

# 2023 INDEX OF U.S. MILITARY STRENGTH

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We are honored to dedicate the 2023 Index of U.S. Military Strength to Senator James M. Inhofe (R–OK)

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Any views presented in or reflecting the results of any prepublication review of this document by an officer or employee of the United States government are rendered in his or her individual capacity and do not necessarily represent the views of the United States government or any agency thereof.

## Acknowledgments

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James Di Pane, Policy Analyst in the Center for National Defense, extended his winning streak in shepherding production of the *2023 Index of U.S. Military Strength*. He worked with everyone involved to make this *Index* a reality, both in print and on the web.

Senior Editor William T. Poole is a force of nature in the world of editing, each year using his ability to maintain a consistent tone, impeccable accuracy, and a fresh approach to conveying essential information throughout this multi-author document to enhance the excellent work produced by our authors. Data Graphics Services Manager John Fleming continued his impressive work in giving visual life to text and statistics to convey a message with maximum impact, working with the authors to explore more creative ways to convey important information. Research Editor and Paper Production Specialist Kathleen Scaturro again used her proofreading skills to ensure a high-quality final product. Graphic Designer Grace DeSandro created the cover image for this year's *Index*. Senior Designer and Web Developer, Research Projects, Jay Simon and Senior Digital Strategist Augusta Cassada Irvine ensured that the presentation of Index materials was tuned

to account for changes in content delivery as our world becomes increasingly digital, portable, and driven by social media, and the guidance and coordination provided by Director of Research Editors Therese Pennefather ensured the creation of a cohesive finished product.

We believe that this *Index* helps to provide a better-informed understanding and wider appreciation of America's ability to "provide for the common defence"—an ability that undergirds The Heritage Foundation's vision of "an America where freedom, opportunity, prosperity, and civil society flourish." The *Index* continues to be cited and referenced across government—by Congress, the executive branch, and officials within the Department of Defense and supporting government agencies—as well as the media, academia, and policy institutes and among the public. We remain encouraged that so many Americans are similarly concerned about the state of affairs in and the multitude of factors affecting our country.

The Heritage Foundation seeks a better life for Americans, and this requires a strong economy, a strong society, and a strong defense. To help measure the state of the economy, Heritage publishes the annual Index of Economic Freedom; to help guide Congress in its constitutional exercise of the power of the purse, Heritage scholars analyze federal spending across all sectors of the economy and put forward recommendations throughout the year that, if implemented, would make Members of Congress better stewards of the taxes paid by all Americans; and to help Americans everywhere more fully understand the state of our defenses, our Kathryn and Shelby Cullom Davis Institute for National Security and Foreign Policy is publishing this ninth annual edition of the *Index of U.S. Military Strength*.

In addition to acknowledging all of those who helped to prepare this edition, very special recognition is due to the Heritage members and donors whose continued support has made this 2023 Index of U.S. Military Strength possible.

Finally, as we do each year, The Heritage Foundation expresses its enduring appreciation to the members of the U.S. armed forces who continue to protect the liberty of the American people in an ever more challenging world.

## Preface

The Russia–Ukraine War of 2022 shocked many from the complacency that suggested conventional war was a thing of the past. Vladimir Putin's invasion of Ukraine has reminded many countries of the global threats that remain and has caused several to begin to rebuild their national defenses. It's a message the U.S. should heed as well.

U.S. foreign policy has tended to oscillate between an overreliance on internationalism to remake the world to America's liking and an urge to isolate ourselves behind our oceans. Neither policy is appropriate for American interests. The American people want—and deserve—a new approach to global leadership: policies that draw lessons from our realist and idealist traditions but apply those lessons narrowly to American interests rather than elite fantasies.

The world is more dangerous today than it has ever been. A strong military and effective strategies to project military strength to friend and foe alike are not luxuries, but necessities.

Times change; human nature does not.

In global affairs, as on street corners, ideals like justice, freedom, and human dignity, however true, are ultimately only as strong as their enforcers. If America is going to remain free, safe, and prosperous, it requires the military power necessary to ensure that its adversaries would never dare to challenge it on the battlefield. The leaders of Russia and China understand this.

In Washington, American "strength" is too often, and lazily, solely measured by military *spending*— as if courage, lethality, technology, and ingenuity were budget line items themselves rather than the byproducts of intelligent budgeting and inspiring leadership.

If the U.S. military is going to regain its preeminence, the Pentagon must act to be both more focused and more efficient. Procurement disasters such as the Littoral Combat Ship, the *Zumwalt*-class

destroyer, and the KC-46 tanker must never happen again. Wasteful spending on unnecessary programs to push the military to go "green" (which will cost \$3 billion in 2023) must be curtailed. Less effort should be placed on critical race theory and diversity, equity, and inclusion programs in favor of increasing readiness.

A strong U.S. military is all the more important because America's existential threat—the People's Republic of China—is expanding its strength and global influence with the cunning of serpents. The Chinese Communist Party has spent the past three decades methodically leveraging Western elites' decadence and compromising American institutions to its own strategic advantage.

China has invested in an arsenal of missiles designed to target U.S. warships, has upgraded its fleet of fighter jets, and is fielding advanced equipment that is rivaling the U.S. military's in quality. U.S. intelligence experts gauge that China has surpassed the U.S. in hypersonic missiles, space systems, and naval shipbuilding. It has initiated a massive increase in its nuclear capabilities. We should remember Vladimir Putin and Ukraine when thinking of China and Taiwan. America's adversaries have shown a willingness to do more than simply invest in capabilities; they have also shown a willingness to use them.

Even if China had no hard military power, its rancid ideological ambitions, demographic urgency, and institutionalized technological aggression would make it our most dangerous adversary. That the Chinese navy is adding the equivalent of *the entire British navy* every year in new warships, is developing missiles designed to target U.S. warships, is upgrading its fleet of fighter jets, and now fields an army 50 percent larger than our own adds an exclamation point to the fact.

This *Index of U.S. Military Strength*, composed by experts who have studied these areas for decades,

provides an unvarnished assessment of the U.S. military. In many cases, the reports are troubling. The U.S. Army is the smallest it has been since 1940. The Air Force is the smallest and oldest it has been since its inception. The Navy is nowhere near its goal of 350 ships and is retiring more ships than it is building.

We need to do not simply *more*, but *better* to check Beijing's ambitions. A strong and modern military is not enough. Congress must finally close the soft-power gap, reclaim information and technological supremacy—and end the high-tech piracy on which China has built its economic and military power. We should deploy economic policy in the

effort too with tariffs, sanctions, economic and institutional disengagement from Chinese agents—and closer ties to Pacific allies.

We are in a new era, against a new enemy, wielding and deflecting new weapons. But the *fight* remains the same: to protect the American people, our interests, and our unique constitutional freedoms from oppressive tyrannies abroad and elite complacency and entitlement here at home. In this fight, as ever, success is not a battle to win, but a choice to make.

Kevin Roberts, PhD, President The Heritage Foundation October 2022

## Introduction

The United States maintains a military force primarily to protect the homeland from attack and to protect its interests abroad. Other uses—assisting civil authorities in times of emergency, for example, and maintaining the perception of combat effectiveness to deter enemies—amplify other elements of national power such as diplomacy or economic initiatives, but America's armed forces exist above all else so that the U.S. can physically impose its will on an enemy and change the conditions of a threatening situation by force or the threat of force.

The Heritage Foundation's *Index of U.S. Military Strength* gauges the ability of America's military to perform its missions in today's world and assesses how the condition of the military has changed during the preceding year. The *Index* is not meant either to predict what the U.S. military might be able to do in the future or to accord it efficacy today based on the promise of new technologies that are in development rather than fielded and proven in use. It is a report to American citizens on the status of the military that they join, that they support, and on which they depend.

The United States prefers to lead through "soft" elements of national power-diplomacy, economic incentives, and cultural exchanges-but soft power cannot ultimately substitute for raw military power. When soft approaches like diplomacy work, their success often owes much to the knowledge of all involved that U.S. "hard power" stands ready, however silently, in the diplomatic background. In similar fashion, countries seek an economic relationship with the United States because of the strength of the U.S. economy and the country's perceived longterm viability and stability. All are predicated on the ability of the U.S. to protect itself, safeguard its interests, and render assistance to its allies, and all depend on a competent, effective, and commensurately sized military.

Soft approaches cost less in manpower and treasure than military action costs and do not carry the same risk of damage and loss of life, but when the United States is confronted by physical threats to its national security interests, it is the hard power of its military that carries the day. In fact, the absence of military power or the perception that one's hard power is insufficient to protect one's interests will frequently—and predictably—invite challenges that soft power is ill-equipped to address. Thus, hard power and soft power are complementary and mutually reinforcing. An insufficiency of either damages the other and ultimately jeopardizes the country's future.

The decline of America's military hard power, historically shown to be critical to defending against major military powers and to sustaining operations over time against lesser powers or in multiple instances simultaneously, is thoroughly documented and quantified in this *Index*. It is harder to quantify the growing threats to the U.S. and its allies that are engendered by the perception of American weakness abroad and doubts about America's resolve to act when its interests are threatened.

The anecdotal evidence is consistent with direct conversations between Heritage scholars and high-level diplomatic and military officials from countries around the world: The aging and shrinking of America's military forces, their reduced presence in key regions since the end of the Cold War, and various distractions created by America's domestic debates have created a perception of American weakness that contributes to destabilization in many parts of the world, prompts old friends to question their reliance on America's assurances, and spurs them to expand their own portfolio of military capabilities. While stronger allies are generally a boon for U.S. security and economic interests, allies that are less tied to U.S. security assurances reflect

the decline of U.S. influence in regional affairs. For decades, the perception of American strength and resolve has helped to deter adventurous bad actors and tyrannical dictators and has underwritten a vast network of U.S. allies and partners. Regrettably, both that perception and, as a consequence, its deterrent and reassuring effects are eroding.

Recognition of this problem is growing in the U.S. and was forcefully addressed in the 2018 National Defense Strategy (NDS), which called for a renewal of America's military power. However, spending on defense must be commensurate with the interests that the defense establishment is called upon to protect, and there continues to be a significant—even growing— gap between the two. Meanwhile, America's allies, with a few notable exceptions, continue to underinvest in their military forces, and the United States' chief competitors are hard at work improving their own. The result is an increasingly dangerous world threatening a weaker America.

This can seem odd to many observers because U.S. forces have dominated the battlefield in tactical engagements with enemy forces over the past 30 years. Not surprisingly, the forces built to battle those of the Soviet Union have handily defeated the forces of Third World dictators and terrorist organizations. These military successes, however, are quite different from lasting political successes and have masked the deteriorating condition of America's military, which has been able to undertake such operations only by "cashing in" on investments made in the 1980s and 1990s. Unseen by the American public, the consumption of our military readiness has not been matched by corresponding investments in replacements for the equipment, resources, and capacity used up since September 11, 2001, in places like Iraq, Afghanistan, and Syria.

It is therefore critical that we understand the condition of the United States military with respect to America's vital national security interests, the threats to those interests, and the context within which the U.S. might have to use hard power. It is likewise important to know how these three areas—operating environments, threats, and the posture of the U.S. military—change over time, given that such changes can have substantial implications for defense policies and investments.

The U.S. Constitution opens with a beautiful passage in which "We the People" state that among their handful of purposes in establishing the Constitution

was to "provide for the common defence." The Constitution's enumeration of limited powers for the federal government includes the powers of Congress "To declare War," "To raise and support Armies," "To provide and maintain a Navy," "To provide for calling forth the Militia," and "To provide for organizing, arming, and disciplining, the Militia" and the power of the President as "Commander in Chief of the Army and Navy of the United States, and of the Militia of the several States, when called into the actual Service of the United States."

With such constitutional priority given to defense of the nation and its vital interests, one might expect the federal government to produce a standardized, consistent reference work on the state of the nation's security. Yet no such single volume exists, especially in the public domain, to allow comparisons from year to year. In the past half-dozen years, the Department of Defense has moved to restrict reporting of force readiness even further. Thus, the American people and even the government itself are prevented from understanding whether investments in defense are achieving their desired results.

What America needs is a publicly accessible reference document that uses a consistent, methodical, and repeatable approach to assessing defense requirements and capabilities. The Heritage Foundation's *Index of U.S. Military Strength*, an annual assessment of the state of America's hard power, fills this void, addressing both the geographical and functional environments that are relevant to the United States' vital national interests and the threats that rise to a level that puts or has the strong potential to put those interests at risk.

Any assessment of the adequacy of military power requires two primary reference points: a clear statement of U.S. vital security interests and an objective requirement for the military's capacity for operations that serves as a benchmark against which to measure current capacity. Top-level national security documents issued by a long string of presidential Administrations have consistently made clear that three interests are central to any assessment of national military power:

- Defense of the homeland;
- Successful conclusion of a major war that has the potential to destabilize a region of critical interest to the U.S.; and

 Preservation of freedom of movement within the global commons: the sea, air, outer space, and cyberspace domains through which the nations of the world conduct their business.

Every President has recognized that protecting America from attack is one of the U.S. military's fundamental reasons for being. Going to war has always been controversial, but the decision to do so has been based consistently on the conclusion that one or more vital U.S. interests were at stake.

This *Index* embraces the requirement that the U.S. military should be able to handle two major wars or two major regional contingencies (MRCs) successfully at the same time or in closely overlapping time frames as the most compelling rationale for sizing U.S. military forces. The basic argument is this: The nation should have the ability to engage and defeat one opponent and still have the ability to guard against competitor opportunism: that is, to prevent someone from exploiting the perceived opportunity to move against U.S. interests while America is engaged elsewhere.

The *Index* is descriptive, not prescriptive: It reviews the current condition of its subjects within the assessed year and describes how conditions have changed during the previous year, informed by the baseline condition established by the inaugural *2015 Index*. In short, the *Index* answers the question, "Have conditions improved or worsened during the assessed year?"

This study also assesses the U.S. military against the two-war benchmark and various metrics that are explained further in the military capabilities section. Importantly, the *Index* measures the hard power needed to win conventional wars rather than the general utility of the military relative to the breadth of tasks it might be (and usually is) assigned in order to advance U.S. interests short of war.

The authors acknowledge that advances in technology can translate into new military capabilities. New tools, platforms, and weapons tend to prompt some observers to assume that older capabilities can be replaced easily with new ones, often in reduced numbers, or that the current force will be transformed in ways that make it decisively better than that of an opponent. Typically missing in the most optimistic assessments of what the military might then be able to do is a corresponding recognition that competitors quickly adopt similar technological

advances in their own militaries or that the new capability might not be as effective as we believed during its development. The current war in Ukraine offers compelling evidence of this. Although new technologies—unmanned aerial vehicles, anti-armor guided munitions, cyberwarfare—are on display in abundance, "old school" weaponry like artillery, rockets, and automatic weapons have proven to be devastatingly effective.

The historical record of war shows repeatedly that new technologies convey temporary advantages: The force that wins is usually the one that is best able to sustain operations over time, replace combat losses with fresh forces and equipment, and use its capabilities in novel ways that account for the enemy, terrain, time, and achievable objectives. This reality has led the authors to return consistently to an appreciation of the force's capacity, the modernity of its capabilities, and its readiness for close combat with an equally capable and competent enemy. Consequently, this *Index* continues to emphasize the importance of the two-war force sizing benchmark and the need to ensure that the current force is ready for war and materially capable of winning in hard combat.

# Assessing the World and the Need for Hard Power

The assessment portion of the *Index* is composed of three major sections that address the aforementioned areas of primary interest: the operating environments within or through which America's military must be employed, threats to U.S. vital national interests, and the U.S. military services themselves. For each of these areas, the *Index* provides context, explaining why a given topic is addressed and how it relates to understanding the nature of America's hard-power requirements.

The authors of this study used a five-category scoring system that ranges from "very poor" to "excellent" or "very weak" to "very strong" as appropriate to each topic. This approach was selected as the best way to capture meaningful gradations while avoiding the appearance that a high level of precision was possible given the nature of the issues and the information that was publicly available.

Some factors are quantitative and lend themselves to discrete measurement; others are very qualitative in nature and can be assessed only through an informed understanding of the material that leads to an informed judgment.

By themselves, purely quantitative measures tell only part of the story when it comes to the relevance, utility, and effectiveness of hard power. Using only quantitative metrics to assess military power or the nature of an operating environment can lead to misinformed conclusions. For example, the mere existence of a large fleet of very modern tanks has little to do with the effectiveness of the armored force in actual battle if the employment concept is irrelevant to modern armored warfare. (Imagine, for example, a battle in rugged mountains.) Also, experience and demonstrated proficiency are often so decisive in war that numerically smaller or qualitatively inferior but well-trained and experienced forces can defeat a larger or qualitatively superior adversary that is inept or poorly led. Again, the differing performance of Russian and Ukrainian troops is illuminating, and countries like China are taking note.

The world is still very much a qualitative place, however digital and quantitative it has become thanks to the explosion of advanced technologies, and judgments have to be made in the absence of certainty. We strive to be as objective and evenhanded as possible in our approach and as transparent as possible in our methodology and sources of information so that readers can understand why we reached the conclusions we reached—and perhaps reach their own as well. The result will be a more informed debate about what the United States needs in terms of military capabilities to deal with the world as it is. A detailed discussion of scoring is provided in each assessment section.

In our assessment, we begin with the operating environment because it provides the geostrategic stage upon which the U.S. attends to its interests:

- The various states that would play significant roles in any regional contingency;
- The terrain that enables or restricts military operations; the infrastructure—ports, airfields, roads, and rail networks (or lack thereof)—on which U.S. forces would depend; and
- The types of its linkages and relationships with a region and major actors within it that cause the U.S. to have interests in the area or that facilitate effective operations.

Major actors within each region are identified, described, and assessed in terms of alliances, political stability, the presence of U.S. military forces and relationships, and the maturity of critical infrastructure.

Our assessment focuses on three key regions—Europe, the Middle East, and Asia—because of their importance relative to U.S. vital security, economic, and diplomatic interests. This does *not* mean that we view Latin America and Africa as unimportant. It means only that the security challenges within these regions do not currently rise to the level of direct threats to America's vital interests as we have defined them. We addressed their condition in the *2015 Index* and will provide updated assessments when circumstances make such reassessments necessary.

Next is a discussion of threats to U.S. vital interests. Here we identify the countries and non-state actors that pose the greatest current or potential threats to U.S. vital interests based on two overarching factors: behavior and capability. We accept the classic definition of "threat" as a combination of intent and capability, but while capability has attributes that can be quantified, intent is difficult to measure. We concluded that "observed behavior" serves as a reasonable surrogate for intent because it is the clearest manifestation of intent.

We based our selection of threat countries and non-state actors on their historical behavior and explicit policies or formal statements vis-à-vis U.S. interests, scoring them in two areas: the degree of provocative behavior that they exhibited during the year and their ability to pose a credible threat to U.S. interests regardless of intent. For example, a state full of bluster but with only a moderate ability to act accordingly poses a lesser threat, and a state that has great capabilities and a record of bellicose behavior that is opposed to U.S. interests still warrants attention even if it is relatively quiet in a given year. The combination of behavior and ability to pose a credible threat eliminates most smaller terrorist, insurgent, and criminal groups and many problematic states because they do not have the ability to challenge America's vital national interests successfully.

Finally, we address the status of U.S. military power in three areas: capability (or modernity), capacity, and readiness. To do this, we must answer four questions:

- Do U.S. forces possess operational capabilities that are relevant to modern warfare?
- Can they defeat the military forces of an opposing country?
- Do they have a sufficient amount of such capabilities?
- Is the force sufficiently trained to win in combat, and is its equipment materially ready?

All of these are fundamental to success even if they are not de facto determinants of success (something we explain further in the section). We also address the condition of the U.S. nuclear weapons capability, assessing it in areas that are unique to this military component and critical to understanding its real-world viability and effectiveness as a strategic deterrent, and provide a descriptive overview of current U.S. ballistic missile defense capabilities and challenges.

The *Index* does not assess ("score") U.S. cyber and ballistic missile defense capabilities. There are as yet no viable metrics by which to measure the capacity, capability, or readiness of these elements of national defense, their constituent service components, and elements of the government that contribute to activities in these domains, and it is not yet clear how one would assess their roles in measuring "hard combat power," which is the focus of this publication. However, we do provide overviews of each functional capability, explaining to the reader the capability as it is currently constituted and aspects of its function and contribution.

#### **Topical Essays**

Each edition of the *Index* provides the opportunity to share with readers authoritative insights into issues that affect U.S. military power. Past editions have included essays on logistics, alliances, experimentation, the spectrum of conflict and the domains in which forces operate, and special operations forces, among many others. There is a lot of shaft that makes the pointy end of a spear effective, and we endeavor to explain what this means with these essays.

In this edition, we are pleased to share the work of authors who address recruiting, the complexity of military program costs, and a recently announced agreement between the U.S., the United Kingdom, and Australia involving naval power.

- Contributing from "down under," Peter Jennings writes from Australia to explain why the recently signed agreement involving Australia, the U.K., and the U.S. (AUKUS) is so important to their mutual security interests. The U.S. and U.K. have agreed to help Australia develop a nuclear-powered submarine capability. In "AUKUS: New Opportunities for the United States and Its Closest Allies," Jennings provides context essential to understanding why this is a big deal.
- In fiscal year 2022, the military services are struggling to recruit a sufficient number of young Americans to fill the ranks. There are many reasons why this is the case, and there are substantial consequences for America's military power should the services continue to fall short in their efforts. In his essay, "New Approaches for a New Era in Recruiting the All Volunteer Force," Richard Brady draws on his extensive experience in the field to explain the various factors, systems, and processes involved and to offer recommendations that, if implemented, could help to improve such efforts.
- John Ferrari concludes with "Determining the Real Cost of the Tools of War," a superb explanation of why the defense budget is so hard to understand. On the surface, a request for funding to purchase an airplane might appear simple. However, as one gets into the wicked details, the multitude of confusing terms, tricky definitions, and different ways to treat "cost" can easily mislead any but the most expert analyst to an incorrect understanding of what the defense budget actually buys.

# Scoring U.S. Military Strength Relative to Vital National Interests

The purpose of this *Index* is to make the national debate about defense capabilities better informed by assessing the U.S. military's ability to defend against current threats to U.S. vital national interests within the context of the world as it is. Each of the elements considered—the stability of regions and access to them by America's military forces; the various threats as they improve or lose capabilities and change their behavior; and the United States' armed forces themselves as they adjust to evolving

fiscal realities and attempt to balance readiness, capacity (size and quantity), and capability (how modern they are) in ways that enable them to carry out their assigned missions successfully—can change from year to year.

Each region of the world has its own set of characteristics that include terrain; man-made infrastructure (roads, rail lines, ports, airfields, power grids, etc.); and states with which the United States has relationships. In each case, these factors combine to create an environment that is either favorable or problematic when it comes to the ability of U.S. forces to operate against threats in the region.

Various states and non-state actors within these regions possess the ability to threaten—and have consistently behaved in ways that do threaten—America's interests. Fortunately for the U.S., these major threat actors are few in number and continue to be confined to three regions—Europe, the Middle East, and Asia—thus enabling the U.S. (if it will do so) to focus its resources and efforts accordingly. Unfortunately, however, when one of these major threat actors does something outrageous like Russia's invasion of Ukraine, the damage is not confined to the immediate region.

Our globally interconnected world means that local wars have global consequences that lead to severe economic, diplomatic, and security problems for the U.S., its allies, and its trading partners. Russia's assault on Ukraine has sent shocks throughout energy and food markets, causing severe shortages and spikes in costs for nearly every country. One can only imagine the catastrophe that would result if China decided to seize Taiwan or use force to take control of disputed islands or if Iran's acquisition of a nuclear weapons capability prompted Israel to use force to protect itself. The question that looms large in any of these scenarios is both simple and fundamental: Is the U.S. military up to the task of defending America's interests?

To that point, America's military services are beset by aging equipment, shrinking numbers, rising costs, and problematic funding. These four elements interact in ways that are difficult to measure in concrete terms and impossible to forecast with any certainty. Nevertheless, the exercise of describing them and characterizing their general condition is worthwhile because it informs debates about defense policies and the allocation of resources that are necessary if the U.S. military is to carry out its assigned

duties. Further, as seen in this 2023 Index, noting how conditions have changed during the preceding year helps to shed light on the effects that policies, decisions, and actions have on security affairs that involve the interests of the United States, its allies and friends, and its enemies.

It should be borne in mind that each annual *Index* assesses conditions as they are for the assessed year. This *2023 Index of U.S. Military Strength* describes changes that occurred during the preceding year with updates current as of early September 2022.

Assessments for global operating environment, threats to vital U.S. interests, and U.S. military power are shown in the Executive Summary. Factors that would push things toward "bad" (the left side of the scale) tend to move more quickly than those that improve one's situation, especially when it comes to the material condition of the U.S. military. Munitions can be expended in seconds, and an airplane or a tank can be lost in an instant. Replacing either takes months or years. Similarly, wars unfold at a breakneck pace and can last weeks, months, or years, but their aftermath can extend decades into the future, changing the geopolitical and global economic landscapes in ways that cannot be undone.

Of the three areas measured—global operating environment, threats to vital U.S. interests, and U.S. military power—the U.S. can directly control only one: its own military. The condition of the U.S. military can influence the other two because a weakened America arguably emboldens challenges to its interests and loses potential allies, but a militarily strong America deters opportunism and draws partners to its side from across the globe.

#### Conclusion

During the decades since the end of the Second World War, the United States has underwritten and taken the lead in maintaining a global order that has benefited more people in more ways than at any other period in history. Now, however, that American-led order is arguably under the greatest stress since its founding, and some wonder whether it will break apart entirely as fiscal and economic burdens (exacerbated by the costs incurred in dealing with the COVID-19 pandemic and the disruptions caused by the Russia–Ukraine War) plague nations, violent extremist ideologies threaten the stability of entire regions, state and non-state opportunists seek to exploit upheavals, and major states

compete to establish dominant positions in their respective regions.

America's leadership role remains in question, and its security interests are under substantial pressure. Challenges continue to grow, long-standing allies are not what they once were, and the U.S. is increasingly bedeviled by debt and domestic discord that constrain its ability to sustain its forces at a level that is commensurate with its interests.

Informed deliberations on the status of America's military power are therefore desperately needed. It is our hope, as always, that the *Index of U.S. Military Strength* will help to facilitate those deliberations.

# **Executive Summary**

"As currently postured, the U.S. military is at growing risk of not being able to meet the demands of defending America's vital national interests. It is rated as weak relative to the force needed to defend national interests on a global stage against actual challenges in the world as it is rather than as we wish it were. This is the logical consequence of years of sustained use, underfunding, poorly defined priorities, wildly shifting security policies, exceedingly poor discipline in program execution, and a profound lack of seriousness across the national security establishment even as threats to U.S. interests have surged."

The United States maintains a military force to protect the homeland from attack and to protect its interests abroad. There are other uses, of course—for example, to assist civil authorities in times of emergency or to deter enemies—but this force's primary purpose historically has been to make it possible for the U.S. to physically impose its will on an enemy when necessary.

It is therefore critical that the American people understand the condition of the United States military with respect to America's vital national security interests, threats to those interests, and the context within which the U.S. might have to use "hard power" to protect those interests. Because changes can have substantial implications for defense policies and investment, knowing how these three areas change over time is likewise important. Of the three, the condition of the military is the most important to understand because it is the only one over which the U.S. has complete control, and it underwrites the ability of all other aspects of national power to flourish or fail.

Each year, The Heritage Foundation's *Index of U.S. Military Strength* employs a standardized, consistent set of criteria, accessible both to government

officials and to the American public, to gauge the U.S. military's ability to perform its missions in today's world. The inaugural 2015 edition established a baseline assessment on which each annual edition builds, one that both assesses the state of affairs for its respective year and measures how key factors have changed during the preceding year.

The *Index* is not an assessment of what *might* be, although the trends that it captures may well imply both concerns and opportunities that can guide decisions that are germane to America's security. Rather, the *Index* should be seen as a report card for how well or poorly conditions, countries, and the U.S. military have evolved during the assessed year. The past cannot be changed, but it can inform, just as the future cannot be predicted but can be shaped.

#### What the Index Assesses

The *Index of U.S. Military Strength* assesses the ease or difficulty of operating in key regions based on existing alliances, regional political stability, the presence of U.S. military forces, and the condition of key infrastructure. Threats are assessed based on the behavior and physical capabilities of actors that pose challenges to vital U.S. national interests. The condition of America's military power is measured in terms of its capability or modernity, capacity for operations, and readiness to handle assigned missions. This framework provides a single-source reference for policymakers and other Americans who seek to know whether our military is up to the task of defending our national interests.

Any discussion of the aggregate capacity and breadth of the military power needed to protect U.S. security interests requires a clear understanding of precisely what interests must be defended. Three vital interests have been specified consistently (albeit in varying language) by a string of Administrations over the past few decades:

- **Defense** of the homeland;
- Successful conclusion of a major war that has the potential to destabilize a region of critical interest to the U.S.; and
- Preservation of freedom of movement within the global commons (the sea, air, outer space, and cyberspace domains) through which the world conducts its business.

To defend these interests effectively on a global scale, the United States needs a military force of sufficient size: what is known in the Pentagon as capacity. The many factors involved make determining how big the military should be a complex exercise, but successive Administrations, Congresses, Department of Defense staffs, and independent commissions have managed to arrive at a surprisingly consistent force-sizing rationale: an ability to handle two major conflicts simultaneously or in closely overlapping time frames.

At its root, the current National Defense Strategy (NDS) implies the same force requirement. Its emphasis on a return to long-term competition with major powers, explicitly naming Russia and China as primary competitors, reemphasizes the need for the United States to have:

- Sufficient military capacity to deter or win against large conventional powers in geographically distant regions,
- The ability to conduct sustained operations against lesser threats, and
- The ability to work with allies and maintain a U.S. presence in regions of key importance that is sufficient to deter behavior that threatens U.S. interests.

No matter how much America desires that the world be a simpler, less threatening place that is more inclined to beneficial economic interactions than violence-laden friction, the patterns of history show that competing powers consistently emerge and that the U.S. must be able to defend its interests in more than one region at a time. Russia's invasion of Ukraine, China's dramatic expansion of its military and its provocative behavior far beyond the

Indo-Pacific region, North Korea's intransigence with respect to even discussing its nuclear capabilities, and Iran's dogged pursuit of a nuclear weapon capability and sustained support for terrorist groups illustrate this point. Consequently, this *Index* embraces the two-war or two-contingency requirement.

Since its founding, the U.S. has been involved in a major "hot" war every 15–20 years. Since World War II, the U.S. has also maintained substantial combat forces in Europe and other regions while simultaneously fighting major wars as circumstances demanded. The size of the total force roughly approximated the two-contingency model, which has the inherent ability to meet multiple security obligations to which the U.S. has committed itself while also modernizing, training, educating, and maintaining the force. Accordingly, our assessment of the adequacy of today's U.S. military is based on the ability of America's armed forces to engage and defeat two major competitors at roughly the same time.

We acknowledge that without a dramatic change in circumstances such as the onset of a major conflict, a multitude of competing interests that evolve during extended periods of peace and prosperity will cause Administrations and Congresses to favor spending on domestic programs rather than investing in defense. Extended peace leads to complacency, which can lead to distraction and less willingness to invest in defense. The result: a weakened military, competitors that are emboldened, and a nation at risk. Consequently, winning the support needed to increase defense spending to the level that a force with a two-war capacity requires is admittedly difficult politically. But this does not change the patterns of history, the behavior of competitors, or the reality of what it takes to defend America's interests in an actual war.

This *Index*'s benchmark for a two-war force is derived from a review of the forces used for each major war that the U.S. has undertaken since World War II and the major defense studies completed by the federal government over the past 30 years. We concluded that a standing (Active Component) two-war-capable force would consist of:

- **Army:** 50 brigade combat teams (BCTs);
- **Navy:** 400 battle force ships and 624 strike aircraft;
- Air Force: 1,200 fighter/ground-attack aircraft;

- Marine Corps: 30 battalions; and
- **Space Force:** metric not yet established.

This recommended force does not account for homeland defense missions that would accompany a period of major conflict and are generally handled by Reserve and National Guard forces. Nor does it constitute the totality of the Joint Force, which includes the array of supporting and combat-enabling functions that are essential to the conduct of any military operation: logistics; transportation (land, sea, and air); health services; communications and data handling; and force generation (recruiting, training, and education) to name only a few. Rather, these are combat forces that are the most recognizable elements of America's hard power but that also can be viewed as surrogate measures for the size and capability of the larger Joint Force.

#### The Global Operating Environment

The United States is a global power with global security interests, and its military must be able to protect those interests anywhere they are threatened. While this may occur in any region, three regions—Europe, the Middle East, and Asia—stand apart because of the scale and scope of U.S. interests associated with them and the significance of competitors that are able to pose commensurately large threats. Aggregating the three regional scores provides a global operating environment score of **FAVORABLE** in the *2023 Index*.

**Europe.** Overall, the European region remains stable, mature, and friendly to U.S. military operational requirements. Russia remains the preeminent military threat to the region, both conventionally and unconventionally, and its invasion of Ukraine marks a serious escalation in its efforts to exert influence on its periphery. China continues to have a significant presence in Europe and, by mitigating sanctions, has been a key enabler of the Russian government's ability to conduct the war in Ukraine.

The past year saw continued U.S. reengagement with the continent along with increases in European allies' defense budgets and capability investment spurred by alarm over Russia's invasion of Ukraine and related threats to countries that are supporting Ukraine's defense.

It is difficult to predict whether NATO's renewed emphasis on collective defense and its reinvigorated defense spending will continue in the long term or whether this is a short-term response to Russia's invasion. We hope for the former but must plan against the latter.

For Europe, scores this year remained steady, as they did in 2021 (assessed in the 2022 Index), with no substantial changes in any individual categories or average scores. The 2023 Index again assesses the European operating environment as "favorable."

The Middle East. The Middle East region is now highly unstable, both because its authoritarian regimes have eroded and because it continues to serve as a breeding ground for terrorism. Overall, regional security has continued to deteriorate. Although Iraq has restored its territorial integrity since the defeat of ISIS, the political situation and future relations between Baghdad and the United States will remain difficult as long as a government that is sympathetic to Iran is in power. U.S. relations in the region will remain complex, but this has not stopped the U.S. military from operating as needed.

The region's primary challenges—continued meddling by Iran and surging transnational terrorism—are made more difficult by Sunni–Shia sectarian divides, the more aggressive nature of Iran's Islamist revolutionary nationalism and its open pursuit of nuclear weapon capabilities, and the proliferation of Sunni Islamist revolutionary groups.

In the Middle East, the U.S. benefits from operationally proven procedures that leverage bases, infrastructure, and the logistical processes needed to maintain a large force forward deployed thousands of miles away from the homeland. The personal links between allied armed forces are also present, and joint training exercises improve interoperability and give the U.S. an opportunity to influence some of the region's future leaders.

America's relationships in the region are pragmatic, based on shared security and economic concerns. As long as these issues remain relevant to both sides, the U.S. is likely to have an open door to operate in the Middle East when its national interests require that it do so.

Although circumstances in all measured areas vary throughout the year, in general terms, the 2023 Index assesses the Middle East operating environment as "moderate," but the region's political stability continues to be "unfavorable" and will remain a dark cloud over everything else.

## **Global Operating Environment: Summary**

VERY POOR UN	NFAVORABLE	MODERATE	FAVORABLE	EXCELLENT
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## **Operating Environment: Europe**

	VERY POOR	UNFAVORABLE	MODERATE	FAVORABLE	EXCELLENT
Alliances					<b>~</b>
Political Stability				✓	
U.S. Military Posture				<b>~</b>	
Infrastructure				<b>~</b>	
OVERALL				✓	

## **Operating Environment: Middle East**

	VERY POOR	UNFAVORABLE	MODERATE	FAVORABLE	EXCELLENT
Alliances			✓		
Political Stability		✓			
U.S. Military Posture			✓		
Infrastructure			✓		
OVERALL			✓		

## **Operating Environment: Asia**

	VERY POOR	UNFAVORABLE	MODERATE	FAVORABLE	EXCELLENT
Alliances				<b>~</b>	
Political Stability			<b>✓</b>		
U.S. Military Posture				✓	
Infrastructure				✓	
OVERALL				✓	

### **Global Operating Environment**

	VERY POOR	UNFAVORABLE	MODERATE	FAVORABLE	EXCELLENT
Europe				<b>~</b>	
Middle East			✓		
Asia				✓	
OVERALL				✓	

**Asia.** The Asian strategic environment includes half of the globe and is characterized by a variety of political relationships among states with wildly varying capabilities. This makes Asia far different from Europe, which in turn makes America's relations with the region different from its relations with Europe. American conceptions of Asia must recognize the physical limitations imposed by the tyranny of distance and the need to move forces as necessary to respond to challenges from China and North Korea.

The complicated nature of intra-Asian relations and the lack of an integrated, regional security architecture along the lines of NATO make defense of U.S. security interests more challenging than many Americans appreciate. However, the U.S. has strong relations with allies in the region, and their willingness to host bases helps to offset the vast distances that must be covered.

The militaries of Japan and the Republic of Korea are larger and more capable than European militaries, and both countries are becoming more interested in developing missile defense capabilities that will be essential in combatting the regional threat posed by North Korea. In Japan, the growing public awareness of the need to adopt a more "normal" posture militarily in response to China's increasingly aggressive actions indicates a break with the pacifist tradition among the Japanese since the end of World War II. This could lead to improved military capabilities and the prospect of joining the U.S. in defense measures beyond the immediate vicinity of Japan.

We continue to assess the Asia region as "favorable" to U.S. interests in terms of alliances, overall political stability, militarily relevant infrastructure, and the presence of U.S. military forces.

Summarizing the condition of each region enables us to get a sense of how they compare in terms of the difficulty that would be involved in projecting U.S. military power and sustaining combat operations in each one. As a whole, the global operating environment maintains a score of "favorable," which means that the United States should be able to project military power anywhere in the world to defend its interests without substantial opposition or high levels of risk other than those imposed by a capable enemy.

#### Threats to U.S. Interests

America faces challenges to its security at home and interests abroad from countries and organizations that have:

- Interests that conflict with those of the United States;
- Sometimes hostile intentions toward the U.S.; and
- In some cases, growing military capabilities that are leveraged to impose an adversary's will by coercion or intimidation of neighboring countries, thereby creating regional instabilities.

The government of the United States constantly faces the challenge of employing the right mix of diplomatic, economic, public information, intelligence, and military capabilities to protect and advance its interests. Because this *Index* focuses on the military component of national power, its assessment of threats is correspondingly an assessment of the military or physical threat posed by each entity addressed in this section.

Russia remains the primary threat to American interests in Europe as well as the most pressing threat to the United States. Its invasion of Ukraine reintroduced conventional war to Europe. It also is the largest conflict on that continent since the end of the Second World War, and its many economic and security repercussions are felt across the globe. Moscow also remains committed to massive pro-Russia propaganda campaigns in other Eastern European countries as well as disruptive activities around its periphery and across the Middle East.

The 2023 Index again assesses the threat emanating from Russia as "aggressive" in its behavior and "formidable" (the highest category on the scale) in its growing capabilities. Though Russia is consuming its inventory of munitions, supplies, equipment, and even military personnel in its war against Ukraine, it is also replacing those items and people. Unlike Ukraine's, Russia's industrial capacity remains untouched by the war, and will allow Moscow to replace older equipment lost in the conflict with newly manufactured items. Russia's military is also gaining valuable combat experience. Consequently, the war may actually serve to increase the challenge that Russia poses to U.S. interests on the continent.

**China**, the most comprehensive threat the U.S. faces, remained "aggressive" in the scope of its provocative behavior and earns the score of

#### Threats to U.S. Vital Interests: Summary

SEVERE	HIGH	ELEVATED	GUARDED	LOW
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#### **Behavior of Threats**

	HOSTILE	AGGRESSIVE	TESTING	ASSERTIVE	BENIGN
China		<b>✓</b>			
Russia		✓			
Iran		✓			
North Korea			✓		
Non-State Actors		✓			
OVERALL		<b>✓</b>			

### **Capability of Threats**

	FORMIDABLE	GATHERING	CAPABLE	ASPIRATIONAL	MARGINAL
China	✓				
Russia	✓				
Iran		✓			
North Korea		✓			
Non-State Actors			<b>~</b>		
OVERALL		<b>~</b>			

#### Threats to U.S. Vital Interests

	SEVERE	HIGH	ELEVATED	GUARDED	LOW
China		✓			
Russia		✓			
Iran		✓			
North Korea		✓			
Non-State Actors		✓			
OVERALL		✓			

"formidable" for its capability because of its continued investment in the modernization and expansion of its military and the particular attention it has paid to its space, cyber, and artificial intelligence capabilities. The People's Liberation Army continues

to extend its reach and military activity beyond its immediate region and engages in larger and more comprehensive exercises, including live-fire exercises in the East China Sea near Taiwan and aggressive naval and air patrols in the South China Sea.

China also continues to conduct probes of the South Korean and Japanese air defense identification zones, drawing rebukes from both Seoul and Tokyo, and its statements about Taiwan and exercise of military capabilities in the air and sea around the island have been increasingly belligerent. China is taking note of the war in Ukraine and U.S. military developments and has been adjusting its own posture, training, and investments accordingly.

Iran represents by far the most significant security challenge to the United States, its allies, and its interests in the greater Middle East. Its open hostility to the United States and Israel, sponsorship of terrorist groups like Hezbollah, and history of threatening the commons underscore the problem it could pose. Today, Iran's provocations are of primary concern to the region and America's allies, friends, and assets there. Iran relies heavily on irregular (to include political) warfare against others in the region and fields more ballistic missiles than any of its neighbors.

Iran's development of ballistic missiles and its potential nuclear capability also make it a long-term threat to the security of the U.S. homeland. In addition, Iran has continued its aggressive efforts to shape the domestic political landscape in Iraq, adding to the region's general instability. The 2023 Index extends the 2022 Index's assessment of Iran's behavior as "aggressive" and its capability as "gathering."

North Korea's military poses a security challenge for American allies South Korea and Japan, as well as for U.S. bases in those countries and on the island territory of Guam. North Korean officials are belligerent toward the United States, often issuing military and diplomatic threats. Pyongyang also has engaged in a range of provocative behavior that includes nuclear and missile tests and tactical-level attacks on South Korea. It has used its missile and nuclear tests to enhance its prestige and importance domestically, regionally, and globally and to extract various concessions from the U.S. in negotiations on its nuclear program and various aid packages.

Such developments also improve North Korea's military posture. U.S. and allied intelligence agencies assess that Pyongyang has already achieved nuclear warhead miniaturization, the ability to place nuclear weapons on its medium-range missiles, and the ability to reach the continental United States with a missile. North Korea also uses cyber warfare as a means of guerilla warfare against its adversaries

and international financial institutions. This *Index* therefore assesses the overall threat from North Korea, considering the range of contingencies, as "testing" for level of provocation of behavior and "gathering" for level of capability.

A broad array of terrorist groups remain the most hostile of any of the threats to America examined in the *Index*. The primary terrorist groups of concern to the U.S. homeland and to Americans abroad are the Islamic State of Iraq and al-Sham (ISIS) and al-Qaeda. Al-Qaeda and its branches remain active and effective in Syria, Yemen, Iraq, and the Sahel of Northern Africa. Though no longer a territory-holding entity, ISIS also remains a serious presence in the Middle East, in South and Southeast Asia, and throughout Africa, threatening stability as it seeks to overthrow governments and impose an extreme form of Islamic law. Its ideology continues to inspire attacks against Americans and U.S. interests. Fortunately, Middle East terrorist groups remain the least capable threats facing the U.S., but they cannot be dismissed.

Just as there are American interests that are not covered by this *Index*, there may be additional threats to American interests that are not identified here. This *Index* focuses on the more apparent sources of risk and those that appear to pose the greatest threat.

Compiling the assessments of these threat sources, the *2023 Index* again rates the overall global threat environment as "aggressive" and "gathering" in the areas of threat actor behavior and material ability to harm U.S. security interests, respectively, leading to an aggregated threat score of "high."

#### The Status of U.S. Military Power

Finally, we assessed the military power of the United States in three areas: capability, capacity, and readiness. We approached this assessment service by service as the clearest way to link military force size; modernization programs; unit readiness; and (in general terms) the functional combat power (land, sea, air, and space) that each service represents.

We treated the United States' nuclear capability as a separate entity because of its truly unique characteristics and constituent elements, from the weapons themselves to the supporting infrastructure that is fundamentally different from the infrastructure that supports conventional capabilities. While not fully assessing cyber as we do the Army, Navy, Air

Force, Marine Corps, and Space Force, we acknowledge the importance of new tools and organizations that have become essential to deterring hostile behavior and winning wars.

These three areas of assessment (capability, capacity, and readiness) are central to the overarching questions of whether the U.S. has a sufficient quantity of appropriately modern military power and whether military units are able to conduct military operations on demand and effectively.

As reported in all previous editions of the *Index*, the common theme across the services and the U.S. nuclear enterprise is one of force degradation caused by many years of underinvestment, poor execution of modernization programs, and the negative effects of budget sequestration (cuts in funding) on readiness and capacity in spite of repeated efforts by Congress to provide relief from low budget ceilings imposed by the Budget Control Act of 2011. The services have undertaken efforts to reorient from irregular warfare to large-scale combat against a peer adversary, but such shifts take time and even more resources.

Because of the rising costs of fuel, munitions, and repair parts and the lack of qualified maintainers and maintenance facilities, much of the progress in regaining readiness that had been made in 2020 and 2021 has been lost in 2022. The forecast for 2023 is likewise gloomy given a proposed defense budget for FY 2023 that will not be sufficient to keep pace with ongoing and dramatic increases in inflation.

Experience in warfare is ephemeral and context-sensitive. Valuable combat experience is lost as servicemembers who individually gained experience leave the force, and it retains direct relevance only for future operations of a similar type: Counterinsurgency and adviser support operations in Iraq, for example, gained over the past two decades are fundamentally different from major conventional operations against a state like Iran or China.

Although portions of the current Joint Force are experienced in some types of operations, the force as a whole lacks experience with high-end, major combat operations of the sort being seen in Ukraine and toward which the U.S. military services have only recently begun to redirect their training and planning. Additionally, the force is still aged and shrinking in its capacity for operations even if limited quantities of new equipment like the F-35 Lightning II fighter are being introduced.

We characterized the services and the nuclear enterprise on a five-category scale ranging from "very weak" to "very strong," benchmarked against criteria elaborated in the full report. These characterizations should not be construed as reflecting either the competence of individual servicemembers or the professionalism of the services or Joint Force as a whole; nor do they speak to the U.S. military's strength relative to the strength of other militaries around the world in direct comparison. Rather, they are assessments of the institutional, programmatic, and material health or viability of America's hard military power benchmarked against historical instances of use in large-scale, conventional operations and current assessments of force levels likely needed to defend U.S. interests against major enemies in contemporary or near-future combat operations.

Our analysis concluded with these assessments:

- **Army as "Marginal."** The Army's score remains "marginal" in the 2023 Index, and significant challenges that have arisen during the year call into question whether it will improve its status in the year ahead. Though the Army has sustained its commitment to modernizing its forces for great-power competition, its modernization programs are still in their development phase, and it will be a few years before they are ready for acquisition and fielding. In other words, the Army is aging faster than it is modernizing. It remains "weak" in capacity with only 62 percent of the force it should have. However, 25 of its 31 Regular Army BCTs are at the highest state of readiness, thus earning a readiness score of "very strong" and conveying the sense that the service knows what it needs to do to prepare for the next major conflict. Nevertheless, the Army's internal assessment must be balanced against its own statements that unit training is focused on company-level operations rather than battalion or brigade operations. Consequently, how these "ready" brigade combat teams would actually perform in combat is an open question.
- Navy as "Weak." This worrisome score, a drop from "marginal" assessed in the 2022 Index, is driven by problems in capacity ("very weak") and readiness ("weak"). This Index

- assesses that the Navy needs a battle force of 400 manned ships to do what is expected of it today. The Navy's current battle force fleet of 298 ships and intensified operational tempo combine to reveal a service that is much too small relative to its tasks. Contributing to a lower assessment is the Navy's persistent inability to arrest and reverse the continued diminution of its fleet as adversary forces grow in number and capability. If its current trajectory is maintained, the Navy will shrink further to 280 ships by 2037. Current and forecasted levels of funding will prevent the Navy from altering its decline unless Congress undertakes extraordinary efforts to increase assured funding for several years.
- Air Force as "Very Weak." The Air Force has been downgraded once again, the second, time in the past two years. The Air Force was assessed as "marginal" in the 2021 Index but, with public reporting of the mission readiness and physical location of combat aircraft implying that it would have a difficult time responding rapidly to a crisis, fell to a score of "weak" in the 2022 Index. During FY 2022, the year assessed for this *Index*, problems with pilot production and retention, an extraordinarily small amount of time in the cockpit for pilots, and a fleet of aircraft that continues to age compounded challenges even more, leading to the current score of "very weak," the lowest on our scale. The USAF currently is at 86 percent of the capacity required to meet a two-MRC benchmark, it is short 650 pilots, the average age of its fighter aircraft fleet is 32 years old, and pilots are flying barely more than once per week across all types of aircraft. New aircraft like the F-35 and KC-46 are being introduced, but the pace is too slow. Although there is a chance the Air Force might win a single MRC in any theater, there is little doubt that it would struggle in war with a peer competitor. Both the time required to win such a conflict and the attendant rates of attrition would be much higher than they would be if the service had moved aggressively to increase high-end training and acquire the fifth-generation weapon systems required to dominate such a fight.
- Marine Corps as "Strong." The score for the Marine Corps was raised to "strong" from "marginal" in the 2022 Index and remains "strong" in this edition for two reasons: (1) because the 2021 Index changed the threshold for capacity, lowering it from 36 infantry battalions to 30 battalions in acknowledgment of the Corps' argument that it is a one-war force that also stands ready for a broad range of smaller crisis-response tasks, and (2) because of the Corps' extraordinary, sustained efforts to modernize (which improves capability) and enhance its readiness during the assessed year. Of the five services, the Corps is the only one that has a compelling story for change, has a credible and practical plan for change, and is effectively implementing its plan to change. However, in the absence of additional funding that would enable the Corps to maintain higher end strength while also pursuing its modernization and reorientation efforts, the Corps will reduce the number of its battalions even further to just 21, and this reduction will limit the extent to which it can conduct distributed operations as envisioned and replace combat losses (thus limiting its ability to sustain operations). Though the service remains hampered by old equipment in some areas, it has nearly completed modernization of its entire aviation component, is making good progress in fielding a new amphibious combat vehicle, and is fast-tracking the acquisition of new anti-ship and anti-air weapons. Full realization of its redesign plan will require the acquisition of a new class of amphibious ships, for which the Corps needs support from the Navy.
- Space Force as "Weak." The mission sets, space assets, and personnel that have transitioned to the Space Force from the other services since its establishment in December 2019 and that have been added over the past two years have enabled the service to sustain its support to the Joint Force. However, there is little evidence that the USSF has *improved* its readiness to provide nearly real-time support to operational and tactical levels of force operations or that it is ready in any way to execute defensive and offensive counterspace operations to the degree envisioned by Congress when it

## **U.S. Military Power: Army**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		✓			
Capability			✓		
Readiness					✓
OVERALL			✓		

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

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity	✓				
Capability			✓		
Readiness		✓			
OVERALL		<b>✓</b>			

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

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity			✓		
Capability			✓		
Readiness	✓				
OVERALL	✓				

## **U.S. Military Power: Marine Corps**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		<b>✓</b>			
Capability				<b>~</b>	
Readiness				<b>~</b>	
OVERALL				<b>~</b>	

## **U.S. Military Power: Space**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		✓			
Capability		✓			
Readiness		✓			
OVERALL		✓			

#### **U.S. Military Power: Nuclear**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Nuclear Stockpile				<b>~</b>	
Delivery Platform Reliability				<b>~</b>	
Warhead Modernization			~		
Delivery Systems Modernization				~	
Nuclear Weapons Complex			~		
National Labs Talent			<b>✓</b>		
Allied Assurance				<b>~</b>	
OVERALL				<b>~</b>	

#### **U.S. Military Power**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Army			<b>~</b>		
Navy		✓			
Air Force	✓				
Marine Corps				<b>~</b>	
Space		<b>✓</b>			
Nuclear				<b>~</b>	
OVERALL		<b>✓</b>			

authorized the creation of the Space Force. The majority of its platforms have exceeded their life span, and modernization efforts to replace them are slow and incremental. The service's two counterspace weapons systems (Meadowlands and Bounty Hunter) cover only a fraction of the offensive and defensive capabilities required to win a conflict in space. Other counterspace systems are likely being developed or, like cyber, are already in play without public announcement. Nevertheless, the USSF's current visible capacity is not sufficient to support, fight, or weather a war with a peer competitor.

 Nuclear Capabilities as "Strong" but Trending Toward "Marginal" or Even "Weak." This conclusion is sustained from the 2022 Index. The scoring for U.S. nuclear weapons must be considered in the context of a threat environment that is significantly more dangerous than it was in previous years. Until recently, U.S. nuclear forces needed to address one nuclear peer rather than two. Given senior leaders' reassurances with respect to the readiness and reliability of U.S. nuclear forces, as well as the strong bipartisan commitment to modernization of the entire nuclear enterprise, this year's *Index* retains its grade of "strong," but only for now. U.S. nuclear forces face many risks that, without a continued commitment to a strong deterrent, could warrant a decline to an overall score of "marginal" or "weak." The reliability of current U.S. delivery systems and warheads is at risk as they continue to age and

the threat continues to advance. Iran, for example, has announced an ability to enrich uranium to 60 percent (90 percent is needed for a weapon), and Russia and China are aggressively expanding the types and quantities of nuclear weapons in their inventories. Nearly all components of the nuclear enterprise are at a tipping point with respect to replacement or modernization and have no margin left for delays in schedule. Future assessments will need to consider plans to adjust America's nuclear forces to account for the doubling of peer nuclear threats. While capacity was not assessed this year, it is clear that the change in threat warrants a reexamination of U.S. force posture and the adequacy of current modernization plans. Failure to keep modernization programs on track while planning for a three-party nuclear peer dynamic could lead inevitably to a decline in the strength of U.S. nuclear deterrence.

#### **Endnotes**

- 1. Though issued during President Donald J. Trump's Administration, the 2018 NDS has not yet been superseded by a similar document, focused on the military, from the Administration of President Joseph R. Biden. However, the Biden Administration has released interim guidance in which it sets out the broad outlines and priorities of its national security agenda. In particular, President Biden's *Interim National Security Strategic Guidance* reiterates the same core national security interests and the same set of major competitor countries posing challenges to U.S. interests that the preceding Administration identified and places them in a global context wherein the U.S. military must be ready to handle several problems in geographically separated locations. See President Joseph R. Biden, Jr., *Interim National Security Strategic Guidance*, The White House, March 2021, pp. 8–9, https://www.whitehouse.gov/wp-content/uploads/2021/03/NSC-Iv2.pdf (accessed August 1, 2022).
- 2. James Mattis, Secretary of Defense, Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge, p. 2. https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf (accessed August 1, 2022).

In the aggregate, the United States' military posture can only be rated as "weak." The Air Force is rated "very weak," the Navy and Space Force are "weak," and the U.S. Army is "marginal." The Marine Corps and nuclear forces are "strong," but the Corps is a one-war force, and its overall strength is therefore not sufficient to compensate for the shortfalls of its larger fellow services. And if the United States should need to employ nuclear weapons, the escalation into nuclear conflict would seem to imply that handling such a crisis would challenge even a fully ready Joint Force at its current size and equipped with modern weapons. Additionally, the war in Ukraine, which threatens to destabilize not just Europe but the economic and political stability of other regions, shows that some actors (in this case Russia) will not necessarily be deterred from conventional action even though the U.S. maintains a strong nuclear capability. Thus, strong conventional forces of necessary size are essential to the ability of the U.S. to respond to emergent crises in areas of special interest.

The 2023 Index concludes that the current U.S. military force is at significant risk of not being able to meet the demands of a single major regional conflict while also attending to various presence and engagement activities. The force would probably not be able to do more and is certainly ill-equipped to handle two nearly simultaneous MRCs—a situation that is made more difficult by the generally weak condition of key military allies.

In general, the military services continue to prioritize readiness and have seen some improvement over the past few years, but modernization programs, especially in shipbuilding, continue to suffer as resources are committed to preparing for the future, recovering from 20 years of operations, and offsetting the effects of inflation. In the case of the Air Force, some of its limited acquisition funds are being spent on aircraft of questionable utility in high-threat scenarios while R&D receives a larger share of funding than efforts meant to replace quite aged aircraft are receiving. As observed in both the 2021 and 2022 editions of the *Index*, the services have normalized reductions in the size and number of military units, the forces remain well below the level needed to meet the two-MRC benchmark, and substantial difficulties in recruiting young Americans to join the military services are frustrating even modest proposals just to maintain service end strength.

Congress and the Administration took positive steps to stabilize funding in the latter years of the Budget Control Act of 2011 (BCA). This mitigated the worst effects of BCA-restricted funding, but sustained investment in rebuilding the force to ensure that America's armed services are properly sized, equipped, trained, and ready to meet the missions they are called upon to fulfill will be critical. At present, the Administration's proposed defense budget for FY 2023 falls far short of what the services need to regain readiness and to replace aged equipment, and Congress's intention to increase the proposed budget by 5 percent accounts for barely half of the current rate of inflation, which is nearing 10 percent.

As currently postured, the U.S. military is at growing risk of not being able to meet the demands of defending America's vital national interests. It is rated as weak relative to the force needed to defend national interests on a global stage against actual challenges in the world as it is rather than as we wish it were. This is the logical consequence of years of sustained use, underfunding, poorly defined priorities, wildly shifting security policies, exceedingly poor discipline in program execution, and a profound lack of seriousness across the national security establishment even as threats to U.S. interests have surged.

# AUKUS: New Opportunities for the United States and Its Closest Allies

## Peter Jennings

On September 15, 2021, U.S. President Joe Biden, Australian Prime Minister Scott Morrison, and U.K. Prime Minister Boris Johnson held a virtual media conference to announce "the creation of an enhanced trilateral security partnership called 'AUKUS'—Australia, the United Kingdom, and the United States." The partnership focuses on the Indo-Pacific and is intended to "foster deeper integration of security and defense-related science, technology, industrial bases, and supply chains."

The most striking initial AUKUS project is "a shared ambition to support Australia in acquiring nuclear-powered submarines" and a projected 18-month time frame "to seek an optimal pathway to deliver this capability." Only once before has the United States given a foreign power access to technology to develop nuclear propulsion: the United Kingdom in the 1950s. AUKUS therefore represents a significant strategic opportunity for Australia. More broadly, the partnership offers to pool defense-related science and technology and each country's defense industry into a shared endeavor, working on the following high-priority areas: "cyber capabilities, artificial intelligence, quantum technologies, and additional undersea capabilities."

Early reactions to AUKUS described the agreement as a big deal. *The Economist* declared AUKUS to be as profound a strategic shift as "Nixon going to China in 1972 and the fall of the Berlin Wall in 1989." It was a new piece of strategic architecture in the Indo-Pacific and for that reason directly aimed at the People's Republic of China (PRC) and Beijing's challenge to the rules-based order. Biden underlined this point at the agreement's launch: [T] the future of each of our nations—and indeed the world—depends

on a free and open Indo-Pacific enduring and flourishing in the decades ahead."<sup>4</sup>

While the Australian Navy appeared to be the first beneficiary of AUKUS's focus on nuclear propulsion, the reality is that even on the most optimistic projections, a nuclear-powered submarine for Australia is at least a decade—and perhaps more realistically 15 to 20 years—in the future. In this essay, I will assess the opportunities and risks associated with AUKUS, asking what each of the three partners may want to get for their political and economic investment. All three countries stand to gain from AUKUS in geopolitical, strategic, and defense terms, but not without some risk to the practical delivery of defense technology outcomes.

## **AUKUS: The Strategic Context**

AUKUS reflects a shared understanding among the three partner countries that the PRC presents an immediate and sustained challenge to the international security order, not only globally, but most pressingly in the Indo-Pacific region. Each country has been forced to change policy on the PRC over the past decade, moving from attempts to engage Beijing with a view to shaping its behavior to a point now where the three countries openly acknowledge the danger of an assertive China's growing power.

This has not been an easy process. Australia concluded a free trade agreement with China in late 2014 on terms that would hardly be acceptable today, and Tony Abbott, then the center-right Australian Prime Minister, welcomed Xi Jinping to Canberra saying that "a relationship might begin with commerce but it rarely ends there once trust has been established, as I believe it has between Australia

and China."<sup>5</sup> In 2015, then-British Prime Minister David Cameron was welcoming a "golden era" with Beijing based on massive PRC investment in critical infrastructure.<sup>6</sup> When Xi visited Washington, D.C., in September 2015, he gave assurances to President Barack Obama that China had "no intention to militarize" the disputed Spratly Islands in the South China Sea and would reduce the cyber-enabled theft of American intellectual property.<sup>7</sup> For a short while, there was hope in the White House that Xi could be taken at his word.

Since those optimistic times, policy toward the PRC has hardened in the AUKUS capitals. The need to respond to Beijing's militarization of the South China Sea, massive military spending, coercive use of trade and investment, cyber espionage, and attempts to undermine American and allied influence in the Indo-Pacific has forced governments to make more negative assessments about Beijing's intentions. The arrival of AUKUS reflects a shared realization that more concerted effort is needed to align policy responses to China and fast-track emerging military capabilities to strengthen deterrence. AUKUS should therefore be seen in the context of the arrival of the QUAD (a grouping that includes the U.S., Australia, Japan, and India); the rapidly growing Australia-U.S.-Japan trilateral defense partnership; and an enlarged and revitalized NATO. These are all recent examples of the world's consequential pluralist countries grouping together in the face of a sustained authoritarian challenge from the PRC and Russia.

AUKUS does not supplant existing bilateral treaty agreements and defense cooperation activities between the U.S. and Australia and the U.S. and Britain, but it brings a new trilateral mechanism to the fore, creating the possibility of wider cooperation among the three countries' defense and intelligence establishments, research and development, and industrial sectors.

AUKUS is perhaps also a tacit acknowledgement of the limits to the individual capacities of the three countries. As powerful as the United States is, it needs capable allies to bolster American military strength, add options for logistic support and sustainment, and field interoperable military platforms. For all three countries, AUKUS is a potentially valuable force multiplier with the capacity to strengthen conventional deterrence and complicate Beijing's strategic planning.

## How Does AUKUS Fit with U.S. Strategy?

Successive American Administrations have sought to give more priority to the Indo-Pacific, and Biden's February 2022 *Indo-Pacific Strategy* stresses an "intensifying American focus" on the region. Two themes dominate the Biden strategy:

- This is a competition for influence with China, which "seeks to become the world's most influential power" through "coercion and aggression," and
- The United States will counter this through "collective efforts over the next decade" with allies and partners.<sup>8</sup>

On America's defense posture in the region, the Biden strategy refers to AUKUS in the context of reinforcing and strengthening deterrence and bringing together European and Indo-Pacific partners. The AUKUS technology agenda fits neatly into the strategy's priority list for Indo-Pacific defense priorities:

We will foster security ties between our allies and partners in the Indo-Pacific region and beyond, including by finding new opportunities to link our defense industrial bases, integrating our defense supply chains, and co-producing key technologies that will shore up our collective military advantages. As we do, we will bring together our Indo-Pacific and European partners in novel ways, including through the AUKUS partnership.9

There is substantial continuity between the Trump and Biden Administrations in terms of American force posture in the Indo-Pacific. The National Security Strategy released by then-Secretary of Defense James Mattis in 2018 defines key desired attributes of U.S. forces in the Indo-Pacific:

Forward force maneuver and posture resilience. Investments will prioritize ground, air, sea, and space forces that can deploy, survive, operate, maneuver, and regenerate in all domains while under attack. Transitioning from large, centralized, unhardened infrastructure to smaller, dispersed, resilient, adaptive basing that include active and passive defenses will also be prioritized.<sup>10</sup>

This is particularly relevant to U.S. thinking about Australia's strategic geography and the potential for American forces to operate with their Australian Defence Force (ADF) counterparts in and from the north of Australia. Since 2010, the U.S. Marine Corps has been staging annual six-month to eight-month rotational deployments to Darwin in the Northern Territory. The U.S. Air Force has been staging increasing numbers of flights from Australia's northern air bases. Current planning seeks to intensify this cooperation. At the most recent annual Australia-U.S. Ministerial Consultations (AUSMIN) talks in September 2021, bringing the U.S. Secretaries of State and Defense together with their Australian counterparts, the Secretaries and Ministers endorsed the following areas of force posture cooperation:

- Enhanced air cooperation through the rotational deployment of U.S. aircraft of all types in Australia and appropriate aircraft training and exercises.
- Enhanced maritime cooperation by increasing logistics and sustainment capabilities of U.S. surface and subsurface vessels in Australia.
- Enhanced land cooperation by conducting more complex and more integrated exercises and greater combined engagement with Allies and Partners in the region.
- Establish a combined logistics, sustainment, and maintenance enterprise to support high-end warfighting and combined military operations in the region.

Without much attention being drawn to it, the U.S. is investing substantially in building a fuel facility near Darwin, to be completed in September 2023, which will be able to store 300 million litres (nearly 80 million U.S. gallons) of military jet fuel.<sup>12</sup>

Taken together with the arrival of AUKUS, it seems clear that American thinking about Australia's strategic value in the Indo-Pacific is changing. Northern Australia is becoming more important to support a dispersal strategy, while Australia's potential as a supply and sustainment hub is growing. An Australian Defence Force operating nuclear-powered submarines (in all probability *Virginia*-class

SSNs) along with an array of interoperable platforms, sensors, and weapons is valuable. Combine that with key elements of equipment production and prepositioning in Australia along with access to ADF bases and national infrastructure, and this becomes a powerful force multiplier for the U.S. military at great distance from the continental U.S.

Are there risks to the United States in pursuing a closer defense relationship with Australia? All alliances impact autonomous decision-making to some degree. However, nothing can replace the value of Australia's strategic geography to the south of the Asian mainland. Just as in the Second World War, a major military campaign focused on the Western Pacific would find Australia a vital piece of geography for the United States. The U.S. must factor in occasional political differences between Canberra and Washington that may impact the conduct of operations. For example, how would the two countries manage political decision-making in support of military operations mounted from Australian territory? Nevertheless, over the 70-year life of the ANZUS treaty,13 Australia and the United States have had a remarkable confluence of shared strategic interests, and this confluence is only being reinforced by the rise of an assertive Beijing.

## The British Agenda for AUKUS

In March 2021, the U.K. government released a policy statement, *Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy.* The statement argued that "the Indo-Pacific will be of increasing geopolitical and economic importance, with multiple regional powers with significant weight and influence, both alone and together." As a result, Britain would "tilt to the Indo-Pacific," in part as a response to the competitive challenges presented by China. The policy shift was underscored by a deployment to the Indo-Pacific of the *Queen Elizabeth* aircraft carrier and a maritime strike group in late 2021.

Not all in the U.K. are convinced that the "tilt" will survive after the Prime Ministership of Boris Johnson, the chief architect of the policy. The judgment of Peter Ricketts, now in the House of Lords after a career at the heart of British foreign policy, is unambiguous: "A tilt to the Indo-Pacific is a slogan not a strategy. It does not match closely enough the pattern of Britain's vital interests to become the basis for a durable national strategy." Ricketts does

accept, though, that an active foreign policy in Europe and deeper engagement in the Asia–Pacific "are not mutually exclusive."  $^{17}$ 

Russia's invasion of Ukraine is a reminder that Europe and the U.K. face more immediate strategic threats in their own neighborhood. This, appropriately, will be a primary driver of British defense policy. However, enabled by the size of its economy and population and driven by a nationalist and assertive ideology, the PRC will remain the biggest long-term strategic challenge to global stability. Whether acknowledged or not, all countries are tilting to the Indo-Pacific. After Brexit, the U.K. is looking for markets and economic prospects in the region. This mix of risk and reward is likely to sustain a long-term British interest in the Indo-Pacific, perhaps best regarded as a second-level security priority after the existential threat presented to Europe by a revanchist Russia.

AUKUS is a prime enabler for the U.K. to pursue its agenda for an Indo-Pacific tilt. The two policy objectives of enhanced trilateral cooperation and a stronger British presence and interest in the Indo-Pacific align comfortably. In a perfect policy world, AUKUS should add momentum to independent British efforts to pursue a tilt to the region. From a British perspective, AUKUS cements a stronger bilateral relationship with the U.S. that is quite separate from NATO or other European connections. If the aspired level of technology cooperation is achieved, AUKUS lifts the U.K. and Australia into a closer and stronger relationship with the United States relative to any other ally or partner. Britain will probably also assess that a close AUKUS industrial partnership will strengthen its defense export position relative to European competitors.

## **AUKUS and Australia**

The arrival of AUKUS reflects a strong Australian interest to seek support from like-minded democracies in what has been a protracted and complicated set of disputes with China. In 2018, Australia became one of the first countries to exclude PRC companies, in particular Huawei and ZTE, from participating in the rollout of the 5G network. Canberra has also passed laws banning PRC funding of political parties, prevented at least some Chinese acquisitions of critical infrastructure, and modernized anti-espionage and anti-covert interference laws. Following then-Prime Minister Scott Morrison's call for an international investigation into the origin of the Covid-19

virus, Beijing retaliated with official and unofficial bans on Australian exports including coal, barley, wine, beef, seafood, and other commodities.

From a defense perspective, Australia has been particularly concerned about the PRC's illegal annexation of much of the South China Sea and its cultivation of political influence with Australian state governments, with Pacific Island countries, and in Southeast Asia. A *Defence Strategic Update* issued in 2020 concluded that:

Previous Defence planning has assumed a tenyear **strategic warning time** for a major conventional attack against Australia. This is no longer an appropriate basis for defence planning. Coercion, competition and grey-zone activities directly or indirectly targeting Australian interests are occurring now.... Reduced warning times mean defence plans can no longer assume Australia will have time to gradually adjust military capability and preparedness in response to emerging challenges. This includes the supply of specialised munitions and logistic requirements, such as fuel, critical to military capability.<sup>18</sup>

In responding to these developments, Canberra has sought to deepen alliance cooperation with the United States significantly, build closer defense ties with Japan and India, and restate the importance of cooperation between countries that support the international rule of law.

There is bipartisan political and domestic popular support for lifting defense spending beyond the current level of 2.1 per cent of gross domestic product, as well as for establishing the conditions for domestic production of a range of missiles for ADF and allied use, expanding offensive and defense cyber capabilities, and looking for other ways to increase ADF range and firepower to boost deterrence. Australian governments have recognized that emphasizing force structure improvements—replacing aging submarines and surface vessels, for example—that would not deliver new capabilities until well into the 2030s was a major weakness in defense planning.

AUKUS therefore addresses five identified Australian strategic needs.

• It seeks to engage the United States more closely, giving Washington reason to put higher value on its alliance with Australia.

- British involvement is welcomed by Canberra
  as a way of signaling that likeminded democracies will work together to resist the PRC's
  challenge to the global order. This is a way of
  internationalizing what has been a difficult bilateral struggle between Canberra and Beijing.
- AUKUS offers the possibility of fast-tracking the acquisition of new military technology that will strengthen deterrence and give the ADF a technology edge.
- AUKUS underpins a strategic judgment that the defense of Australia is something that can be credibly assured only within an alliance context, so the ADF needs to have the best possible levels of interoperability with the U.S. military.
- AUKUS addresses a central policy failure spanning several Australian administrations, which is the inability to find more capable replacements for the ADF's high-quality but aging Collins-class submarines.

Australian critics of AUKUS argue that the agreement draws the country too closely into the U.S. rivalry with China. Hugh White, for example, argues that "we cannot take it for granted the US will solve our China problem for us. On the contrary, our ally will probably fail us. Americans will find that it will cost them more than it is worth to maintain leadership in Asia against China's formidable challenge."<sup>19</sup>

White's critique is based on his concluded view that China will not be deterred from seeking dominance in the Indo-Pacific. Australian national security policymakers do not accept that position, preferring instead to argue that a close alliance with the United States helps to strengthen deterrence. It is certainly true, though, that an alliance made closer through AUKUS will lift American expectations about what Australia should be able to contribute to that collective defense effort.

## The Submarine Strategy

Prior to the AUKUS announcement, Australia was planning to replace its six *Collins*-class conventional attack submarines with 12 locally built French-designed submarines designated the *Attack*-class. The aim as stated in the *2016 Defence White Paper* was to produce 12 "regionally superior

submarines with a high degree of interoperability with the United States." The "key capabilities" of these submarines "will include: anti-submarine warfare; anti-surface warfare; intelligence, surveillance and reconnaissance; and support to special operations." By 2020, Prime Minister Scott Morrison had formed doubts about whether the *Attack* class would provide that regionally superior capability at the time of initial delivery around the mid-2030s.

Morrison directed a small team in the Defence Department to identify alternative submarine designs. By the time of the G-7 meeting in Cornwall in the United Kingdom, Biden, Johnson, and Morrison had agreed privately on the broad shape of AUKUS cooperation, noting that "the strategic context in the Indo-Pacific was changing and that there was a strong rationale for deepening strategic cooperation between the three governments." It was a remarkable step made possible only by the presidential decision to allow Australia access to nuclear technology.

In my personal experience as Deputy Secretary for Strategy in the Defence Department between 2009 and 2012, the United States Navy and wider national security system was not in any way disposed to give Australia access to submarine nuclear propulsion technology. Australian officials had raised the issue on several occasions only to be politely but firmly rebuffed. The U.S. Navy's interest was in assisting Australia to strengthen its capacity for conventional attack submarine operations.

Media reports suggest that there are substantial reservations in the U.S. Navy about the AUKUS plan to develop an Australian SSN. For example, Randy Schriver, a former Assistant Secretary of Defense in the Trump Administration, identified "many potential obstacles on both sides" including from the U.S. Navy. Schriver told *The Australian* newspaper that there needed to be "sustained commitment from the senior political leaders in both capitals, otherwise the chances of Australia deploying its own nuclear submarine will drop below 50 per cent."22 In effect, the decision to proceed with finding a pathway for Australia to access SSNs could have come only from President Biden. From an Australian perspective, an essential part of the 18-month "pathway" to March 2023 is to assure the U.S. Navy, Department of Energy, and other parties that Australia is capable of handling this transfer of intellectual property and technology securely and safely.

An Australian Nuclear Powered Submarine Taskforce was established to work with the U.K. and U.S. on defining an 18-month pathway to development of an acquisition strategy. Key issues that the pathway is intended to address are "[s]ubmarine design, construction, safety, operation, maintenance, disposal, regulation, training, environmental protection, installations and infrastructure, industrial base capacity, workforce, and force structure."<sup>23</sup>

Compared to normal Defence business processes, this work is happening at breakneck speed, and measurable progress is being made. By December of 2021, a key parliamentary committee agreed to a U.S.–U.K.–Australia treaty enabling the exchange of naval nuclear propulsion information, an essential platform for classified information sharing. The committee noted that "the Australian Government has approved funding of up to \$300 million for the operation of the Nuclear Powered Submarine Task Force. As of 25 November 2021, the task force had 134 staff."<sup>24</sup> By May 2022, that staff had grown to 226 people—by Australian standards a significant policy commitment.<sup>25</sup>

In the United States, a bipartisan congressional working group announced in June 2022 that the Australia–U.S. Submarine Officer Pipeline Act was being introduced to "establish a joint training pipeline between the U.S. Navy and the Royal Australian Navy" and "enable the start of U.S.-based training of Commanding Officers for Australia's future fleet of nuclear-powered submarines under the AUKUS alliance."

Given the rapid worsening of the strategic outlook in the Indo-Pacific, much attention has been paid to how quickly a nuclear propulsion capability could be delivered to Australia. A complicating factor is that the Morrison government insisted that the nuclear submarines could be built in Adelaide, South Australia. To put it mildly, this is a major commitment, well ahead of current Australian industrial capability. The head of the Nuclear Powered Submarine Task Force, Vice Admiral Jonathan Mead, has said that outside of weapons fit, no design changes would be made to a choice between either the British Astute-class or American Virginia-class SSNs. Mead has acknowledged that, given design priorities in the U.K. and U.S., "new versions, the American SSNX and the British SSNR, will be in the mix."27

In January 2022, U.K. Foreign Secretary Elizabeth Truss commented to the Australian media that

there could be the possibility of "collaborative development by the three AUKUS parties rather than a choice of Britain's Astute-class or America's Virginia-class." There is promise in that approach, which could produce a design common to all three navies along lines like the common development approach used for the Joint Strike Fighter.

There is intense speculation in Australia that it might be possible to lease or acquire a U.S. *Virginia*-class SSN in U.S. service, reflagging the boat as Australian before 2030 and before construction of Australian SSNs. Peter Dutton, Australia's Minister for Defence up to the May 2021 election and now leader of the centre-right Opposition, claims that:

I believed it possible to negotiate with the Americans to acquire, say, the first two submarines off the production line out of Connecticut. This wouldn't mean waiting until 2038 for the first submarine to be built here in Australia. We would have our first two subs this decade. I had formed a judgment that the Americans would have facilitated exactly that.<sup>29</sup>

For that to happen, Biden or his successor would have to conclude that there was value in giving Australia access to these boats ahead of the U.S. Navy's own demands for more submarines. The advantage to the U.S. is that Australia would pay for the capability, allowing an expansion of a larger "federated" submarine presence in the Indo-Pacific. However, no one should underestimate the costs and challenges ahead in realising this Australian capability in every area from construction and sustainment to basing, crew training, safety, and operational planning.

## The Wider AUKUS Technology Agenda

In addition to nuclear propulsion, the September 2021 AUKUS announcement identified four "high priority areas" for collaborating work: cyber capabilities, artificial intelligence, quantum technologies, and additional undersea capabilities. Further, in April 2022, Biden, Johnson, and Morrison met virtually to review progress on the AUKUS agenda and added some new categories for increased collaboration: "We also committed today to commence new trilateral cooperation on hypersonics and counter-hypersonics, and electronic warfare capabilities, as well as to expand information sharing and to deepen cooperation on defense innovation."<sup>30</sup>

Little has been publicly released about progress to date. A tripartite senior officials' group has been appointed to oversee progress. In Australia, the Secretary of the Department of Prime Minister and Cabinet is the representative, while U.K. and U.S. National Security Advisers Stephen Lovegrove and Jake Sullivan, respectively, lead for their countries.

Two joint steering groups have been established: one focused on submarines and the other covering all other nominated areas of advanced technology. Working groups have been established for each technology. To date, a work plan has not been released.

On April 5, 2022, the partners released a fact sheet reporting the following meetings:

- "On March 10, 2022, National Security Advisors from the three allies met virtually to review AUKUS progress and provide direction to the trilateral partnership going forward."<sup>31</sup>
- "The three countries have held multiple Joint Steering Group meetings for each of the two AUKUS lines of effort, including in-person meetings in Canberra, London, and Washington, D.C."
- "Seventeen trilateral working groups have been established (nine relating to nuclear-powered submarines, and eight to other advanced military capabilities); each has met multiple times."

On April 1, 2022, it was announced that a bipartisan AUKUS Working Group, also known as the "AUKUS Caucus," had been formed in the U.S. Congress. Its members, drawn from both the Democratic and Republican parties, are intent on "provid[ing] a forum for congressional attention on the implementation of AUKUS and on completing the steps needed to strengthen our already-existing security relationship."<sup>34</sup>

Three areas of weapons development activity that have been publicly revealed may be taken as examples of what could emerge from AUKUS cooperation.

First, in April 2022, the AUKUS leaders reviewed progress on implementation and, on autonomous systems, said: "Through the AUKUS Undersea Robotics Autonomous Systems (AURAS) project, our nations are collaborating on autonomous underwater vehicles, which will be a significant force

multiplier for our maritime forces. Trials and experimentation of this capability are planned for 2023."<sup>35</sup> In May 2022, during the election campaign, then-Defence Minister Peter Dutton announced plans to fast-track the acquisition of three Extra Large Autonomous Undersea Vehicles (XLAUV).<sup>36</sup> For a planned cost of USD\$100 million, the boats are to be built in Australia over three years in a co-development project between the Australian Defence Organisation and U.S. company Anduril.<sup>37</sup> The boats are said to be capable of long endurance and multi-mission roles.

Second, a large investment in cyber capability was announced in the March 2022 Australian budget. Project REDSPICE—an acronym standing for Resilience, Effects, Defence, Space, Intelligence, Cyber and Enablers—will invest an additional AUS\$9.9 billion over the coming decade in a range of areas, including tripling the size of the Australian Signals Directorate's offensive cyber capability. In terms of cooperation with the U.S. and U.K., ASD claims that Project REDSPICE will enable "[g]reater integration through expanded global footprint," "[c]o-investment in Five-Eyes initiatives," and "[c]ollaboration on AI and cyber technologies." 38

Finally, without providing details, the Australian government has alluded to "collaboration with the United Sates to develop hypersonic missiles" as part of wider plans to develop a local missile manufacturing capability and increase stock holdings of U.S. missiles, including Tomahawk cruise missiles; joint air-to-surface standoff missiles (extended range); long-range anti-ship missiles (extended range); and precision-strike guided missiles for land forces with a range of over 400 kilometres.<sup>39</sup> In April 2022, the government announced that "Raytheon and Lockheed Martin have been chosen to deliver the Sovereign Guided Weapons and Explosive Ordnance Enterprise (GWEO), to initially enhance self-reliance and supply chain resilience, but with a future goal of developing a guided weapons manufacturing capability in Australia."40 It is clear that the project is intended to support U.S. missile requirements in the Indo-Pacific as much as it is to expand the ADF's missile capabilities.

## Reactions to AUKUS

International reactions to AUKUS were varied and largely divided on lines reflecting the strategic competition for influence in the Indo-Pacific. Countries that welcomed the agreement included Japan, Singapore, and the Philippines. While Vietnam remained silent on the subject, it is assumed that it tacitly approves. France was critical based on the difficult reality that AUKUS ended its contract to design and build conventionally powered submarines in Australia.<sup>41</sup> The change of government in Australia has opened the way to resuming a more positive bilateral relationship between Canberra and Paris.

Predictably, the PRC was a strident critic. A Ministry of Foreign Affairs spokesperson condemned the agreement, claiming that:

Cooperation on nuclear-powered submarine technology between the US, the UK and Australia will gravely undermine regional peace and stability, aggravate arms race and impair international nuclear non-proliferation efforts. It runs counter to regional countries' wishes. The three countries should discard the Cold War zero-sum mentality and narrow geopolitical perspective, follow the trend of the times for peace and development, and stop forming exclusive blocs or cliques.<sup>42</sup>

Concerns about a supposed proliferation risk were aired by Indonesia and Malaysia. In May, Prime Minister Ismail Sabri of Malaysia told Japan's Nikkei newspaper that "We are worried that some other major economies will take advantage of AUKUS. For example, if China wants to help North Korea purchase nuclear-powered submarines, we can't say no because AUKUS has set a precedent."43 Australia continues to make the case in Southeast Asia that it has no intention of acquiring nuclear weapons. All three AUKUS partners maintain that the agreement to provide Australia with a pathway to nuclear propulsion does not compromise their support for nuclear non-proliferation. The AUKUS countries advised the International Atomic Energy Agency (IAEA) that a critical objective of their cooperation will be to maintain "the strength of both the nuclear non-proliferation regime and Australia's exemplary non-proliferation credentials."44

One important task for the AUKUS partners will be to determine whether any other countries should be allowed to participate in the broader technology development programs being advanced by the agreement. In an interview with the Australian Strategic Policy Institute (ASPI) in November 2021, Japan's ambassador to Australia said, "We have been told there are some instances or areas where AUKUS members may need Japanese cooperation and participation and we are more than willing to do our contribution."

With two AUKUS members in NATO, it is relevant that the recently released NATO Strategic Concept commits the alliance to "promote innovation and increase our investments in emerging and disruptive technologies to retain our interoperability and military edge." This too could create a basis for expanding AUKUS cooperation, although hopefully without a loss of focus and pace, which are key aspects of the AUKUS strategy.

## **Next Steps**

A defining event in AUKUS's short history will be in March 2023 when officials are projected to bring to the President and the two Prime Ministers the plan for how Australia can acquire nuclear-propelled submarines. Australia's new Defence Minister and Deputy Prime Minister, Richard Marles, has said that he hopes to achieve three key outcomes at that time. The first is an identified submarine type, which amounts to a choice between the U.S. Virginia-class or British Astute-class SSNs or their design successors. Second, it is expected that the advice in March 2023 will identify a realistic time frame for the Australian submarine acquisition. Finally, Marles has said that he wants to understand options for an interim conventional submarine replacement if there is a gap between the end of life of the Collins-class submarines and the arrival of the SSNs. 47 The Australian Defence Organisation is working on the third of these options in parallel with the AUKUS study.

At this stage, there is little on the public record indicating timelines for developments in the other technology areas. A potential critical waypoint will be the AUSMIN Ministerial meeting, which is due to be held in Australia toward the end of 2022. Given the priority that recent AUSMIN meetings have put on strengthening interoperability between the ADF and U.S. forces and on shared technology development, we should expect that the United States and Australian governments will put a high priority on the AUKUS agenda's leading to the quickest possible deployment of new military capabilities.

## What Could Go Wrong?

For all its promise, a lot could happen to derail AUKUS. The agreement is too disruptive of existing policy processes to have come from officials, and AUKUS would not have proceeded without the personal commitment of President Biden, Boris Johnson, and Scott Morrison. On May 21, 2022, Morrison's government was defeated in Australia's federal election. The new centre-left Labor government of Anthony Albanese has pledged to continue with AUKUS, although there are elements of the Labor Party that oppose nuclear propulsion. Labor depends on support from minor parties in the Senate, which in some cases are adamantly opposed to AUKUS and the alliance with the United States.

Whatever the views inside the Labor Party, AUKUS was popularly received by Australians. A poll conducted in March 2022 found that 52 percent of those surveyed thought AUKUS would make Australia safer, while 70 percent surveyed were in favor of acquiring nuclear propelled submarines.<sup>48</sup>

As for Boris Johnson, in addition to having become deeply unpopular with British voters, he narrowly survived a vote of no confidence in his leadership from Conservative Party members of Parliament in early June and was finally forced to resign on July 7.49 The Conservative Party is going through lengthy mandated processes to select a new party leader and therefore Prime Minister by October 2022. It would be surprising if a new Conservative Prime Minister opposed AUKUS, but beset with domestic and international problems, a new British PM might not give AUKUS the priority that Boris Johnson did. The British Labour Party maintains support for the U.K.'s own submarine-based nuclear deterrent (although this is a contested position within the party) and has also indicated support for AUKUS.50

While President Biden has indicated an intention to run for a second term, his age is giving rise to speculation about his capacity to continue in office. All three of the original AUKUS leaders could therefore be out of office before the agreement delivers tangible progress on any defense capability plan. Would a re-elected Donald Trump continue AUKUS? It must be said that while Trump was skeptical of NATO, in office he was a strong supporter of the alliance with Australia and bilateral partnership with the U.K. Much could depend on how Trump or any future Republican President might choose to engage with Beijing.

A further risk is that once the 18-month study into Australia's nuclear propulsion options is concluded in March 2023, U.S. officials might conclude that Australia does not have the capacity or resolve to adopt nuclear propulsion. By then, the Albanese government will have a clearer sense of the cost involved. A Labor government might conclude that the cost is too high, although against that, Labor would have to balance the negative implications for wider alliance cooperation.

Alliance relationships work best when they are delivering practical outcomes that benefit all parties. In short, AUKUS needs some practical results, including in areas where the fast delivery of capability will show the value of each country's changing long-standing industrial and procurement practices. While that is clearly the aim of officials working on AUKUS delivery, we should not underestimate the challenges. Will the U.S. Congress, for example, really support the early delivery of a Block IV *Virginia*-class SSN to Australia ahead of the U.S. Navy's own requirements? To date, congressional backing for AUKUS has been vocal and impressive, but in all three countries, local industrial and political perspectives will have to be acknowledged.

On balance, there is more for the AUKUS countries to gain by continuing cooperation under the agreement than there is by backsliding. Biden's personal investment in AUKUS is such that a failure to deliver tangible outcomes would damage the Administration's position, particularly in the Indo-Pacific region, weakening future options for the U.S. military posture in the Western Pacific. For Australia, the costs of an AUKUS backdown would likely have an election-losing consequence for any Australian government. The U.K. has perhaps the least to lose if AUKUS fails to deliver, but London has much to gain if it can shape a closer industry and technology relationship with Washington.

## Conclusion

Speaking at Singapore's Shangri La Dialogue in June 2022, U.S. Secretary of Defense Lloyd J. Austin summed up the value of AUKUS:

That's another reason why our new security partnership with Australia and the U.K. is so important. AUKUS won't just deliver nuclear-powered submarines. It holds out the promise of progress across a range of emerging tech areas that can bolster our deterrence, from AI to hypersonics.<sup>51</sup>

The defining words here are surely "the promise of progress." AUKUS offers a remarkable new stage of alliance cooperation that will substantially lift Australian defense capabilities and strengthen allied military forces in the Indo-Pacific with exotic new technology. If AUKUS succeeds, it will be transformative. If for whatever reason AUKUS fails, that would do lasting damage to the United States' position in the Indo-Pacific and to the position of the U.K. and Australia as America's closest allies. The next 12 months will be hugely consequential as officials work to deliver a viable path forward.

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## Recruiting the All-Volunteer Force: New Approaches for a New Era

## Richard Brady

The National Defense Strategy defines the enduring mission of the U.S. Department of Defense (DOD) as providing combat-credible military forces to deter war and protect the security of our nation. This requires the fielding of sufficient capable forces to defeat America's enemies and protect the American people and our vital national interests.<sup>1</sup>

In 1973, the U.S. military undertook a dramatic change in how it populated the services, moving from a model that relied on a combination of young Americans who wanted to join and those who were drafted by order of the government. The volunteer or recruited model has been a feature of the military since the country was founded, and the services have made all sorts of efforts to attract young men—and later, women—to join the military. Recruiters have appealed to a sense of patriotism, a desire for experience or education, health care benefits, or even a steady paycheck.

During periods of war, when the size of the military needed to be increased dramatically and very rapidly, the country employed a draft to fill the ranks, especially when casualties from combat needed to be replaced even by the unwilling. But the Vietnam war, occurring as it did during a period of great social and political upheaval in the U.S., led to a great rethinking about the military and what it needed to be. While not always the case, compelling draftees to serve in a controversial war during a time of domestic discord led to disciplinary problems in the military and declines in unit cohesion, effectiveness, and morale. The all-volunteer force (AVF) model was meant to improve the professionalism of the force, which it has, but it also depends on success in convincing young Americans in large numbers to join the force.

We are now seeing some substantial problems. Changes in American culture, the rise of new technologies used by American youth to interact with the world around them, and fewer opportunities to be exposed to the military are making the recruiting effort extraordinarily difficult. Beyond making it harder to meet annual recruiting goals, this potentially calls into question the AVF's viability and demands a number of improvements to and adaptations within the "accessions enterprise" if we are to continue to have the most competent, professional military possible.

Military accessions—the process of recruiting, qualifying, and conducting initial entry training—is vital to our national security interests. Its operating environment is constantly evolving, and the organizations involved must respond in kind to remain relevant and accomplish their missions. This is particularly true of the recruiting portion of the accession environment, as recruiting tends to be the most visible and significant aspect of accessions. Recruiting is constantly affected by changing applicant demographics and expectations, service requirements and demands, accession policies, threats and security requirements, and technologies.

The accession enterprise is made up of three components:

- The service recruiting commands;
- The United States Military Entrance Processing Command (USMEPCOM); and
- The service recruit training sites.

Each component has a vital role in supporting the DOD mission by ensuring and supporting the quality and quantity of the AVF. Given some significant changes in the recruiting environment, all participants in the process must adapt their systems, processes, organizations, and mindsets to meet the annual requirement of recruits in an AVF.

The military accession enterprise is experiencing structural, political, social, and technical shifts on a scale not seen since the all-volunteer force was adopted in 1973. It has been 50 years since the U.S. last drafted people, and the military services must address these shifts if they are to continue to be successful in populating our military with young Americans who are willing to serve our country.

Military recruiting involves actions and activities taken by a service to identify and attract individuals in sufficient numbers to meet organizational needs. These actions include marketing, advertising, influencing, and educating to generate a pool of desirable candidates, enhance their interest and attraction to military service, and increase the probability that these individuals will enlist. Among the organizational needs to be met by this process are the end strength objective for each service (how large it needs to be) and personnel with the aptitude and skills required to serve in technical fields.<sup>2</sup>

DOD recruiting data highlight the challenge involved in accomplishing the accession mission. Service recruiting productivity and resultant USME-PCOM and service recruit training throughput continue to be challenged by the COVID-19 pandemic, which has resulted in limited access to high school students and large student gatherings. But the COVID-19 challenges tell only part of the story. The COVID-19 pandemic exacerbated systemic issues—changing demographics, propensity, standards, technology, and methods—within the accession environment that had been building for years, and it will take more than the end of the pandemic to resolve them.

The services have limited levers to influence near-term recruiting results. For applicants, these levers include waiving tattoo policies, weight standards, and education standards and providing higher enlistment bonuses. Recent headlines indicate that service recruiting commands are attempting to use a mix of these levers to improve recruiting outcomes in fiscal year (FY) 2022.<sup>4</sup> Similarly, the services can increase recruiter productivity in the

near term through promotion and duty assignment preferences, monetary incentives, and involuntary extension of productive recruiters.<sup>5</sup>

The more important levers reside at the policy and societal levels where the quality and quantity of military service inductees can be properly balanced with a focus on long-term outcomes and costs to the accession enterprise. These levers include medical policies and standards, testing policies and standards, and youth propensity to serve. An appreciation for the role these levers play requires an understanding of the complex interplay of the organizations involved as well as the history of accession standards.

## A Balance of Interests: The Accession Triad

The first leg of the accession triad includes the military service recruiting commands. Under Title 10 of the United States Code:

The Secretary concerned may accept original enlistments in the Regular Army, Regular Navy, Regular Air Force, Regular Marine Corps, Regular Space Force, or Regular Coast Guard, as the case may be, of qualified, effective, and able-bodied persons who are not less than seventeen years of age nor more than forty-two years of age.<sup>6</sup>

The service secretaries carry out this mission largely through the recruiting force with oversight from service headquarters.

In terms of a supply chain, the service recruiting commands are the first step in a long process that eventually results in military servicemembers being fielded to operational commands and adding to military readiness. Collectively, the service recruiting commands employ more than 20,000 recruiters worldwide to meet their annual recruiting requirements. Within the accession triad, service recruiting results receive the most visibility, as annual goals are used by both the public and private sectors to gauge military readiness and the willingness of young Americans to serve their country in uniform.

In 1976, the Secretary of Defense established the United States Military Entrance Processing Command, the second leg of the accession triad. Initially established as a Department of the Army field operating agency under the jurisdiction of the Deputy Chief of Staff for Personnel, USMEPCOM was led

by a commanding general who was also commanding general of U.S. Army Recruiting Command. This arrangement remained in place until 1979 when USMEPCOM became a DOD field operating activity reporting to the Office of the Under Secretary of Defense for Personnel and Readiness. This arrangement gave the Secretary of Defense greater oversight of the accession process through USMEPCOM's mission of evaluating applicants by applying established DOD aptitude, medical, and moral standards during processing for military service.

The Secretary of Defense's authority over USME-PCOM and the accession process helps to ensure equality of opportunity for all eligible applicants for military service. The DOD uses common entrance qualification standards for enlistment, appointment, and induction across all military services. This helps to avoid inconsistencies and inequities linked to ethnicity, race, religion, or gender. Moreover, this enables the judgment of suitability for military service on the basis of an applicant's adaptability, potential to perform, and conduct.<sup>7</sup>

The third leg of the accession triad is the service recruit training mission. The services, including the U.S. Coast Guard, maintain nine recruit training sites with the mission to transform civilian volunteers into professional servicemembers who are disciplined, fit, acculturated, and combat ready. To increase the likelihood of success, the service recruit training commands desire new recruits who are at high levels of medical and mental readiness before the start of training.

All components of the accession triad—recruiting, USMEPCOM, and recruit training—must work cohesively to enlist approximately 250,000 men and women into the U.S. armed forces annually. This requires not only the integration of policies and systems, but also the balance of incentives and desired outcomes at each step of the process. Recruiting has the dual mission of quantity and quality with the former taking precedent over the latter. USMEPCOM has a near singular focus on quality and adherence to accession standards. Recruit training focuses on individual recruit readiness, which is a function of quality and training standards.

Because of the divergent incentive structure, there is a natural tension among the three elements of the triad: recruiting, USMEPCOM, and recruit training. This tension has generally led to positive outcomes for the accession enterprise, allowing it

to meet quality and quantity metrics in most years. However, when recruiting quantity metrics begin to fall short, as experienced in FY 2022, the tension builds, upsetting the balance between quality and quantity.

The military services must enlist a sufficient quantity of recruits to fill units in the operating forces and maintain readiness. If the quantity of recruits falls short, then the services must restructure operational units to ensure combat effectiveness. In terms of cold, hard metrics, quantity is valued more than quality. This has been true in both peacetime and in war. But starting in the early 20th century and as medicine and cognitive testing evolved, it became more difficult to ignore the quality aspects of recruits and the medical and mental fitness impacts on readiness.

### **Evolution of the Accession Process**

Today's modern accession standards originated with the United States' entry into World War I. The declaration of war signed by President Woodrow Wilson on April 6, 1917, set in motion what would become by the end of the war the largest coordinated system of human resource selection, classification, training, and assignment ever implemented. During the 18 months the nation participated in World War I, uniform standards were devised to screen out the medically unsuitable and to assess the aptitude capabilities of enlistees. Medically, screening for tuberculosis was a priority as TB was a leading cause of death at the time. Height and weight standards were also first applied with uniformity during the World War I era.<sup>9</sup> The application of these standards resulted in far more rejections of prospective servicemembers for underweight than for overweight.

World War I also witnessed the advent of aptitude testing. The Army Alpha test consisted of eight subtests and served as a prototype for later test development. The Army Beta test was one of the first paper-and-pencil tests to evaluate the aptitude of recruits who had little or no schooling or who did not speak English. Both tests were eventually replaced by the Army General Classification Test (AGCT).

More than 20 years later, World War II presented the nation with an even more monumental mobilization effort. By the time the wartime selective service laws expired in 1947, more than 10 million men had been inducted into the military services. The physical standards for induction were first published by the War Department in 1940.<sup>10</sup> They were used by local draft board physicians and physicians at Joint Army and Navy Induction Stations. The physical standards changed as the war progressed, as medical science advanced, and as the needs of the War Department evolved. The most extensive changes involved dental and visual acuity standards and the PULHES physical classification system, all of which are still in use today.<sup>11</sup>

In 1948, an interservice working group was created to develop a single aptitude test for use by all services. This effort resulted in the introduction in 1950 of the Armed Forces Qualification Test (AFQT). The AFQT served as a screening device, determining an applicant's overall capacity to absorb military training, and provided a uniform yardstick with which to predict the individual's potential for success while in service.

The AFQT did not aid in job classification. For this, the services employed their separate examinations or specialized tests. In 1974, the DOD selected the Armed Services Vocational Aptitude Battery (ASVAB) as the single instrument of choice to screen applicants both for enlistment and for occupational classification testing. This streamlined the testing process and enhanced the individual service's ability to match applicants with jobs and provide job guarantees to applicants who qualify. In 1976, the same year USMEPCOM was established, a revised version of the ASVAB became the enlistment eligibility test DOD-wide. Pefined and improved versions of the ASVAB continue to serve in the 21st century.

Medical fitness standards continue to be refined to keep pace with current trends in public health and advances in medical science and military requirements. Audiometric standards were added and hearing tests became routine. <sup>13</sup> Screening for HIV was mandated in the 1980s for all persons entering the services. <sup>14</sup> USMEPCOM incorporated International Classification of Disease (ICD-10) codes in 2015, <sup>15</sup> and updated standards related to transgender applicants and the pandemic diseases were added between 2017 and 2021. <sup>16</sup>

Today, the DOD regularly evaluates the medical and testing standards applied to accession based on emerging science, research, and advances in technology. These efforts, intended to balance cost and performance in military enlistments, are nonetheless influenced by politics and public opinion. The shifts in policy governing military service

for transgender individuals between 2018 and 2021 and the COVID-19 medical standards and vaccine policies of 2020 and 2021 are cases in point. While these policies are of interest from a societal or public health perspective, their impact on military readiness is hotly debated. One thing is quite clear, however: They increase both the cost and the level of effort needed to recruit military personnel.

## Levers of Control: Medical, Testing, and Propensity

The United States Army is projected to miss annual recruiting goals in FY 2022 and FY 2023, falling short by as many as 40,000 new recruits. General Joseph Martin, Vice Chief of Staff of the Army, identified the unprecedented challenges presented by the COVID-19 pandemic environment, the labor market, and competition with private companies as key factors that negatively impact recruiting. 17 These challenges have affected recruiter productivity by largely prohibiting large group events, curtailing widely attended sports or school events, and limiting the impact of traditional incentive schemes like bonuses. The Army, Army Reserve, and Army National Guard are the recruiting bellwether for all of the military services, accounting for nearly 50 percent of the annual DOD accession goal of 250,000 recruits.

The traditional model of recruiting, which was effective before the COVID-19 pandemic, will not suffice in a post-COVID environment. Understanding this requires understanding the structural issues that determine whether a potential recruit desires to serve and is qualified to join. Finding medically fit, academically proficient, and motivated men and women is the foundational issue in military recruiting.

**Medical.** DOD Instruction 6130.03, Volume 1, "Medical Standards for Military Service: Appointment, Enlistment, or Induction," establishes baseline accession medical standards. <sup>18</sup> All applicants complete the same accession medical history process, which requires self-disclosure of medical history, authorization given to the military to access personal medical records, and a physical examination by a licensed medical professional.

Uniform accession medical standards reduce the risk of long-term negative outcomes both for the servicemember and for the military services. The intent is to not aggravate any preexisting physical or mental health condition that might lead to the injury or death of the servicemember or a long-term cost

to the government from a permanent disability. The stress of military service can result in a reoccurrence of some previous condition, whether resolved or unresolved. All components of the accession enterprise have a shared goal: finding young adults to meet the mission requirements of the military services and ensuring that they have every opportunity to pursue a successful military career.

Accession medical standards are based on advances in medical science, changes in public health, operational needs, and prerogatives of the DOD and military services pertaining to sociopolitical or cultural issues. They are designed to ensure that individuals are physically and psychologically qualified and capable of performing the strenuous military duties that are often associated with wartime activities. This requires the applicant to be available for worldwide duty without restriction or delay; able to tolerate exposure to stressful, dangerous, and harsh environments; and able to operate dangerous, sensitive, or classified equipment.

Applicants with conditions that would normally disqualify them are reviewed on a case-by-case basis by the relevant service to determine whether a medical waiver can be issued. Each service has its own waiver policy that typically calls for more information about the condition of the individual and treatments available to mitigate risk associated with the medical condition. This additional information helps the service to make a risk-informed decision on the applicant. Conditions that are more rarely waived include those involving behavioral health, including self-mutilation, suicidal attempts or gestures, major depression, bipolar disorder, or other similar conditions.

As important as the military recruiting and accession processes are, they rely heavily on a patchwork of outdated technology and paper-based data collection for medical history. Until recently, this process was seen to serve both the needs of DOD and those of the services even though it was based on the assumption that the medical record provided by the applicant was complete and accurate. Based on this assumption, the DOD thought it was able to apply stringent accession medical standards, and this gave the impression that high quality standards were being met even though the services were recruiting applicants with largely unverifiable medical histories.

Various studies and reports over the years identified this shortfall in validating applicant disclosure

of medical history, which led to Existing Prior to Service (EPTS) attrition (early discharge of the service-member because of undisclosed medical problems revealed during the servicemember's first enlistment) and high costs to the DOD at recruit training and during first-term enlistment.

USMEPCOM data consistently show that almost 50 percent of all EPTS attrition in all services is due to applicant nondisclosure of medical information. The principal reasons for EPTS in all services are (in order) psychological, orthopedic, and asthma (pulmonary). Applicants for military service undergo a USMEPCOM medical screening that includes a physical exam; urinalysis for protein, glucose, and illicit drugs; hearing; and vision. Applicants complete a report of medical history as well as behavioral questionnaires, both of which require the applicant to disclose any conditions, particularly in behavioral health, that would normally be disqualifying.

For various reasons, from willful nondisclosure to poor recall, applicants tend not to reveal such information. According to a 2016 Accession Medical Standards Analysis and Research Activity (AMSARA) report, "the great majority of EPTS discharges are for medical conditions that were not discovered or disclosed at the time of application for service, with concealment by the applicant being the most common scenario."21 Since these instances of nondisclosure are not uncommon, obtaining applicant medical and/or prescription records helps USMEPCOM medical providers to make the appropriate qualification decisions. In addition, the services, through their Service Medical Waiver Review Authorities (SMWRA), are better informed when conducting risk assessments during waiver reviews. In most cases, the relevant military medical authorities are able to acquire this important information, but the time needed to do so also means that it takes longer to process the applicant.

Between 1997 and 2017, the Government Accountability Office (GAO) made several recommendations to improve recruit medical screening processes at USMEPCOM. The GAO's 1997 report recommended that DOD develop methods to verify applicant medical history to decrease issues of nondisclosure that could lead to recruit injury, attrition, or even death.<sup>22</sup> Its 2017 report highlighted concern with the lack of electronic interfaces between USMEPCOM and electronic medical information

holders that would otherwise make it easier for Military Entrance Processing Stations (MEPS) to obtain medical history information.<sup>23</sup>

In 2016, USMEPCOM was directed to gain access to authoritative health information through a fully automated and electronic health record system to reduce the number of EPTS discharges and respond to the various problems noted in government reports. USMEPCOM conducted assessments, pilots, and initiatives between 2016 and 2020 to obtain this information and prepare for implementation. These efforts resulted in a system-of-systems approach that began with formal pilot programs in 2020 and an implementation plan in 2021.

Medical modernization in USMEPCOM encompasses multiple systems that collectively provide access to an applicant's health information and electronic health records. The systems include:

- MEPCOM Integrated Resource System (MIRS 1.1). MIRS is a cloud-based, enterprise processing system that provides centralized control and interface for accessions. <sup>24</sup> Deployed in 2021, MIRS features increased maintainability, usability, security, and scalability compared to legacy systems. It supports medical processing through the scheduling and reporting of medical exams.
- Health Artifact and Image Management Solution (HAIMS). HAIMS provides global visibility and access to records and images generated during health care delivery. With access available at all MEPS and service recruit training sites, HAIMS supports the digitization and transmission of accession health records while reducing personally identifiable information (PII) and personal health information (PHI) exposure.
- **Joint Longitudinal Viewer (JLV).** JLV provides an integrated, read-only view of electronic health records from the DOD, Department of Veterans Affairs (VA), and health information exchanges. <sup>26</sup> JLV primarily contains health information on prior service applicants and the dependents (spouses and children) of military servicemembers. It utilizes electronic health records held by DOD and VA to provide prescription history for beneficiary populations.

- Prescription Medication Reporting System (PMRS). A commercial application used primarily by the insurance industry, PMRS provides pharmacy history reports on individuals, including prescription drug dosage and refill information. PMRS primarily covers insured applicants who have no prior military affiliation and is compliant with both the Health Insurance Portability and Accountability Act (HI-PAA) and the Fair Credit Reporting Act.
- Military Health System (MHS) GENESIS.

  MHS GENESIS is the next-generation DOD,

  VA, and Department of Homeland Security (for
  U.S. Coast Guard) electronic health record that
  covers accession through retirement. 28 MHS

  GENESIS is a fully digital system that leverages authoritative data and reduces reliance on
  paper-based processes.

Collectively, these systems provide end-to-end electronic health record coverage and access to authoritative health information while fully digitizing the accession medical process in a cloud-based environment. From an enterprise standpoint, they improve qualification decisions, reduce recruit training attrition (EPTS), and enhance policy formation at the DOD and service levels.

In December 2021, USMEPCOM initiated the Medical Review of Authoritative Data (MROAD) program as the first step to address the problem of applicant nondisclosure. MROAD makes it possible for the military to obtain applicant prescription histories that are used to identify medical conditions contributing to avoidable attrition. <sup>29</sup> MROAD leverages two complementary systems: JLV and PMRS. The data obtained from JLV and PMRS reports allow for a more comprehensive picture of applicants' medical histories.

In early 2020, USMEPCOM used MROAD to assess the use and impact of JLV and PMRS in the medical evaluation process. Only records of applicants already shipped to recruit training were reviewed so that the assessment did not affect actual qualification decisions. After reviewing the records of 1,545 applicants between April and June 2020, USMEPCOM found that nearly 7 percent of applicants had a prescription history suggesting non-waiverable medical conditions.<sup>30</sup> Further analysis indicated that approximately 83 percent of applicants would be

fully qualified during the physical exam with an additional 10 percent receiving service medical waivers.

The net impact on qualifications confirmed that applicants were not disclosing potentially disqualifying conditions, as the disqualification rate increased by nearly 7 percent overall. It was estimated that the savings associated with better qualification decisions totaled nearly \$1 billion per year for the DOD and services at a financial cost of only \$5 million per year. Interestingly, the results of the review also revealed that an additional 21,000 applicants need to be recruited each year to offset the number that are medically disqualified during prescreening for the services to meet their annual recruiting goals.

The individual applicant findings were somewhat more startling. When the prescription history of applicants who had already assessed and shipped to recruit training during 2020 were reviewed, it was found that many had undisclosed, significant mental health conditions that would not be compatible with military service or success at recruit training. Examples included:

- An applicant with 232 prescription fills for multiple psychiatric medications,
- An applicant with over 100 prescription fills for ADHD and anti-depressives, and
- An applicant who was prescribed lithium for bipolar disorder.

Such cases would not normally be granted a waiver for enlistment by the military services, yet they somehow "slipped through the system."

The decision to implement MROAD in actual qualification decisions was made in 2021. DOD developed several courses of action (COA) that balanced the need for medical modernization with the realities of the recruiting environment. While varying somewhat in their implementation start date and the use of medical history reports during the course of the accession process, all of the COAs recommended better use of both electronic and paper medical records to determine whether an applicant needed a more comprehensive physical examination.

Perhaps not surprisingly, the positions of agencies involved in the decision to implement recommendations varied greatly, depending on their missions and roles in the accession supply chain.

- USMEPCOM had processes and procedures in place to implement the use of PMRS and JLV when directed. This initiative addressed the historical problem of applicant nondisclosure of medical history and would have allowed USMEPCOM medical providers to make better informed risk-based decisions. The use of authoritative health information would also reduce the variance in medical decision-making and EPTS attrition, nearly 50 percent of which is due to applicants failing to disclose medically disqualifying information.
- Service recruiting commands were hesitant,
   preferring to implement MROAD in FY 2023.
   The ongoing COVID-19 pandemic, inability to
   gain access to schools and conduct large-scale
   events, and a young, less experienced recruiting
   force had created challenges to meeting recruitment goals. Recruiting commands were concerned that implementation of more stringent
   medical screening practices would decrease
   the pool of eligible applicants and increase the
   workload for recruiters. Any additional barriers
   to entry were seen as counterproductive.
- The Council on Recruit Basic Training, an organization made up of the commanders and commanding generals of the service recruit training commands, supported medical modernization efforts if they reduced EPTS attrition at the initial entry training sites. Identifying medically disqualifying conditions would arguably prevent injury or death, minimize attrition rates, and increase graduation rates. Furthermore, applicants approved through the waiver process would sustain fewer injuries/illnesses if preventive measures were available.
- Service medical review waiver authorities largely favored the use of authoritative health information in the accession process because it provided a more holistic picture of an applicant's medical history and allowed for better determinations in cases involving medical waiver requests.

The DOD directed the implementation of MROAD beginning in FY 2022<sup>31</sup> against the strong reservations of the services. USMEPCOM was

directed to provide implementing procedures to the services before the initiation of MROAD and to conduct an assessment of the program after six months of use. Military applicant medical disqualification rates began to increase immediately following the implementation of MROAD in December 2021. Additionally, the increase in the quantity of medical history that MEPS medical providers needed to review increased the timeline for medical evaluations. These two factors—higher disqualification rates and longer timelines—increased the risk of missed recruiting goals for the service recruiting commands. The services voiced their concerns in early 2022, and DOD decided to pause the MROAD program in anticipation of the deployment of MHS GENESIS.<sup>32</sup>

USMEPCOM deployed MHS GENESIS in the second and third quarters of FY 2022. Similar to the deployment of MROAD, the services strongly objected to the deployment of MHS GENESIS. They continued to be concerned about the negative impact that increased medical disqualification rates would have on service recruiting efforts, particularly in a year when all military services are struggling to meet their recruiting goals. Despite these concerns, determining that the improved quality of military applicants outweighed the services' concerns about quantity and given the difficulty of the recruiting mission in FY 2022 and the likelihood that the services would miss recruiting goals in any event, DOD determined that FY 2022 was the best time to deploy MHS GENESIS.

The deployment of MHS GENESIS marked the most significant change in medical qualification in a half-century and was the result of decades of work and research. USMEPCOM moved from a paper-based system to a modern health care system that provides "a single health record for service members, veterans, and their families"33 as well as better, more responsive access to authoritative health information. Its use not only has the direct impact of improving the quality of recruits enlisted in the military, but also provides improved insight into the overall health of the U.S. armed forces. These long-term benefits should not be outweighed by the short-term impacts being experienced by the service recruiting commands in meeting their quantity goals.

**Cognitive and Non-Cognitive Testing.** The ASVAB is the world's most widely used multiple-aptitude test battery and became so widely used

because of the evolutionary process by which it was developed and implemented—a process in which the U.S armed forces have played a central role.

The process of administering standardized tests at the beginning of the 20th century was time-consuming and costly and required highly trained administrators. In 1917, American Psychological Association (APA) President Robert Yerkes urged the APA to contribute to the war effort by helping to find a way to assess recruits. <sup>34</sup> The APA formed numerous committees, one of which was charged with developing a group intelligence test that could identify men with low intelligence and those who were well-prepared for special assignments or higher-level training.

Their efforts resulted in the Army Alpha and Beta tests, introduced in 1917.<sup>35</sup> The Army Alpha was a written test for literate recruits. It had various parts, including analogy recognition, missing number fillins, and sentence unscrambling. These types of questions are still common in modern IQ tests. The Beta version was used for men who did not speak English or were illiterate. It also had several parts, including a maze, number work, and picture completions. The Alpha and Beta tests could be administered to large groups and took less than an hour to complete. By the end of World War I, more than one million people had taken the Army Alpha and Beta tests.

The Army used the tests for two primary reasons: to improve the assigning of new recruits and to allow military leaders to gain a better understanding of their soldiers' individual abilities. The first tests were just the beginning of the journey for intelligence and aptitude testing within the U.S. military.

During World War II, each service used its own assessment procedures before an individual's induction. The War Department also began to use the Army General Classification Test and Navy General Classification Test to classify enlisted personnel. These tests included questions on vocabulary, arithmetic, and block counting. More than nine million people took these tests during the war.

In 1948, Congress passed the Selective Service Act, which mandated that the newly formed DOD should develop a uniform screening test to be used by all of the services. In response, DOD developed the AFQT.<sup>37</sup> DOD began to administer the AFQT in 1950 and continued to administer it until the mid-1970s. The AFQT consisted of 100 multiple choice questions in vocabulary, arithmetic, spatial relations,

TABLE 1

# Armed Forces Qualification Test: Categories and Score Ranges

**SOURCE:** Armed Services Vocational Aptitude Battery, "Understanding ASVAB Scores," https://www.officialasvab.com/applicants/scores/ (accessed August 9, 2022).

Category	Score Range
1	93-99
II	65-92
IIIA	50-64
IIIB	31-49
IVA	21-30
IVB	16-20
IVC	10-15
V	1-9

and mechanical ability. DOD used the AFQT to measure the "general trainability" of draftees and volunteers for all of the armed services.

In 1966, the DOD began to develop a single battery for all of the services. In 1968, the DOD first offered the ASVAB at no cost to high schools and postsecondary schools. By 1976, DOD introduced the ASVAB as the official aptitude test for all of the services. Since that time, the DOD has improved the ASVAB program, most notably with the inclusion of the Career Exploration Program (CEP). Administered to over 500,000 high school students annually, the CEP is used by school counselors to encourage students to increase their level of self-knowledge and understand how that information is linked to military and civilian occupational opportunities.

For recruiters and potential recruits, the ASVAB test's most important score is the AFQT, which is computed using scores from four subtests: Arithmetic Reasoning, Mathematics Knowledge, Paragraph Comprehension, and Word Knowledge. The AFQT score is a percentile ranging from 1–99 and is normed based on a sample of 18-year-old through 23-year-old youth that was collected in 1997, resulting in a bell curve in which an AFQT score of 50 represents an average result. The AFQT scores are further broken into eight categories, as depicted in the accompanying table.

The military services are required to report the number of military applicants enlisted under each category. The service recruiters are strongly encouraged to enlist AFQT Category I, II, and IIIA applicants and to limit AFQT IIIB applicants. Generally,

the services will not enlist applicants below Category IIIB without a waiver.

The difficulty involved in finding sufficient numbers of AFQT Category I, II, and IIIA applicants has led the services to explore non-cognitive testing as an alternative way to assess American youth for their potential to succeed in military service. These non-cognitive tests, the most notable being the Tailored Adaptive Personality Assessment System (TAPAS), identify behavioral skills and attributes like grit, resilience, or coping that predict success in an endeavor. Nearly all of the military services have administered or are administering the TAPAS test to military applicants, and the Army was administering it on a limited basis as early as 2012. However, none of the military services has fully integrated the TAPAS scores into its enlistment-related decision-making.

Service recruiting commands and advocacy groups have asked that applicants be allowed to use electronic calculators when taking ASVAB tests and that testing be provided in a language option other than English (for example, in Spanish). The thought is that the use of calculators and testing in a native language will increase the pool of qualified applicants. However, these proposals present multiple challenges. ASVAB testing questions have not been developed with calculators in mind, and the test has not been normed with applicants who used calculators. As a result, allowing calculators to be used in ASVAB testing would likely have only a marginal impact on the number of qualified applicants. In addition, military training is conducted

in English, so applicants who are not proficient in English would likely struggle with and possibly fail in training because of their inability to comprehend the training materials.

The most viable way to increase the pool of qualified applicants would be to use a blend of cognitive and non-cognitive tests to determine suitability and enlistment. For example, ASVAB Category IV applicants who would otherwise not be considered for enlistment could be granted a waiver if they have a high TAPAS score. As all the services are currently administering the TAPAS test to prospective recruits, this blended approach could be implemented quickly and at a fraction of the cost of other options. The blended approach represents a step-increase in testing capability, increasing the enlistment eligibility (qualification) of the current and prospective pool of recruits while also improving the classification of recruits to improve success rates in military service.

**Propensity.** While the DOD as a whole and the military services individually develop and implement policies to identify high-quality prospects for military service and increase the odds that such service will be successful, they also work to understand the attitude of youth toward military service. This is key to marketing efforts that link the military to American youth.

One of the DOD's greatest challenges is a significant decline in the propensity to serve among America's youth and a corresponding negative trend in views of the value of military service among key "influencers" that shape their opinions. This decline has been influenced by a combination of factors such as:

- A shrinking military footprint in many areas of the country (resulting in less opportunity for youth to have personal contact with anyone in the military);
- Low unemployment rates (plenty of job opportunities in the civilian sector);
- Improved access to college and higher education; and
- Years of prolonged overseas conflict for the military (implying that anyone joining the military would have a similar experience).

These factors have created conditions in which the intrinsically motivating elements of military service have become less self-evident to the youth market while the sacrifices of service in terms of physical, psychological, and quality-of-life consequences remain top-of-mind. Today's youth view military service as fraught with risk and sacrifice without unique rewards or advantages. The distinguishing outcomes that youth associate with joining the military often include physical injury, constant deployment, family separation, post-service unemployment, and trouble reintegrating into society. These views are often reinforced by the media, national headlines, and family influence.

Moreover, the increased political polarization of America has crept into perceptions of military service. The military is portrayed negatively as either a breeding ground for racist, extremist, or insurgent behavior on the one hand or weakened by "woke," fragile, and social experimentation policies on the other. Both portrayals, neither of which is either true or productive, undermine youth propensity to serve and therefore military recruiting.

To counter these challenges and help reimage the military for today's youth, the DOD initiated a series of influencer media campaigns. The messaging was intended to increase awareness of the opportunities of military service, advocate for the benefits of public service, and overcome the misinformation with respect to the risks associated with military service.

The Joint Advertising, Market Research and Studies (JAMRS) program is the DOD office for military advertising, market research, and studies related to recruiting.<sup>39</sup> JAMRS uses annual surveys to explore the perceptions, beliefs, and attitudes of American youth as they relate to joining the military. Understanding these factors is critical to success in sustaining an AVF and helps to ensure that recruiting efforts are directed in the most efficient and beneficial manner.

JAMRS survey results show a steady decline in the general propensity to serve in the military among youth ages 16–21 between 2018 and 2021, reaching a low of 10 percent in the summer of 2021. At low levels of propensity, all resources supporting the recruiting mission must work harder for the services and DOD to make annual recruiting goals. For the first time, a majority of youth have never considered the military as an option, even though economic hardships and uncertainties persisted throughout the COVID-19 pandemic.

Additionally, only 23 percent of America's youth are eligible to enlist in the military without a waiver. Disqualifying factors include overweight, drug use, adverse medical conditions/history, adverse mental health condition/history, low aptitude and education, poor conduct, and having dependents (a spouse, child or children, or other family members who depend on the potential enlistee for support). Nearly half of all youth who are ineligible are so for multiple reasons. This situation is exacerbated by low youth propensity and the difficulties recruiters have in engaging youth in a fragmented social and cultural landscape with limited resources.

Most youth do not seek information about serving in the military and are not motivated to look past the stereotypes presented in our culture. Emergent concerns around sexual harassment and assault in the military are at an all-time high: Nearly one-third of eligible youth cite this as the main reason why they would not consider joining the U.S. military. Significant growth in the number of media platforms, including traditional media, social media, and digital media, requires outreach resources to work harder and be targeted so that they reach intended markets more effectively.

The disconnect between the youth population and the military has been exacerbated by current events, creating a perfect storm for military recruiters. The restrictions on in-person engagements imposed because of the COVID-19 pandemic have left recruiters at a disadvantage in cultivating and maintaining relationships with both the broader market and the low-propensity segments of that market. As many recruiters will relate, it is much easier for a potential applicant to "ghost" them, either by not responding to efforts to contact them or by ignoring follow-on efforts once an initial contact is made, if they have met only online. Additionally, many recruiters lack the social media skills and authorities to engage with potential applicants in the digital platforms where they are most likely to be found.

Nonetheless, recruiting remains a very personal business. Unlike transactional sales, recruiting for military service is more akin to a serial sales model where a recruit must be sold multiple years of service. This requires face-to-face interactions not only with the prospective recruit, but also with his or her family, friends, and other influencers. For most successful recruiters, this is not a "9 to 5" job; it is one that requires significant evening and

weekend engagement to achieve recruiting goals. Individual recruiter engagement with prospective applicants is therefore extremely important and must be measured across multiple metrics to ensure that the front end of the accession pipeline remains productive.

Market indications are problematic for military recruiting in both the short and long terms. Many youth aspire to a lifestyle that maximizes work-life alignment, which they do not perceive as being available with military service. The military recruiting services have not adjusted their messaging to account for this change in youth attitudes. Doing so will come at increased cost, but it will also help to attract high-quality, eligible, and diverse youth. Experience has shown that support for AVF recruitment requires adequate and sustained resources. The services must have the resources to make timely investments in the number of recruiters, marketing and advertising efforts, and enlistment bonuses to mitigate the adverse effects of such a challenging environment.

## **Modernizing Military Accessions**

The military accession process must evolve to achieve the quality standards and quantity requirements that are needed to maintain military readiness. Industrial age accession practices, based on large-scale batch processing, need to be replaced by data-driven and targeted strategies. The COVID-19 pandemic served as an inflection point for the accession enterprise, highlighting systemic issues in the accession model while prompting the development of potentially transformational programs to modernize the process. At present, the military services are failing to leverage new tools to achieve their recruiting goals at the very time when American youth are increasingly ineligible to serve and have less desire to serve.

While challenging, the recruiting environment does present an opportunity to emerge from the COVID-19 pandemic with a new accession model that is built on modern medical standards and technologies, integrated cognitive and non-cognitive testing, and the ability to adapt to changing youth attitudes and behaviors. The current incentive structure, which tends to favor quantity of recruits over quality of recruits, does not support this transition. History has shown that the accession enterprise can evolve when there is sufficient dissatisfaction with

the current state, when there is a compelling vision for a future state, and when initial steps are taken toward that future state.

The medical technologies, in terms of authoritative health information and electronic health records, and the cognitive and non-cognitive testing methodologies are in place to be fully integrated into the accession process. The only obstacles that remain are the policy and political will to do so and the institutional resistance to change. Failure to act at this moment will delay implementation for at least another generation and continue to jeopardize military readiness.

Political agendas and public opinion will continue to play a role in the accession process, but their negative manifestations can be marginalized when all of the components needed to identify, engage, recruit, and induct new servicemembers are aligned on outcomes. Understanding the primary levers of control through medical and testing standards, as well as a deep understanding of changing youth attitudes and behaviors, will allow the accession enterprise to achieve its goals in any political, economic, or social environment.

### Conclusion

The accession enterprise must build the resilience that is similarly expected of military service-members. Recruiting the AVF cannot be a reactive activity; it must be a proactive, initiative-driven effort that engages American youth and convinces them of the value and nobility of serving their country in uniform.

Removing impediments is critical to making progress in this endeavor, and implementing a host of modern systems within the medical screening and recruit processing systems is a huge step forward. Similar efforts are needed in the recruiting system and should receive priority attention not just from senior defense officials, but also from influencers in education, civic organizations, and the sports and entertainment industries. These are the sectors of American society that are in the closest and most regular contact with our youth. If such efforts are not made, the viability of the AVF and, consequently, the security of the country will come into question.

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# Determining the Real Cost of the Tools of War

John G. Ferrari, Major General, U.S. Army (Ret.)

A popular low-cost airline advertises one-way flights from New York City to Los Angeles starting at \$61, an undeniable bargain. When you go to book the flight, you realize it is a 13-hour trip, compared to the six-hour nonstop advertised by competitors. Then you notice the five-and-a-half-hour layover in Miami, in a direction the opposite of where you are traveling.

When you continue with your booking, it becomes clear that to choose your seat, bring any sort of personal item on the plane, and check a bag, you will have to spend another \$65—four bucks more than the cost of the flight itself. A carry-on and one-time waived change fee will cost you an additional \$15. Finally, for the right to check in with an agent at the airport, you will be squeezed for an extra \$10. On the payment page, your \$61 flight will have become nearly triple what you would have paid to be afforded the same amenities provided on most other flights (with the exception of complimentary in-flight beverages and snacks), and you have become the beneficiary of an unexpected five-and-a-half-hour pit stop in a Florida airport.

The Department of Defense (DOD) weapons systems and personnel cost estimates and the unnamed low-cost airline have many commonalities including misleading up-front and fixed costs, misunderstood timelines, and operational costs that are often ignored. Why make the comparison? The American public is consuming information from various sources that often mix up, confuse, and make erroneous cost projections for various DOD programs. Just as they need to be better consumers of airline flight information, American taxpayers need to be more well-informed about defense capabilities and better consumers of defense information and security.

With regard to defense costs, there are four key problems with respect to both weapons systems and personnel:

- The failure to include operating and support costs,
- Undefined timelines,
- · Poor or nonexistent updating of estimates, and
- Abuse of the English language.

It is clear that some of the most prominent programs and personnel costs in the U.S. military today suffer from inconsistent and incomplete estimations, with one prominent exception: the much-maligned F-35 fighter. As complicated as the estimation process and DOD estimation guidelines are, once he or she knows where to look, anyone can determine where programs fall victim to some of the more common estimation pitfalls.

Although submitting incorrect estimations could eventually lead to bad policy decisions, it is safe to assume that few to none of these inaccuracies are the result of malicious intent. Some estimations, such as those for the F-35 program and the cost of the Iraq War, have serious political implications that may incentivize the cherry-picking of numbers, but consistent problems in DOD estimations result from a number of systemic and procedural issues. This analysis is not meant to forgive misguided budgeting but seeks rather to explain that even the "facts" may not be accurate in the end, whether miscalculations are caused by inclusion or by omission of data. As the U.S. seeks to strengthen the military's budget, it is critical that policymakers have the right information

at the right time so that they can make the best decisions and Americans can get the most national defense for their tax dollars.

# Using and Understanding the Right Defense Budget Terms

How much money does Congress provide for our national defense? This is a seemingly easy question, yet most get it wrong, and they do so mostly because there are three different sets of numbers that get transposed in normal conversation. What the United States spends on national defense is not the same as what the Pentagon spends, which is not the same as how much money is appropriated by the Defense Appropriations Subcommittees of Congress. Understanding the difference between, for example, "basic economy" and merely "economy" is key to understanding what our money is buying.

To start with, the term "national defense"—in the case of resourcing-encompasses much more than the Pentagon and includes programs run by other departments such as the nuclear program in the Department of Energy. This number is often called the "050" budget line number and aligns with the National Defense Authorization Act. For the Pentagon specifically, its funding is often called "051." But just to make it slightly more confusing, in the congressional appropriation process, the defense appropriation does not include either the Pentagon funds for Military Construction/Family Housing, which are provided by the Appropriations Committee's Military Construction, Veterans Affairs, and Related Agencies Subcommittee, or the non-Pentagon National Defense funds, which are provided by the Energy and Water Development and Related Agencies Subcommittee.

Table 2 is a helpful guide to understanding these numerical discrepancies and explains why the following sentence incorrectly compares budget resources: "A budget of even \$770 billion [051] would be a significant increase when compared to the \$728.5 billion enacted in law for the Defense Department in FY22 [defense appropriation less military construction]."

This is just one example (albeit a simple one) of how the word "defense" has three different meanings depending upon who is using it and when. Now imagine this playing out across different programs or in the context of real versus nominal dollars. Not being specific with defense budget terms can complicate the analyses of and justifications for billions of dollars in national security decisions. One should never be afraid to ask what is meant by a word: Words matter.

**PAUC vs. APUC.** Anyone who wants to know how much specific weapons systems or munitions cost should be prepared to be dazzled by two different combinations—PAUC and APUC—and be prepared for both to be used interchangeably or, worse yet, not identified.

PAUC stands for Program Acquisition Unit Cost, which is set in statute and used to define cost reporting requirements to Congress.<sup>2</sup> It is simply calculated by adding together all of the developmental costs for a program, including program-specific military construction; adding it to the projected cost of production; and then dividing that sum by the total number of systems intended to be procured throughout the system's lifetime. If you want to make a system appear affordable, be extremely optimistic in how many you plan to acquire: The more you "intend" to buy, the more you spread the development costs, thus driving down the appearance of the per unit price. In this case, imagine you are the airline, trying to raise money from investors. If you assume lots of people on your aircraft for each flight, you can market yourself as a low-cost airline. However, if the passengers do not show up, you are now a high-cost airline.

Within DOD, analyzing the PAUC is important for programs with large up-front development costs and high projected quantities. As a smart consumer of DOD acquisition data, never take the PAUC at face value without understanding those two factors.

The second acronym is APUC: same letters, but this time they stand for Average Per Unit Cost. The APUC is calculated by taking the actual projected cost of production and dividing it by the proposed quantity. Since inflating the quantity does not get you a lower average in this case, how does this number get misused? It is called the "learning curve." The learning curve occurs when a program assumes that the cost of production will magically decrease over time. Since there is both an art and a science to forecasting the learning curve effect in forecasted pricing, this is an area in which you should be extremely skeptical when comparing different systems.

To see it in practice, consider the recent budget documents for the F-35 and F-15EX. In 2023, the F-35 jets are Block 4 models, and the fly-away cost

TABLE 2

## **Funding Provided to the Department of Defense**

	2021 Enacted	2022 President's Budget	2022 Omnibus	Change, 2021 Enacted to 2022 Omnibus
DOD, Defense Appropriations	\$695.2	\$705.2	\$728.5	4.8%
DOD, MILCON Appropriations	\$8.5	\$9.8	\$14.9	75.3%
Total DOD (051)	\$703.7	\$715.0	\$743.4	5.6%
Non-DOD National Defense (DOE/Other)	\$37.1	\$37.9	\$38.6	4.0%
National Defense Budget (050)	\$740.8	\$752.9	\$782.0	5.6%

**SOURCE:** Elaine McCuster and John G. Ferrari, "4 Initial Defense Highlights from the 2022 Omnibus Appropriations Bill," American Enterprise Institute, AEIdeas Blog, March 11, 2022, https://www.aei.org/foreign-and-defense-policy/4-initial-defense-highlights-from-the-2022-omnibus- appropriations-bill/ (accessed August 11, 2022).

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(APUC) is about \$91.6 million each or \$5 million more than the Block 3 jets, which is straightforward. If the Air Force bought 48 jets, the gross weapons system cost (PAUC) of each fighter would have been \$108 million. By reducing the number of F-35s purchased/denominator to just 33 F-35As, the gross weapons systems cost (PAUC) increases by almost \$8 million to \$115.5 million.

Why would the Air Force do this? Because they want to buy more F-15EXs. Reducing F-35 quantities makes the \$120.2 million PAUC for the F-15EX seem almost even. In other words, \$120.2 million per plane seems a lot more justifiable to Congress when the other option is nearly the same price anyway. Buying only 33 enables the Air Force to level the cost comparisons. All of the math is accurate, but knowing how the costs are calculated is just as important.

# Missile Defense Agency: How Excluding Costs "Looks" Cheaper

A common fallacy holds that projected cost estimates are guided by and adhere to a common set of rules and standards and that they cannot be skewed by the agency providing them. The Missile Defense Agency (MDA) has its own acquisition authority

and funding lines; therefore, it does not go through the same bureaucratic process that other agencies must go through inside the Pentagon. Before the Federal Aviation Administration cracked down on the airlines, some of them excluded such things as the Passenger Facility Charge, Flight Segment Tax, September 11 Security Fee (Passenger Civil Aviation Security Service Fee), and Transportation Tax from their advertised fares. Unfortunately, we have no version of the FAA for program costing; therefore, as with a resort fee at a hotel, you need to ask about other costs.

At its core, the MDA is only supposed to procure systems, and after it is done fielding them, the intent is for the systems and all associated costs to be transferred to one of the military services. Therefore, MDA estimates tend to be limited to just the MDA's costs—not lifetime costs. A February 2022 Government Accountability Office (GAO) report highlights this reality, noting that the U.S. Missile Defense Agency's cost estimates included "a number of shortcomings...such as its comprehensiveness, accuracy, transparency, and traceability." 3

With regard to cost omissions, one needs to be aware that the MDA is omitting certain operational and sustainment costs from its estimates. Why is this important? Because operations and sustainment costs can often reach 70 percent of lifetime-program costs, which means that omitting or adjusting these estimates has an enormous impact not just on current funding levels, but also on future funding levels. This has hampered the MDA because, in reality, the agency has not transferred many programs to the services. Therefore, over time, the MDA finds itself spending more funds on sustainment, which is not in its mission statement, and less on research and development and procurement, which are why it exists. This error, in effect, mortgages our future to pay for the present.

The GAO also notes that the MDA is inaccurately reporting flight test cost estimates. Two recent Terminal High Altitude Area Defense (THAAD) tests cost a combined \$20 million, but the flight test estimate was only \$2 million. This discrepancy is not isolated to the Army's THAAD system. The GAO also found a \$1.5 billion increase in development costs for the Aegis Weapon System Spiral 5.1 program between 2019 and 2020 baseline reporting, while MDA only reported a \$664 million increase—a difference of \$851 million." Why is this important? Because those costs are inaccurately represented elsewhere in the budget, which means that policymakers are using bad information when assessing the cost-benefit of one system versus another.

Is the MDA doing anything malicious? Not necessarily. For the most part, it is doing estimates only for those costs that apply directly to its mission set rather than after it transfers the program to the services. The MDA will also state that, regarding test costs, assessing fixed costs across programs may not be worth the effort. In any event, an observer's understanding of the costs for various MDA systems would be just over one-third of the actual cost: \$1.3 billion reported by the MDA versus "at least \$3.5 billion" uncovered by the GAO.

However, just because it is not malicious doesn't mean it is not a problem. Anticipating ongoing systems costs certainly needs to be included in program estimates to help the decision-makers prepare for future years' defense spending.

# Constellation-Class Frigate: The Guide to Wishful Thinking

Much like the MDA, the Navy has its own unique way of calculating costs. The Navy places all of its detailed design/nonrecurring engineering (DD/NRE)

costs in the procurement of the first ship for a specific class. Even taking that into account, it appears that the Navy then engages in a bit of wishful thinking on how costs can be reduced for the new class of ships, relying on intuition rather than on past data. This is analogous to someone who checks the price of an airplane ticket six weeks out and then uses that estimate to set aside funds for a ticket he intends to purchase the night before he flies.

In 2020, the Navy estimated that the *Constellation*-class frigate would cost about \$870 million per ship, or \$8.7 billion for the 10-ship project;<sup>7</sup> Eric Labs, one of the top Congressional Budget Office (CBO) naval analysts, separately predicted that the program would cost \$1.2 billion per ship, or \$12.3 billion for the entire program.<sup>8</sup> Historically, the Navy has "almost always" underestimated the cost of its shipbuilding projects.<sup>9</sup> The Navy was able to weave together a wishful narrative that, according to the Congressional Research Service, could be true because the "FFG(X) is based on a[n Italian] design that has been in production [in Italy and France] for many years" and "[l]ittle if any new technology is being developed for it." So what actually happened?

From fiscal year (FY) 2021 to FY 2022, the Navy's estimate of the cost per ship increased by 14 percent. Specifically:

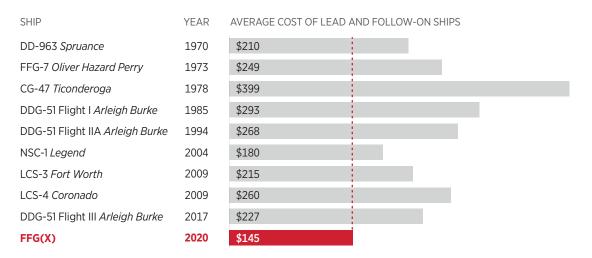
In the Navy's FY2021 budget submission, the FFG-62 class ship to be procured in FY2022 (i.e., the third ship in the program) had an estimated procurement cost of \$954.5 million. In the Navy's FY2022 budget submission, the ship has an estimated procurement cost of \$1,087.9 million—an increase of \$133.4 million, or 14.0%, over the figure in the Navy's FY2021 budget submission.<sup>11</sup>

This increase came about as a result of preparation and testing costs that were not previously included in the estimates. Looking forward, "if FFG-62s were to wind up costing about the same to construct per thousand tons of displacement as other recent U.S. military surface combatants, then the third and subsequent FFG-62s could cost 17% to 56% more than the estimate for those ships shown in the Navy's FY2021 budget submission."<sup>12</sup>

The military services are not immune to wishful thinking, and they also know that getting the proverbial camel's nose under the tent is a certain way to

### Pound for Pound: Comparing the Cost of the Navy's New Frigate

Every surface combatant built since 1970 cost more by weight to produce than the Navy expects its new FFG(X) to cost. Figures shown below are costs per thousand tons of displacement in millions of 2020 dollars.



**SOURCE:** Figure 1, "Cost of the Navy's Surface Combatants per Thousand Tons of Lightship Displacement," in Congressional Budget Ofce, "The Cost of the Navy's New Frigate," October 2020, p. 6, https://www.cbo.gov/system/files/2020-10/56669-New-Frigate-Program.pdf (accessed August 11, 2022).

keep a program. Very few people get promoted for saying that they will run acquisition programs that cost more than previous programs; therefore, the inherent bias to "try for" savings is not malicious in intent but is instead rational inside a large bureaucracy. But that is not to say this rationale doesn't desperately need a cleanup.

### Littoral Combat Ships: Forgetting People and the Price of Having Them

The Navy is already decommissioning its initial purchase of the Littoral Combat Ship (LCS) fleet just 14 years after the first ship set sail and, amazingly enough, even as a ship is finishing construction. What went wrong? A lot. For the purpose of this analysis, however, we will confine ourselves to the cost projections for operating costs, which turned out to be outdated and inaccurate according to the GAO.<sup>13</sup>

The initial plan called for the ship to have about 40 people with maintenance done by contractors. The Navy estimated total operating costs per year per ship at \$50 million. In reality, the cost over time

was closer to \$71 million—a 42 percent miscalculation. While the difference between \$50 million and \$71 million might seem relatively small, if you account for a 42 percent mistake over a long period of time for a large fleet of ships, the cost increase gets very large, very fast.

How did the Navy get this so wrong? It turns out that outsourcing maintenance to contractors drove up the cost. <sup>14</sup> The initial estimate of 40 crew members nearly doubled in reality to about 70, and before the Navy decided to terminate the program, the number of sailors needed was about to grow even more. Cost projections based on bad assumptions or preferred assumptions that turn out to be wrong introduce flawed data for programs; the result is policy decisions and budget commitments that prove to be terribly costly for the service and the taxpayer.

# Optionally Manned Fighting Vehicle: Failing to Account for Uncertainty

One of the Army's signature modernization programs is the Optionally Manned Fighting Vehicle

(OMFV). Being optionally manned means that it could operate autonomously, a task that has never been accomplished and for which there are almost no past cost data. To fund this program in the near term, the Army is slowing down procurement of its existing systems, in essence trading current combat power for future combat power.

However, will the Army be able to afford the new program, or is it doing as it did with the Future Combat Systems and other past efforts to build ground combat systems: setting itself up for having neither current nor future ground combat capabilities while spending tens of billions of dollars? If one is to believe the GAO, the Army is substituting the precision of point estimates to mask uncertainty, which in the past has led to failure "due to immature technology and changing and complex requirements at a cost to taxpayers of roughly \$23 billion." In effect, reality displaces optimistic projections over time, revealing the true cost of systems that are consistently higher than originally presumed.

In the case of the OMFV, the consumer of the Army's cost estimates needs to grapple with two important pieces of uncertainty. First, as discussed above, the Army has tried this before and failed to the tune of \$23 billion. One has to ask: Why is this time different? The second question is: If this has never been done before, as we have never built an optionally manned combat platform, how can the cost estimate even be accurate?

Given these complicating factors, it might have made more sense for the Army to structure this program as a series of smaller-duration, less risky demonstration projects that can prove out the cost, technology, and feasibility of the system. The GAO did give the Army high marks for following the cost estimation process, but at \$46 billion (the projected cost of the program), the uncertainty error is enormous. As we saw with the Navy LCS, there really may be no way to know what the actual cost will be.

The equivalent of this, for our airline ticket purchaser, is that you are going to buy an airline ticket for a flight 10 years from now and agree to pay based on the purchase price of aircraft that have yet to be purchased, the future unknown price of jet fuel, and the potential costs of developing the flight to have either a real pilot or no pilot at all. At this point, it is an open-ended commitment to spend money. Maybe this is less like buying a plane ticket than it is like buying a ticket to Mars.

# Reserve Forces: The Cost of Active vs. Activating

In the past decade, both the U.S. Air Force and the U.S. Army have had financial disputes with their National Guard forces that have led to congressionally chartered commissions, both of which were triggered during periods of declining budgets and potential force structure reductions.<sup>17</sup> The cost discussions are often difficult to understand, with both sides making "accurate" statements that lead to "different" conclusions. How can this be? It depends on how you blend personnel costs, equipment costs, and operating costs along with assumptions on Reserve use during peacetime for operational rotation missions versus wartime surge capacity. These five different variables can be, and often are, blended differently and then compared together as if they were the same.

The first and most frequently used costs are those for personnel. Since Reserve personnel are part-time personnel, it is a mathematical fact that those that are not activated are less expensive than full-time personnel. However, depending on how often and for what purpose the services activate their Reserve Component forces, they could cost more than the equivalent of an Active unit. This is due to the time—and therefore the resources—needed for mobilization and post-mobilization efforts. If used for the occasional surge operation, the costs of the Reserve over time tend to be less than those of their Active counterparts. But if used nearly continuously for operational missions (continuous boots on the ground), the costs tend to be higher.

Equipment costs, though often not discussed in relation to Reserve components, are relevant depending upon whether one treats equipment as a sunk cost because the equipment already exists or as a procurement cost that should be included in the Reserve's total value/expense. The National Commission on the Future of the Army began over a dispute about the Apache helicopter's force structure. Because the Army did not have enough Apaches and needed more funds to buy more aircraft, the price became a central component of the conversation.

When related to low-density, high-cost weapons platforms like the Apache, costs become more relevant because they can dwarf other investments like personnel or operations. To compare, the cost of 100 cargo trucks might be nearly negligible within the Army's total budget for accounting purposes, but the

cost of additional Apache helicopters at \$13 million apiece mounts up significantly and quickly. (The less expensive trucks, however, also can add up to significant dollars if the quantity is high enough.) In other words, it matters what type of Reserve unit one is discussing, because the equipment within one type of unit can account for much more in dollar terms than the equipment in others does.

Emerging from all of these studies over many years are two fundamental premises when discussing the Active Component/Reserve Component force mix:

- "Part-time" force structure, meaning the capability delivered by traditional Reservists and
  Guardsmen who do not serve continuously on active duty, costs less than the force structure provided by "full-time" personnel.
- Reserve Component force structure, especially traditional Reservists, costs less than that of the Active Component, but Reserve Component forces are not always less expensive when conducting operations than are Active Component forces.

If you are trying to figure out how much it costs to travel from New York to Los Angeles, it matters whether you are flying on a private jet or a commercial jet, taking the train, or getting on a bus. For the discussion of Active versus Reserve Component costing, it matters whether you are including equipment costs, operational use, and wartime surge, broken out by various types of units.

#### The Cost of War: Who's Asking?

According to the Special Inspector General for Afghanistan Reconstruction's most recent report:

DOD's latest *Cost of War Report*, dated September 30, 2021, said its cumulative obligations for Operation Enduring Freedom and Operation Freedom's Sentinel in Afghanistan, including U.S. warfighting and DOD reconstruction programs, had reached \$849.7 billion.... State, USAID, and other civilian agencies report cumulative obligations of \$50.1 billion for Afghanistan reconstruction, which when added to the DOD amount results in \$136.9 billion obligated for Afghanistan reconstruction through that date....<sup>18</sup>

As of March 2021, the Department of Defense estimated that emergency/overseas contingency operations (OCO) spending for the wars in Iraq, Syria, and Afghanistan totaled \$1.596 trillion;<sup>19</sup> as of June 2022, it estimated that the total had reached \$1.637 trillion.<sup>20</sup>

The cost of a war is perhaps the most challenging of all cost estimates. There are, off the bat, many necessary clarifying questions such as:

- In what time span do you quantify the war?
- When do residual costs end?
- Do you count related but indirect war costs?
   For example, do you count related activities in Syria as part of the Iraq war's costs?
- Does it include personnel costs, which have to be accounted for regardless of whether the servicemember is at home or abroad?
- Are you measuring what was spent that otherwise would have not been spent, or also the cost of assets and resources that would still have been costly without the war? For example, a plane is flown in peacetime if only for pilots to maintain their skills and certification.
- Is one to account for direct economic costs?
- What about costs associated with deaths, the climate, etc.?
- Do you know how you measure those?
- Do you count associated medical care for veterans of those wars?

Any estimate that professes to have determined the *actual* cost of war involves many subjective decisions about what to count and what not to count. Estimating the cost of the Iraq War is a chief example of this dilemma. The Brown University Costs of War Project has estimated that from FY 2001–FY 2022, the wars in Iraq and Syria cost a total of \$2.058 trillion (exclusive of future veterans' care). If one includes future veterans' care, total costs rise to \$3.158 trillion.<sup>21</sup> A much less aggressive and comprehensive estimate by the Congressional Research Service puts

obligations for Iraq at 51 percent (\$759 billion) of total DOD OCO obligations from 9/11 through FY 2018.<sup>22</sup> This would be the simplest number because it includes the fewest factors in estimated war costs.

This is very similar to trying to calculate externalities into the cost of a flight to differentiate it from the price you are actually paying. For example:

- What is the price of the carbon emissions from the flight?
- What about the cost of the taxpayer-subsidized airport?
- If the airline goes bankrupt, what pension costs will the government have to pay for in the future?
- What about the food stamp costs for the people cleaning the airplane because they do not make a living wage?
- Have we calculated the environmental damage caused by production of the jet fuel?
- While we are at it, how about the human cost of extracting the titanium needed in war-torn countries to build the aircraft?

All of a sudden, the "cost" of your flight diverges wildly from the "price" you pay for the ticket.

Such is the case with the cost of war. It encompasses not only weapons systems and personnel costs, but also the accounting difficulties within both. The question of what to count and what is being accounted for leads to incredible variance between cost estimates—whether based on projected interest or whether or not to include veterans' care. The key here is transparency: By knowing how it is totaled, one can better assess the components of that total, whether and how it compares to others, and what capabilities the funds physically provide.

#### F-35: Most Expensive or Most Impressive?

The F-35 aircraft is one of the most advanced and ambitious programs that DOD has undertaken. It also is heralded as the most expensive program ever undertaken. As this is the last of the cases we will examine, it is interesting to see how the F-35 compares to some of the other programs discussed in this essay.

First, the cost is estimated over a 66-year life cycle, with a current estimate in excess of \$1.7 trillion. (By contrast, the MDA did not estimate operational costs over the lifetime of the missiles and supporting systems it purchased.) Of the \$1.7 trillion, the procurement of 2,456 aircraft accounts for just under \$400 billion, while the cost of sustaining the planes over time hits nearly \$1.3 trillion. This is very important, as no other DOD program has a 66-year operating cost estimate.

Second, this program has updated its cost estimates more times than almost all other programs combined. Over the course of the program, the GAO alone has issued an extensive series of reports examining the F-35's ongoing cost estimates and the "significant challenges DOD faced in sustaining a growing F-35 fleet."<sup>24</sup> In April 2021, for example, the GAO reported that the Air Force needs to reduce estimated sustainment costs per plane by \$3.7 million by 2036 or face \$4.4 billion in costs beyond estimates.<sup>25</sup> Each time the GAO issues a report, the cost estimates are updated. For most programs, the cost estimates are traditionally frozen in time, so this is likely the first living cost estimate in DOD's history.

Many worry that the armed services will be unable to afford the F-35's sustainment. This should certainly be worrisome, as this critical project faces a grim future. But in relation to the thesis of this analysis, the forewarning and guidance on reducing future expenses make this program's cost accounting also very impressive. As a result of expansive reporting from DOD and other U.S. government agencies on current costs and program updates and estimates, the F-35 program is likely the most well-accounted major weapons program in DOD history. One cannot help but wonder what the cost would be for every other major acquisition program across DOD if the same criteria and program updates that have been applied to the F-35 program were applied to them.

Finally, in comparing F-35 procurement costs with procurement costs for other aircraft, it is obvious that other systems do not have the same in-depth cost accounting. This makes an apples-to-apples comparison impossible for anyone but the most determined budget analyst.

In a recent and relevantly titled article, "Air Force's Math on the F-15EX and F-35 Doesn't Add Up," <sup>26</sup> a comparison of the two fighter platforms reveals the impressive nature of F-35 program

cost counting. The Administration cuts the F-35 procurement quantities for FY 2023 because the F-15s are "less expensive to buy and to fly" than the F-35. The Air Force's cost data for these two weapons systems prove this to be "patently false." The F-35's "flyaway" cost includes all of the equipment needed to meet mission requirements. The "cheaper" F-15 estimate provided by DOD fails to include offensive systems that are included in the F-35's "sticker" price to meet the same requirements. And while the F-35 program might be a record due to its inclusion of all elements, for FY 2022, the gross weapons systems cost—including all necessary packages, equipment, and support depots-brings the F-15EX to \$120 million<sup>27</sup> compared to the fully loaded F-35A's \$98.2 million.

Because of the F-35's comprehensive cost estimates, the program has been able to see where changes need to be made. The fighter's mission-capable rate has continued to rise in recent years, and DOD has reduced sustainment and readiness expenditures and timelines. Reform efforts include increasing the availability and production of spare parts, improving depot-level repair, and decreasing customer wait times.

Increased transparency may increase the apparent cost, but in the long term, it results in better decisions and informed savings. The same cannot be said with any certainty for other aircraft procurement programs because no other such program has been similarly assessed.

#### Conclusion

When you purchase an airline ticket these days, sites like Google Flights attempt to standardize the pricing by allowing you to adjust the ticket price for expenses like carry-on baggage and picking your seats while also measuring your carbon footprint. But even that tool is not necessarily sufficient because some airlines, such as Southwest, are simply

not on their search engine, while others use techniques like fare ghosting or providing discounted rates to other sites. In essence, *caveat emptor*—let the buyer beware. The same is true when you read a paper, news story, or official document about how much anything in DOD costs: Know that what you read is likely not everything you should know.

First, there is no consistent standard for the updating of lifetime budget costs, which is especially problematic when actual inflation rates vary heavily from those anticipated numbers. In these cases, the estimates become obsolete. Lifetime budgets are sometimes not updated when estimates for the procurement of individual units unexpectedly increase, as in the case of the FFG-62.

Next, the updated standards for budget estimation are not high enough, and there is no consumer protection board to hear complaints or to assess penalties for bad information. Even though services consistently underestimate initial and lifetime costs of personnel and weapons systems, there is no system for ensuring adjustments before the release of official estimates, which are almost always incomplete. Think of this as "in-flight meals not included" the next time you book your trip. The remedy for this is firmer definitions regarding budget estimations, something akin to the MSRP sticker on a new car—which in reality is often much more than the price you end up paying the dealer.

Perhaps most important, the consumers of this information should channel their inner "Sy Syms." Sy ran a series of discount clothing stores in the Northeast, and his slogan was "An educated consumer is our best customer." From reporters to analysts to the American public, asking the right questions, understanding partial answers—and when the answers are only partial—and then acting on the information will ensure that as a nation, we make better decisions and smarter investments regarding our national security.

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# Global Operating Environment

# Assessing the Global Operating Environment

easuring the strength of a military force-defined as the extent to which that force can accomplish missions-requires examination of the environments in which the force operates. Aspects of one environment may facilitate military operations; aspects of another may work against them. A favorable operating environment presents the U.S. military with obvious advantages; an unfavorable operating environment may limit the effect of U.S. military power. The capabilities and assets of U.S. allies, the strength of foes, the willingness of friend or foe to use its military power, the region's geopolitical environment, and the availability of forward facilities and logistics infrastructure all factor into whether an operating environment can support U.S. military operations.

When assessing an operating environment, one must pay particular attention to any U.S. treaty obligations with countries in the region. A treaty defense obligation ensures that the legal framework is in place for the U.S. to maintain and operate a military presence in a particular country. In addition, a treaty partnership usually yields regular training exercises and interoperability as well as political and economic ties. It also obligates the U.S. to commit its military in support of an ally, which has the effect of focusing U.S. military leadership on some regions more than others.

Additional factors—including the military capabilities of allies that might be useful to U.S. military operations; the degree to which the U.S. and allied militaries in the region are interoperable and can use, for example, common means of command, communication, and other systems; and whether the U.S. maintains key bilateral alliances with nations in the region—also affect the operating environment. Similarly, nations where the U.S. has stationed assets or permanent bases and countries from which the U.S. has launched military operations in the past may

provide needed support for future U.S. military operations. The relationships and knowledge gained through any of these factors would undoubtedly ease future U.S. military operations in a region and contribute greatly to a positive operating environment.

In addition to U.S. defense relations within a region, additional criteria—including the quality of the local infrastructure, the area's political stability, whether or not a country is embroiled in any conflicts, and the degree to which a nation is economically free—should also be considered.

Then there are low-likelihood, high-consequence events that occur infrequently but that, when they do happen, can radically alter conditions in ways that affect U.S. interests. Massive natural disasters like Typhoon Tip in 1979 or the explosion of Mount Tambora in 1816 can displace populations, upend regional power arrangements, or destroy critical infrastructure. The eruption of Mount Pinatubo did just that in 1991, causing so much damage to Clark Airbase and Subic Bay Naval Station that the cost, combined with diplomatic frictions between the U.S. and the Philippines, led the U.S. to abandon these strategic facilities. A massive solar flare could have a similar impact on a much larger scale because of the level of dependence on electrical power across our world. Scientists, analysts, planners, and officials in public and commercial ventures study such things but seldom take concrete action to mitigate their potential impact.

For the past two years, the world has been shaken by the COVID-19 pandemic, which has caused governments to spend extraordinary sums of money not only to manage the public health crisis, but also to mitigate the economic impact on their countries. The economic and societal stresses stemming from the pandemic have put terrific pressures on political establishments. They also have caused funding for such essential government functions as defense to

be reallocated to meet the more immediate demands of the pandemic and—given the threat of contagion—mitigation measures to be adopted at the expense of military exercises, training events, and deployments. As of mid-2022, most countries appear to have resolved many of the disruptions caused by the pandemic, adapting their economies and adjusting their policy approaches to deal with the public health crisis. So, too, have populations that have normalized their routines, mitigating many of the original fears stemming from the crisis. In similar fashion, military forces have found ways to return to training and exercises that are necessary to regain proficiency.

Most recently, Russia's invasion of Ukraine in early 2022 has affected national and public perspectives with regard to military power. Before Russia invaded its neighbor, many capitals acknowledged the importance of military power but often failed to follow their words with commensurate investments in operationally relevant military forces. Confronted with the reality of a war in Europe and the possibility of another one in Asia because of China's persistent saber rattling and heavy investment in its ability to project power, Poland, Germany, Great Britain, and Japan, to name but a few, have

substantially increased their defense budgets and, among European allies, have contributed equipment, munitions, and a range of supplies to Ukraine to help it defend itself.

One consequence of this has been reinvigorated discussions among U.S. allies about the status of military power and the need to ensure that forces can work together effectively. But another has been the consumption of expensive military capabilities, which has led some countries to start hedging on their pledges to sustain support to Ukraine or, in some circumstances, to contribute national power to collective defense.

All of this to say that conditions evolve from one year to the next and from one security setting to the next in ways that affect the ease or difficulty of conducting U.S. military operations. The operating environment assessment is meant to add critical context to complement the threat environment and U.S. military assessments that are detailed in subsequent sections of the *2023 Index*.

A final note: This *Index* refers to all disputed territories by the names employed by the United States Department of State and should not be seen as reflecting a position on any of these disputes.

## Europe

### **Daniel Kochis**

The past year has seen significant and swift changes in U.S. force posture in Europe and the trajectory of allied capabilities because of Russia's second invasion of Ukraine in February. The scale, scope, and intensity of conventional military power used by Russia led to a renewed appreciation for such power in many European capitals that had neglected their militaries since the end of the Cold War. In April, a U.S. Department of Defense (DOD) spokesperson stated that "[t]he European security environment has changed and will stay changed as a result of [Russian President Vladimir] Putin's willingness to conduct an unprovoked invasion of a neighboring state."

The U.S. has reintroduced additional manpower and capabilities into Europe and is reevaluating its long-term basing posture. European NATO allies have deployed in support of alliance deterrence efforts in eastern Europe, and many have renewed their commitment to NATO spending benchmarks and rebuilding military capabilities that have atrophied over the past 30 years. In June, NATO invited Finland and Sweden to join the alliance. Also in June, the alliance adopted a new Strategic Concept at its Madrid summit. The first new concept since 2010, it takes into account the comprehensive changes in the transatlantic security environment that have taken place during the past 12 years. With respect to Russia, it states clearly that:

The Russian Federation is the most significant and direct threat to Allies' security and to peace and stability in the Euro-Atlantic area. It seeks to establish spheres of influence and direct control through coercion, subversion, aggression and annexation. It uses conventional, cyber and hybrid means against us and our

partners. Its coercive military posture, rhetoric and proven willingness to use force to pursue its political goals undermine the rules-based international order.<sup>3</sup>

Additionally, the new concept recognizes China as a major challenge: "The People's Republic of China's (PRC) stated ambitions and coercive policies challenge our interests, security and values," and "[t]he deepening strategic partnership between the People's Republic of China and the Russian Federation and their mutually reinforcing attempts to undercut the rules-based international order run counter to our values and interests."

In addition to taking steps to bolster NATO's collective defense capability, the U.S. and its allies have made significant investments in arming and training the Ukrainian military. What began as individual nations supplying arms, ammunition, and supplies (often surplus) has evolved into a sustained flow of intelligence, weapons, matériel, and platforms upon which Ukrainian forces have become entirely reliant. Some nations have even begun to repair damaged Ukrainian equipment. In addition to military aid and intelligence, European nations in particular have accepted millions of Ukrainian refugees fleeing the war.

All of this illuminates the reality that war is still a feature of international relations that cannot be predicted or always deterred, that is costly both in preparation and undertaking, and that generates additional costs (such as support for refugees and disruption of economic activity) beyond the straightforward expense of equipment and training.

The 51 countries in the U.S. European Command (USEUCOM) area of responsibility (AOR) include approximately one-fifth of the world's population, 10.7 million square miles of land, and 13 million

square miles of ocean. Some of America's oldest (France) and closest (the United Kingdom) allies are found in Europe. The U.S. and Europe share a strong commitment to the rule of law, human rights, free markets, and democracy. During the 20th century, millions of Americans fought alongside European allies to defend these shared ideals—the foundations on which America was built.

America's economic ties to the region are likewise important. A stable, secure, and economically viable Europe is in America's economic interest. For more than 70 years, the U.S. military presence has contributed to regional security and stability, and both Europeans and Americans have benefited economically. The member states of the European Union (EU), along with the United States, account for approximately half of the global economy, and the U.S. and EU member countries are generally each other's principal trading partners.

Europe is also important to the U.S. because of its geographical proximity to some of the world's most dangerous and contested regions. From the eastern Atlantic Ocean to the Middle East, up to the Caucasus through Russia, and into the Arctic, Europe is enveloped by an arc of instability. The European region also has some of the world's most vital shipping lanes, energy resources, and trade choke points.

European basing allows U.S. forces to respond robustly and quickly to challenges to U.S. economic and security interests in and near the region. Russia's brutal effort to remake the borders of Europe by force has shocked many partners, upended the continent's strategic picture, and begun a war with implications that are far wider than the sovereignty of Ukraine itself. Admiral Robert Burke, Commander of U.S. Naval Forces Europe, U.S. Naval Forces Africa, and Allied Joint Forces Command Naples, for example, has described the European and African theaters as "the forefront of great power competition." 5

Other external threats to European security include Russia's activity in the Arctic, growing presence in the Mediterranean theater, and efforts to destabilize Western cohesion in addition to the possibility that Russia might expand the scope of its aggression to include the eastern states of NATO. Added to this is the growing threat to the transatlantic alliance that is posed by Chinese investments, technology, and propaganda efforts. Russian naval activity in the North Atlantic and Arctic has necessitated a renewed focus on regional command and

control and has led to increased operations by U.S. and allied air and naval assets in the Arctic, and Russia's strengthened position in Syria has led to a resurgence of Russian activity in the Mediterranean that has contributed to "congested" conditions.<sup>6</sup>

Speaking at an Atlantic Council meeting in March 2019, U.S. Joint Chiefs of Staff Chairman General Joseph Dunford explained that the U.S. has two key advantages over adversaries: "our network of allies and partners, and the ability to project power where and when necessary to advance our national interest." Nowhere is the value of allies and U.S. basing more apparent than it is in the European operating environment.

U.S. Reinforcements in Europe. Russia's war against Ukraine greatly accelerated a trend of U.S. reinvestment in Europe that had begun following Russia's initial invasion of Ukraine in 2014. In April 2014, the U.S. launched Operation Atlantic Resolve (OAR), a series of actions meant to reassure U.S. allies in Europe, particularly those bordering Russia. Under Operation Atlantic Resolve and funded through the European Deterrence Initiative (EDI), the U.S. increased its forward presence in Europe; invested in European basing infrastructure and in prepositioned stocks, equipment, and supplies; engaged in enhanced multinational training exercises; and negotiated agreements for increased cooperation with NATO allies.

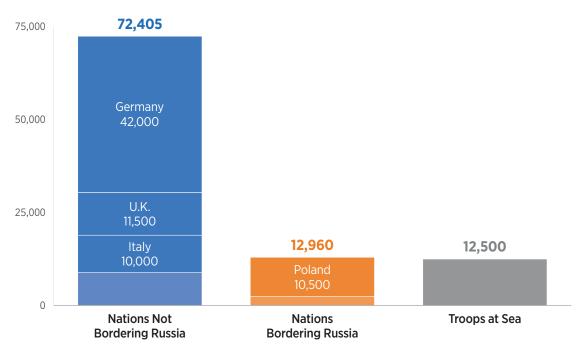
Russia's invasion of Ukraine spurred the U.S. to increase forces flowing to Europe and ignited a U.S. and NATO-wide reevaluation of long-term basing structures and force posture requirements to deter Russian aggression from spilling over to alliance member states, especially those like Poland, whose role as a staging ground for aid to Ukrainian forces has made it a Russian target.<sup>8</sup>

In January 2022, the U.S. had approximately 80,000 troops in Europe (permanent and rotational); that number grew to more than 100,000 by March.<sup>9</sup> A month after Russia's invasion,

[T]he U.S. ha[d] activated about 11,600 troops for the mission: 4,700 from the 82nd Airborne Division to Poland; 300 from the XVIII Airborne Corps to Germany; 1,000 from the 2nd Cavalry Regiment to Romania; 800 from the 173rd Airborne Brigade Combat Team to Latvia; 100 F-35 Lightning II air crew to Estonia, Lithuania and Romania; 100 AH-64 Apache aircrew to

CHART 2

Few U.S. Troops in Europe Are Stationed Near Russia



**SOURCE:** U.S. European Command, written response to Heritage Foundation request for information on U.S. troop levels in Europe, July 7, 2022.

Poland and the Baltic states; 3,800 from 1st Armored Brigade Combat Team, 3rd Infantry Division and its sustainment unit to Germany; 150 airmen from Fairchild Air Force Base, Washington; 40 members of an air support operations unit to Romania and Poland; 300 ordnance and maintenance soldiers to Germany; and 300 members of V Corps to Germany and Poland.<sup>10</sup>

The U.S. has brought additional air assets to Europe. The U.S. Air Force (USAF), for example, "has moved additional fighters, tankers, and intelligence, surveillance, and reconnaissance aircraft into the European theater over the past few months, as well as bombers on a rotational basis, all to reassure NATO allies who feel threatened by the invasion of Ukraine." In March 2022, six U.S. Navy EA-18G Growlers and 240 troops deployed to Spangdahlem Air Base in Germany from Washington State to bolster alliance collective defense. According to

the Pentagon, "These Growlers…are equipped for a variety of missions. But they do specialize in flying electronic warfare missions, using a suite of jamming sensors to confuse enemy radars, greatly aiding in the ability to conduct suppression of enemy air defense operations." From February through April, three B-52 Stratofortress aircraft and 300 troops from North Dakota rotated to a base in the United Kingdom as part of the Bomber Task Force Mission, flying regularly over European airspace. <sup>13</sup>

The U.S. has also begun to consider new permanent basing in eastern European NATO member states. In April 2022, Joint Chiefs of Staff Chairman General Mark Milley voiced his support for permanent U.S. bases in eastern Europe but with troops deployed rotationally "[s]o you get the effect of permanence' at a lesser cost because expenses such as family housing and schools are not involved." "I believe a lot of our allies, especially those such as the Baltics or Poland or Romania...are very willing to establish permanent bases," Milley noted. "They

will build them and pay for them."<sup>14</sup> In May, responding to advance questions as part of Senate Armed Services Committee hearings on his nomination to serve as Commander, U.S. European Command and Supreme Allied Commander, Europe, General Christopher Cavoli similarly stated that "permanently assigned forces are more operationally effective, as they remain fully oriented to the operational environment and can become interoperable with our Allies and Partners."<sup>15</sup>

European Deterrence Initiative. On top of renewed investments in Europe, the U.S. has continued with more established efforts to bolster collective defense in Europe. The Biden Administration has requested \$4,176.9 billion for the European Deterrence Initiative in fiscal year (FY) 2023, which would be a \$365.3 million increase from the enacted FY 2022 EDI budget of \$3,811.6 billion. EDI funding requests for FY 2023 include (among others):

- "[Continued support for] rotational force deployments, infrastructure investments, and [delivery of] the right capabilities in key locations throughout Europe (i.e., Air Force-European Contingency Air Operations Sets (ECAOS), Army Prepositioned Stocks (APS))."
- Exercises to "increase the overall readiness and interoperability of U.S. forces across all domain" and "improve the interoperability of U.S. forces with our NATO Allies and theater partners."
- Infrastructure improvements that include "purchasing new fixed undersea surveillance systems and refurbishment of older, existing systems already in place throughout the AOR" and improving "airfield infrastructure and prepositioned storage capability to support U.S. Air Forces in Europe operations, actions, and activities."
- "Providing our Allies and partners with the capability and capacity to better defend themselves and to enable or enhance their participation as full operational partners against threatening actors...."

Testifying in March 2022, General Tod Wolters, Commander, U.S. European Command, and NATO's Supreme Allied Commander Europe (SACEUR), highlighted the importance of EDI funding in returning the United States to a posture of deterrence:

EDI enhances our posture to deter adversaries and compete in a contested logistics environment alongside our European defense counterparts. Increases in forward stationed and rotational forces strengthen our contact, blunt, and surge layer capabilities, providing an ability to compete and win in a multi-domain crisis or conflict. EDI investments improve theater infrastructure and prepositioned stocks. Funding for exercises, training, and building partner capacity strengthens the readiness, architecture, and interoperability across the Euro-Atlantic area. These advances enable our deterrence and defense efforts through rapid deployment and sustainment of forces.<sup>18</sup>

The EDI has supported infrastructure improvements across the region. One major EDI-funded project is a replacement hospital at Landstuhl, Germany, to be named the Rhine Ordnance Barracks Medical Center. Originally slated to be completed in 2022, it is now expected that it will be completed in 2027. The new permanent facility will "provid[e] primary care, specialized consultative care, hospitalization and treatment for more than 200,000 U.S. military personnel, DoD and interagency civilians and dependents in Europe." Landstuhl's importance is illustrated by the fact that in early March 2020, it was one of the first two overseas U.S. laboratories to be capable of testing for coronavirus. 20

In addition to the EDI, as of the end of 2021, the U.S. Department of State had awarded nearly \$300 million in grants since 2018 through its European Recapitalization Incentive Program (ERIP) and repurposed funds to help U.S. allies in Europe replace Russian equipment with U.S.-made equipment. This includes infantry fighting vehicles for Croatia, Greece, and North Macedonia; helicopters for Albania, Bosnia and Herzegovina, Lithuania, and Slovakia; and air surveillance radars and fixedwing aircraft for Bulgaria. The program helps allies to "modernize their militaries by building NATO interoperable forces and removing Russian and Soviet-legacy equipment from their force structure." 21

Forward Presence. In April 2022, the 3rd Armored Brigade Combat Team (ABCT) of the 4th Infantry

Division from Fort Carson, Colorado, replaced the outgoing BCT in the ninth armored rotation in support of Operation Atlantic Resolve. The BCT consisted in part of 4,000 troops, 90 tanks, 15 Paladins, and 150 infantry fighting vehicles. Many analysts have noted the special importance of ground forces for deterrence. "Land forces provide traditional 'boots on the ground' and a visible presence among local populations," according to one recent analysis. "They can also enhance the credibility of deterrence through bringing to bear the heavy ground forces required to defend, seize, and hold territory in the event of conflict." <sup>23</sup>

In addition to back-to-back rotations of armor, the U.S. has maintained a rotational aviation brigade in Europe since February 2017. The eighth such rotation, lasting from November 2021–July 2022, has been the 1st Air Cavalry Brigade, 1st Cavalry Division from Fort Hood, Texas, with 2,000 troops, 10 CH-47 Chinooks, 25 AH-64 Apaches, and 35 UH-60 and 15 HH-60 Black Hawk helicopters.

In May 2018, the U.S. began to fly MQ-9 Reaper drones on unarmed reconnaissance flights out of Miroslawiec Air Base in Poland. The drones became fully operational in March 2019 when U.S. Air Force officials stated that Poland was chosen for the MQ-9s because of its "strategic location." In June 2020, runway work at Miroslawiec caused drones to be moved temporarily to Ämari Air Base in Estonia, marking the first time that unmanned U.S. aircraft have operated out of Estonia.

In January 2021, the U.S. announced that 90 USAF personnel and an unspecified number of MQ-9s would be based at Campia Turzii in Romania "to conduct intelligence, surveillance and reconnaissance missions in support of NATO operations." According to General Jeffrey Harrigian, Commander of U.S. Air Forces in Europe, U.S. Air Forces Africa, and Allied Air Command, the new permanent base's location approximately 300 miles from the coast "really facilitates our ability to compete in the Black Sea." In addition to Ämari, Miroslawiec, and Campia Turzii, the U.S. also operates MQ-9s out of Lask Air Base in Poland.

In August 2020, the U.S. and Poland signed the Enhanced Defense Cooperation Agreement, which entered into force in November 2020. The agreement increased U.S. rotational forces in Poland by 1,000 people and provided for more exercises and infrastructure development to support a deployment of 20,000 U.S. troops if necessary.<sup>31</sup> In addition:

[The agreement] covers matters such as the establishment of a forward division command in Poznan, stationing of a rotationally-present armoured brigade in Żagań-Świętoszów, deployment of Reaper UAVs squadron to Łask, the establishment of a Polish-US combat training centre (CTC) in Drawsko Pomorskie, the establishment of an airlift cargo hub for USAF in Wrocław-Starachowice, the establishment of the presence of an Army Aviation Brigade on a rotational basis, and a logistics battalion as well as special ops facility in Powidz, and another special ops facility in Lubliniec.<sup>32</sup>

The U.S. Army's V Corps, which had been deactivated in 2013, was reactivated on November 9, 2020, and became fully operational in November 2021.<sup>33</sup> In June 2022, President Joseph Biden announced that the U.S. would establish the permanent V Corps headquarters in Poland.34 In March, the headquarters, then based in Kentucky, was largely deployed to Europe "to provide additional command and control of U.S. Army forces in Europe" and to "to build readiness, improve interoperability, reinforce allies and deter further Russian aggression."35 By April, the U.S. had deployed more than 10,000 troops to Poland including forces helping to aid Ukrainian refugees and facilitate the flow of weapons and aid to Ukraine.<sup>36</sup> In March 2022, the U.S. Defense Department confirmed that U.S. troops were "liaising" with Ukrainian forces in Poland as weapons are handed over but not training "in the classic sense." 37 By the end of April, the Pentagon confirmed that the U.S. was training Ukrainian forces in Germany on systems that include armored vehicles, artillery, and radar.38

The U.S. has strengthened its presence in Norway as well. In April 2021, the two nations signed the Supplementary Defense Cooperation Agreement, which allows the U.S. to build additional infrastructure at Rygge and Sola Air Stations in southern Norway as well as Evenes Air Station and Ramsund Naval Station above the Arctic Circle. <sup>39</sup> Construction at Evenes will support the monitoring of Russian submarine activity by Norwegian and allied maritime patrol aircraft. According to former Norwegian Foreign Minister Ine Eriksen Soereide, "The agreement reaffirms Norway's close relationship with the U.S. and confirms Norway's key position on the northern flank of NATO." <sup>40</sup> In October 2021, the U.S. Navy

deployed a mobile "Expeditionary Medical Facility to a cave system near Bogen Bay in northern Norway, some 100 miles north of the Arctic Circle." According to the operations director for the U.S. Navy Expeditionary Medical Support Command (NEMSCOM), "Expeditionary Medical Facilities are deployable on short notice and contain many capabilities of a modern hospital."

In August 2020, the Marine Corps announced the end of heel-to-toe rotations of 700 Marines to Norway, which began in 2017, opting for shorter, more sporadic deployments.<sup>43</sup> The first new deployment in October 2020 consisted of 400 Marines, and in the second, 1,000 Marines were deployed to Setermoen, Norway, from January-March 2021 for Arctic warfare training.44 Major General Patrick J. Hermesmann, former Commander of U.S. Marine Corps Forces Europe & Africa, has noted the growing relationship between Norway and the U.S. through "shared hardship of tough, realistic training in this austere environment."45 From March-April 2022, Norway hosted NA-TO's Cold Response 2022, the largest Norwegian-led exercise since the Cold War. Among the participants were 3,000 American Marines.46

In addition to ground forces, in February and March 2021, four B-1 Lancers were based out of Ørland Air Station in southern Norway, marking the first time the aircraft have been based in Norway. The Lancers conducted training exercises with allies Denmark, Germany, Italy, Norway, and Poland while also practicing landing and refueling at Bodø Air Base above the Arctic Circle. 48

In October 2020, at the behest of the United States, Norway announced the reopening of Olavsvern bunker, a mountainside submarine base near Tromsø with "9,800ft of deep water underground docks that can house and refit nuclear submarines." The base, which had been closed in 2002, is now open to U.S. *Seawolf*-class nuclear submarines.<sup>49</sup>

The U.S. also continues to rotate a Sustainment Task Force "comprised of nearly 1,000 personnel and 200 pieces of equipment" from "11 active duty, U.S. Army Reserve and National Guard units." The units that make up the task force are varied and "include ammunition, fuel, movement control, transportation, maintenance, ordnance, supply, and postal services." <sup>50</sup>

During the June 2022 NATO Summit, the U.S. announced additional deployments to Europe

including (among others) deployment of a new rotational Brigade Combat Team to Romania; enhanced rotational deployments of "armored, aviation, air defense, and special operations forces" to the Baltics; deployment of "two squadrons of F-35s at RAF Lakenheath"; the forward stationing of an "air defense artillery brigade headquarters, a short-range air defense battalion, a combat sustainment support battalion headquarters, and an engineer brigade headquarters" in Germany; and the forward stationing of "a short-range air defense battery" in Italy.<sup>51</sup>

Operation Atlantic Resolve's naval component has consisted partly of increased deployments of U.S. ships to the Baltic and Black Seas since 2014. In 2021, the U.S. spent 111 days in the Black Sea, significantly more than the 82 days it spent there in 2020.<sup>52</sup>

Russian undersea activity continues at an elevated level. The U.S. Navy reestablished the 2nd Fleet, which is "responsible for the northern Atlantic Ocean," in May 2018 nearly seven years after it had been disbanded in 2011. 53 The 2nd Fleet reached full operational capability at the end of 2019. 54 The fleet was reestablished because of Russian militarization of the Arctic. 55 "This is where the fight is...where the competition is," according to Vice Admiral Andrew Lewis, former Commander of the 2nd Fleet. "Specifically in the Atlantic [and] the undersea capability of the Russians." 56 In March 2021, in a statement exercise, three Russian ballistic missile submarines punched through ice in the Arctic near the North Pole. 57

For Vice Admiral Lewis, "[a]nti-submarine warfare is a primary mission for everybody in the United States Navy, regardless of what you wear on your chest." Admiral Burke has stated that the 6th Fleet keeps units operating "nearly continuously" in the Arctic and that U.S. submarines "really dominate that area." The U.S. also has capable partners in patrolling Arctic waters including the "U.K. and France to name two extremely reliable [and] capable partners." In addition:

Canada...Norway...all contribute significantly to the theater of undersea warfare fight. Denmark is expanding their capabilities. Now almost every one of those nations that I've mentioned now have significant airborne maritime patrol reconnaissance aircraft, if not the P-8A version, closely resembling the P-8 capabilities. Many have bought versions similar to the P-8.

Their surface combatants today are incredibly capable too.<sup>60</sup>

In recent years, the U.S. has also made a point of publicly acknowledging the surfacing of nuclear-powered submarines in Arctic waters as a message of deterrence. One such example occurred in May 2021, when the *Virginia*-class submarine USS *New Mexico* docked in Tromsø, Norway.<sup>61</sup>

Outside the Arctic, as explained by General Wolters, "Rarely navigated by Russia since the 1990's, advances in its submarine fleet and expanding maritime strategic goals have reinvigorated Russia's access to the broader Atlantic Ocean." These changes have led officials to state that the U.S. east coast is no longer "a safe haven."

Russia has also increased its naval capabilities in the Mediterranean, utilizing its naval base in Tartus, Syria. In February 2022, the U.S. and its allies detected an unusual positioning of three Russian guided missile cruisers in the Mediterranean near U.S., French, and Italian Carrier Strike Groups operating in theater. One analyst assessed that "Russia has reinforced its naval presence in the Mediterranean, much more than usual. This can be seen as an outer defense layer for naval operations in the Black Sea, off Ukraine. In particular, to deter NATO involvement, especially from the US and French aircraft carriers."

Prepositioned Stocks. The U.S. continues to preposition equipment in Europe across all services. In February 2022, the U.S. activated its Army Prepositioned Stock-2 across six sites to outfit an armored brigade combat team deploying from the U.S. 66 The FY 2023 budget request includes \$1,273.9 billion to support enhanced prepositioning for the U.S. Army, Air Force, and Special Forces. 67 With specific respect to the Army, DOD's FY 2023 budget request includes "funding to continue the build of a division-sized set of prepositioned equipment with corps-level enablers that is planned to contain two ABCTs (one of which is modernized), two Fires Brigades, air defense, engineer, movement control, sustainment and medical units." 68

In March 2022, General Wolters testified that:

In the ground domain, we expect to establish a U.S. division-sized capability through forward-stationed forces, rotational forces, and Army Prepositioned Stocks (APS). Continued

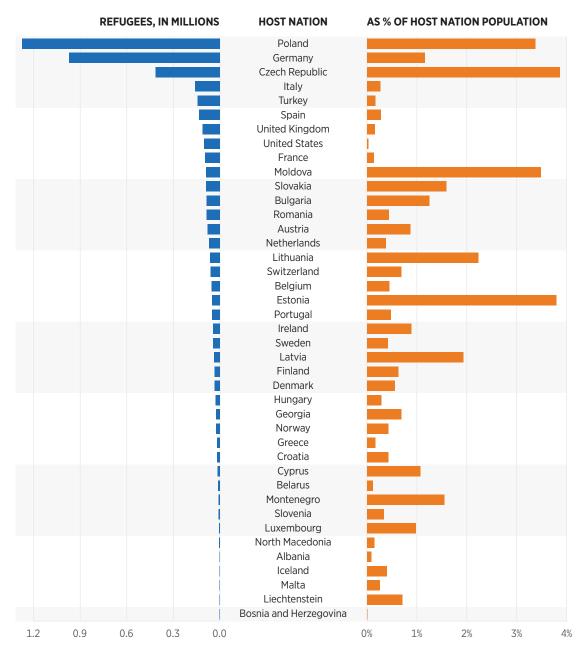
investment in APS equipment facilitates increased agility and lethality by enabling rapid integration of rotational combat units into USEUCOM and NATO operations. During Exercise DEFENDER-Europe 21, U.S. Army Europe and 26 participating nations demonstrated readiness to command and control large-scale operations by exercising at the battalion and brigade levels while building interoperability. In Exercise DEFENDER-Europe 24, we plan to assemble a divisional formation on NATO's eastern flank for the first time since the end of the Cold War, conducting a multinational command post exercise with U.S. and multinational divisions and brigades operating under U.S. Army Europe leadership. These prepositioned stocks enabled us to respond swiftly in response to Russia's aggression in and around Ukraine.<sup>69</sup>

In March 2022, NATO opened its first Multinational Ammunition Warehousing Initiative (MAWI) in Estonia for allies to store munitions for EFP deployments. The alliance plans further MAWI sites to support EFP deployments and the Very High Readiness Joint Task Force (VJTF). NATO Secretary General Jens Stoltenberg noted in June, "if there's any lesson to be learned from Ukraine [it] is the importance of heavy equipment in place, but also fuel, ammunition, supplies." By April, the U.S. had deployed Joint Munitions Command experts to Germany and Poland to provide "expert technical ammunition and explosives assistance and support to units stationed in or deployed to Europe." <sup>72</sup>

**Aid to Ukraine.** The U.S. and its allies have provided significant military aid to Ukraine. By early May, the U.S. had provided Ukraine with \$3.8 billion in security assistance since the beginning of Russia's second invasion. In April, President Biden stated that "[t]he United States alone has provided 10 anti-armor systems for every one Russian tank that's in Ukraine—a 10-to-1 ratio, adding that "[w]e've sent thousands of anti-armor and anti-missile helicopters, drones, grenade launchers, machine guns, rifles, radar systems." By mid-April, according to U.S. Secretary of Defense Lloyd Austin:

[The U.S. had sent Ukraine] over 1,400 stingers, over 5,500 Javelins, over 14,000 other anti-armor weapons, over 700 switchblade tactical unmanned aerial systems, 18 155mm Howitzers,

### **Nations Hosting Ukrainian Refugees**



**NOTES:** According to the UN High Commissioner for Refugees, these numbers reflect "the estimated number of individual refugees who have fled Ukraine since 24 February and are currently present in European countries." Border crossings are far higher. Russia has been excluded from the list due to the large number of Ukrainian deportations. Belarus is a belligerent alongside Russia in the war against Ukraine. **SOURCES:** U.N. High Commissioner for Refugees, "Operational Data Portal: Ukraine Refugee Situation," July 6, 2022, https://data.unhcr.org/en/situations/ukraine (accessed September 8, 2022), and Camilo Montoya Galvez, "U.S. Admits 100,000 Ukrainians in 5 Months, Fulfilling Biden Pledge," CBS News, July 29, 2022, https://www.cbsnews.com/news/us-admits-100000-ukrainians-in-5-months-fulfilling-biden-pledge/ (accessed September 8, 2022).

▲ heritage.org

16 Mi-17 helicopters, 200 M113 Armored Personnel Carriers, 75,000 sets of body armor and helmets, two air surveillance radars, 14 counter artillery radars, 4 counter mortar radars, unmanned coastal defense vessels, tactical secure communications systems, over 7,000 small arms, and 50,000,000 rounds of ammunition.<sup>75</sup>

U.S. allies have also donated large amounts of military hardware. By April, the EU had funded €1.5 billion in military aid to Ukraine. <sup>76</sup> In May, it was reported that Estonia and Latvia had donated approximately a third of their military budgets to Ukraine, Poland had donated around 13 percent, and Slovakia had donated nearly 12 percent.<sup>77</sup> In April, France announced that it was sending Caesar self-propelled howitzers.78 The French also have trained "Ukrainian soldiers in France on how to use the powerful guns."79 Estonia, Germany, Latvia, Lithuania, the Netherlands, and the U.S. have donated U.S. Javelin and Stinger missiles, leaving holes in their own inventories that need to be backfilled.80 The rate of system use in Ukraine, combined with "an aged and insecure production infrastructure, riddled with potential bottlenecks, vulnerabilities, and supply challenges," could make this difficult for the U.S.<sup>81</sup> By mid-April, for example, the U.S. reportedly had "provided one-third of its overall stockpile of Javelin anti-tank missiles. It cannot easily deliver more without leaving its own armories badly depleted—and it may take months or years to significantly ramp up production."82

Air defense is a particular problem for Ukrainian forces. In April, Slovakia announced that it was sending an S-300 air defense system to Ukraine, and the Netherlands deployed Patriot missile batteries to Slovakia "in order to reinforce the eastern flank of the NATO area." A Defence Ministry spokesman said that the Netherlands "will also send S-300 anti-aircraft systems to Ukraine at NATO's request." The United Kingdom, a particular leader in aiding Ukraine, has announced its intention to supply Ukraine with anti-ship missiles.<sup>84</sup>

The U.S. has trained Ukrainian forces outside of Ukraine, including a group of around 50 Ukrainian soldiers that it trained to operate U.S. howitzers. <sup>85</sup> The United Kingdom has been training Ukrainians on the use of AS-90 howitzers and armored vehicles, principally in Poland but also smaller contingents of Ukrainian forces inside the U.K. <sup>86</sup> In April, the Czech Republic announced that its defense firms

would begin repairing Ukrainian tanks and armored vehicles. Czech Defense Minister Jana Cernochova stated that "[t]he Czech Republic is the first partner country that the Ukrainian side has officially approached for cooperation in repairing ground weapons which need to be put into service or were damaged during combat."<sup>87</sup>

In addition to military training and aid, the transatlantic community has accepted large numbers of Ukrainian refugees fleeing the war. Poland has accepted more than 3,000,000—by far the largest total since the beginning of the war.<sup>88</sup> Other nations have accepted numbers that are far smaller but still significant in proportion to the receiving nation's population.

**NATO Responses to Russia's War in Ukraine.** On February 25, 2022, for the first time in its history, NATO activated approximately one-third of its 40,000-strong NATO Response Force (NRF).<sup>89</sup> In announcing the activation General Wolters stated that:

This is an historic moment and the very first time the Alliance has employed these high readiness forces in a deterrence and defence role. They represent a flexible, combat credible force that can be employed in multiple ways, and we are utilizing fully their inherent agility.

These deterrence measures are prudent and enhance our speed, responsiveness and capability to shield and protect the one billion citizens we swore to protect.<sup>90</sup>

In January 2022, the U.S. announced that 8,500 troops would be put on alert for possible deployment as part of the NRF.<sup>91</sup> In February, Canada announced that 3,400 troops would be placed on standby for the same purpose.<sup>92</sup> In addition to ground forces, NATO has 130 aircraft on alert and more than 200 ships operating in theater.<sup>93</sup>

In June, the alliance announced that the NRF would be increased in size from 40,000 to 300,000. Secretary General Stoltenberg noted that "for the first time since the Cold War, we will have pre-assigned forces to defend specific Allies" and will be able to "reinforce much faster if needed."<sup>94</sup> It should be noted, however, that Stoltenberg's announcement appeared to have caught some NATO members by surprise, leading an unnamed NATO official to say that "[t]he concept has not been fully worked

### **NATO Nations Collaborate on Russian Deterrence Measures**

Since Russia's first invasion of Ukraine, NATO has put in place new measures in eastern Europe to deter Russia. In 2014, it established Enhanced Forward Presence Multinational Battalions in four member states in the Baltic Sea region. In 2022, additional battalions were added in four member states in central Europe and the Black Sea region. Most of those same nations also benefit from NATO air policing operations.



▲ heritage.org

Battalion location

**SOURCE:** Heritage Foundation research.

up yet" and that "[w]e will have to do more to build up the model before we can work out what national commitments can be."95

In March 2022, the establishment of multinational battle groups in Bulgaria, Hungary, Romania, and Slovakia was announced at an extraordinary NATO summit.

The battle group in Bulgaria consists of "Up to 803" Bulgarian troops supplemented by 135 U.S. and 30 Albanian troops.<sup>96</sup>

The battle group in Hungary consists of 900 troops: 60 Croatian, 130 U.S., and 710 Hungarian.<sup>97</sup>

The Czech Republic (133 troops) will lead the NATO battle group in Slovakia with contributions from Germany (284); the Netherlands (125); and Slovenia (101). Both the Dutch and German deployments include air defense.<sup>98</sup>

France (550 troops) is leading the 1,148-strong NATO battalion in Romania, which also includes troops from Belgium (248); Poland (230); and the U.S. (120).<sup>99</sup> The French deployment includes armored vehicles and a naval air group for air defense and air surveillance.<sup>100</sup>

NATO also retains "multinational battalion-size battlegroups" in Estonia, Latvia, Lithuania, and Poland. Established as part of NATO's Enhanced Forward Presence in 2017, they are led, respectively, by the U.K., Canada, Germany, and the U.S.<sup>101</sup>

**U.S. Nuclear Weapons in Europe.** In his 2022 EUCOM posture statement, General Wolters reaffirmed that:

As long as nuclear weapons exist, NATO must remain a nuclear Alliance. NATO's nuclear capability preserves peace, prevents coercion, deters aggression, and instills confidence in the transatlantic bond. The United States continues to make available its strategic nuclear forces to the defense of NATO and they are the supreme guarantee of the security of our Allies.<sup>102</sup>

It is believed that until the end of the Cold War, the U.S. maintained approximately 2,500 nuclear warheads in Europe. Unofficial estimates range between 150 and 200 warheads spread out across bases in Belgium, Italy, Germany, the Netherlands, and Turkey.<sup>103</sup>

In October 2019, reports surfaced that the U.S. was considering moving the approximately 50 tactical nuclear weapons stored at Incirlik Air Base in

Turkey in light of ongoing tensions, but this has not happened. All of these weapons are free-fall gravity bombs designed for use with U.S. and allied dual-capable aircraft. Although tactical nuclear weapons are forward deployed to Incirlik, "there are no aircraft capable of delivering the B-61 gravity bombs co-located at Incirlik Airbase." The U.S. has nuclear sharing agreements with Belgium, Italy, Germany, and the Netherlands that allow for delivery of U.S. tactical nuclear weapons by allied aircraft, but no such agreement is in force with Turkey: "The weapons at Incirlik Air Base in Turkey are solely for use on U.S. aircraft." 105

The B61 nuclear gravity bomb that is "deployed from U.S. Air Force and North Atlantic Treaty Organization (NATO) bases" is undergoing a life extension program that is expected to add at least 20 years to its service life and "improve the B61's safety, security, and effectiveness."106 The B61-12 bomb, according to U.S. officials, is "intended to be three times more accurate than its predecessors."107 The first production unit was completed in February 2022, and the extension program is to be completed by 2026. <sup>108</sup> In October 2021, the Air Force completed a full weapons system demonstration that was "the flight test portion of the nuclear design certification process for the latest B61 series weapon," allowing the program to move "into the nuclear operational certification phase, essentially clearing the [F35-A] and weapon for frontline service."109

China. At NATO's 2019 leaders meeting in London, the alliance "recognize[d] that China's growing influence and international policies present both opportunities and challenges that we need to address together as an Alliance." Issues of concern include Russian and Chinese military cooperation as well as Chinese technology, propaganda, offensive cyber capabilities, and control of critical infrastructure in Europe, all of which affect NATO's member states. "We are concerned," NATO noted in its Brussels statement, "by recent public comments by PRC officials and call on China to cease amplifying the Kremlin's false narratives, in particular on the [Russia-Ukraine] war and on NATO, and to promote a peaceful resolution to the conflict."

In an interview, Admiral Burke, noting that Chinese warships and investments are "increasingly present" in the Mediterranean, highlighted the potential risk to U.S. and alliance interests from Chinese infrastructure acquisitions in Europe:

Today, the Chinese have a controlling interest in 12 European ports. So, are NATO countries going to be able to count on those ports for Free Trade, and if NATO has to defend Europe, will they allow us into those ports to refuel, resupply, do repairs, rearm? We don't know if we can count on that. It's a troubling pattern and our European partners are increasingly aware and awakened to this potential threat.<sup>112</sup>

# Important Alliances and Bilateral Relations in Europe

The United States has a number of important multilateral and bilateral relationships in Europe. First and foremost is the North Atlantic Treaty Organization, the world's most important and arguably most successful defense alliance.

North Atlantic Treaty Organization. NATO is an intergovernmental, multilateral security organization that was designed originally to defend Western Europe from the Soviet Union. It anchored the U.S. firmly in Europe, solidified Western resolve during the Cold War, and rallied European support following the 9/11 terrorist attacks. NATO has been the bedrock of transatlantic security cooperation ever since its creation in 1949 and is likely to remain so for the foreseeable future.

In April 2021, following a U.S. decision to withdraw forces from Afghanistan and "recognising that there is no military solution to the challenges Afghanistan faces," NATO ended Operation Resolute Support, a non-combat operation intended to provide "training, advice and assistance to Afghan security forces and institutions." The withdrawal of alliance forces was completed in August 2021, and the mission was terminated in September 2021.

Two ongoing NATO operations are Kosovo Force (KFOR), which includes "approximately 3,500 Allied and partner troops," and Operation Sea Guardian, which maintains "maritime situational awareness, counter-terrorism at sea and support to capacity-building" in the Mediterranean. Additional operations include air policing "to meet Iceland's peacetime preparedness needs"; air policing over the Baltics, Albania, Montenegro, Slovenia, and the Benelux countries of Belgium, the Netherlands, and Luxembourg; and support for the African Union Mission in Somalia through occasional airlifts and sealifts while helping to train and build capacity in the African Standby Force. <sup>114</sup>

Finally, there is NATO Mission Iraq (NMI), a non-combat mission to train and build the capacity of Iraqi Security Forces. In February 2021, following an Iraqi government request in late 2020, NATO defense ministers agreed to increase the size of NMI and expand the scope of training activities beyond the Baghdad region. NATO Secretary General Jens Stoltenberg stated that an incremental increase could raise the number of NATO troops participating in NMI from 500 to around 4,000.<sup>115</sup>

In recent years, NATO has focused strongly on military mobility and logistics in line with its 2014 Readiness Action Plan (RAP). The RAP was designed to reassure nervous member states and put in motion "longer-term changes to NATO's forces and command structure so that the Alliance will be better able to react swiftly and decisively to sudden crises." <sup>116</sup>

In June 2018, NATO defense ministers agreed to the Four 30s plan to improve the movement of troops in Europe by 2020. "Four 30s" derives from the plan's objective that NATO should be able to respond to any aggression with "30 troop battalions, 30 squadrons of aircraft, and 30 warships within 30 days." In 2019, according to Secretary General Stoltenberg, "Allies contributed all of the combat forces required for this initiative" and were "now working to build and maintain the level of readiness of these forces and organise them into larger formations." Ils

At the 2019 London summit, space was recognized as "the Alliance's 'fifth domain' of operations, alongside land, sea, air and cyberspace." Subsequently, in October 2020, "NATO Defence Ministers...agreed to the creation of a space centre at NATO's Allied Air Command in Ramstein, Germany." The center's mission "is to help coordinate Allied Space activities, support NATO activities and operations, and help protect Allied Space systems by sharing information about potential threats." To these ends, it "works closely with the Allies' national Space agencies and organisations and the NATO Command Structure to fuse data, products and services provided by nations, such as imagery, navigation and early warning." <sup>119</sup>

In May 2022, in a historic shift brought about by Russia's war against Ukraine, Finland and Sweden applied for NATO membership. Secretary General Stoltenberg stated that the alliance would fast-track their applications.<sup>120</sup> Each of the existing 30 NATO

TABLE 3

			Jnknown	Lease	Less than Half	Nearly Half	Majority	_
Country	Туре	Site/Location	ᆰ	Lea	Les	Ne	Σ	Own
Albania	Airport	Tirana Airport						
Belgium	Port	Zeebrugge (Bruges)						
	Port	Antwerp Gateway						
	Airport	Logistics hub Liège airport						
Bulgaria	Port	Port of Varna						
	Port	Port of Burgas						
Denmark	Port	Maersk Container Industry (Tinglev)						
France	Port	Terminal des Flandres (Dunkirk)				•		
	Port	Terminal de France (Le Havre)						
	Port	Terminal du Grant Ouest (Nantes)						
	Port	Eurofos Terminal (Marseille)						
Germany	Port	Port of Hamburg						
	Port	Jade-Weser-Port Logistics Center (Wilhelmshaven)						
	Airport	Frankfurt-Hahn Airport						
	Airport	Schwerin-Parchim						
	Railway	Port of Duisburg						
Greece	Port	Piraeus Container Terminal						
Hungary	Railway	BILK Kombiterminal (Budapest)			•			
Italy	Port	Vado Reefer Terminal (Genoa)				•		
Malta	Port	Malta Freeport Terminal (Marsaxlokk)						
Netherlands	Port	Euromax Terminal (Rotterdam)						
Poland	Port	Gdynia Container Terminal (Gdynia)					•	
Portugal	Port	Port of Sines						
Romania	Port	Port of Constanta						
Slovenia	Airport	Maribor Airport						
	Airport	Ljubljana Airport						
Spain	Port	Noatum Container Terminal (Bilbao)						
•	Port	Noatum Container Terminal (Valencia)						
Turkey	Port	Kumport Sea Terminal (Istanbul)						
U.K.	Airport	Heathrow Airport			•			

member states must ratify the accession protocols and are expected to do so. Finland and Sweden's inclusion in NATO would bring substantial capabilities to the alliance and enhance the security of the Baltic Sea region.

**SOURCE:** Heritage Foundation research.

*Enhanced Forward Presence*. Historically, the centerpiece of NATO's renewed focus on collective

defense has been the existing four multinational battalions stationed in Poland and the Baltic States as part of the alliance's Enhanced Forward Presence (EFP). Different countries serve as lead (framework) nations, providing overall coordination and the centerpiece force that is augmented by other contributing nations, for different supported countries.

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- The U.S. serves as the framework nation in Orzysz, Poland, near the Suwalki Gap. The U.S.-led battle group consists of 780 American troops augmented by four troops from Croatia, "up to 120" from Romania, and 129 from the United Kingdom.<sup>121</sup>
- In Estonia, the United Kingdom serves as the framework nation, headquartered in Tapa with 993 troops in an armored infantry battalion with main battle tanks and armored fighting vehicles along with "self-propelled artillery and air defence assets, engineers, an intelligence, surveillance and reconnaissance group and logistic support elements," in addition to one Icelandic civilian strategic communications specialist, 219 French troops, and 217 Danish troops. 122
- In Adazi, Latvia, Canada is the framework nation with "Up to 639" troops and armored fighting vehicles augmented by "Up to 21" troops from Albania; "Up to 81" from the Czech Republic; one civilian communications specialist from Iceland; "Up to 250" troops from Italy with short-range air defense and a chemical, biological, radiological and nuclear defense unit; 11 from Montenegro; nine from North Macedonia; "up to 177" from Poland with tanks; "up to 152" from Slovakia; 42 from Slovenia; and "Up to 504" from Spain with tanks and armored fighting vehicles. 123
- In Rukla, Lithuania, Germany serves as the framework nation with 1,031 troops augmented by "Up to 135" from a Czech Republic air defense unit, 270 from the Netherlands, and "Up to 188" from Norway with main battle tanks and infantry fighting vehicles in addition to one public affairs official from Belgium, another from Iceland, and a six-person transportation team from Luxembourg.<sup>124</sup>

EFP troops are under NATO command and control; a Multinational Division Headquarters Northeast located in Elblag, Poland, which reached full operational capability in December 2018, coordinates the four battalions. <sup>125</sup> In February 2017, the Baltic States signed an agreement to facilitate the movement of NATO forces among the countries. <sup>126</sup>

Some EFP host nations have called for additional assets—importantly, enablers to be added to the battalions. In April 2022, Lithuanian Minister of Foreign Affairs Gabrielius Landsbergis called for "more armored vehicles, air defense, sea defenses, and the securing of ports and infrastructure in the region." Some contributing nations have begun to deploy new enablers to the region; in Lithuania, for example, Germany now deploys an Ocelot short-range air defense system. 128

NATO also has established eight Force Integration Units located in Sofia, Bulgaria; Tallinn, Estonia; Riga, Latvia; Vilnius, Lithuania; Bydgoszcz, Poland; Bucharest, Romania; Szekesfehervar, Hungary; and Bratislava, Slovakia. These new units "will help facilitate the rapid deployment of Allied forces to the Eastern part of the Alliance, support collective defence planning and assist in coordinating training and exercises." <sup>129</sup>

At its July 2016 Warsaw summit, NATO agreed to "develop tailored forward presence in the southeast part of the Alliance territory." Specifically:

Appropriate measures, tailored to the Black Sea region and including the Romanian initiative to establish a multinational framework brigade to help improve integrated training of Allied units under Headquarters Multinational Division Southeast, will contribute to the Alliance's strengthened deterrence and defence posture, situational awareness, and peacetime demonstration of NATO's intent to operate without constraint. It will also provide a strong signal of support to regional security. Options for a strengthened NATO air and maritime presence will be assessed.<sup>130</sup>

The U.S. and Romania jointly organize the biannual Saber Guardian exercise, which is designed to "improve the integration of multinational combat forces" stationed in the region. <sup>131</sup> In the 2021 iteration, which took place in Estonia, Bulgaria, and Romania, "more than 13,000 service members from 19 countries [conducted] live fire and air and missile defense operations, plus a large scale medical evacuation." <sup>132</sup> Saber Guardian 21 was one of several exercises linked with DEFENDER-Europe 21, which had a Black Sea regional focus. The purpose of DEFENDER Europe 2022, which was conducted in May, was to "demonstrate U.S. Army Europe

and Africa's ability to aggregate US-based combat power quickly in Eastern Europe" and to "increase the lethality of the NATO alliance through long-distance fires, build unit readiness in a complex joint, multinational environment and leverage host nation capabilities to increase the command's operational reach." The exercise included "3,437 U.S. and 5,193 multi-national service members from 11 Allied and Partner nations." <sup>133</sup>

NATO continues air policing missions over Bulgarian and Romanian airspace. In September and October of 2020, six U.S. F-16s took part in a fourweek air policing mission over Bulgaria with Bulgarian air force units and Canadian F-18s flying from Romania. In 2021, NATO jets were scrambled 370 times, and 290 of these incidents involved Russian military aircraft (down from 350 in 2020).

In October 2019, addressing a NATO capability gap in aerial refueling, the Czech Republic, Belgium, Germany, Luxembourg, the Netherlands, and Norway jointly procured A330 air-to-air refueling aircraft, to be deployed from 2020–2024. The fifth of nine aircraft ordered was delivered in August 2021. Five of the aircraft will operate out of Eindhoven air base in the Netherlands, and three will operate out of Germany's Cologne–Wahn air base. 137

Additionally, in November 2019, NATO announced a \$1 billion package to upgrade its Airborne Warning and Control System (AWACS) planes. The upgrades, which "will provide AWACS with sophisticated new communications and networking capabilities, including upgrades to the NE-3A's data link and voice communications capabilities, and enhanced Wide-Band Beyond Line-of-Sight airborne networking capability," will extend the aircrafts' service life to 2035. NATO's Alliance Ground Surveillance force, which consists of five RQ-4D Phoenix remotely piloted aircraft based out of Sigonella, Italy, along with ground command and control stations, achieved initial operating capability in February 2021. 139

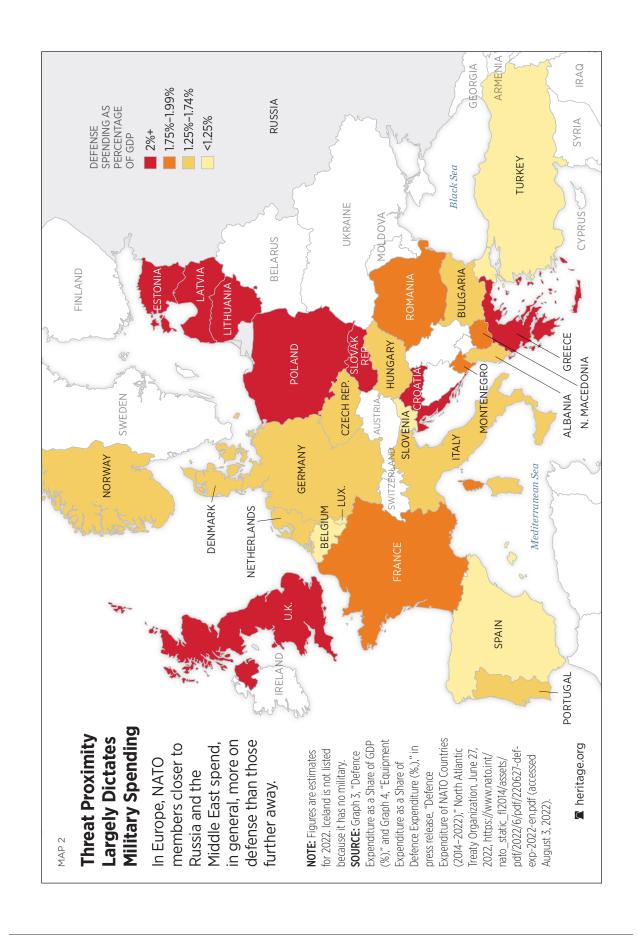
In 2018, NATO established two new commands with a combined total of 1,500 personnel: a joint force command for the Atlantic based in Norfolk, Virginia, and a logistics and military mobility command headquartered in Ulm, Germany. Logistics has been a significant alliance focus in recent years. An internal alliance assessment in 2017 reportedly concluded that NATO's "ability to logistically support rapid reinforcement in the much-expanded

territory covering SACEUR's (Supreme Allied Commander Europe) area of operation has atrophied since the end of the Cold War."<sup>141</sup> Former U.S. Commander of European Command Lieutenant General Ben Hodges has described the importance of military mobility: "We need to think how fast the Russians are moving. We must be able to move as fast or faster than them so that they do not make the mistake of thinking that they could launch an attack of some sort in an area before we could respond."<sup>142</sup>

Continued shortfalls in the alliance's ability to move soldiers and equipment swiftly and efficiently include "limitations of road surface weight capacity, bridges capacity and railway traffic limits" as well as differences in rail gauges and continued legal, procedural, and regulatory slowdowns. 143 NATO has focused heavily on overcoming these barriers, working with the European Union, which retains competencies that are critical to improving military mobility, particularly with regard to overcoming legal and regulatory hurdles. In May 2021, NATO Deputy Secretary General Mircea Geoană underscored the importance of continued cooperation with the EU on military mobility, noting that continued improvements are needed in such areas as "regulations for swift border-crossing, close coordination between military forces and civil government bodies, access to necessary transport capabilities, and ensuring that national transport infrastructure is fit for purpose."144

In April 2022, the alliance established the Defence Innovation Accelerator of the North Atlantic (DIANA). With a \$1.1 billion "innovation fund" that will invest in "deep-tech startups" over a 15-year period and working through "more than 10 accelerator sites and over 50 test centers," DIANA is "tasked to bring innovative civilian and military organizations closer together to develop cutting-edge solutions in the realms of emerging and disruptive technologies." Among these "emerging and disruptive technologies" are artificial intelligence, autonomy, big-data processing, biotechnology, hypersonic technology, new materials, propulsion, quantum-enabled technologies, and space-related systems. 145

**Cyber Capabilities.** "A secure cyberspace is essential to everything the Alliance does," according to NATO's secretary general. "This is why cyber defence is part of NATO's core task of collective defence. NATO has made clear that a severe cyber attack could lead it to invoke Article 5 of the



Washington Treaty."<sup>146</sup> Ultimately, the decision to invoke Article 5 will be a political decision.

As noted, NATO recognized cyberspace as a domain of operations at its 2016 Warsaw summit. Subsequently:

- On August 31, 2018, NATO established a Cyberspace Operations Centre (CYOC) in Mons, Belgium, that will include 70 cyber experts when it becomes fully operational in 2023. The CYOC "supports military commanders with situational awareness to inform the Alliance's operations and missions." 147
- In 2020, NATO published its first cyber doctrine. 148
- In 2021, at the NATO summit in Brussels, "Allies endorsed a new Comprehensive Cyber Defence Policy, which supports NATO's core tasks and overall deterrence and defence posture to enhance further the Alliance's resilience." 149

Through the NATO Industry Cyber Partnership, NATO has also invested in a stronger relationship with industry. "This partnership," as described by NATO, "includes NATO entities, national Computer Emergency Response Teams (CERTs) and Allies' industry representatives. Information-sharing, exercises, and training and education are just a few examples of areas in which NATO and industry are working together." 150

Cooperation within NATO is also facilitated by two other entities.

- The NATO Intelligence on Cyberspace Community of Interest was created "to more regularly exchange information, assessments and best practices—improving NATO's ability to prevent and respond to cyber threats."
- The NATO Communications and Information Agency "is responsible for ensuring NATO has the secure networks, communications and software needed to guarantee peace and stability for one billion citizens" and "runs the NATO Cyber Security Centre, which defends NATO's networks around the clock from cyber attacks and malicious activity, monitoring, identifying and preventing potential threats." When requested to do so, "the Agency also helps Allies

and partner countries boost their capabilities in areas such as cyber defence."<sup>152</sup> In November 2021, the Communication and Information Agency "organised a first NATO counter-drone exercise in the Netherlands...to ensure that commercial systems from different NATO nations can work together, interoperably, to counter threats posed by drones."<sup>153</sup>

With respect to the likely effects of Chinese 5G technology on the sharing of intelligence in Europe, U.S. officials have said that utilizing Chinese state-controlled companies for next-generation wireless networks would be "nothing short of madness." A Chinese presence in European telecommunications networks could decisively compromise the communications integrity of both the military and the intelligence community. The Brussels Statement notes that "NATO and Allies, within their respective authority, will maintain and enhance the security of our critical infrastructure, key industries, supply chains, and communication information networks, including 5G." In March 2022, General Wolters testified that:

The PRC's efforts to expand 5G networks throughout Europe via state-backed firms, such as Huawei and ZTE, pose significant security risks to the interests and military forces if the U.S., Allies, and Partners. These networks place intellectual property, sensitive information, technology, and private personal information at heightened risk of acquisition and exploitation by the Chinese government.<sup>156</sup>

Many nations have taken decisions in recent years to restrict Chinese vendors from 5G networks, but these threat perceptions are not uniform, and implementation of these decisions will remain crucially important. The impact of the emerging patchwork approach toward Chinese 5G technology on the European operating environment should become clearer in the coming years.

At the June 2019 NATO summit:

Allies reaffirmed that secure access to space services, products and capabilities is essential for the Alliance's operations, missions and activities. They agreed that attacks to, from or within space present a clear challenge to the

security of the Alliance, could be as harmful to modern societies as a conventional attack and could lead to the invocation of the mutual defence clause (Article 5) of the North Atlantic Treaty.

To implement space as an operational domain, the Alliance is enhancing its space domain awareness and common understanding of the space environment. To that end, NATO announced plans in 2021 to develop a Strategic Space Situational Awareness System at NATO Headquarters in Brussels. In addition, NATO's military authorities have accepted an offer from France to establish a NATO Centre of Excellence devoted to space in Toulouse. NATO also agreed on a roadmap for further implementation of NATO's Space Policy in the upcoming years to guide NATO's efforts in a number of areas, including science and technology, resilience and exercises. In 2021, space operational activities were integrated into several exercises, including Steadfast Jupiter, Ramstein Ambition and Steadfast Leda. These exercises involved the development and management of space effects and the integration of space products. 157

**Ballistic Missile Defense.** NATO's ballistic missile defense (BMD) achieved initial operational capability in July 2016, offering a stronger capability to defend alliance populations, territory, and forces across the southern portion of Europe from a potential ballistic missile attack. For example:

- An Aegis Ashore site in Deveselu, Romania, became operational in May 2016, and upgrades were completed in August 2019.<sup>158</sup>
- An AN/TPY-2 forward-based early-warning BMD radar is located at Kürecik, Turkey, pursuant to the U.S. European Phased Adaptive Approach (EPAA).<sup>159</sup>
- BMD-capable U.S. Aegis-equipped ships are forward deployed at Rota, Spain.<sup>160</sup> General Wolters has characterized Rota's four current destroyers as the "workhorses of deterrence," adding that "[w]e currently have a set number of four and the request is for two additional

and we have infrastructure in place to be able to house all six in Rota, Spain."<sup>161</sup> In June 2022, DOD announced that "the United States is working with the government to increase the number of destroyers stationed at Rota from four to six."<sup>162</sup>

- A second Aegis Ashore site in Redzikowo, Poland, that broke ground in May 2016 has faced delays but was commissioned in September 2020. It is supposedly nearing completion, but whether it will begin operations in 2022 remains unclear.<sup>163</sup>
- Ramstein Air Base in Germany hosts the command center.<sup>164</sup>
- The U.K. operates an early warning BMD radar at RAF Fylingdales in England. The U.K. also continues to consider upgrades to its Type 45 Destroyers with BMD-capable missiles.<sup>165</sup>

In May and June 2021, 10 nations—Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, the United Kingdom, and the United States—took part in the biannual BMD exercise Formidable Shield. Formidable Shield 21 featured 15 ships, 10 aircraft, and 3,300 participants and "[was] designed to improve allied interoperability in a live-fire joint IAMD [Integrated Air and Missile Defense] environment, using NATO command and control reporting structures." <sup>166</sup>

In January 2017, the Russian embassy in Norway threatened that if Norway contributed ships or radar to NATO BMD, Russia "[would] have to react to defend our security." Norway operates four *Fridtjof Nansen*–class Aegis-equipped frigates that are not currently BMD-capable. 168 A fifth Aegis-equipped frigate, the *Helge Ingstad*, collided with an oil tanker and sustained so much damage that the government decided to scrap it. 169

Denmark, which agreed in 2014 to equip at least one of its *Iver Huitfeldt*–class frigates with radar to contribute to NATO BMD, reaffirmed this commitment in the Defence Agreement 2018–2023.<sup>170</sup> Russia's ambassador in Copenhagen responded by publicly threatening Denmark: "I do not believe that Danish people fully understand the consequences of what may happen if Denmark joins the American-led missile defense system. If Denmark joins,

Danish warships become targets for Russian nuclear missiles."<sup>171</sup>

In March 2019, the first of four Dutch De Zeven Provinciën-class frigates received a SMART-L Multi-Mission/Naval (MM/N) D-band long-range radar upgrade that is "capable of BMD mission (surveillance and tracking of ballistic missiles) up to 2000 km while simultaneous [ly] maintaining the air defence capability."172 All four Dutch frigates will receive the radar upgrade and carry SM-3 surfaceto-air missiles.<sup>173</sup> In May 2021, as part of NATO's Formidable Shield exercise, radar aboard the HN-LMS De Zeven Provinciën "was used to eliminate a ballistic missile, marking a first in Europe."174 In December 2020, the Royal Netherlands and German navies signed an agreement to work jointly to develop a replacement for the Dutch De Zeven Provinciën-class frigate and Germany's three F124 Sachsen-class frigates. 175

Belgian Admiral Jan de Beurme stated in April 2021 that "we are studying the feasibility of integrating ballistic missile defense shooter capabilities into the new frigates." A contract to develop a weapons suite for a joint Belgian and Dutch procurement of two multipurpose frigates apiece was awarded in February 2019, and the vessels are expected to enter service beginning in 2024. 177

Spain currently operates four Aegis-equipped F-100 *Alvaro de Bazan*–class frigates, but they are not yet BMD-capable.<sup>178</sup> In April 2019, Spain signed an agreement to procure five F-110 multi-mission frigates, the first of which will likely be deployed in 2026. The Aegis-equipped frigates "will host the first naval solid-state S-band radar for the Spanish Navy."<sup>179</sup>

The Italian Navy is procuring seven multi-role offshore patrol vessels (PPAs) that are to be delivered from 2021–2026. The first of two BMD-capable PPAs in full configuration is scheduled for delivery in 2024. 180

#### **Quality of Armed Forces in the Region**

Article 3 of the 1949 North Atlantic Treaty, NA-TO's founding document, states that at a minimum, members "will maintain and develop their individual and collective capacity to resist armed attack." Regrettably, only a handful of NATO members are living up to their Article 3 commitments.

In 2022, only nine countries will spend the required minimum of 2 percent of gross domestic

product (GDP) on defense: Croatia (2.03 percent); Estonia (2.34 percent); Greece (3.76 percent); Latvia (2.10 percent); Lithuania (2.36 percent); Poland (2.42 percent); the Slovak Republic (2.00); the United Kingdom (2.12 percent); and the United States (3.47 percent). Romania is just below the threshold at 1.99 percent. However, NATO defense spending is trending upward overall. According to the NATO Secretary General's annual report for 2021:

In 2021, eight Allies met the guideline of spending 2% of their GDP on defence, up from just three Allies in 2014. The United States accounted for 51% of the Allies' combined GDP and 69% of combined defence expenditure. Total NATO military spending in 2021 was estimated to exceed USD 1 trillion.

Allies also made progress on their pledge to invest 20% or more of defence expenditures in major new capabilities. In 2021, 21 Allies met the NATO-agreed 20% guideline, compared to only seven in 2014, and 20 Allies spent more in real terms on major equipment than they did in 2020. Allies also made progress on their pledge to invest 20% or more of defence expenditures in major new capabilities. 183

In 2022, 24 Allies met the NATO-agreed 20 percent guideline, compared to only seven in 2014 and 21 in 2021.  $^{184}$ 

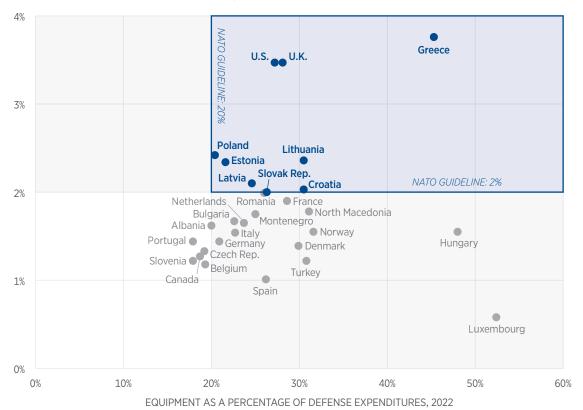
Germany. Germany has long been an economic powerhouse with mismatched military capabilities, but Russia's second invasion of Ukraine sparked major changes in the government's thinking about military power. In 2022, Germany will spend 1.44 percent of GDP on defense and 20.9 percent of its defense budget on equipment, meeting one of two benchmarks. <sup>185</sup> In February 2022, Chancellor Olaf Scholz "vow[ed] to anchor a 100 billion (US \$113 billion) euro defense fund in the country's constitution and exceed a NATO-wide annual spending goal." <sup>186</sup> In announcing the policy change, Scholz stated that "[i]t's clear we need to invest significantly more in the security of our country in order to protect our freedom and our democracy." <sup>187</sup>

In February, Germany also sent an additional 380 troops, including "artillery soldiers, reconnaissance specialists, medics [and] nuclear and biological warfare specialists," to Lithuania where it serves as

### **Less than Half of NATO Members Follow Defense Spending Guidelines**

NATO members are expected to spend at least 2 percent of their GDP on defense, and at least 20 percent of their defense spending is supposed to go to equipment. Only the U.S. and eight other nations do both.





**NOTE:** Figures are estimates for 2022. Iceland is not listed because it has no military.

**SOURCE:** Graph 3, "Defence Expenditure as a Share of GDP (%)," and Graph 4, "Equipment Expenditure as a Share of Defence Expenditure (%)," in press release, "Defence Expenditure of NATO Countries (2014–2022)," North Atlantic Treaty Organization, June 27, 2022, p. 3, https://www.nato.int/nato\_static\_fl2014/assets/pdf/2022/6/pdf/220627-def-exp-2022-en.pdf (accessed August 3, 2022).

the framework nation for NATO's EFP battalion. <sup>188</sup> These forces joined the 543 German troops already stationed in Rukla. <sup>189</sup> In early April, Germany deployed Ozelot short-range self-propelled air defense systems with Stinger missiles. <sup>190</sup> Germany also spent \$110 million through 2021 to upgrade facilities in Lithuania that include barracks used by the multinational battalion. <sup>191</sup> The Luftwaffe has taken part

in NATO's Baltic Air Policing 13 times—more than any other nation's armed forces—most recently out of Šiauliai air base in Lithuania in the summer of 2020 and Ämari Air Base in Estonia from September 2020 to May 2021.<sup>192</sup>

Germany also maintains 70 troops in Kosovo as part of NATO's Kosovo Force. <sup>193</sup> In March 2022, the Bundestag extended the mandate for Germany's

participation in NATO's Sea Guardian maritime security operation, for which 210 troops are currently deployed, and approved a one-year extension of Germany's participation in the United Nations Mission in South Sudan. <sup>194</sup> In May, Germany announced the end of its participation in the EU Training Mission Mali (EUTM), where 300 soldiers had served, but indicated a willingness to extend the mandate for the 1,000 German troops taking part in the U.N.'s Multidimensional Integrated Stabilization Mission in Mali (MINUSMA) if "the UN made sure the shortfalls created by the French withdrawal were filled to ensure the safety of German soldiers." <sup>195</sup>

In the Middle East, German forces participate in the United Nations Interim Force in Lebanon (UNI-FIL) peacekeeping mission, the mandate for which extends through June 2022. In January 2022, Germany extended its non-combat training mission in Iraq and its air-to-air refueling, air surveillance radar, and air transport missions in support of the counter-ISIS coalition through the end of October. In the Iraq and Ira

In April 2017, the Bundeswehr established a new cyber command with a staff of approximately 14,500. 198 Germany also led NATO's VJTF in 2019 and will do so again in 2023 with "the earmarked units prioritised for modernisation and upgrades." 199 In June 2022, Germany announced that it would contribute "15,000 soldiers, 65 aeroplanes, 20 navy units, and other formations to the New Force Model," greatly increasing the size of the NRF. 200

Although Germany's forces have taken on additional roles in recent years, its military continues to suffer serious equipment and readiness issues overall. The Bundeswehr was recently described as "more or less bare" by Chief of the Army Alfons Mais and in an "alarming" state by Defense Commissioner Eva Hoegl.<sup>201</sup> Major weapons systems have an operational readiness rate of 77 percent.<sup>202</sup> However, despite some improvements such as the 71 percent readiness rate for combat vehicles, less than half of Germany's Leopard 2 tanks are ready for action, only 35 of 400 Puma infantry fighting vehicles are "fit for war," less than 30 percent of the Navy's ships are "fully operational in the sense that all of the ship's major systems [are] functional and up to high-intensity operations," and the readiness rate for helicopters is only 40 percent.<sup>203</sup> Challenges to the rebuilding of Germany's military capabilities include a lack of domestic industry capacity, a need to rely on manufacturers for repair and upgrade of

equipment, manpower shortages, and an outdated and slow procurement structure.<sup>204</sup>

In March 2022, Germany announced a deal to purchase 35 F-35A fighters "as replacement for the Tornado in the role of nuclear sharing." The Tornados are to be phased out between 2025 and 2030. The Luftwaffe also announced the purchase of 15 Eurofighter Typhoons "equipped for electronic warfare."205 Germany has stated that these purchases do not change its commitment to take part in the Future Combat Air System (FCAS). The Luftwaffe is also reportedly moving toward procurement of an anti-ballistic missile system—either the Israeli-produced Arrow 3 system along with corresponding radar installed at three locations in Germany or the U.S.-produced THAAD system—to defend against attacks from Russian Iskander missiles.<sup>206</sup> In March 2021, the Ministry of Defence announced plans to upgrade its Patriot missiles to keep them in service until 2030 and to invest in drone technology rather than a next-generation air defense platform.<sup>207</sup>

Germany operates the largest fleet of heavy transport aircraft in Europe and has taken delivery of 37 of 53 A400M cargo aircraft ordered. In May 2018, the U.S. approved the sale of six C-130J Hercules aircraft and three KC-130J tankers to France and Germany, which were planning to create a joint capability. A new joint training center for both aircraft in Normandy broke ground in 2021 and is scheduled to begin operations in 2024. The aircraft will be based at Évreux, France, where "this binational air transport squadron will have unrestricted exchange of aircraft, air crews, and maintainers, as well as technical and logistical support based on a common pool of spare parts and a common service support contract." 211

Germany announced the end of its P-3C ORION maritime patrol aircraft (MPA) modernization program in June 2020. In July 2021, Germany's Defense Ministry signed a letter of offer and acceptance to procure five P-8 Poseidon maritime patrol aircraft under the U.S. government's Foreign Military Sales process. <sup>212</sup> In September, Boeing signed a contract with the U.S. Navy to produce the five planes at a "total price tag" of \$1.6 billion with deliveries to begin in 2024. <sup>213</sup> Other planned air force procurements include replacement of the country's heavy transport helicopter fleet. <sup>214</sup>

In April 2022, an agreement was struck for the procurement of 140 missiles for Germany's five

Heron TP unmanned aerial vehicles.<sup>215</sup> Armed drones have been a contentious political issue for years in Germany, resisted in large part by the Social Democrats. That the decision has now been taken is a significant shift. Germany, France, Italy, and Spain plan to acquire a collective fleet of Eurodrones at an estimated total cost of \$7.5 billion. Germany will have seven systems, each of which will include two ground stations and three aircraft.<sup>216</sup>

Germany continues to work with France on development of the Main Ground Combat System (MGCS), which will replace both nations' main battle tanks.<sup>217</sup> However, other funding priorities reportedly include "air transport capabilities, frigates and landing platform," along with €20 billion for munitions, and it is not expected that the project will be completed before 2035.<sup>218</sup>

Germany's troubled F-125 Baden-Württemberg—class frigate procurement has been completed. In December 2017, the frigate failed sea trials because of "software and hardware defects." It reportedly had "problems with its radar, electronics and the flameproof coating on its fuel tanks," was "found to list to the starboard," and lacked sufficiently robust armaments as well as the ability to add them. 220 In addition, there are concerns about whether the frigate's ability to defend against aerial attack is so deficient that the ship is fit only for "stabilization operations," and the lack of sonar and torpedo tubes makes the ship vulnerable to attack by submarines. 221

Germany returned the ship to the shipbuilder following delivery. The redesigned *Baden-Württemberg* was belatedly commissioned in June 2019, and Germany took delivery of the fourth and final F-125 in January 2022. In January 2020, Germany awarded a \$6.7 billion contract to the Dutch Damen Shipyards for the next-generation F-126 frigate. He first of building the frigates "together with its [German] partners Blohm+Voss and Thales," and the first of four ordered (with the possibility of another two) is to be delivered in 2028.

In July 2021, Germany and Norway signed an agreement for a joint program to construct six Type 212CD submarines (two for Germany and four for Norway), the first of which are to be delivered to the Norwegian Navy in 2029 with Germany taking delivery of its submarines in 2032 and 2034. <sup>226</sup> Germany's five K130 Corvettes are due to be delivered by 2025, and the first of the class is undergoing sea trials this year. <sup>227</sup>

In addition to procurements, Germany is seeking to improve readiness by having a combat-ready army division by 2025 rather than the originally planned target of 2027. Germany currently does not have a combat-ready division.<sup>228</sup>

Deployments often strain the military for years. In one example, "the concentration of all available resources in training, personnel, special tools and spare parts" during the 15-month deployment of TI-GER combat helicopters to Mali in 2017 and 2018 "halted the process chain in domestic operations to such an extent that this continued to have a significant disruptive impact on materiel readiness in 2020." Even Germany's robust contribution to Baltic Air Policing "takes everything it has, often at the expense of training initiatives."

The navy is not much better off. Problems with submarines include "long yard periods, difficulties with main batteries and the practice of 'controlled removal' from some submarines in order to keep others operational."230 Reports surfaced in March 2021 that more than 100 German vessels including submarines rely on a Russian navigation system that does not meet NATO standards and that "[d]uring a worst-case cyberattack, navigation data could be hacked and the ship could fully lose operability."231 And according to one analyst, the six-month deployment of the frigate Bayern to the Mediterranean, Indian Ocean, and Pacific theater beginning in August 2021 "came 'at the price of gutting the fleet,' with ship maintenance plans and training schedules altered to accommodate the Bayern mission."232

There is also a shortage of personnel. The number of personnel on active duty in Germany's army rose from 176,000 in 2016 to 183,695 by the end of 2021. However, "20,412 of the 116,974 military posts above the ranks of junior-ranking personnel were vacant [by the end of 2021]. This is the equivalent of 17.5 per cent." In addition, "at the end of 2019 the average age was 32.4 (32.9 for career soldiers and temporary-career volunteers, 20.1 for military service volunteers)" and "had risen to 33.1 by the first half of 2021 (33.8 for career soldiers and temporary-career volunteers, 20.7 for military service volunteers)."233 In April 2021, Germany started a year-long "voluntary military service in homeland security" program that mixes combat training with specialist training to prepare 1,000 young Germans per year to deal with pandemics or natural disasters and protect critical infrastructure.234

**France.** France has one of NATO's most capable militaries and retains an independent nuclear deterrent capability. France rejoined NATO's Integrated Command Structure in 2009 but remains outside the alliance's nuclear planning group.

In 2022, France will spend 1.90 percent of GDP on defense and 28.6 percent of defense spending on equipment, narrowly missing meeting both NATO benchmarks.<sup>235</sup> France will spend at least \$45.1 billion on defense in 2022, which is about \$1.8 billion more than it spent in 2021. Incumbent President Emmanuel Macron has promised further increases, but the scale of those increases remains unclear.<sup>236</sup> France's defense budget for 2022, according to an Armed Forces Ministry spokesman, "reflects the nation's commitment to increase its defense funds by €1.7 billion year over year since 2019" and "represents a €9 billion increase over the 2017 budget." All told, the "French government has invested a cumulative €26 billion on defense over the past five years."237

Following the Cold War, France drew down the capabilities needed for peer-to-peer conflict. Between 1991 and 2021, "the number of battle tanks dropped from 1,349 to 222, the number of fighters from 686 to 254, the number of large surface ships from 41 to 19 and its active-duty manpower from 453,000 to 203,000." "Today, the French Army is beautiful," French General Eric Laval has said, "but in a high intensity conflict, would it be able to hold beyond 48 hours? High intensity would imply potentially very tough battles which could last between 72 to 96 hours and which we are not allowed to lose." Chief of the Army General Pierre Schill has described the current transformation process as the "most important modernization undergone since World War II."238

Air Force procurements include an upgrade to the aerial refueling and airlift fleet. In February 2020, France received the second of two KC-130J Super Hercules. <sup>239</sup> It also has been introducing new A330 MRTT (Multi-Role Tanker Transport) aircraft and as of April 19, 2022, had received six of a dozen ordered. <sup>240</sup> France received its 18th A400M Atlas military transport aircraft in April 2021 and plans to have 25 in service by 2025. <sup>241</sup> In October 2020, the government announced that the final 10 NH90 Tactical Troop Helicopters on order for delivery in 2025 and 2026 would be upgraded to meet special forces requirements. <sup>242</sup>

In January 2019, France signed a \$2.3 billion agreement with Dassault Aviation for development of the F4 Standard upgrade to the Rafale fighter aircraft. The upgrade includes "a number of new features, the most important of which is an improvement in the aircraft's connectivity in both national and allied contexts, through software-defined radio, new links, and satellite communications."243 The 28 Rafales to be delivered in 2025 "will include some F4 functionalities."244 An additional 30 Rafales at full F4 configuration will be delivered by 2030. It is expected that "[t]he F4 version will significantly improve the 4.5-generation fighter's stealth capabilities, which although present in earlier versions to some extent failed to compete with fifth-generation combat aircraft."245

In February 2021, France signed a contract to procure an additional 12 Rafales at the F3R standard by 2025 to replace fighters that had recently been sold to Greece.<sup>246</sup> In May 2021, France, Germany, and Spain signed an agreement to develop a flying demonstrator aircraft for the Future Combat Air System, which is to begin entering service in 2040.<sup>247</sup> As of March 2022, because of ongoing disputes between defense companies on technology sharing, the program had yet to enter research and development.248 Executives at Dassault, one of the main defense firms working on the program, stated that "development work on FCAS had in effect ground to a halt, with the company taking its engineers off the programme until it was able to agree [on] a way forward with Airbus."249 Further complicating the picture, France now worries that Germany's plan to buy the F-35 places the two countries on diverging timelines for the new aircraft.<sup>250</sup> In March, France announced that it would upgrade 42 of 67 Tiger MkIII attack helicopters at a cost of \$3.06 billion with delivery expected in 2029.<sup>251</sup>

France established a 220-person Space Command under the Air Force in September 2019 and has committed to investing \$4.78 billion in its space capabilities by 2025. <sup>252</sup> In January 2021, NATO approved a Center of Excellence for Military Space to be located alongside French Space Command in Toulouse. The first researchers arrived in 2021, and the center is to be fully staffed by 2025. <sup>253</sup>

France intends to have a "fully capable" system to defend its space assets in place by 2030. "If our satellites are threatened," Armed Forces Minister Florence Parly has said, "we intend to blind those of our adversaries. We reserve the right and the means to be able to respond: that could imply the use of powerful lasers deployed from our satellites or from patrolling nano-satellites."254 In March 2021, with German and U.S. space forces also participating, France launched its first military exercise (AsterX) in space "to evaluate its ability to defend its satellites and other defense equipment from an attack."255 AsterX 2022 took place in February and March with the U.S. participating. In 2022, in addition to personnel and infrastructure, "[t]he Air and Space Force will receive a number of anti-drone jammer guns, and the service plans to deploy an experimental counter-UAS laser weapon aboard a warship at sea next year."

Army procurements include Kochi HK416 Assault Rifles, more than 50 percent of which had been delivered as of March 2022; 300 ANAFI USA micro-drones; and 364 Serval Armored Vehicles, 108 of which are to be delivered by the end of 2022. <sup>258</sup> The Army will receive 50 upgraded Leclerc tanks in 2022 and plans to invest €58 million in the Main Ground Combat System, a next-generation tank that is being developed jointly with Germany. <sup>259</sup>

One major project is an upgrade to the French sea-based and air-based nuclear deterrent. The nation test-fired the M51.2, the current three-stage, sea-land strategic ballistic missile (without a warhead), in April 2021 as part of a development program for the M51.3, which is expected in 2025. <sup>260</sup>

France's sea-based deterrent is provided by four Le Triomphant-class ballistic missile submarines.<sup>261</sup> In March, in response to Russian aggression and threats, France reportedly had three of its four ballistic missile submarines at sea at the same time—something that has not happened in decades. Similar messaging was behind the successful test of the ASMP-A air-launched nuclear weapon in March 2022.262 The government launched France's third-generation ballistic missile submarine program in February 2021. Delivery of the first submarine is planned for 2035 with three additional subs to be delivered every five years thereafter. Armed Forces Minister Parly has described the third-generation submarines in colorful terms as able to "hear better and defend themselves better whilst at the same time being more silent: They will not make more noise than a school of shrimp."263

Other major naval procurements include \$1.09 billion through 2025 for the design phase of a new nuclear-powered aircraft carrier that will deploy

30 Future Combat Air Systems and is planned to enter service in 2038.264 The carrier procurement will account for 20 percent of French naval vessel procurement spending during the next decade.265 In December 2021, the U.S. Department of State's Defense Security Cooperation Agency (DSCA) cleared a potential \$1.3 billion sale to France of an Electromagnetic Aircraft Launch System (EMALS), an Advanced Arresting Gear (AAG) system, and related equipment for its new carrier, which will incorporate two or three EMALs and relatively new electromagnetic catapult systems. According to the DSCA, "[t]he proposed sale will result in a continuation of interoperability between the United States and France."266 The Suffren, the first of six new fifth-generation Barracuda-class nuclear-powered attack submarines, was commissioned in November 2020.267 The second vessel, the *Duguay-Trouin* will be delivered by the end of the year.<sup>268</sup>

France is procuring five defense and intervention frigates, the first of which is due in 2024 and the second and third due in 2025.<sup>269</sup> The *Alsace*, a FREMM multi-mission frigate delivered in April 2021, and the *Lorraine*, which underwent sea trials in February and will be delivered by year's end, will have enhanced air defense capabilities in addition to the focus on anti-submarine warfare that characterizes the six FREMMs that were delivered between 2012 and 2019.<sup>270</sup>

In November 2020, Armed Forces Minister Parly announced the overhaul of the entire mine countermeasures systems by 2029. In the same month, France and the U.K. signed a production contract for the joint Maritime Mine Counter Measure (MMCM) autonomous minehunting system. Identical unmanned mine-hunting demonstrators were delivered to France and the U.K. in December 2021 and have begun capability development trials.

In December 2016, France opened a cyber-operational command.<sup>274</sup> The French Military Programming Law for 2019–2025, enacted in the summer of 2018, added "an additional 1.6 billion euros for cyber operations along with 1,500 additional personnel for a total of 4,000 cyber combatants by 2025," and in January 2019, France issued its "first doctrine for offensive cyber operations."<sup>275</sup> This year, France will spend "€11 million to develop a sovereign combat cloud capability."<sup>276</sup>

France, which has NATO's third-largest number of active-duty personnel, 277 withdrew the last of its

troops from Afghanistan at the end of 2014, although all of its combat troops had left in 2012. France continues to remain engaged in the fight against the Islamic State, deploying 600 troops in Operation Chammal. <sup>278</sup> In February 2022, the *Charles de Gaulle* Carrier Strike Group undertook a three-month operational deployment to the Mediterranean that included support for Operation Chammal. During the deployment, the CSG took part in "'tri carrier operations' with the Italian Navy (Marina Militare)'s Cavour CSG and the U.S. Navy's Truman CSG" to maintain interoperability and train with new assets like F-35Bs and E-2D Advanced Hawkeye aircraft. <sup>279</sup>

France's contributions to NATO deterrence missions in Eastern Europe have included the deployment of approximately 337 soldiers to Estonia as part of NATO's Enhanced Forward Presence.<sup>280</sup> France also has deployed 500 troops to Romania "to further increase its contribution to reassurance for the Allies most exposed to Russia's threatening actions" in Ukraine and has taken part in Baltic Air Policing nine times, most recently flying out of Estonia from March 31 to August 1, 2022, with "four Mirage 2000-5 fighter aircraft and a 100-strong air force detachment."281 In addition, four Rafale fighters along with air-to-air refuelers fly combat air patrol missions over Poland from bases in France as part of NATO's "enhanced Vigilance Activities." 282 France, which led NATO's VJTF in the first half of 2022, 283 is preparing for high-intensity warfare with a full-scale divisional exercise Orion for 2023 that could involve up to 10,000 troops in addition to air and naval units.284

On February 17, 2022, President Macron announced that "France will withdraw its [2,400] troops from Mali nine years after it first intervened to drive Islamic extremists from power but intends to maintain a military presence in neighboring West African nations." France also plans to reduce its Barkhane force in the Sahel region, which includes Burkina Faso, Chad, Mauritania, and Niger, from 4,300 to 2,500–3,000 troops. <sup>285</sup> The French military has more than 1,600 troops stationed in Djibouti, 900 in Côte d'Ivoire, 350 in Gabon, and 400 in Senegal. <sup>286</sup> France also has 650 troops stationed in the United Arab Emirates, <sup>287</sup> and a 15-year defense agreement between the two countries has been in effect since 2012.

In the Mediterranean, French Rear Admiral Jean J. de Muizon is Deputy Operation Commander of the EU-led Operation Irini, which has as its chief mission the enforcement of a U.N. arms embargo on Libya. <sup>288</sup> Operation Irini organized the April 2021 Le Pérouse naval exercise in the Bay of Bengal, which also included ships from Australia, Japan, India, and the U.S. <sup>289</sup> France also conducts occasional freedom-of-navigation operations in the Pacific. In 2021, for example, it sent a nuclear-propelled attack submarine and warship on an eight-month mission to the Indian and Pacific Oceans. <sup>290</sup>

France is keenly aware of and concerned about Chinese activity in the Pacific. In June 2021, French Admiral Pierre Vandier said that France faced "a logic of suffocation" in the region because of China's activities:

We have a lot of evidence showing a change in posture. Our boats are systematically followed, sometimes forced to maneuver in front of Chinese ships to avoid a collision, in defiance of the rules of freedom of navigation that we defend. Some of our stopovers in countries in the region where we used to pass are canceled at the last moment, without clear explanations.<sup>291</sup>

The French-led, Abu Dhabi-based Awareness Strait of Hormuz initiative to help patrol the waters near Iran became operational on February 25, 2020. France continues to contribute to the initiative's military mission, Operation Agenor.<sup>292</sup>

Operation Sentinelle, launched in January 2015 to protect the country from terrorist attacks, is the largest operational commitment of French forces. Sentinelle and Operation Resilience, launched in March 2020 to help combat the coronavirus, <sup>293</sup> together represent a domestic commitment of 13,000 French forces.

Frequent deployments, especially in Operation Sentinelle, have placed significant strains on French forces and equipment. According to one analyst:

Firstly, the conjunction of *Opération Sentinelle* and operations *Inherent Resolve* and *Barkhane* led to reduced training time for land forces and for pilots of combat aircraft, helicopters and especially transport aircraft, with the training shortfall amounting to nearly one-third of the intended flight hours. These personnel were on active duty and no longer receiving sufficient training.

Secondly, the equipment was in intensive use and wearing out more quickly, but the budgets allocated for maintenance proved to be insufficient, which meant that equipment-readiness rates fell. Readiness rates were very low for transport and attack helicopters in particular—just over 50% in 2017—and for the armoured vehicles used in the Sahel, only three-quarters of which were serviceable during the same period.<sup>294</sup>

The United Kingdom. America's most important bilateral relationship in Europe is its Special Relationship with the United Kingdom. From the sharing of intelligence to the transfer of nuclear technology, a high degree of military cooperation has helped to make this relationship unique.

In 2022, the U.K. will spend 2.12 percent of GDP on defense and 28.1 percent of its defense budget on equipment.<sup>295</sup> In November 2020, the government announced plans to spend "a projected total of nearly \$22 billion" on defense across the next four years "on top of a previous commitment to add \$2 billion more to the country's defense budget, with the combined planned increase being approximately \$24.1 billion through 2024." The new funding will be used in part for acquisitions, including frigates, Type 32 warships, and the U.K.'s Future Combat Air System. The U.K. is also standing up a Space Command and an Artificial Intelligence Center.<sup>296</sup>

In March 2021, the U.K. released its Integrated Review of Security, Defence, Development and Foreign Policy as well as a Defence Command Paper. Phe Defence Ministry's Command Paper, which lays out a plan for military modernization, includes plans for a new Multi-Role Ocean Surveillance capability to safeguard the critical undersea national infrastructure on which our prosperity depends and a new special operations Army Ranger Regiment that will be able to operate in complex, high-threat environments, taking on some tasks traditionally done by Special Forces.

The paper also specifies significant cuts in capability, including retirement of Mine Counter Measures Vessels, and the early retirement of C-130J transport aircraft.<sup>299</sup> The army would be reduced "from the current Full Time Trade Trained strength of 76,000 to 72,500 by 2025"—the smallest it has been since 1714.<sup>300</sup> One analysis argues that the Army reduction "is less than might appear" because "the

Army has been well below its planned personnel numbers for some years," but the loss of the C-130J will be felt as "[t]hese aircraft had been particularly favoured for Special Forces roles, which will now fall to the considerably larger A400M Atlas." Additionally:

[T]the Army will invest around £1.3bn in our armoured capability by upgrading 148 of our main battle tanks to ensure the Challenger III will become one of the most protected and most lethal in Europe. The remaining fleet will be retired. We will no longer upgrade Warrior but it will remain in service until replaced by Boxer, which we expect to happen by the middle of this decade.<sup>302</sup>

Russia's second invasion of Ukraine has raised questions about plans detailed in the Integrated Review: "Among the changes to be implemented was a pivot to the Asia–Pacific region and a transformation of the military towards hi-tech capabilities like space, cyber, and artificial intelligence, away from conventional weapons like main battle tanks." 303

The U.K.'s Defence Equipment Plan 2021–2031 details spending of £238 billion (approximately \$310 billion), across 10 years, an increase of 25 percent (£48 billion) from the previous year's plan.<sup>304</sup> Navy Command will receive £38.1 billion; Army Command, £41.3 billion; Air Command, £36.2 billion; Strategic Command, £35.0 billion; the Defence Nuclear Organisation, £58.1 billion; and the combined Strategic and Combat Air Programmes, £21.5 billion.<sup>305</sup> According to U.K. Secretary of State Ben Wallace MP:

[W]e have also made the significant investments required to address new threats and to ensure that our armed forces remain capable and credible. This includes continuing to deliver the Dreadnought class of submarines to renew the nuclear deterrent, building new ships for the Royal Navy, a major modernisation and upgrade programme for the Army, developing the Future Combat Air System, and investing in space, cyber and digital.<sup>306</sup>

It remains unclear whether the Ministry of Defence will be able to cover the costs of the proposed equipment plan. The National Audit Office has warned that "in this year's Plan, risks remain of over-optimistic assumptions about future budgets, costs and the likely achievement of savings targets." As a consequence, "[t]here is a real risk that, despite the additional funding it has received, the Department's ambition outstrips the resources available to it." 307

Although the number of its active-duty service-members is small in comparison to the militaries of France and Germany, the U.K. maintains European NATO's most effective armed forces. Nevertheless, the Army admitted in October 2020 that it would miss targets set down in the 2015 Strategic Defence and Security Review (SDSR) and that "[a] fully capable division including a new Strike brigade will not be available for fielding until the early 2030s." By 2025, the Army will "only be able to deploy a combat division consisting of just a single armoured infantry brigade and an interim manoeuvre support brigade." 308 As explained by Ben Barry of the IISS:

The Army was mandated [in the 2015 review] to deliver two armored infantry brigades, whereas they are now saying they can only generate one. They have enough vehicles for three infantry armored brigades, but my very strong suspicion is they haven't been spending money on spares. If they haven't got sufficient spare parts they will only risk sending one brigade on operations.<sup>309</sup>

In early 2021, the Defence Ministry announced that it had been granted observer status for the Franco-German Main Ground Combat System program, which is slated to replace French and German Main Battle Tanks "around 2035." In April 2019, the U.K. reported that it was planning to upgrade only 148 of its 227 remaining Challenger II main battle tanks, cutting its fleet by one-third.<sup>311</sup> The 79 other tanks would be scavenged for spare parts.<sup>312</sup> Because Challenger tanks are not currently manufactured, sourcing spare parts is a continual problem.<sup>313</sup> The British Army had previously cut its tank forces by 40 percent in 2010.314 The Defence Command Paper laid out plans to spend £1.3 billion on upgrades to "148 of our main battle tanks to ensure the Challenger III will become one of the most protected and most lethal in Europe."315 One former U.K. tank officer recently wrote that the small number of available U.K. tanks means that "our armoured brigades can only play a bit part in someone else's military in alliance

or coalition."<sup>316</sup> Production of the Challenger IIIs began in March, and initial operating capability is expected in 2027.<sup>317</sup>

In March 2021, the U.K. announced that it would no longer upgrade its Warrior armored vehicles but that they would remain in service through the mid-2020s. The 2019, the U.K. signed a £2.8 billion deal to procure around 523 Boxer armored vehicles. As a result of the decision to stop upgrading the heavier Warriors, the Army is "conducting an analysis on potential lethality enhancements of Boxer vehicles." The Army announced a purchase of 100 additional Boxers (for a total of 623) in April 2022 with the first units expected to enter service next year. 321

As of February 2022, the U.K. had taken delivery of 25 of 48 F-35Bs ordered with delivery of three more expected by the end of 2022. Although the total number of F-35s that will be procured may not be known until "the 2025 time frame," the Defense Command Paper states an ambition to "grow the [F-35] Force, increasing the fleet size beyond the 48 aircraft that we have already ordered." RAF F-35s based at Akrotiri, Cyprus, flew operational sorties for the first time in June 2019.

In 2019, the U.K. took delivery of the last of 160 Typhoon aircraft, all of which were expected to stay in service until 2040. The W.K. announced that 24 Tranche 1 Typhoons will be retired by 2025. Project Centurion, a \$515.83 million Typhoon upgrade to integrate additional Storm Shadow long-range cruise missiles and Brimstone precision attack missiles, was completed in 2018 and enabled the U.K. to retire its fleet of Tornado aircraft. The U.K. recently detailed a £2 billion investment over the next four years to develop the Tempest, a sixth-generation fighter to be delivered in 2035, and is partnering with Italy, Japan, and Sweden on the project. 328

The RAF operates the largest fleet of air-to-air refuelers in Europe, which is noteworthy because of the severe shortage of this capability on the continent. Along with the U.K., the U.S. has produced and jointly operated an intelligence-gathering platform, the RC-135 Rivet Joint aircraft, which has seen service in Mali, Nigeria, and Iraq and is now part of the RAF fleet.

The U.K. operates seven C-17 cargo planes and has started to bring the European A400M cargo aircraft into service after years of delays. Britain has taken delivery of 20 of 22 A400M heavy transport

aircraft ordered, with the final two set for delivery by the end of 2022, and appears to be planning to order additional A400Ms later in this decade. $^{331}$ 

The Sentinel R1, an airborne battlefield and ground surveillance aircraft, flew its last operational flight in February 2021.<sup>332</sup> In January 2021, the U.K. took delivery of the last of nine P-8 Poseidon maritime patrol aircraft (MPA) that are to be based at RAF Lossiemouth in Scotland.<sup>333</sup> In 2018, retired Air Vice-Marshal Andrew Roberts testified to Parliament that "capable though the P-8 may be, the number of aircraft planned is undoubtedly inadequate to fulfil even the highest priority tasks likely to be assigned to the force in tension and hostilities."<sup>334</sup>

The U.K. also plans to procure approximately 45 medium helicopters to remain in service until the mid-2040s. This platform will replace four different helicopter platforms currently in service.<sup>335</sup>

The Royal Navy has lost 40 percent of its fleet since the end of the Cold War.<sup>336</sup> Of the 55 ships lost since the early 1980s, half are frigates, and the U.K. now operates only 12.<sup>337</sup> Overall:

Budget cuts have delayed crucial procurement programmes. The Type 23 frigates and Trafalgar class submarines should have been replaced years ago, and it is becoming increasingly challenging and expensive to maintain aging vessels. The Navy has also taken too long to rectify major problems with vessels. One notable example is the issue with the Type 45 destroyers' propulsion system: the six vessels are not scheduled to be fixed until 2028, and there are already signs that this target may be slipping. As a result of these failures too many of our high-end warships spend too much of their time unavailable for operations.<sup>338</sup>

However, as construction of destroyers and frigates picks up steam, "the ambition is to rebuild to more than 20 by the end of the decade."<sup>339</sup>

The Royal Navy's surface fleet is based on the new Type-45 destroyer and the older Type-23 frigate. The latter will be replaced by eight Type-26 Global Combat Ships sometime in the 2020s. <sup>340</sup> The Type-26 Global Combat Ships are meant to handle a flexible range of tasks; weaponry will include "the Sea Ceptor missile defence system, a 5-inch medium calibre gun, flexible mission bay, Artisan 997 Medium Range Radar, and towed array sonars" as well as "the

Future Cruise/Anti-Ship Weapon (FCASW) from 2028."<sup>341</sup> In September 2021, construction began on the first of five T31e frigates, which are scheduled to enter service in 2027.<sup>342</sup> One of the U.K.'s oldest Type-23 frigates, HMS *Monmouth*, was retired early at the end of 2021, and a second, HMS *Montrose*, is being retired this year. The projected savings of £100 million (\$133 million) "will be invested into the development of the follow-on capabilities of the Type 26 anti-submarine warfare frigate and Type 31 general purpose frigate."<sup>343</sup>

From May 2021-December 2021, the HMS Queen Elizabeth conducted its first operational deployment that included time in the Mediterranean Sea and the Indian and Pacific Oceans, "working alongside ships from 17 countries and participating in 18 major exercises."344 The Carrier Strike Group deployment included a U.S. destroyer and a Dutch frigate. The Queen Elizabeth's embarked F-35s "undertook 1,278 sorties in total during the deployment, with more than 2,200 hours of flying, including 44 combat missions in support of Operation Inherent Resolve against the Islamic State (ISIS) in Iraq and Syria."345 In November, the Carrier Strike Group took part in interoperability exercises with Italian F-35Bs. According to Commodore Steve Moorhouse, commander of the U.K. Carrier Strike Group, "The fact that US, Italian, and UK F-35Bs are able to fly to and from one another's decks offers tactical agility and strategic advantage to NATO."346

The U.K.'s Queen Elizabeth-class carriers are the largest operated in Europe. A second in this class, HMS *Prince of Wales*, will be the larger of the two carriers and was commissioned in December 2019.347 However, the Prince of Wales has been beset by a series of leaks that have cost £3.3 million to correct and necessitated the cancellation of planned fixed-wing sea trials with F-35s off the U.S. east coast that were scheduled for January 2021.348 The Prince of Wales returned to the sea in May 2021 after five months of repairs.<sup>349</sup> Each carrier is capable of supporting 36 F-35s, but the U.K. currently plans to procure only 48.350 In March 2022, the *Prince of Wales* led NATO's Maritime High Readiness Force, serving as command ship for Exercise Cold Response, in which 35,000 troops from 28 nations converged in Norway and the surrounding seas through April for cold-weather exercises. 351

The Royal Navy is also introducing seven *Astute*-class attack submarines as it phases out its older *Trafalgar*-class subs. The fifth *Astute*-class

submarine was launched in April 2021.<sup>352</sup> Crucially, the U.K. maintains a fleet of 13 Mine Counter Measure Vessels (MCMVs) that deliver world-leading capability. As a supplement, the U.K. began minehunting and survey operations using unmanned surface vessels (USVs) in March 2020.<sup>353</sup> In February 2022, the U.K. ordered a fifth ATLAS Remote Combined Influence Minesweeping System.<sup>354</sup>

Perhaps the Royal Navy's most important contribution is its continuous-at-sea, submarine-based nuclear deterrent based on the *Vanguard*-class ballistic missile submarine and the Trident missile. In July 2016, the House of Commons voted to renew Trident and approved the manufacture of four replacement submarines to carry the missile. The U.K.'s Integrated Review announced plans to raise the ceiling on the nation's nuclear-warhead stockpile because of "the developing range of technological and doctrinal threats."

The U.K. plans to procure four new *Dread-nought*-class ballistic missile submarines, which are expected to have a 30-year life span, at a cost of £31 billion (plus an additional contingency funding stream of £10 billion for any potential cost overruns) with the first, HMS *Dreadnought*, to be completed in the early 2030s. <sup>356</sup> Construction on a second submarine, HMS *Valiant*, is ongoing, and construction on the third and fourth, HMS *Warspite* and HMS *King George VI*, is in its initial phases. In May 2021, the Ministry of Defence ordered a review of the program because of delays that continue to push back the date of completion. <sup>357</sup>

Despite these issues, the U.K. remains a leader in NATO, serving as the framework nation for NATO's EFP in Estonia and a contributing nation for the U.S.-led EFP in Poland with 150 troops.<sup>358</sup> In February 2022, the U.K. announced that it was doubling its troop presence in Estonia to more than 1,700 troops along with 48 Warrior Infantry Fighting Vehicles and 24 Challenger II Main Battle Tanks. 359 The U.K. also deployed 140 armed forces engineers to Poland in December 2021 "in response to the pressures from irregular migration at the Belarus border" and 350 Marines to Poland in February 2022 to assist "Polish Armed Forces with joint exercises, contingency planning and capacity building in the face of ongoing tensions on the Ukrainian border." Both deployments are on a bilateral basis. 360 In March 2022, the U.K. announced that more than 150 troops would be joining a new NATO multinational battalion in Bulgaria with 150 troops.<sup>361</sup>

The Royal Air Force has taken part in Baltic Air Policing six times since 2004, most recently in May-August 2020. In March 2022, four RAF Typhoons were deployed to Romania to take part in NATO's enhanced Air Policing (eAP), the fourth time the RAF has participated in eAP since 2017. In taken month, the RAF announced that F-35s flying from RAF Marham were taking part in patrols of Polish and Romanian airspace as part of NATO's Enhanced Vigilance Activity. From November–December 2019, four U.K. typhoons and 120 personnel took part in Icelandic Air Policing.

Before its withdrawal early in 2021, the U.K. maintained a force of 895 troops in Afghanistan as part of NATO's Resolute Support Mission.<sup>366</sup> It also contributes to NATO's Kosovo Force;<sup>367</sup> the Standing NATO Mine Countermeasures Group One, Standing NATO Maritime Group One, and Standing NATO Maritime Group Two;<sup>368</sup> and, as an active part of the anti-ISIS coalition, Operation Shader.<sup>369</sup> In February 2021, the U.K. announced that it planned to increase the number of British troops (currently "about 100 soldiers") engaged in training Iraqi security forces.<sup>370</sup>

Italy. Italy hosts some of the U.S.'s most important bases in Europe, including the headquarters of the 6th Fleet. It also has NATO's fifth-largest military371 and one of its more capable despite continued lackluster defense investment. In 2022, Italy will spend 1.54 percent of its GDP on defense and 22.7 percent of its defense budget on equipment, meeting the second NATO spending benchmark. 372 Spending in 2021 represented a 9.6 percent or \$1.7 billion yearover-year increase from 2020.373 In April, Prime Minister Mario Draghi announced that Italy would attain the 2 percent benchmark in 2028 rather than 2024, "a member of his ruling coalition, the Five Star party, [having] threatened to oppose a pending parliamentary vote on the matter over concerns the cash would be better used on social programs."374 As indicated in the Defense Ministry's Multi-year Planning Document 2021-2023, released in August 2021, overall defense spending will decline "to about 1.23% [of GDP] by 2023 moving further away from the 2% that European NATO countries agreed to aim for at the 2014 NATO summit."375 Italy spends the alliance's second-highest total on salaries (60.5 percent of its defense budget), "leaving proportionally less cash for military procurement, training, maintenance and infrastructure."376

Air Force procurements include (among others) T-345 and T-346 jet trainers; three MC-27J Praetorians "in the special operations configuration" and the EC-27J JEDI (Jamming and Electronic Defense Instrumentation) electronic warfare aircraft, both of which are variants of the C-27J Spartan; loitering munitions; and two KC-767 air-to-air refuelers.<sup>377</sup> Italy plans to purchase 60 F-35As for the Air Force and 30 F-35Bs, the F-35Bs to be divided equally between the Air Force and Navy. 378 A government-owned plant for final assembly of the F-35 is located in Cameri, Italy. Italy has thus far received 18 aircraft: 14 F-35As and one F-35B for the Air Force and three F-35Bs for the Navy.<sup>379</sup> The Air Force will continue funding development of the Eurodrone in conjunction with France, Germany, and Spain and is planning upgrades to its fleet of MQ-9 reaper drones, which Italy may be intending to arm. 380

In December 2020, Italy signed the Future Combat Air System (FCAS) Cooperation agreement with Sweden and the U.K. The agreement covers "the cooperation for research, development, and 'joint-concepting'" of the sixth-generation Tempest fighter.³81 According to the planning document, Italy has allocated an initial €2 billion for the program.³82 In April 2021, Military Chief of Staff General Enzo Vecciarelli suggested that the Tempest might possibly employ directed energy weapons to defeat hypersonic missiles.³83

Key Army procurements include the planned acquisition of 150 Centauro II tank destroyers, with delivery of the first tranche to be completed by the end of 2022; 650 Lince 2 light multi-role vehicles; 156 VBM Freccia 8x8 infantry combat vehicles; and upgrades to the Ariete Main Battle Tank (MBT). The Army plans to upgrade 125 Ariete MBTs, extending their operational timeline to 2040. However, analysts have noted that not enough money has been allocated to upgrade all 125, so either future allocations will be necessary or plans will be scaled down. Because of inadequate funding, other non-priority Army acquisition projects are not likely to come into service until the end of the decade. 384

Key naval procurements include plans for four U212A submarines, the first of which is scheduled for delivery in May 2030; "a special operations & diving operations/Submarine Rescue Ship"; and the Teseo Mk2/E anti-ship missile, which is in development. 385 Italy launched the last of 10 new FREMM frigates in January 2020 and has funded "two-year"

feasibility and risk-reduction studies" with a view to replacing two aging destroyers with two 10,000-ton DDX destroyers by 2028. 386

Italy's focus is the Mediterranean region where it participates in a number of stabilization missions including NATO's Sea Guardian, the EU's Operation Irini and Operation Atalanta, and the Italian Navy's own Operation Mare Sicuro (Safe Sea) off the Libyan coast. 387 Additionally, "Italy has 400 men, 142 land vehicles and 2 air vehicles in Libya" as part of the bilateral Mission of Assistance of Support in both Misrata and Tripoli. 388

Despite a southern focus, Italy contributes to Standing NATO Mine Countermeasures Group Two, as well as the EFP battalion in Latvia (250 troops) and Operation Prima Parthica (600 troops, partly to help train Iraqi Security Forces), and is leading NATO Mission Iraq in 2022. 389 Italian air assets including Tornado jets operating out of the Ahmed Al Jaber air base in Kuwait are performing reconnaissance missions in support of the coalition to defeat the IS. 390 With 621 troops, Italy is the second-largest contributor to KFOR after the United States. 391 In March 2022, Italy announced that it was sending two mine countermeasures vessels to Romania. 392

The Italian Air Force is a strong contributor to Baltic Air Policing and participated in a 15-month mission from September 2020-December 2021. Italian Typhoons first operated out of Lithuania from September 2020-April 2021.393 In April 2021, Italy deployed four F-35As to Estonia, marking the first time the F-35 has taken part in Baltic Air Policing.<sup>394</sup> In September 2021, four Italian Typhoons took over flying out of Ämari air base in Estonia until December 1, 2021.<sup>395</sup> From December 2021-March 2022, the Air Force took part in NATO's enhanced Air Policing in Romania with four typhoons and 140 troops.<sup>396</sup> Italy previously participated in air policing out of Romania in 2019 and "a four-month enhanced Air Policing deployment to Bulgaria in 2017."397 The Italian Air Force has deployed to Iceland to perform air patrols six times since 2013, most recently in June-July 2020 when six F-35As were deployed to Iceland.398

**Poland.** Situated in the center of Europe, Poland shares a border with four NATO allies, a long border with Belarus and Ukraine, and a 144-mile border with Russia's Kaliningrad Oblast, a Russian enclave between Poland and Lithuania on the Baltic

Sea. Poland also has a 65-mile border with Lithuania, making it the only NATO member state that borders any of the Baltic States. NATO's contingency plans for liberating the Baltic States in the event of a Russian invasion reportedly rely heavily on Polish troops and ports.<sup>399</sup>

Poland is ground zero for supplies and military equipment from Western allies reaching Ukraine. In early March 2022, it was reported that an average of 14 wide-bodied aircraft with matériel and weapons arrive at the Rzeszow airport each day. The U.S. reportedly deployed two Patriot missile batteries at the airport, thereby underscoring its importance, in mid-March. The weapons are supplied to the property of th

Poland has an active military force of 114,050 that includes a 58,500-person army with 797 main battle tanks. 402 It also has a Territorial Defense Force (TDF) that is intended "to increase the strength of the armed forces and the defense capabilities of the country," according to former Minister of Defense Antoni Macierewicz, and "is also the best response to the dangers of a hybrid war like the one following Russia's aggression in Ukraine."403 The TDF is mostly volunteer; "its personnel combine their civilian careers with limited military service of a minimum of two days twice a month and an annual two-week camp."404 Its planned 17 brigades will be distributed across the country.405 The force, which will number 53,000 by 2026,406 constitutes the fifth branch of the Polish military, subordinate to the Minister of Defense.407 National Defense Minister Mariusz Blaszczak has stated that the TDF's performance combating COVID-19 has "impeccably proved their importance and effectiveness."408

Poland is also investing in cyber capabilities. Its new Cyberspace Defense Force was established in February 2022 with a mission of "defense, reconnaissance and, if need be, offensive actions to protect Poland's Armed Forces from cyberattacks."<sup>409</sup> In November 2020, the U.S. and Poland signed an enhanced defense cooperation agreement that increased the number of U.S. forces stationed in Poland. The U.S. further expanded its footprint in Poland in 2022 following Russia's second invasion of Ukraine.

In 2022, Poland will spend 2.42 percent of GDP on defense and 20.4 percent of its defense budget on equipment, surpassing both NATO benchmarks.<sup>410</sup> Poland's 2020 National Security Strategy accelerated the timeline for spending 2.5 percent of GDP on

defense from 2030 to 2024. $^{411}$  A law passed by the lower house of Parliament in March 2022 would increase defense spending to 3 percent of GDP in 2023 and increase the size of the armed forces to 300,000, 50,000 of whom would be members of territorial defense units). $^{412}$ 

Poland is making major investments in military modernization and is planning to spend \$133 billion on new capabilities by 2035 as envisioned in the Defense Ministry's Technical Modernization Plan for 2021–2035, which was signed in October 2019. In addition, several major acquisitions have been announced in recent years. For example:

- In February 2018, Poland joined an eight-nation "coalition of NATO countries seeking to jointly buy a fleet of maritime surveillance aircraft."
- In March 2018, in the largest procurement contract in its history, Poland signed a \$4.75 billion deal for two Patriot missile batteries, which are scheduled for delivery between 2022 and 2025.<sup>415</sup>
- In February 2019, Poland signed a \$414 million deal to purchase 20 high-mobility artillery rocket systems from the U.S. for delivery by 2023.
- In April 2019, it signed a \$430 million deal to buy four AW101 helicopters that will provide anti-submarine warfare and search-and-rescue capabilities and are to be delivered by the end of 2022.<sup>417</sup>
- In April 2020, it was announced that Poland had concluded negotiations for the purchase of 60 Javelin Command Launch Units (CLUs) and 180 Javelin anti-tank missiles and that "[a] formal agreement to this effect will be signed soon."<sup>418</sup>
- In January 2020, Poland signed a \$4.6 billion deal to purchase 32 F-35As, with "deliveries from 2026," to be based at Poland's Lask Air Base. A group of 24 Polish pilots completed F-35 simulator training in Arizona early in 2021.

- In April 2021, the U.S. and Poland signed an agreement for Poland to acquire five retrofitted C-130H Hercules transport aircraft (decommissioned by the U.S. in 2017) by 2024, with the first arriving in 2021.<sup>420</sup>
- In July 2021, Poland announced a deal to procure 250 M1A2 Abrams SEPv3 tanks with deliveries beginning by the end of 2022.<sup>421</sup>
- In April, Poland announced that it had "significantly accelerated the delivery of the Narew short-range air defense system" with the first of two fire modules to be delivered in September 2022 and the second to be delivered "on the turn of 2022 and 2023" rather than in 2027 as originally planned.<sup>422</sup>

Although Poland's focus is territorial defense, it had 290 troops deployed in Afghanistan as part of NATO's Resolute Support Mission. Poland's Air Force has taken part in Baltic Air Policing 10 times since 2006, most recently operating four F-16s out of Šiauliai Air Base in Lithuania from December 2021–March 2022. Prom August–October 2021, four Polish F-16s and 140 troops took part in Icelandic Air Policing, marking the first time that Poland has taken part in that mission. In 2020, Poland was the lead for NATO's VJTF, and approximately half of the 6,000 troops in the VJTF's Spearhead Force were Polish. Poland also is part of NATO's EFP in Latvia and has 247 troops in NATO's KFOR mission in Kosovo.

In addition, 150 troops are deployed to Iraq, Jordan, Kuwait, and Qatar as part of Operation Inherent Resolve, and 30 are deployed as part of NATO Mission Iraq. <sup>428</sup> In April 2021, about 80 Polish soldiers deployed to Turkey as part of a NATO assurance mission to assist Turkey by providing additional maritime patrols over the Black Sea and the Mediterranean. <sup>429</sup> Poland also continues to take part in NATO's tailored forward presence in Bulgaria and Romania with 220 troops. <sup>430</sup> Finally, a tank company with 177 troops is deployed to Latvia as part of the NATO EFP battalion in that nation, and Poland reportedly is contributing 100 soldiers to a new NATO EFP battalion in Slovakia. <sup>431</sup>

**Turkey.** Turkey remains an important U.S. ally and NATO member. Autocratic President Recep Tayyip Erdogan's efforts to warm relations with Russia have strained U.S.–Turkish bilateral relations, but Russia's war in Ukraine and Turkey's support for Ukrainian forces are helping relations move forward on a more positive track. Turkey has been an important U.S. ally since the closing days of World War II. During the Korean War, it deployed 15,000 troops and suffered 721 killed in action and more than 2,000 wounded. Turkey joined NATO in 1952, one of only two NATO members (the other was Norway) that had a land border with the Soviet Union. Today, it continues to play an active role in the alliance, but not without difficulties.

Following an attempted coup in July 2016, thousands of academics, teachers, journalists, judges, prosecutors, bureaucrats, and soldiers were fired or arrested. Since 2016, 321,000 people have been detained in Turkey. Opposition politicians and civil society leaders continue to be jailed. Turkey has built 131 new prisons since the attempted coup and is thinking of building another 100. In addition, Turkey's prison population reached 300,000 in 2020, up from 180,000 in 2016, and political dissidents have been barred from being released under COVID-19 amnesties. 433

The post-coup crackdown has had an especially negative effect on the military. As of July 2021, 23,364 military personnel had been dismissed, and "[t]he effect on officer morale of these continuing purges," according to the IISS, has been "exacerbated by the widespread suspicion that promotions and appointments were increasingly politicised, with outspoken supporters of Erdogan fast-tracked for promotion." In April 2021, Turkish authorities detained 10 former admirals who were part of a group of more than 100 retired naval officers that issued an open letter criticizing a government plan to construct a canal in Istanbul.

Turkey's military is now suffering from a loss of experienced generals and admirals as well as an acute shortage of pilots. The dismissal of 680 of 1,350 pilots greatly exacerbated existing pilot shortages. A third of the dismissed pilots were in the leadership echelon, commanding squadrons, fleets, or bases. A request to the U.S. to send trainers was denied, as was a Turkish plan to utilize Pakistani trainers to fly the F-16. Furthermore, as one analyst notes, "[t]he shortage of pilots was not the only problem. Many of the veteran staff members, especially at the operations and logistics centers that help pilots fly successful missions, were also removed, hampering

the close coordination between the air and land elements of the air force. Hundreds of engineers on the ground were also removed."<sup>439</sup>

The dilapidated condition of its air force is partly why Turkey has decided to acquire new groundbased air defense systems. 440 In December 2017, Turkey signed a \$2.5 billion agreement with Russia to purchase two S-400 air defense systems. Delivery of the first system, consisting of two S-400 batteries and 120 missiles, was completed in September 2019, but delivery of a second system has been delayed by the inability of the two countries to agree on technology transfer and co-production.441 "The decision to purchase two S-400 air-defence systems from Russia," reports the IISS, "was made by the president without detailed consultation with the armed forces about the possible technical and strategic repercussions."442 U.S. officials have expressed grave concerns about this purchase and suspended Turkey from the F-35 program in July 2019, stating that "[t]he F-35 cannot coexist with a Russian intelligence collection platform that will be used to learn about its advanced capabilities."443

Turkey tested the system against its F-16s in November 2019 and further tested the system at Sinop near the Black Sea in October 2020.<sup>444</sup> In December, a U.S. official stated that "[w]e object to Turkey's purchase of the system and are deeply concerned with reports that Turkey is bringing it into operation."<sup>445</sup> That same month, in response to Turkey's purchase of the S-400 systems, the U.S. announced sanctions that took effect in April 2021.<sup>446</sup> Fearful of the effect of these sanctions, Turkey had been stockpiling spare F-16 parts since 2019.<sup>447</sup>

Turkish defense firms make "more than 800 components...for the F-35 as part of a nine-nation consortium," and Turkey's suspension from the program could cost Turkish defense industry as much as \$10 billion. 448 (The U.S. Government Accountability Office has specified more precisely that 1,005 parts are produced by Turkish firms. 449) As of April 2021, it was reported that "the Pentagon [had] hoped to remove all Turkish suppliers from the program by 2020, but it will take until 2022 for all contracts with Turkish companies to come to a close."450 Both sides have floated proposals to end the dispute, with Turkey suggesting that it "not keep the S-400s operational at all times" and the U.S. suggesting that Turkey transfer its S-400s to Ukraine—a suggestion that Ankara rejected as "quite unrealistic." 451

In his posture statement to Congress, General Wolters downplayed the lasting potential of the Turkish–Russian rapprochement:

Turkey possesses the second largest military in NATO, borders a volatile region, and retains a pivotal role in countering Russia. The Turkish and Russian government's [sic] relationship remains competitive and transactional, with Turkish engagement often aimed at constraining Russian behavior. Both nations view the Black Sea region within their natural spheres of influence, and each continues to oppose the other in Ukraine, Libya, and Syria. Turkey can best counter Russia through close cooperation with the U.S. and NATO. We laud Turkey's strong support to Ukraine up to and during Russia's invasion, and we will continue to find ways to increase our cooperation with Turkey bilaterally and within NATO.452

Turkey has been a key supporter of Ukraine. In addition to \$7.4 billion worth of trade with Kyiv in 2021, Turkish Bayraktar TB2 armed drones have proven particularly effective on the battlefield in Ukraine, and Turkey has continued to resupply Ukrainian forces "despite warnings from Moscow." <sup>453</sup> In February, Turkey closed the Bosphorus and Dardanelles straits to warships, blocking Russian warships operating in the Mediterranean from entering the Black Sea to join in the assault on Ukraine. <sup>454</sup>

Turkey remains reliant on Western companies, including for its drones. "While Turkish companies have assembled the drones," according to the Congressional Research Service, "they apparently rely on Western countries for some key components, including engines, optical sensors, and camera systems."

Turkey is also seeking ways to modernize its manned aircraft. In October 2021, Turkey requested to purchase 40 F-16 fighters and 80 modernization kits for its older fleet of F-16s, and in a March 2022 letter to Congress, the State Department found "compelling long-term NATO alliance unity and capability interests, as well as U.S. national security, economic and commercial interests that are supported by appropriate U.S. defense trade ties with Turkey." In May, the Biden Administration asked Congress to approve the sale of electronics, missiles, and radar to Turkey for F-16 upgrades. Following

Turkey's announcement in June that it was lifting its objections to Finland and Sweden joining NATO, the Administration reiterated its support both for the modernization kits and for the sale of new F-16s to Turkey: "The United States supports Turkey's modernization of its fighter fleet because that is a contribution to NATO security and therefore American security." 457

Whether the equipment to modernize Turkey's fleet of F-16s or the purchase of new F-16s materializes remains to be seen, but the Administration's favorable position undoubtedly reflects a thawing trend because of Turkey's robust support for Ukraine and support for Finnish and Swedish membership. Absent modernization kits, however, Turkey will have to rely on its own domestic industry to modernize its aging fleet.<sup>458</sup>

In October 2019, Turkey launched a major offensive in Syria against the Kurdish-led Syrian Democratic Forces (SDF), partly to create a buffer zone near the Turkish border. The largest Kurdish armed faction within the SDF is the People's Protection Units (YPG), an offshoot of the Kurdistan Workers' Party (PKK), a U.S.-designated terrorist group that has waged war against Turkey off and on since 1984. The offensive led to the creation of a buffer zone jointly patrolled by Turkish and Russian forces following an agreement between Presidents Erdogan and Putin in Sochi.

In February 2020, Russian-backed Syrian regime forces launched an attack on Idlib, the last remaining stronghold of forces opposed to Bashar al-Assad. Turkish forces opposed the offensive and lost 36 soldiers before Turkey and Russia agreed to a cease-fire. The cease-fire was extended in February 2021 and, despite violations by the Syrian Army and rebel factions, has held because of a détente in Syria between Turkey and Russia.

Turkish threats to renege on a 2016 agreement with the EU under which the EU paid Turkey to stop the flow of migrants to Europe are a consistent and enduring source of friction (perhaps at least partly because Turkey did in fact renege on the agreement in 2020). Turkey and Greece remain at odds over maritime boundaries and drilling rights between their two nations in the eastern Mediterranean in addition to drilling rights off the Cypriot coast and migration. Maritime talks between Turkey and Greece are ongoing despite a flare-up of tensions in 2020. Turkey is reportedly planning to build a

naval base in the Turkish Republic of Northern Cyprus and began flying UAVs out of Geçitkale Airport in December 2019. 462 Recent upgrades to the base have further heightened tensions. 463 In March 2021, Turkey and Qatar signed a deal for Qatari pilots to train in Turkey, leading to speculation that Turkey had "decided to train its fighter pilots on Rafale jets of the Qatar Emiri Air Force (QeAF) so as to counter the Rafale fleet of its adversary, Greece."

U.S. security interests in the region lend considerable importance to America's relationship with Turkey. Turkey is home to Incirlik Air Base, a major U.S. and NATO facility, but it was reported early in 2018 that U.S. combat operations at Incirlik had been significantly reduced and that the U.S. was considering permanent reductions. In January 2018, the U.S. relocated an A-10 squadron from Incirlik to Afghanistan to avoid operational disruptions; these aircraft have since returned to their home base in Missouri following the U.S. withdrawal. Restrictions on the use of Incirlik for operations in Syria have proven problematic. "[The] American operation to kill Islamic State leader Abu Bakr al-Baghdadi in Syria," for example, "saw U.S. forces use a base in Iraq instead of the much closer Incirlik, requiring a round trip of many hours."465 The U.S. reportedly began reviewing plans to remove nuclear weapons from Incirlik in 2019, but no such decision has vet been taken.

Turkey's Konya Air Base continues to support NATO AWACS aircraft involved in counter-ISIS operations and Spain's operation of a Patriot system in the Turkish city of Adana under NATO auspices. Turkey also hosts a crucial AN/TPY-2 radar at Kürecik, which is part of NATO's BMD system with a range of up to 1,800 miles. 467

In 2021, Turkey commanded NATO's Very High Readiness Joint Task Force, making investments in their units assigned to the VJTF. "Turkey has made substantial investments into the unit—amongst the most mobile in NATO—particularly in its logistics and ammunition requirements planning," according to NATO. "The latest models of Turkish armed vehicles, anti-tank missiles and howitzers have been allocated to the force."

Early in 2021, Turkey maintained "a 600-strong contingent" in Afghanistan as part of NATO's Resolute Support Mission.<sup>469</sup> The Turks also have contributed to a number of peacekeeping missions in the Balkans, still maintain 316 troops in Kosovo,<sup>470</sup>

and have participated in counterpiracy and counterterrorism missions off the Horn of Africa in addition to deploying planes, frigates, and submarines during the NATO-led operation in Libya. Turkey currently contributes to the Standing NATO Mine Countermeasures Group Two and Standing NATO Maritime Group Two. 471 It has taken part in Baltic Air Policing twice, most recently from May-September 2021 when four F-16s and 80 troops deployed to Malbork, Poland, for the mission.<sup>472</sup> In February 2022, Turkey closed the Bosphorus and Dardanelles Straits to warships—a decision that was made even more significant in April when Russia's Black Sea fleet flagship the *Moskva* was sunk by Ukrainian forces. 473 Turkey's closure of the Black Sea will prevent Russia from replacing this ship.

Turkey has a 355,200-strong active-duty military,<sup>474</sup> which is NATO's second largest after that of the United States. However, in June 2019:

President Recep Tayyip Erdogan ratified a new law that reduced the length of compulsory military service from 12 to six months. On payment of a fee, compulsory service can be reduced further to one month of basic training. The changes were expected to reduce the overall size of the armed forces by around 35%, as part of Turkey's long-term plan to create compact and fully professional armed forces.<sup>475</sup>

Turkey, which in 2022 will spend 1.22 percent of GDP on defense and 30.8 percent of its defense budget on equipment, <sup>476</sup> has become increasingly self-reliant with respect to its defense capabilities. A particular success has been its Bayraktar drone program, and the nation is investing further in autonomous systems. Specifically:

It has begun mass production of the Akıncı, a larger unmanned combat aircraft with a payload of 1.5 tons, and has started sea trials for the ULAQ, an unmanned surface vessel armed with six guided missiles. Four kinds of armed unmanned ground vehicles are competing for a Turkish government contract.

Turkey also has plans for a "mobile naval mine" that can be used for surveillance and to attack ships, as well as for unmanned fighter jets and strike aircraft to be used on its amphibious

assault ships, which officials say will be able to carry 30 to 50 drones. $^{477}$ 

In June 2021, Turkey test-fired its "first domestically produced long-range anti-ship cruise missile." For many platforms, however, despite some successes, Turkey continues to rely on foreign components, including "US-made engines in the T129 ATAK attack helicopter, German guns for the Altay tank, and German air-independent propulsion systems for its new Reis-class submarines."

Turkey's procurement of 250 new Altay main battle tanks has been delayed for years because of the need to acquire foreign components. The tank had relied on a German-made engine and transmission, as well as French armor, but the technology transfer was not approved. In March 2022, Turkey announced an agreement with two South Korean manufacturers to produce the engine and transmission for the tank. <sup>479</sup> Even the Bayraktar drone relies on "optical/infrared imaging and targeting sensor systems" from a Canadian company. <sup>480</sup>

In January 2022, Pakistan cancelled a \$1.5 billion deal for 30 T129 ATAK helicopters, which had been signed in 2018, after years of delays. 481 The helicopter's engine is produced by American and British firms, and Turkey has yet to field a domestic replacement. In April 2021, the U.S. granted export licenses for the sale of six T129s to the Philippines; its refusal to issue export licenses for the sale to Pakistan led to the deal's cancellation. 482 In February 2022, Turkey announced that a Ukrainian-developed engine for its larger T929 helicopter gunship would be produced in Turkey. The helicopter is supposed to make its first flight equipped with the new engine in 2023, although the war could cause the flight to be delayed. 483

Additionally, the French government has blocked development of anti-ballistic missiles because of Turkey's actions in Syria. President Erdogan has personally lobbied French President Macron to allow Turkey to purchase the French–Italian EU-ROSAM consortium's SAMP/T missile-defense systems. In March 2022, France and Italy reportedly agreed to "explore reviving the steps for the SAMP/T missile defense system."

Having been removed from the F-35 program, Turkey is purportedly planning to produce a domestic fifth-generation jet, the TF-X National Combat Aircraft, with the goal of a prototype by 2023 and the first flight by 2025. 487

Another major procurement is for six Type-214 submarines, the first of which was launched in May 2021 and will enter service in 2022 and the last of which is to be delivered in 2027. In February 2019, Turkey announced upgrades of four *Preveze*-class submarines, to take place from 2023–2027. See acceptance trials of the early delivered systems and the Critical Design Phase of the Preveze Mid-Life Modernisation Project have been successfully completed.

In February 2019, Turkey launched an intelligence-gathering ship, the TCG *Ufuk*, which President Erdogan has described as the "eyes and ears of Turkey in the seas." In December 2019, Turkey's Presidency of Defense Industries (SSB) released its Strategic Plan 2019–2023, which sets targets of 75 percent of Turkish military needs being supplied domestically by 2023 and defense exports being increased to \$10.2 billion by 2023. Turkey is forecasted to fall short of its indigenous production target of 71 percent in 2023. <sup>492</sup> Turkish exports declined by 17 percent to \$2.28 billion in 2020, down from \$2.74 billion in 2019, but they rebounded in 2021 at more than \$3 billion. <sup>493</sup>

The Baltic States. The U.S. has a long history of championing the sovereignty and territorial integrity of the Baltic States that dates back to the interwar period of the 1920s. Since regaining their independence from the Soviet Union in the early 1990s, the Baltic States have been staunch supporters of the transatlantic relationship. Although small in absolute terms, the three countries contribute significantly to NATO in relative terms.

Estonia. Estonia has been a leader in the Baltics in terms of defense spending. In 2022, it will spend 2.34 percent of GDP on defense and 21.6 percent of its defense budget on new equipment. Estonia will increase defense spending by €476 million (US\$523 million) in 2022 and plans to spend an estimated €350 million to acquire short-range and medium-range air defense systems by 2025. In October 2021, Estonia signed a contract to purchase the Blue Spear 5G coastal shore-to-ship mobile defense system.

Some of the planned investments in Estonia's Ministry of Defence Development Plan 2031, released in December 2021, details investments in ammunition stocks along with renovation of Ämari airfield, a modern War and Disaster Medicine Centre in Tartu, "mid-range anti-tank weapons for all

infantry brigades," R-20 Rahe assault rifles, a midrange air surveillance radar, CV-9035 armoured combat vehicle upgrades, and naval mines.<sup>497</sup> In February 2022, Estonia announced its largest defense procurement, a \$794 million joint Estonia–Latvia purchase of such logistics vehicles as "cranes, loaders and aircraft loaders."<sup>498</sup>

Although the Estonian armed forces total only 7,200 active-duty personnel (including the army, navy, and air force),<sup>499</sup> they are held in high regard by their NATO partners and punch well above their weight inside the alliance. Between 2003 and 2011, 455 Estonians served in Iraq. Perhaps Estonia's most impressive deployment has been to Afghanistan: More than 2,000 Estonian troops were deployed between 2003 and 2014, and they sustained the second-highest number of deaths per capita among all 28 NATO members.

In 2015, Estonia reintroduced conscription for men ages 18–27, who must serve eight or 11 months before being added to the reserve rolls. <sup>500</sup> The number of Estonian conscripts will increase from 3,200 to 4,000 by 2025. <sup>501</sup>

Estonia has demonstrated that it takes defense and security policy seriously, focusing on improving defensive capabilities at home while maintaining the ability to be a strategic actor abroad. Estonia is acquiring a total of 18 South Korean–built K9 self-propelled howitzers at a total cost of €66 million.<sup>502</sup> It received the first units in October 2020, and the remaining units are scheduled to arrive by 2023.<sup>503</sup> Estonia has prioritized anti-tank weapons and has sent Ukraine significant numbers of Javelin anti-tank weapons from its own stocks.

In October 2020, Estonia withdrew from a joint armored vehicle development program with Latvia and Finland for financial reasons, deferring the acquisition of new armored vehicles until the end of the decade. <sup>504</sup> In 2019, it received two C-145A tactical transport aircraft donated by the U.S. <sup>505</sup> In July 2019, Estonia signed a \$24 million deal to purchase 16,000 rifles from an American arms company, allowing it to phase out older Soviet and Israeli weapons. <sup>506</sup>

Estonia's cyber command became operational in August 2018 and is expected to include 300 people when it reaches full operational capability in 2023. 507 U.S. and Estonian cyber commands train together. In the fall of 2020, for example, they trained in Estonia to help search for and block incoming cyber threats from Russia. 508 Estonia also participated in

U.S. Cyber Command's CYBER FLAG 21-1 exercise in November 2021.<sup>509</sup>

In 2017, Estonia and the U.S. strengthened their bilateral relationship by signing a defense cooperation agreement that builds on the NATO-Estonia Status of Forces Agreement, further clarifying the legal framework for U.S. troops in Estonia. 510 Estonian forces have participated in a number of operations. These involvements include, for example, 45 soldiers in Resolute Support before its end, a vessel as part of the Standing NATO Mine Countermeasures Group One, and special forces as part of France's Task Force Takuba in the Sahel, which began in the latter half of 2020.511 Estonian troops also take part in NATO Mission Iraq and the U.S.-led Operation Inherent Resolve in Iraq.<sup>512</sup> In February 2022, Estonia announced the withdrawal from Mali of 95 troops who had been taking part in the French-led Operation Barkhane.513

Latvia. Latvia's recent military experience has been centered on operations in Iraq and Afghanistan with NATO and U.S. forces. Latvia deployed more than 3,000 troops to Afghanistan and between 2003 and 2008 deployed 1,165 troops to Iraq. It also has contributed to a number of other international peacekeeping and military missions.

A recent IISS analysis notes that "Latvia has no requirement and therefore no capacity to independently deploy and sustain forces beyond its national boundaries, although the armed forces have taken part in a range of NATO and EU missions." Nevertheless, despite a military that consists of only 8,750 full-time servicemembers, Latvia deployed troops to NATO's Resolute Support Mission until the mission's completion; participates in Operation Inherent Resolve in Iraq, where the mandate for the approximately 30 Latvian soldiers taking part was extended in March 2022 and now runs until February 2024; and has 136 troops deployed in NATO's KFOR mission. 515

Latvia's State Defence Concept states that "the size of the National Guard must grow to 10,000 troops by 2024 and reach 12,000 troops by 2027." Latvia "is investing \$56 million annually through 2022 on military infrastructure, with two-thirds of this amount being spent to upgrade Ādaži military base, headquarters of the Canadian-led EFP battlegroup." <sup>517</sup>

In 2022, Latvia will spend 2.10 percent of GDP on defense and 24.6 percent of its defense budget

on equipment, exceeding both NATO benchmarks.<sup>518</sup> It also plans to increase defense spending "in 2025 and subsequent years" to "not less than 2.5 percent of the forecasted GDP."<sup>519</sup>

In November 2018, Latvia signed a deal for four UH-60M Black Hawk helicopters, to be delivered in 2022. The Michigan National Guard began training Latvian maintainers on the helicopters in December.<sup>520</sup>

In 2018, Latvia signed a \$133 million agreement to purchase Spike precision-guided tactical missiles from Israel, the first of which were delivered in February 2020.521 A new team trainer for the missiles was installed in October 2020.<sup>522</sup> Latvia has also expressed interest in procuring a medium-range ground-based air defense system (GBADS). Joint procurements include (with Estonia) logistics vehicles and (with Finland) 200 armored vehicles for Latvian forces, the first two of which were delivered in March 2022 and all of which are to be delivered by 2029.<sup>523</sup> Latvia is looking to upgrade temporary fencing along its border with Belarus into permanent fencing to stem the flow of migrants "illegally pushed into Latvia from Belarus."524 The U.S. continues to aid the Latvian border guard including through delivery of tactical vehicles.<sup>525</sup>

*Lithuania*. Lithuania is the largest of the three Baltic States, and its armed forces total 23,000 active-duty troops. <sup>526</sup> It reintroduced conscription in 2015 and lowered the age for compulsory service in December 2019. <sup>527</sup>

Lithuania has shown a steadfast commitment to international peacekeeping and military operations. Between 2003 and 2011, it sent 930 troops to Iraq. From 2002–2021, around 3,000 Lithuanian troops served in Afghanistan, and Lithuania continues to contribute to NATO's KFOR and NATO Mission Iraq.

In 2022, Lithuania will spend 2.36 percent of GDP on defense and 30.5 percent of its defense budget on equipment. <sup>528</sup> It also "plans to reach 2.5% [of GDP] by 2030." <sup>529</sup>

In April 2019, the U.S. and Lithuania signed a fiveyear "roadmap" defense agreement.<sup>530</sup> According to the Pentagon, the agreement will help "to strengthen training, exercises and exchanges" and help Lithuania "to deter and defend against malicious cyber intrusions and attacks." The two nations also pledged "to support regional integration and procurement of warfighting systems," including "integrated air and missile defense systems and capabilities to enhance maritime domain awareness."<sup>531</sup> A Mobilisation and Host Nation Support law took effect in January 2021. <sup>532</sup> In December 2021, the U.S. and Lithuania signed a Reciprocal Defense Procurement Agreement that U.S. Secretary of Defense Austin stated "will improve conditions for the acquisition of defense items and increase military interoperability."<sup>533</sup>

In November 2020, Lithuania signed a \$213 million deal to purchase four UH-60M Black Hawk helicopters beginning in late 2024; the U.S. is contributing approximately \$30 million to help with the acquisition.534 In October 2020, Lithuania received two Norwegian-made NASAMS mid-range air defense batteries armed with U.S.-made missiles.<sup>535</sup> In March 2022, Lithuania announced a \$40 million purchase of additional Javelin anti-tank weapons. 536 In April 2021, the U.S. donated \$10 million worth of M72 Light-Armor Weapons to Lithuania. 537 Additional procurements include Boxer Infantry Fighting Vehicles and €145 million for 200 U.S.-made Oshkosh Joint Light Tactical Vehicles (JLTV).<sup>538</sup> The first 50 JLTVs were delivered in October 2021 with 50 more to be delivered per year through 2024. 539 In January 2022, it was reported that Saab had recently "signed a framework agreement with the Lithuanian Ministry of Defence to provide the country with several Carl-Gustaf M4 recoilless weapons and ammunition" and that Lithuania's "Defence Materiel Agency has placed a \$16.7 million ammunition order as part of the framework agreement."540

#### Current U.S. Military Presence in Europe

At its peak in 1953, because of the Soviet threat to Western Europe, the U.S. had approximately 450,000 troops in Europe operating across 1,200 sites. During the early 1990s, both in response to a perceived reduction in the threat from Russia and as part of the so-called peace dividend following the end of the Cold War, U.S. troop numbers in Europe were slashed. Today, the U.S. has fewer than 66,000 active-duty forces permanently stationed in Europe. However, increased rotational forces deployed to Europe to bolster deterrence in eastern NATO member states have increased total U.S. deployments to around 100,000.<sup>541</sup>

In response to Russia's second invasion of Ukraine, EUCOM created Control Center Ukraine (ECCU) to coordinate defense assistance to Ukraine. One official has described ECCU as "a combination of a call center, a watch floor, meeting rooms. They

execute a battle rhythm to support decision-makers as well as 24/7 engagement and coordination around the globe with about 40 to 60 people at any given time."  $^{542}$ 

EUCOM "executes a full range of multi-domain operations in coordination with Allies and partners to support NATO, deter Russia, assist in the defense of Israel, enable global operations, and counter trans-national threats in order to defend the Homeland forward and fortify Euro-Atlantic security."<sup>543</sup> It is supported by four service component commands (U.S. Naval Forces Europe [NAVEUR]; U.S. Army Europe and Africa [USAREUR-AF]; U.S. Air Forces in Europe [USAFE]; and U.S. Marine Forces Europe [MARFOREUR]) and one subordinate unified command (U.S. Special Operations Command Europe [SOCEUR]).

**U.S. Naval Forces Europe.** NAVEUR is responsible for providing overall command, operational control, and coordination for maritime assets in the EUCOM and Africa Command (AFRICOM) areas of responsibility. This includes more than 20 million square nautical miles of ocean and more than 67 percent of the Earth's coastline.

This command is currently provided by the U.S. 6th Fleet, based in Naples, and brings critical U.S. maritime combat capability to an important region of the world. Some of the more notable U.S. naval bases in Europe include the Naval Air Station in Sigonella, Italy; the Naval Support Activity Base in Souda Bay, Greece; and the Naval Station at Rota, Spain.

The USS *Harry S. Truman* Carrier Strike Group deployed to the European theater in 2022 to demonstrate the U.S. commitment to NATO. In January, the CSG took part in NATO exercise Neptune Strike 22 under direct NATO operational control. <sup>544</sup> Examples of activities during the exercise include (among others) "airborne patrols with Allied aircraft through a series of missions spanning enhanced vigilance, training and NATO enhanced Air Policing (eAP), supporting the Alliance's cohesive defence and collective resolve," and the refueling of F/A-18E Super Hornets by German Air Force A400M Tankers in February and participation by HST squadrons in "a series of training missions with the Romanian Air Force" in March. <sup>545</sup>

**U.S. Army Europe and Africa.** In November 2020, U.S. Army Europe and U.S. Army Africa were consolidated into U.S. Army Europe and Africa

(USAREUR-AF), headquartered in Wiesbaden, Germany. According to the Army, "The consolidation of these two Army service component commands under one four-star commander will play a vital role in supporting missions across two interconnected theaters of operation" and will "enhance efficiency by streamlining the headquarters' ability to execute functions and improving global and regional contingency response efforts." 546

The former USAREUR was established in 1952. Then, as today, the U.S. Army formed the largest portion of U.S. forces in Europe. USAREUR-AF includes "approximately 73,000 U.S. Army personnel assigned and deployed throughout Europe and Africa." Permanently deployed forces include the 2nd Cavalry Regiment, based in Vilseck, Germany; the 173rd Airborne Brigade in Italy; the 12th Combat Aviation Brigade out of Ansbach, Germany; and the 41st Field Artillery Brigade, with headquarters in Grafenwoehr, Germany. In addition:

Operational and theater enablers such as the 21st Theater Sustainment Command, 10th Army Air and Missile Defense Command, 7th Army Training Command, 79th Theater Sustainment Command, 66th and 207th Military Intelligence Brigades, 2nd Theater Signal Brigade, U.S. Army NATO Brigade, Installation Management Command-Europe and Regional Health Command-Europe provide essential skills and services that support our entire force.<sup>547</sup>

Reactivated in September 2019, the 1st Battalion, 6th Field Artillery, 41st Field Artillery Brigade is currently the only U.S. rocket artillery brigade in Europe and represents the first time in 13 years that USAREUR has had the Multiple Launch Rocket System in its command; a second field artillery battalion was reactivated in the fall of 2020.548 The 5th Battalion, 4th Air Defense Artillery Regiment, was activated in November 2018 and is now based in Ansbach.549 The Army announced plans to outfit a complete battalion with the Maneuver-Short-Range Air Defense System (M-SHORAD) by the end of 2022; currently, only a platoon within the 5th Battalion, 4th Air Defense Artillery Regiment is equipped with M-SHORAD. 550 Finally, each year, USAREUR-AF takes part in more than 60 exercises with 80,000 multinational participants from 75 countries.551

**U.S. Air Forces in Europe.** USAFE provides a forward-based air capability that can support a wide range of contingency operations. It originated as the 8th Air Force in 1942 and flew strategic bombing missions over the European continent during World War II. USAFE describes itself as "direct[ing] air operations in a theater spanning three continents, covering more than 19 million square miles, containing 104 independent states, and possessing more than a quarter of the world's population and more than a quarter of the world's Gross Domestic Product." 552

Headquartered at Ramstein Air Base, USAFE has seven main operating bases along with 114 geographically separated locations. The main operating bases include the RAF bases at Lakenheath and Mildenhall in the U.K., Ramstein and Spangdahlem Air Bases in Germany, Lajes Field in the Azores, Incirlik Air Base in Turkey, and Aviano Air Base in Italy. Terrorist attacks against these installations remain a threat. In March and April 2020, five Tajik nationals who had come to Germany seeking refugee status were arrested for plotting terrorist attacks against U.S. Air Force bases and personnel on behalf of ISIS. 554

Strategic bomber deployments continue periodically. In March 2021, U.S. B-1 and B-2 bombers flying from the U.S. deployed out of Orland Air Base in Norway and Lajes Field in Portugal, respectively. 555 According to the U.S. Air Force, "[s]trategic bomber deployments to Europe provide theater familiarization for aircrew members and demonstrate U.S. commitment to allies and partners." 556

**U.S. Marine Forces Europe.** MARFOREUR was established in 1980. It was originally a "designate" component command (only a shell during peacetime but able to bolster its forces during wartime). Its initial staff was 40 personnel based in London. By 1989, it included more than 180 Marines in 45 separate locations in 19 countries throughout the European theater. Today, the command is based in Boeblingen, Germany, and approximately 300 of the more than 1,500 Marines based in Europe are assigned to MARFOREUR. To was also dual-hatted as Marine Corps Forces, Africa (MARFORAF), under U.S. Africa Command in 2008.

MARFOREUR supports the Norway Air Landed Marine Air Ground Task Force, the Marine Corps' only land-based prepositioned stock. As of June 2017, the U.S. had enough prepositioned stock in Norway "to equip a fighting force of 4,600 Marines, led by a colonel, with everything but aircraft and desktop computers."<sup>558</sup> The Norwegian government covers half of the costs of the prepositioned storage, and the stock's proximity to the Arctic region makes it particularly important geostrategically. In March–April 2022, these prepositioned stocks were a factor in the Cold Response 22 exercise, which included 30,000 troops from 27 countries including 3,000 U.S. Marines.<sup>559</sup>

In the fall of 2021, Special-Purpose Marine Air-Ground Task Force–Crisis Response–Africa (SPMAGTF–CR–AF), based in Moron, Spain, and created in the wake of the Benghazi embassy attack to respond to crises in the Middle East and North Africa, was shut down. Subsequently, Marines have participated in training exercises conducted by AF-RICOM's North and West Africa Response Force.

U.S. Special Operations Command Europe. SOCEUR is the only subordinate unified command under EUCOM. Its origins are in the Support Operations Command Europe, and it was based initially in Paris. This headquarters provided peacetime planning and operational control of special operations forces during unconventional warfare in EUCOM's area of responsibility.

SOCEUR has been headquartered in Panzer Kaserne near Stuttgart, Germany, since 1967. It also operates out of RAF Mildenhall in the U.K. In 2018, it was announced that the U.S. was planning to relocate tactical United States special operations forces from Stuttgart to Baumholder. The move has yet to occur, but the Administration's FY 2022 Special Operations budget request included funding to support "three major renovation projects" as part of "the initiative to restation SOF to Baumholder in order to alleviate overcrowding in Stuttgart, Germany." <sup>562</sup>

Due to the sensitive nature of special operations, publicly available information is scarce. However, it has been documented that SOCEUR elements participated in various capacity-building missions and civilian evacuation operations in Africa and took an active role in the Balkans in the mid-1990s and in combat operations in the Iraq and Afghanistan wars.

SOCEUR also plays an important role in joint training with European allies and since June 2014 has maintained an almost continuous presence in the Baltic States and Poland in order to train special operations forces in those countries. A new special operations base in Latvia that opened in December 2020, for example, "includes a vehicle servicing facility, ammunition storage and two helipads for

U.S. CV-22 aircraft from the United Kingdom-based 352nd Special Operations Wing," all of which "are designed to allow special operations forces to move rapidly in and out of the area and conduct maintenance." 563

## According to General Wolters:

Our Special Operations Forces (SOF) work with European Allies and Partners to build capacity, counter malign activity, and improve resilience. These unique capabilities enable USEUCOM to identify, attribute, and counter Russian malign influence. Furthermore, our Special Operations personnel provide invaluable contributions in sensing the operational environment, enhancing our ability to deter through indications and warnings.<sup>564</sup>

The FY 2023 DOD EDI budget request includes \$26,760,000 in declared special operations funding for "Increased SOF Partnership Activities in Central/Eastern Europe" (\$491,000) and "SOF Staging Capabilities and Prepositioning" (\$26,269,000). 565

## **Key Infrastructure and Warfighting Capabilities**

One of the major advantages of having U.S. forces in Europe is access to logistical infrastructure. EU-COM, for example, supports the U.S. Transportation Command (TRANSCOM) with its array of air bases and access to ports throughout Europe. One of these bases is Mihail Kogalniceanu Air Base in Romania, which "began as a major refueling and supply route for U.S. troops in support of Operation Iraqi Freedom, as well as a hub to neighboring countries in both EUCOM and CENTCOM," and from which "[n]ations, allies, and partners...leverage and promote an increasingly interoperable force and posture in coordination to deter further Russian aggression." 566

Europe is a mature and advanced operating environment. Because of its decades-long presence in Europe, the U.S. benefits from tried and tested systems that involve moving large numbers of matériel and personnel into, within, and out of the continent. This offers an operating environment that is second to none in terms of logistical capability. There are more than 166,000 miles of rail line in Europe (not including Russia), an estimated 90 percent of the roads in Europe are paved, and the U.S. enjoys access to a wide array of airfields and ports across the continent.

#### Conclusion

Overall, the European region remains a largely stable, mature, and friendly operating environment. Russia remains the preeminent military threat, both conventionally and unconventionally, but Chinese propaganda, influence operations, and investments in key sectors present an additional—and serious—threat. The past year has proven to be an inflection point for transatlantic security with many European allies reinvesting in defense and capabilities. The long-term capacity of allies to sustain a commitment to defense remains to be seen, as does the outcome of the Russia–Ukraine war, which is dramatically reshaping the threat perception in Europe and necessitating operational planning that takes into account what is transpiring on a daily basis.

America's closest and oldest allies are located in Europe, and the region is incredibly important to the U.S. for economic, military, and political reasons. Perhaps most important, the U.S. has treaty obligations through NATO to defend the European members of that alliance. If the U.S. needs to act in or near the European region, there is a history of interoperability with allies and access to key logistical infrastructure that makes the operating environment in Europe more favorable than the environment in other regions in which U.S. forces might have to operate.

The past year saw continued U.S. reengagement with the continent, both militarily and politically, along with continued increases in European allies' defense budgets and capability investments. The

U.S. has increased its investment in Europe, and its military position on the continent is stronger than it has been for some time. Russia's second invasion of Ukraine served to underscore the importance both of continued U.S. reinvestment in Europe and of efforts (which in many cases were already underway) by the U.S. and its allies to improve their defense capabilities.

The military, economic, political, and societal impact of Russia's aggression in Ukraine, including China's support for and enablement of the regime in Moscow, will have to be reckoned with for years to come. Though Russia is experiencing significant battlefield losses, it will be prudent for defense planners to assume that Russia will replace those losses of old equipment with modern, improved items, thereby sustaining the challenge to U.S. and NATO-partner security interests.

NATO's renewed focus on collective defense has resulted in a focus on logistics, newly established commands that reflect a changed geopolitical reality, and a robust set of exercises. NATO's biggest challenges derive from potential spillover from Ukraine, the need to arm and assist Ukrainian forces while also swiftly backfilling stocks, continued capability and readiness gaps for many European nations, continuing improvements and exercises in the realm of logistics, and the need to establish the ability to mount a robust response to both linear and nonlinear forms of aggression.

# Scoring the European Operating Environment

As noted at the beginning of this section, various considerations must be taken into account in assessing the regions within which the U.S. may have to conduct military operations to defend its vital national interests. Our assessment of the operating environment utilized a five-point scale, ranging from "very poor" to "excellent" conditions and covering four regional characteristics of greatest relevance to the conduct of military operations:

- Very Poor. Significant hurdles exist for military operations. Physical infrastructure is insufficient or nonexistent, and the region is politically unstable. The U.S. military is poorly placed or absent, and alliances are nonexistent or diffuse.
- 2. **Unfavorable.** A challenging operating environment for military operations is marked by inadequate infrastructure, weak alliances, and recurring political instability. The U.S. military is inadequately placed in the region.
- **3. Moderate.** A neutral to moderately favorable operating environment is characterized by adequate infrastructure, a moderate alliance structure, and acceptable levels of regional political stability. The U.S. military is adequately placed.
- **4. Favorable.** A favorable operating environment includes good infrastructure, strong alliances, and a stable political environment. The U.S.

military is well placed in the region for future operations.

5. Excellent. An extremely favorable operating environment includes well-established and well-maintained infrastructure; strong, capable allies; and a stable political environment. The U.S. military is exceptionally well placed to defend U.S. interests.

The key regional characteristics consist of:

- a. Alliances. Alliances are important for interoperability and collective defense, as allies are more likely to lend support to U.S. military operations. Various indicators provide insight into the strength or health of an alliance. These include whether the U.S. trains regularly with countries in the region, has good interoperability with the forces of an ally, and shares intelligence with nations in the region.
- b. Political Stability. Political stability brings predictability for military planners when considering such things as transit, basing, and overflight rights for U.S. military operations. The overall degree of political stability indicates whether U.S. military actions would be hindered or enabled and considers such questions as whether transfers of power are generally peaceful and whether there have been any recent instances of political instability in the region.
- **c. U.S. Military Positioning.** Having military forces based or equipment and supplies staged in a region greatly enhances the ability of the United States to respond to crises and

(presumably) achieve successes in critical "first battles" more quickly. Being routinely present in a region also helps the U.S. to maintain familiarity with its characteristics and the various actors that might try to assist or thwart U.S. actions. With this in mind, we assessed whether or not the U.S. military was well positioned in the region. Again, indicators included bases, troop presence, prepositioned equipment, and recent examples of military operations (including training and humanitarian) launched from the region.

d. Infrastructure. Modern, reliable, and suitable infrastructure is essential to military operations. Airfields, ports, rail lines, canals, and paved roads enable the U.S. to stage, launch operations from, and logistically sustain combat operations. We combined expert knowledge of regions with publicly available information on critical infrastructure to arrive at our overall assessment of this metric.

For Europe, scores this year remained steady, with an increase in the Strength of Alliances spurred by the enhanced threat to common interests resulting from Russia's invasion of Ukraine.

- Alliances: 5—Excellent
- Political Stability: **4—Favorable**
- U.S. Military Positioning: 4—Favorable
- Infrastructure: 4-Favorable

Leading to a regional score of: Favorable

## **Operating Environment: Europe**

	VERY POOR	UNFAVORABLE	MODERATE	FAVORABLE	EXCELLENT
Alliances					✓
Political Stability				✓	
U.S. Military Posture				✓	
Infrastructure				✓	
OVERALL				✓	

#### **Endnotes**

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## Middle East

## Nicole Robinson

S trategically situated at the intersection of Europe, Asia, and Africa, the Middle East has long been an important focus of United States foreign policy. U.S. security relationships in the region are built on pragmatism, shared security concerns, and economic interests that include large sales of U.S. arms to help countries in the region to defend themselves. The U.S. also has a long-term interest that derives from the region's economic importance as the world's primary source of oil and gas.

The region is home to a wide array of cultures, religions, and ethnic groups, including Arabs, Jews, Kurds, Persians, and Turks among others. It also is home to the three Abrahamic religions of Judaism, Christianity, and Islam as well as many smaller religions like the Bahá'í, Druze, Yazidi, and Zoroastrian faiths. The region contains many predominantly Muslim countries as well as the world's only Jewish state.

The Middle East is deeply sectarian, and these long-standing divisions, exacerbated by religious extremists' constant vying for power, are central to many of its current challenges. In some cases, these sectarian divides have persisted for centuries. Contemporary conflicts, however, have less to do with these histories than they do with modern extremist ideologies and the fact that today's borders often do not reflect cultural, ethnic, or religious realities. Instead, they are often the results of decisions taken by the British, French, and other powers during and soon after World War I as they dismantled the Ottoman Empire.<sup>1</sup>

In a way that many in the West do not understand, religion remains a prominent fact of daily life in the modern Middle East, and the friction within Islam between Sunnis and Shias is at the heart of many of the region's conflicts. This friction dates back to the

death of the Prophet Muhammad in 632 AD.<sup>2</sup> Sunni Muslims, who form the majority of the world's Muslim population, hold power in most of the region's Arab countries.

However, viewing the Middle East's current instability through the lens of a Sunni-Shia conflict does not reveal the full picture. The cultural and historical division between Arabs and Persians has reinforced the Sunni-Shia split. The mutual distrust between many Sunni Arab powers and Iran, the Persian Shia power, compounded by clashing national and ideological interests, has fueled instability in such countries as Iraq, Lebanon, Syria, and Yemen. Sunni extremist organizations like al-Qaeda and the Islamic State (IS) have exploited sectarian and ethnic tensions to gain support by posing as champions of Sunni Arabs against Syria's Alawite-dominated regime and other non-Sunni governments and movements.

Regional demographic trends also are destabilizing factors. The Middle East contains one of the world's youngest and fastest-growing populations. This would be viewed as an advantage in most of the West, but not in the Middle East. Known as "youth bulges," these demographic tsunamis have overwhelmed many countries' inadequate political, economic, and educational infrastructures, and the lack of access to education, jobs, and meaningful political participation fuels discontent. Because almost two-thirds of the region's inhabitants are less than 30 years old, this demographic bulge will continue to undermine political stability across the region.<sup>3</sup>

The Middle East has more than half of the world's oil reserves and is the world's chief oil-exporting region.<sup>4</sup> As the world's largest producer and consumer of oil,<sup>5</sup> the U.S., even though it actually imports relatively little of its oil from the Middle East, has

a vested interest in maintaining the free flow of oil and gas from the region. Oil is a fungible commodity, and the U.S. economy remains vulnerable to sudden spikes in world oil prices.

During the COVID-19 crisis, oil prices plunged to below zero in April 2020 after stay-at-home orders caused a severe imbalance between supply and demand. This unprecedented drop in demand sparked an oil price war between Saudi Arabia and Russia, both of which tried to maintain revenue by increasing the price of the reduced amount of oil sold. Although both countries eventually agreed to reduce production by 12 percent, the plummet in oil prices during 2020 caused significant shocks for both exporters and importers.<sup>6</sup>

U.S. energy policies during 2021 exacerbated the problem. The new Administration's decisions to shutter some existing energy production and refuse permission for new exploration made the U.S. more sensitive to energy market volatility originating from the Middle East. Then Russia's invasion of Ukraine made matters worse. The price of oil jumped to more than \$139 a barrel while gas prices doubled—the highest levels for both in almost 14 years. In November 2021 and February 2022, Saudi Arabia declined the U.S. request to increase oil production, choosing instead to abide by the April 2020 agreement between OPEC and Russia to cut production.

Because many U.S. allies depend on Middle East oil and gas, there is also a second-order effect for the U.S. if supply from the Middle East is reduced or compromised. For example, Japan is the world's third-largest economy and largest importer of liquefied natural gas (LNG). The U.S. might not have to depend on Middle East oil or LNG, but the economic consequences arising from a major disruption of supplies would ripple across the globe. Thus, tensions and instabilities continue to affect global energy markets and directly affect U.S. national security and economic interests.

Financial and logistics hubs are growing along some of the world's busiest transcontinental trade routes, and one of the region's economic bright spots in terms of trade and commerce is in the Persian Gulf. The emirates of Dubai and Abu Dhabi in the United Arab Emirates (UAE), along with Qatar, are competing to become the region's top financial center.

The region's economic situation is part of what drives its political environment. The lack of

economic freedom helped to fuel the popular discontent that led ultimately to the Arab Spring uprisings, which began in early 2011 and disrupted economic activity, depressed foreign and domestic investment, and slowed economic growth. Sustained financial and economic growth could lead to greater opportunities for the region's people, but tensions will persist as countries compete for this added wealth.

The COVID-19 pandemic has had massive repercussions for the entire region, affecting economies and shaking political systems in the aftermath of the crisis. Regional gross domestic product (GDP) did rise by 3 percent last year after contracting 5 percent in 2020, but most Middle Eastern economies will not exceed their pre-pandemic GDP per capita in 2022 according to economic projections. Ocuntries that were already facing economic challenges before the pandemic are now facing a long road to recovery, increasing the likelihood of political instability in an already fragile region.

The political environment has a direct bearing on how easily the U.S. military can operate in the region. The political situation in many Middle Eastern countries remains fraught with uncertainty. The Arab Spring uprisings of 2010–2012 formed a sandstorm that eroded the foundations of many authoritarian regimes, erased borders, and destabilized many of the region's countries, <sup>11</sup> but the popular uprisings in Tunisia, Libya, Egypt, Bahrain, Syria, and Yemen did not usher in a new era of democracy and liberal rule as many in the West were hoping. At best, they made slow progress toward democratic reform; at worst, they added to political instability, exacerbated economic problems, and contributed to the rise of Islamist extremists.

Today, the region's economic and political outlooks remain bleak. In some cases, self-interested elites have prioritized regime survival over real investment in human capital, aggravating the material deprivation of youth as issues of endemic corruption, high unemployment, and the rising cost of living remain unresolved. Since 2019, large-scale protests have called attention to the region's lack of economic and political progress. COVID-19 lockdowns and curfews temporarily disrupted protests in Lebanon and Iraq, but demonstrations resumed in 2020. They failed to gain momentum, but more recently, the spike in food and gas prices caused in part by the Russian invasion of Ukraine has sparked demonstrations in both countries that, alongside

ongoing socioeconomic deterioration, will fuel further discontent.<sup>12</sup> If similar protests were to break out across the region, the operational environment for U.S. forces could well be affected.

There is no shortage of security challenges for the U.S. and its allies in this region. Using the breathing space and funding afforded by the July 14, 2015, Joint Comprehensive Plan of Action (JCPOA), <sup>13</sup> for example, Iran exploited Shia–Sunni tensions to increase its influence on embattled regimes and undermine adversaries in Sunni-led states. In May 2018, the Trump Administration left the JCPOA after European allies failed to address many of its serious flaws, including its sunset clauses, and imposed crippling economic sanctions in a "maximum pressure campaign." <sup>14</sup> The sanctions are meant to force changes in Iran's behavior, particularly with regard to its support for terrorist organizations and refusal to renounce a nascent nuclear weapons program. <sup>15</sup>

Many of America's European allies publicly denounced the Trump Administration's decision to withdraw from the JCPOA, but most officials agree privately that the agreement is flawed and needs to be fixed. America's allies in the Middle East, including Israel and most Gulf Arab states, supported the U.S. decision and welcomed a harder line against the Iranian regime. <sup>16</sup>

However, the Biden Administration's efforts to resurrect the JCPOA threaten to disrupt the gains made by the Trump Administration. Iran has been mounting its own maximum-pressure campaign to force President Joseph Biden to lift sanctions and return to the 2015 agreement without imposing conditions. Indirect talks brokered by the European Union between U.S. and Iranian diplomats in Vienna resumed in April 2021, but as this study was being prepared, talks had stalled and a deal had not been reached.<sup>17</sup> Despite Iran's insistence, the Biden Administration has rightly refused to lift the terrorist designations of the Islamic Revolutionary Guard Corps (IRGC).<sup>18</sup>

Tehran attempts to run an unconventional empire by exerting great influence on sub-state entities like Hamas in the Palestinian territories, Hezbollah in Lebanon, the Mahdi movement and other Shia militias in Iraq, and the Houthi insurgents in Yemen. The Iranian Quds Force, the special-operations wing of Iran's Islamic Revolutionary Guard Corps, has orchestrated the formation, arming, training, and operations of these sub-state entities as well as other

surrogate militias. These Iran-backed militias have carried out terrorist campaigns against U.S. forces and allies in the region for many years. On January 2, 2020, President Donald Trump ordered an air strike that killed General Qassem Suleimani, leader of the Iranian Quds Force, and Abu Mahdi al-Muhandis, leader of an Iraqi Shia paramilitary group, both of whom had been responsible for carrying out attacks against U.S. personnel in Iraq. Suleimani's and Muhandis's deaths were a huge loss for Iran's regime and its Iraqi proxies. They also were a major operational and psychological victory for the United States.<sup>19</sup>

In Afghanistan, Tehran's influence on some Shiite groups is such that thousands have volunteered to fight for Bashar al-Assad in Syria. <sup>20</sup> Iran also provided arms to the Taliban after it was ousted from power by a U.S.-led coalition<sup>21</sup> and has long considered the Afghan city of Herat near the Afghan–Iranian border to be within its sphere of influence. The Biden Administration's disastrous withdrawal from Afghanistan paved the way for a Taliban takeover and may deepen ties between Tehran and Kabul, increasing Iran's growing alliances in the region.

Iran already looms large over its weak and divided Arab rivals. Iraq and Syria have been destabilized by insurgencies and civil war and may never fully recover; Egypt is distracted by its own internal problems, economic imbalances, and the Islamist extremist insurgency in the Sinai Peninsula; and Jordan has been inundated by a flood of Syrian refugees and is threatened by the spillover of Islamist extremist groups from Syria. Meanwhile, Tehran has continued to build up its missile arsenal, now the largest in the Middle East; has intervened to prop up the Assad regime in Syria; and supports Shiite Islamist revolutionaries in Yemen and Bahrain. 23

In Syria, the Assad regime's brutal repression of peaceful demonstrations early in 2011 ignited a fierce civil war that killed more than half a million people and created a major humanitarian crisis: according to the United Nations High Commissioner for Refugees, "13.4 million people in need of humanitarian and protection assistance in Syria"; "6.6 million Syrian refugees worldwide, of whom 5.6 million hosted in countries near Syria" like Turkey, Lebanon, and Jordan; and "6.7 million internally displaced persons" within Syria. The large refugee populations created by this civil war could become a source of recruits for extremist groups. For example, both

the Islamist Hay'at Tahrir al-Sham, formerly known as the al-Qaeda-affiliated Jabhat Fateh al-Sham and before that as the al-Nusra Front, and the self-styled IS, formerly known as ISIS or ISIL and before that as al-Qaeda in Iraq, used the power vacuum created by the war to carve out extensive sanctuaries where they built proto-states and trained militants from a wide variety of other Arab countries, Central Asia, Russia, Europe, Australia, and the United States.<sup>25</sup>

At the height of its power, with a sophisticated Internet and social media presence and by capitalizing on the civil war in Syria and sectarian divisions in Iraq, the IS was able to recruit more than 25,000 fighters from outside the region to join its ranks in Iraq and Syria. These foreign fighters included thousands from Western countries, among them the United States. In 2014, the U.S. announced the formation of a broad international coalition to defeat the Islamic State. By early 2019, the territorial "caliphate" had been destroyed by a U.S.-led coalition of international partners. However, the socioeconomic meltdown of Lebanon and ongoing fighting in Syria present an environment that the IS can exploit to reconstitute itself. Multiple reports indicate that the IS is recruiting young men in Tripoli, Lebanon.26 There is a real danger that IS or other Islamic extremists could capitalize on the security vacuum created by that country's ongoing deterioration.27

Arab–Israeli tensions are another source of regional instability. The repeated breakdown of Israeli–Palestinian peace negotiations has created an even more antagonistic situation. Hamas, the Palestinian branch of the Muslim Brotherhood that has controlled Gaza since 2007, seeks to transform the conflict from a national struggle over sovereignty and territory into a religious conflict in which compromise is denounced as blasphemy. Hamas invokes jihad in its struggle against Israel and seeks to destroy the Jewish state and replace it with an Islamic state.

The signing of the Abraham Accords in 2020 caused a brief spark of hope. These U.S.-brokered agreements normalizing relations between Israel and the UAE and between Israel and Bahrain have created new opportunities for trade, investment, and defense cooperation. They are also important milestones in the diplomatic march toward a broader Arab–Israeli peace.

However, Israeli–Palestinian tensions have only worsened over the past two years. In April 2022,

tensions escalated after nearly a month of deadly violence and attacks in Jerusalem's old city. Hamas fired a barrage of rockets into Israel from Gaza, and Israel responded with air strikes.<sup>30</sup> This escalation is remarkably similar to the 11-day war that took place around the same time in 2021.<sup>31</sup> Increased violence threatens the unity of Israel's ideologically divided coalition government led by Naftali Bennett. Members of the coalition, including the country's Arab minority Ra'am party, have suspended their support as a result of violence at the Al-Aqsa Mosque, causing the coalition to lose its slim majority in parliament.<sup>32</sup> As this study was being prepared, the situation remained tense.

# Important Alliances and Bilateral Relations in the Middle East

The U.S. has strong military, security, intelligence, and diplomatic ties with several Middle Eastern nations, including Israel, Egypt, Jordan, and the six members of the Gulf Cooperation Council (GCC): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. Because the historical and political circumstances that led to the creation of NATO have been largely absent in the Middle East, the region lacks a similarly strong collective security organization.

When it came into office, the Trump Administration proposed the idea of a multilateral Middle East Strategic Alliance with its Arab partners.<sup>33</sup> The initial U.S. concept, which included security, economic cooperation, and conflict resolution and deconfliction, generated considerable enthusiasm, but the project has since been sidelined. Middle Eastern countries traditionally have preferred to maintain bilateral relationships with the U.S. and generally have shunned multilateral arrangements because of the lack of trust among Arab states.

This lack of trust manifested itself in June 2017 when the Kingdom of Saudi Arabia, the UAE, Bahrain, Egypt, and several other Muslim-majority countries cut or downgraded diplomatic ties with Qatar after Doha was accused of supporting terrorism in the region.<sup>34</sup> These nations severed all commercial land, air, and sea travel with Qatar and expelled Qatari diplomats and citizens. In January 2021, Saudi Arabia, the UAE, Bahrain, and Egypt agreed to restore ties with Qatar during the 41st Gulf Cooperation Council Summit. Per the agreement, Saudi Arabia and its GCC allies lifted the economic

and diplomatic blockade of Qatar, reopening their airspace, land, and sea borders. This diplomatic détente paves the way for full reconciliation in the GCC and, at least potentially, a more united front in the Gulf.<sup>35</sup>

Military training is an important part of these relationships. Exercises involving the United States are intended principally to ensure close and effective coordination with key regional partners, demonstrate an enduring U.S. security commitment to regional allies, and train Arab armed forces so that they can assume a larger share of responsibility for regional security.

**Israel.** America's most important bilateral relationship in the Middle East is with Israel. Both countries are democracies, value free-market economies, and believe in human rights at a time when many Middle Eastern countries reject those values. With support from the United States, Israel has developed one of the world's most sophisticated air and missile defense networks. <sup>36</sup> No significant progress on peace negotiations with the Palestinians or on stabilizing Israel's volatile neighborhood is possible without a strong and effective Israeli–American partnership.

Ties between the U.S. and Israel improved significantly during the Trump Administration, encouraged by the relocation of America's embassy from Tel Aviv to western Jerusalem in 2018 and the Administration's role in facilitating the Abraham Accords, which were signed in 2020, and so far have shown no signs of deteriorating under the Biden Administration.<sup>37</sup> However, beyond "floating the idea of a White House meeting between senior Israeli and Palestinian officials,"<sup>38</sup> the Biden Administration has shown little interest in taking an active role in Israeli–Palestinian peace negotiations. If the conflict between the two sides continues to escalate, President Biden may find himself pressured to become more involved.

Saudi Arabia. After Israel, the U.S. military relationship is deepest with the Gulf States, including Saudi Arabia, which serves as de facto leader of the Gulf Cooperation Council. America's relationship with Saudi Arabia is based on pragmatism and is important for both security and economic reasons, but it has come under intense strain since the murder of Saudi dissident journalist Jamal Ahmad Khashoggi by Saudi security services in Turkey in 2018.

The Saudis enjoy huge influence across the Muslim world, and approximately 2 million Muslims

participate in the annual Hajj pilgrimage to the holy city of Mecca. Riyadh has been a key partner in efforts to counter the influence of Iran. The U.S. is also the largest provider of arms to Saudi Arabia and regularly, if not controversially, sells munitions needed to resupply stockpiles expended in the Saudi-led campaign against the Houthis in Yemen.

Under the Biden Administration, bilateral relations have shown signs of deterioration because the Administration has turned a blind eye to Houthi aggression. For example, the Biden Administration lifted the Trump Administration's designation of the Houthi Ansar Allah (Supporters of God) movement as a terrorist organization despite Houthi drone and ballistic missile attacks against military and civilian targets in Saudi Arabia and the UAE. Both Saudi Arabia and the UAE have called for a redesignation of the Houthis, but as this book was being prepared, no such designation had been imposed.<sup>39</sup>

Gulf Cooperation Council. The GCC's member countries are located in an oil-rich region close to the Arab-Persian fault line and are therefore strategically important to the U.S.<sup>40</sup> The root of Arab-Iranian tensions in the Gulf is Tehran's ideological drive to export its Islamist revolution and overthrow the traditional rulers of the Arab kingdoms. This ideological clash has further amplified long-standing sectarian tensions between Shia Islam and Sunni Islam. Tehran has sought to radicalize Shia Arab minority groups to undermine Sunni Arab regimes in Saudi Arabia, Kuwait, Yemen, and Bahrain. It also sought to incite revolts by the Shia majorities in Iraq against Saddam Hussein's regime and in Bahrain against the Sunni al-Khalifa dynasty. Culturally, many Iranians look down on the Gulf States, many of which they see as artificial entities carved out of the former Persian Empire and propped up by Western powers.

GCC member countries often have difficulty agreeing on a common policy with respect to matters of security. This reflects both the organization's intergovernmental nature and its members' desire to place national interests above those of the GCC. The 2017 dispute regarding Qatar illustrates this difficulty.

Another source of disagreement involves the question of how best to deal with Iran. The UAE and Saudi Arabia, states that once opposed the Iran nuclear deal, were courting Tehran through diplomatic engagements in 2021.<sup>41</sup> Bahrain still maintains

a hawkish view of the threat from Iran. Oman prides itself on its regional neutrality, and Qatar shares natural gas fields with Iran, so it is perhaps not surprising that both countries view Iran's activities in the region as less of a threat and maintain cordial relations with Tehran. Kuwait tends to fall somewhere in the middle. Intra-GCC relations also can be problematic.

**Egypt.** Egypt is another important U.S. military ally. As one of six Arab countries that maintain diplomatic relations with Israel (the others are Jordan, Bahrain, the UAE, Sudan, and Morocco), Egypt is closely enmeshed in the Israeli–Palestinian conflict and remains a leading political, diplomatic, and military power in the region.

Relations between the U.S. and Egypt have been difficult since the 2011 downfall of President Hosni Mubarak after 30 years of rule. The Muslim Brotherhood's Mohamed Morsi was elected president in 2012 and used the Islamist-dominated parliament to pass a constitution that advanced an Islamist agenda. Morsi's authoritarian rule, combined with rising popular dissatisfaction with falling living standards, rampant crime, and high unemployment, led to a massive wave of protests in June 2013 that prompted a military coup in July. The leader of the coup, Field Marshal Abdel Fattah el-Sisi, pledged to restore democracy and was elected president in 2014 and again in 2018 in elections that many considered to be neither free nor fair.

Sisi's government faces major political, economic, and security challenges. However, because of Egypt's ban on anti-government demonstrations and Sisi's tight control of internal security, there was only one outbreak of protests in 2018.<sup>42</sup> Internal security may deteriorate if bread prices continue to rise—a development that could trigger a new wave of anti-government protests—or if the Islamic State resurges inside Egypt.

### Quality of Armed Forces in the Region

The quality and capabilities of the region's armed forces are mixed. Some countries spend billions of dollars each year on advanced Western military hardware; others spend very little. Saudi Arabia's military budget is by far the region's largest, but in 2020 (the most recent year for which data are available), Oman spent the region's highest percentage of GDP on defense at 11 percent, followed by Saudi Arabia at 8.4 percent.<sup>43</sup>

Historically, figures on Middle East defense spending have been very unreliable, and the lack of data has worsened. For 2020, according to the Stockholm International Peace Research Institute, there were no available data for Qatar, Syria, the United Arab Emirates, and Yemen.<sup>44</sup>

Different security factors drive the degree to which Middle Eastern countries fund, train, and arm their militaries. For Israel, which fought and defeated Arab coalitions in 1948, 1956, 1967, 1973, and 1982, the chief potential threat to its existence is now an Iranian regime that has called for Israel to be "wiped off the map." States and non-state actors in the region have invested in asymmetric and unconventional capabilities to offset Israel's military superiority. For the Gulf States, the main driver of defense policy is the Iranian military threat combined with internal security challenges; for Iraq, it is the internal threat posed by Iran-backed militias and Islamic State terrorists.

The Israel Defense Forces (IDF) are considered the most capable military forces in the Middle East. Iran and other Arab countries have spent billions of dollars in an effort to catch up with Israel, and the resulting "arms race," supplied in part by the U.S., could threaten Israel's qualitative military effectiveness (QME). Iran is steadily improving its missile capabilities and, due to the expiration of the U.N. conventional arms embargo in October 2020, now has access to the global arms trade. In response, Arab countries are upgrading their weapons capabilities while establishing officer training programs to improve military effectiveness.

Israel funds its military sector heavily and has a strong national industrial capacity that is supported by significant funding from the U.S. Combined, these factors give Israel a regional advantage despite limitations of manpower and size. In particular, the IDF has focused on maintaining its superiority in missile defense, intelligence collection, precision weapons, and cyber technologies.<sup>49</sup> The Israelis regard their cyber capabilities as especially important and use cyber technologies for a number of purposes, including defending Israeli cyberspace, gathering intelligence, and carrying out attacks.<sup>50</sup>

In 2010, Israel signed a \$2.7 billion deal with the U.S. to acquire approximately 20 F-35I "Adir" Lightning fighter jets (the F-35I is a heavily modified version of the Lockheed Martin F-35 stealth fighter).<sup>51</sup> In the 2021 conflict with Hamas, these jets were deployed in a major combat operation that targeted dozens of Hamas rocket launch tubes in northern Gaza.<sup>52</sup>

Israel maintains its qualitative superiority in medium-range and long-range missile capabilities and fields effective missile defense systems, including Iron Dome and Arrow, both of which the U.S. helped to finance. However, because Congress has yet to pass legislation to restock the interceptors for the Iron Dome, Israel is vulnerable to ongoing threats across its border. Israel also has a nuclear weapons capability (which it does not publicly acknowledge) that increases its strength relative to other powers in the region and has helped to deter adversaries as the gap in conventional capabilities has been reduced.

After Israel, the most technologically advanced and best-equipped armed forces are found in the GCC countries. Previously, the export of oil and gas meant that there was no shortage of resources to devote to defense spending, but the collapse of crude oil prices has forced oil-exporting countries to adjust their defense spending patterns. Nevertheless, GCC nations still have the region's best-funded (even if not necessarily its most effective) Arab armed forces. All GCC members boast advanced defense hardware that reflects a preference for U.S., U.K., and French equipment.

Saudi Arabia maintains the GCC's most capable military force. It has an army of 75,000 soldiers and a National Guard of 130,000 personnel reporting directly to the king. The army operates 1,010 main battle tanks including 500 U.S.-made M1A2s. Its air force is built around American-built and British-built aircraft and consists of more than 456 combat-capable aircraft that include F-15s, Tornados, and Typhoons.<sup>54</sup>

In fact, air power is the strong suit of most GCC members. Oman, for example, operates F-16s and Typhoons. In 2018, the U.S. government awarded Lockheed Martin a \$1.12 billion contract to produce 16 new F-16 Block 70 aircraft (Lockheed Martin's newest and most advanced F-16 production configuration) for the Royal Bahraini Air Force.<sup>55</sup> Qatar operates French-made Mirage fighters and is buying 24 Typhoons from the U.K.<sup>56</sup>

In November 2020, the U.S. Department of State notified Congress that it had approved the sale of a \$23.4 billion defense package of F-35A Joint Strike Fighters, armed drones, munitions, and associated equipment to the UAE. After a temporary freeze

on arm sales by the Biden Administration, the sale moved forward in April 2021.<sup>57</sup> The sale is somewhat controversial because of Israeli concerns about other regional powers also possessing the most modern combat aircraft, potentially challenging an important Israeli advantage.

Middle Eastern countries have shown a willingness to use their military capability under certain and limited circumstances. The navies of GCC member countries rarely deploy beyond their Exclusive Economic Zones, but Kuwait, Bahrain, the UAE, Saudi Arabia, and Qatar have participated in and in some cases have commanded Combined Task Force 152, formed in 2004 to maintain maritime security in the Persian Gulf.58 The UAE and Qatar deployed fighters to participate in NATO-led operations over Libya in 2011, although they did not participate in strike operations. To varying degrees, all six GCC members also joined the U.S.-led anti-ISIS coalition with the UAE contributing the most in terms of air power.<sup>59</sup> Air strikes in Syria by members of the GCC ended in 2017.

With 438,500 active personnel and 479,000 reserve personnel, Egypt has the region's largest Arab military force. Egypt has the region's largest Arab military with an army, air force, air defense, navy, and special operations forces. Until 1979, when the U.S. began to supply Egypt with military equipment, Cairo relied primarily on less capable Soviet military technology. Since then, its army and air force have been significantly upgraded with U.S. military weapons, equipment, and warplanes. Egypt's naval capabilities have also grown with the opening of a naval base at Ras Gargoub and the commissioning of a fourth Type-209/1400 submarine and a second FREMM frigate.

Egypt has struggled with increased terrorist activity in the Sinai Peninsula, including attacks on Egyptian soldiers, attacks on foreign tourists, and the October 2015 bombing of a Russian airliner departing from the Sinai. The Islamic State's "Sinai Province" terrorist group has claimed responsibility for all of these actions. <sup>63</sup> Although the Egyptian army regained control of two IS-controlled villages, militant attacks against army affiliates in different parts of North Sinai and the kidnapping of tribal leaders threaten the stability of the area. <sup>64</sup>

Jordan is a close U.S. ally and has small but effective military forces. The principal threats to its security include terrorism, turbulence spilling

over from Syria and Iraq, and the resulting flow of refugees. Although Jordan faces few conventional threats from its neighbors, its internal security is threatened by Islamist extremists returning from fighting in the region who have been emboldened by the growing influence of al-Qaeda and other Islamist militants. As a result, Jordan's highly professional armed forces have focused on border and internal security in recent years.

Considering Jordan's size, its conventional capability is significant. Jordan's ground forces total 86,000 soldiers and include 182 British-made Challenger 1 tanks and four French-made Leclerc tanks. Forty-seven F-16 Fighting Falcons form the backbone if its air force, <sup>65</sup> and its special operations forces are highly capable, having benefitted from extensive U.S. and U.K. training. Jordanian forces have served in Afghanistan and in numerous U.N.-led peacekeeping operations.

Iraq has fielded one of the region's most dysfunctional military forces. After the withdrawal of U.S. troops in 2011, Iraq's government selected and promoted military leaders according to political criteria. Shiite army officers were favored over their Sunni, Christian, and Kurdish counterparts, and former Prime Minister Nouri al-Maliki chose top officers according to their political loyalties. Politicization of the armed forces also exacerbated corruption within many units with some commanders siphoning off funds allocated for "ghost soldiers" who never existed or had been separated from the army for various reasons.

The promotion of incompetent military leaders, poor logistical support because of corruption and other problems, limited operational mobility, and weaknesses in intelligence, reconnaissance, medical support, and air force capabilities have combined to undermine the effectiveness of Iraq's armed forces. In June 2014, for example, the collapse of as many as four divisions that were routed by vastly smaller numbers of Islamic State fighters led to the fall of Mosul.<sup>68</sup> The U.S. and its allies responded with a massive training program for the Iraqi military that led to the liberation of Mosul on July 9, 2017.<sup>69</sup> Since 2017, the capabilities and morale of Iraq's armed forces have improved, but there is still concern about Baghdad's ability to sustain operational effectiveness in the face of the current U.S. drawdown and redeployment of forces. The continued presence of armed militias presents the biggest obstacle to force unity.<sup>70</sup>

# Current U.S. Military Presence in the Middle East

Before 1980, the limited U.S. military presence in the Middle East consisted chiefly of a small naval force that had been based in Bahrain since 1958. The U.S. "twin pillar" strategy relied on prerevolutionary Iran and Saudi Arabia to take the lead in defending the Persian Gulf from the Soviet Union and its client regimes in Iraq, Syria, and South Yemen,<sup>71</sup> but the 1979 Iranian revolution demolished one pillar, and the December 1979 Soviet invasion of Afghanistan increased the Soviet threat to the Gulf.

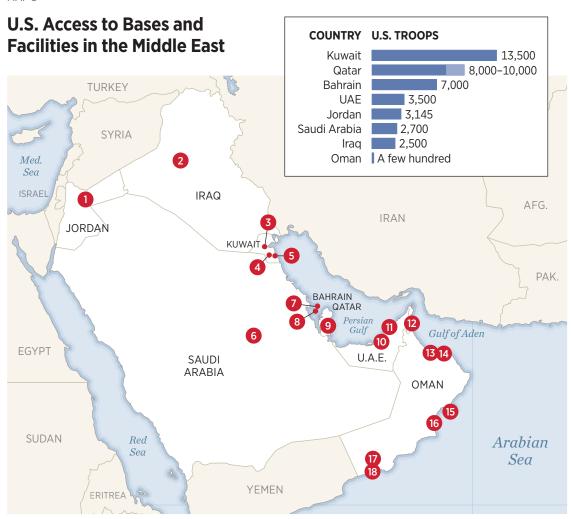
In January 1980, President Jimmy Carter proclaimed in a commitment known as the Carter Doctrine that the United States would take military action to defend oil-rich Persian Gulf States from external aggression. In 1980, he ordered the creation of the Rapid Deployment Joint Task Force (RDJTF), the precursor to U.S. Central Command (USCENT-COM), which was established in January 1983.<sup>72</sup>

Until the late 1980s, according to USCENTCOM, America's "regional strategy still largely focused on the potential threat of a massive Soviet invasion of Iran." After the collapse of the Soviet Union, Saddam Hussein's Iraqi regime became the chief threat to regional stability. Iraq invaded Kuwait in August 1990, and the United States responded in January 1991 by leading an international coalition of more than 30 nations to expel Saddam's forces from Kuwait. CENTCOM commanded the U.S. contribution of more than 532,000 military personnel to the coalition's armed forces, which totaled at least 737,000. This marked the peak U.S. force deployment in the Middle East.

Confrontations with Iraq continued throughout the 1990s as Iraq continued to violate the 1991 Gulf War cease-fire. Baghdad's failure to cooperate with U.N. arms inspectors to verify the destruction of its weapons of mass destruction and its links to terrorism led to the U.S. invasion of Iraq in 2003. During the initial invasion, U.S. forces numbered nearly 192,000,75 joined by military personnel from coalition forces. Apart from the "surge" in 2007, when President George W. Bush deployed an additional 30,000 personnel, the number of American combat forces in Iraq fluctuated between 100,000 and 150.000.76

In December 2011, the U.S. officially completed its withdrawal of troops, leaving only 150 personnel attached to the U.S. embassy in Iraq.<sup>77</sup> Later, in

MAP 3



## **JORDAN**

Muwaffaq Salti Airbase

### **IRAQ**

2 al-Asad Air Base

## **KUWAIT**

- 3 Ali al-Salem Air Base
- 4 Ahmad al-Jabir Air Base
- 5 Camp Arifjan

## **SAUDI ARABIA**

6 Eskan Village Air Base

## **BAHRAIN**

- 7 Khalifa bin Salman Port
- 8 Shaykh Isa Air Base

## QATAR

9 Al Udeid Air Base

### **UNITED ARAB EMIRATES**

- 10 Al-Dhafra Air Base
- 11 Jebel Ali Port
- 12 Fujairah Naval Base

## OMAN

- 13 Musnanah Air Base
- 14 Muscat International Airport
- 15 RAFO Masirah
- 16 Al Dugm Port
- 17 RAFO Thumrait
- 18 Salalah Port

**SOURCE:** Heritage Foundation research.

▲ heritage.org

the aftermath of IS territorial gains in Iraq, the U.S. redeployed thousands of troops to the country to assist Iraqi forces against IS and help to build Iraqi capabilities. In July 2021, the Biden Administration announced that America's combat mission in Iraq would come to a close by the end of the year and that the remaining U.S. forces would transition to an advisory role. U.S. force levels in Iraq declined from 5,200 in 2020 to 2,500 in January 2021.<sup>78</sup>

The U.S. also continues to maintain a limited number of forces in other locations in the Middle East, primarily in GCC countries. Rising naval tensions in the Persian Gulf prompted the additional deployments of troops, Patriot missile batteries, and combat aircraft to the Gulf in late 2019 to deter Iran, but most were later withdrawn.<sup>79</sup>

By January 2022, CENTCOM deployed an estimated 40,000 to 60,000 U.S. troops in 21 countries within its area of responsibility. 80 Although the exact disposition of U.S. forces is hard to triangulate because of the fluctuating nature of U.S. military operations in the region, 81 information gleaned from open sources reveals the following:

- Kuwait. More than 13,500 U.S. personnel are based in Kuwait and spread among Camp Arifjan, Ahmad al-Jabir Air Base, and Ali al-Salem Air Base. A large depot of prepositioned equipment and a squadron of fighters and Patriot missile systems are also deployed to Kuwait.<sup>82</sup>
- UAE. About 3,500 U.S. personnel are deployed at Jebel Ali port, Al Dhafra Air Base, and naval facilities at Fujairah. Jebel Ali port is the U.S. Navy's busiest port of call for aircraft carriers. U.S. Air Force personnel who are stationed in the UAE use Al Dhafra Air Base to operate fighters, unmanned aerial vehicles (UAVs), refueling aircraft, and surveillance aircraft. In addition, the United States has regularly deployed F-22 Raptor combat aircraft to Al Dhafra and in April 2021 deployed the F-35 combat aircraft because of escalating tensions with Iran. Patriot and Terminal High Altitude Area Defense (THAAD) missile systems are deployed for air and missile defense.<sup>83</sup>
- Oman. In 1980, Oman became the first Gulf State to welcome a U.S. military base. Today, it provides important access in the form of over

5,000 aircraft overflights, 600 aircraft landings, and 80 port calls annually. The number of U.S. military personnel in Oman has fallen to a few hundred, mostly from the U.S. Air Force. According to the Congressional Research Service, "the United States reportedly has access to Oman's military airfields in Muscat (the capital), Thumrait, Masirah Island, and Musnanah" as well as (pursuant to a March 2019 Strategic Framework Agreement) the ports of Al Duqm and Salalah.<sup>84</sup>

- personnel are based in Bahrain. Because Bahrain is home to Naval Support Activity Bahrain and the U.S. Fifth Fleet, most U.S. military personnel there belong to the U.S. Navy. A significant number of U.S. Air Force personnel operate out of Shaykh Isa Air Base, where F-16s, F/A-18s, and P-8 surveillance aircraft are stationed. U.S. Patriot missile systems also are deployed to Bahrain. The deep-water port of Khalifa bin Salman is one of the few facilities in the Gulf that can accommodate U.S. aircraft carriers.<sup>85</sup>
- Saudi Arabia. In June 2021, President Biden reported to Congress that approximately 2,700 U.S. military personnel were deployed in Saudi Arabia "to protect United States forces and interests in the region against hostile action by Iran or Iran-backed groups." The President confirmed that these troops, "operating in coordination with the Government of the Kingdom of Saudi Arabia, provide air and missile defense capabilities and support the operation of United States fighter aircraft."86 The six-decade-old United States Military Training Mission to the Kingdom of Saudi Arabia, the four-decade-old Office of the Program Manager of the Saudi Arabian National Guard Modernization Program, and the Office of the Program Manager-Facilities Security Force are based in Eskan Village Air Base approximately 13 miles south of the capital city of Riyadh.87
- Qatar. The number of U.S. personnel, mainly from the U.S. Air Force, deployed in Qatar "has ranged from about 8,000 to over 10,000."88 The U.S. operates its Combined Air Operations

Center at Al Udeid Air Base, which is one of the world's most important U.S. air bases. It is also the base from which the anti-ISIS campaign was headquartered. Heavy bombers, tankers, transports, and ISR (intelligence, surveillance, and reconnaissance) aircraft operate from Al Udeid Air Base, which also serves as the forward headquarters of CENTCOM. The base houses prepositioned U.S. military equipment and is defended by U.S. Patriot missile systems. The recent tensions between Qatar and other Arab states have not affected the United States' relationship with Qatar.

• **Jordan.** According to CENTCOM, Jordan "is one of [America's] strongest and most reliable partners in the Levant sub-region." Although there are no U.S. military bases in Jordan, the U.S. has a long history of conducting training exercises out of Jordanian air bases. Due to recent events in neighboring Syria, in addition to other military assets like fighter jets and air defense systems, "approximately 3,147 U.S. military personnel are deployed to Jordan to 'counter-ISIS operations, enhance Jordan's security, and promote regional stability." 90

CENTCOM "directs and enables military operations and activities with allies and partners to increase regional security and stability in support of enduring U.S. interests." <sup>91</sup> Execution of this mission is supported by four service component commands (U.S. Naval Forces Middle East [USNAVCENT]; U.S. Army Forces Middle East [USARCENT]; U.S. Air Forces Middle East [USAFCENT]; and U.S. Marine Forces Middle East [MARCENT]) and one subordinate unified command (U.S. Special Operations Command Middle East [SOCCENT]).

• U.S. Naval Forces Central Command. US-NAVCENT is USCENTCOM's maritime component. With its forward headquarters in Bahrain, it is responsible for commanding the afloat units that rotationally deploy or surge from the United States in addition to other ships that are based in the Gulf for longer periods. USNAV-CENT conducts persistent maritime operations to advance U.S. interests, deter and counter disruptive countries, defeat violent extremism, and strengthen partner nations' maritime

capabilities in order to promote a secure maritime environment in an area that encompasses approximately 2.5 million square miles of water.

- U.S. Army Forces Central Command. US-ARCENT is USCENTCOM's land component. Based in Kuwait, it is responsible for land operations in an area that totals 4.6 million square miles (1.5 times larger than the continental United States).
- U.S. Air Forces Central Command. USAF-CENT is USCENTCOM's air component. Based in Qatar, it is responsible for air operations and for working with the air forces of partner countries in the region. It also manages an extensive supply and equipment prepositioning program at several regional sites.
- U.S. Marine Forces Central Command.

  MARCENT is USCENTCOM's designated

  Marine Corps service component. Based in

  Bahrain, it is responsible for all Marine Corps
  forces in the region.
- U.S. Special Operations Command Central. SOCCENT is a subordinate unified command under USCENTCOM. Based in Qatar, it is responsible for planning special operations throughout the USCENTCOM region, planning and conducting peacetime joint/combined special operations training exercises, and orchestrating command and control of peacetime and wartime special operations.

In addition to the American military presence in the region, two NATO allies—the United Kingdom and France—play an important role.

The U.K.'s presence in the Middle East is a legacy of British imperial rule. The U.K. has maintained close ties with many countries that it once ruled and has conducted military operations in the region for decades. As of 2020, approximately 1,350 British service personnel were based throughout the region. This number fluctuates with the arrival of visiting warships.<sup>92</sup>

The British presence in the region is dominated by the Royal Navy. Permanently based naval assets include four mine hunters and one Royal Fleet Auxiliary supply ship. In addition, there generally are frigates or destroyers in the Gulf or Arabian Sea performing maritime security duties, 93 and (although such matters are not the subject of public discussion) U.K. attack submarines also operate in the area. In April 2018, as a sign of its long-term maritime presence in the region, the U.K. opened a base in Bahrain—its first overseas military base in the Middle East in more than four decades. 94 The U.K. has made a multimillion-dollar investment in modernization of the Duqm Port complex in Oman to accommodate its new *Queen Elizabeth*—class aircraft carriers. 95

The U.K. also has a sizeable Royal Air Force (RAF) presence in the region, mainly in the UAE and Oman. A short drive from Dubai, Al-Minhad Air Base is home to a small contingent of U.K. personnel, and small RAF detachments in Oman support U.K. and coalition operations in the region. Although considered to be in Europe, the U.K.'s Sovereign Base Areas of Akrotiri and Dhekelia in Cyprus have supported U.S. military and intelligence operations in the past and are expected to continue to do so.

The British presence in the region extends beyond soldiers, ships, and planes. A British-run staff college operates in Qatar, and Kuwait chose the U.K. to help run its own equivalent of the Royal Military Academy at Sandhurst. The U.K. also plays a very active role in training the Saudi Arabian and Jordanian militaries.

The French presence in the Gulf is smaller than the U.K.'s but still significant. France opened its first military base in the Gulf in 2009. Located in the emirate of Abu Dhabi, it was the first foreign military installation built by the French in 50 years. The French have 650 personnel based in the UAE, along with seven Rafale jets and an armored battle-group, as well as military operations in Kuwait and Qatar. French ships have access to the Zayed Port in Abu Dhabi, which is big enough to handle every ship in the French Navy except the aircraft carrier *Charles De Gaulle*.

Military support from the U.K. and France has been particularly important in Operation Inherent Resolve, a U.S.-led joint task force that was formed to combat the Islamic State in Iraq and Syria. As of May 2021, France had between 600 and 650 troops stationed in the UAE, 600 stationed in Syria and Iraq, and 700 stationed in Lebanon. The U.K. temporarily redeployed troops back to the U.K. because of COVID-19 but announced in February 2021 that the

500 troops would be sent back along with an additional 3,500 troops to boost its counterterrorism training mission in Iraq. <sup>100</sup> The additional troops will help both to prevent the IS from returning and to manage threats from Iran-backed militias more effectively.

Another important actor in Middle East security is the small East African country of Djibouti. Djibouti sits on the Bab el-Mandeb Strait, through which an estimated 6.2 million barrels of oil a day transited in 2018 (the most recent year for which U.S. Energy Administration data are available) and which is a choke point on the route to the Suez Canal. <sup>101</sup> An increasing number of countries recognize Djibouti's value as a base from which to project maritime power and launch counterterrorism operations. The country is home to Camp Lemonnier, which can hold as many as 4,000 personnel and is the only permanent U.S. military base in Africa. <sup>102</sup>

China is also involved in Djibouti and has established its first permanent overseas base there. This base can house 10,000 troops, and Chinese marines have used it to stage live-fire exercises featuring armored combat vehicles and artillery. France, Italy, and Japan also have presences of varying strength in Djibouti. 103

## **Key Infrastructure and Warfighting Capabilities**

The Middle East is critically situated geographically. Two-thirds of the world's population lives within an eight-hour flight from the Gulf region, making it accessible from most other regions of the globe. The Middle East also contains some of the world's most critical maritime choke points, including the Suez Canal and the Strait of Hormuz.

Although infrastructure is not as developed in the Middle East as it is in North America or Europe, during a decades-long presence, the U.S. has developed systems that enable it to move large numbers of matériel and personnel into and out of the region. According to the Department of Defense, at the height of U.S. combat operations in Iraq during the Second Gulf War, the U.S. presence included 165,000 servicemembers and 505 bases. Moving personnel and equipment out of the country was "the largest logistical drawdown since World War II" and included redeployment of "the 60,000 troops who remained in Iraq at the time and more than 1 million pieces of equipment ahead of their deadline."

The condition of the region's roads varies from country to country. The most recent available data

reflect that 100 percent of the roads in Israel, Jordan, and the UAE are paved. Other nations—for example, Oman (49.3 percent); Saudi Arabia (21.5 percent); and Yemen (8.7 percent)—have poor paved road coverage. Rail coverage is also poor. China's Belt and Road Initiative has targeted ports, roads, and railway development in Syria, Iraq, Egypt, and many other countries, and the result could be improved transportation conditions across the region at the expense of U.S. interests. 106

The U.S. has access to several airfields in the region. The primary air hub for U.S. forces is Al Udeid Air Base in Qatar. Other airfields include Ali Al Salem Air Base, Kuwait; Al Dhafra, UAE; Al Minhad, UAE; Isa, Bahrain; Eskan Village Air Base, Saudi Arabia; Muscat, Oman; Thumrait, Oman; and Masirah Island, Oman, in addition to the commercial airport at Seeb, Oman. In the past, the U.S. has used major airfields in Iraq, including Baghdad International Airport and Balad Air Base, as well as Prince Sultan Air Base in Saudi Arabia.

The fact that a particular air base is available to the U.S. today, however, does not necessarily mean that it will be available for a particular operation in the future. For example, because of their more cordial relations with Iran, Qatar and Oman probably would not allow the U.S. to use air bases in their territory for strikes against Iran unless they were first attacked themselves.

The U.S. also has access to ports in the region, perhaps the most important being the deep-water port of Khalifa bin Salman in Bahrain and naval facilities at Fujairah in the UAE.107 The UAE's commercial port of Jebel Ali is open for visits from U.S. warships and the prepositioning of equipment for operations in theater.<sup>108</sup> In March 2019, "Oman and the United States signed a 'Strategic Framework Agreement' that expands the U.S.-Oman facilities access agreements by allowing U.S. forces to use the ports of Al Dugm and Salalah."109 The location of these ports outside the Strait of Hormuz makes them particularly useful. Approximately 90 percent of the world's trade travels by sea, and some of the busiest and most important shipping lanes are located in the Middle East. Tens of thousands of cargo ships travel through the Strait of Hormuz and the Bab el-Mandeb Strait each year.

Given the high volume of maritime traffic in the region, no U.S. military operation can be undertaken without consideration of the opportunity and risk

that these shipping lanes offer to America and her allies. The major shipping routes include:

• The Suez Canal. In 2021, more than 20,000 ships transited the Suez Canal—an average of 55 ships per day. 110 Considering that the canal itself is 120 miles long but only 670 feet wide, this is an impressive amount of traffic. The Suez Canal is important to Europe because it provides access to oil from the Middle East. It also serves as an important strategic asset, as it is used routinely by the U.S. Navy to move surface combatants between the Mediterranean Sea and the Red Sea. Thanks to a bilateral arrangement between Egypt and the United States, the U.S. Navy enjoys priority access to the canal. 111

The journey through the narrow waterway is no easy task for large surface combatants. The canal was not constructed with the aim of accommodating 100,000-ton aircraft carriers and therefore exposes a larger ship to attack. For this reason, different types of security protocols are followed, including the provision of air support by the Egyptian military.<sup>112</sup> These security protocols, however, are not foolproof. In April 2021, the Suez Canal was closed for more than 11 days after a container ship blocked the waterway, creating a 360-ship traffic jam that disrupted almost 13 percent of global maritime traffic. This crisis proves that ever-larger container ships transiting strategic choke points are prone to accidents that can lead to massive disruptions of both global maritime trade and U.S. maritime security.113

• Strait of Hormuz. According to the U.S. Energy Information Administration, the Strait of Hormuz, which links the Persian Gulf with the Arabian Sea and the Gulf of Oman, "is the world's most important oil chokepoint because of the large volumes of oil that flow through the strait." In 2020, its daily oil flow averaged "around 18 million barrels" per day, or the equivalent of about "[o]ne fifth of global oil supply." Given the extreme narrowness of the passage and its proximity to Iran, shipping routes through the Strait of Hormuz are particularly vulnerable to disruption. Iran attacked oil tankers repeatedly in April and May 2021 and continues to harass U.S. naval ships. <sup>116</sup>

• Bab el-Mandeb Strait. The Bab el-Mandeb Strait is a strategic waterway located between the Horn of Africa and Yemen that links the Red Sea to the Indian Ocean. Exports from the Persian Gulf and Asia destined for Western markets must pass through the strait en route to the Suez Canal. Because the Bab el-Mandeb Strait is 18 miles wide at its narrowest point, passage is limited to two channels for inbound and outbound shipments.<sup>117</sup>

Maritime Prepositioning of Equipment and Supplies. The U.S. military has deployed noncombatant maritime prepositioning ships (MPS) containing large amounts of military equipment and supplies in strategic locations from which they can reach areas of conflict relatively quickly as associated U.S. Army or Marine Corps units located elsewhere arrive in the area. The British Indian Ocean Territory of Diego Garcia, an island atoll, hosts the U.S. Naval Support Facility Diego Garcia, which supports prepositioning ships that can supply Army or Marine Corps units deployed for contingency operations in the Middle East.

#### Conclusion

For the foreseeable future, the Middle East region will remain a key focus for U.S. military planners. Once considered relatively stable, mainly because of the ironfisted rule of authoritarian regimes, the area is now highly unstable and a breeding ground for terrorism.

Overall, regional security has deteriorated in recent years. Even though the Islamic State (or at least its physical presence) appears to have been defeated, the nature of its successor is unclear. Iraq has restored its territorial integrity since the defeat of ISIS, but the political situation and future relations between Baghdad and the U.S. will remain difficult as long as Iran retains control of powerful Shia militias that it uses to intimidate Iraqi political leaders. <sup>118</sup>

Although the regional dispute with Qatar has been resolved, U.S. relations in the region will remain complex and difficult to manage. U.S. military operations, however, continue uninterrupted.

Many of the borders created after World War I are under significant stress. In countries like Iraq, Lebanon, Libya, Syria, and Yemen, the supremacy of the nation-state is being challenged by non-state actors that wield influence, power, and resources comparable to those of small states. The region's principal security and political challenges are linked to the unrealized aspirations of the Arab Spring, surging transnational terrorism, and meddling by Iran, which seeks to extend its influence in the Islamic world. These challenges are made more difficult by the Arab–Israeli conflict, Sunni–Shia sectarian divides, the rise of Iran's Islamist revolutionary nationalism, and the proliferation of Sunni Islamist revolutionary groups.

Thanks to its decades of military operations in the Middle East, the U.S. has developed tried-and-tested procedures for operating in the region. Bases and infrastructure are well established, and the logistical processes for maintaining a large force forward deployed thousands of miles away from the homeland are well in place. Moreover, unlike in Europe, all of these processes have been tested recently in combat. The personal links between allied armed forces are also present. Joint training exercises improve interoperability, and U.S. military educational courses that are regularly attended by officers (and often royals) from the Middle East give the U.S. an opportunity to influence some of the region's future leaders.

America's relationships in the region are based pragmatically on shared security and economic concerns. As long as these issues remain relevant to both sides, the U.S. is likely to have an open door to operate in the Middle East when its national interests require that it do so.

## Scoring the Middle East Operating Environment

As noted at the beginning of this section, various aspects of the region facilitate or inhibit the ability of the U.S. to conduct military operations to defend its vital national interests against threats. Our assessment of the operating environment

uses a five-point scale that ranges from "very poor" to "excellent" conditions and covers four regional characteristics of greatest relevance to the conduct of military operations:

- 1. **Very Poor.** Significant hurdles exist for military operations. Physical infrastructure is insufficient or nonexistent, and the region is politically unstable. In addition, the U.S. military is poorly placed or absent, and alliances are nonexistent or diffuse.
- 2. **Unfavorable.** A challenging operating environment for military operations is marked by inadequate infrastructure, weak alliances, and recurring political instability. The U.S. military is inadequately placed in the region.
- **3. Moderate.** A neutral to moderately favorable operating environment is characterized by adequate infrastructure, a moderate alliance structure, and acceptable levels of regional political stability. The U.S. military is adequately placed.
- **4. Favorable.** A favorable operating environment includes good infrastructure, strong alliances, and a stable political environment. The U.S. military is well placed for future operations.
- 5. Excellent. An extremely favorable operating environment includes well-established and well-maintained infrastructure, strong and capable allies, and a stable political environment. The U.S. military is exceptionally well placed to defend U.S. interests.

The key regional characteristics consist of:

- a. Alliances. Alliances are important for interoperability and collective defense, as allies are more likely to lend support to U.S. military operations. Indicators that provide insight into the strength or health of an alliance include whether the U.S. trains regularly with countries in the region, has good interoperability with the forces of an ally, and shares intelligence with nations in the region.
- b. Political Stability. Political stability brings predictability for military planners when considering such things as transit, basing, and overflight rights for U.S. military operations. The overall degree of political stability indicates whether U.S. military actions would be hindered or enabled and reflects, for example,

- whether transfers of power are generally peaceful and whether there have been any recent instances of political instability in the region.
- c. U.S. Military Positioning. Having military forces based or equipment and supplies staged in a region greatly facilitates the ability of the United States to respond to crises and, presumably, achieve success in critical "first battles" more quickly. Being routinely present in a region also helps the U.S. to remain familiar with its characteristics and the various actors that might either support or try to thwart U.S. actions. With this in mind, we assessed whether or not the U.S. military was well positioned in the region. Again, indicators included bases, troop presence, prepositioned equipment, and recent examples of military operations (including training and humanitarian) launched from the region.
- d. Infrastructure. Modern, reliable, and suitable infrastructure is essential to military operations. Airfields, ports, rail lines, canals, and paved roads enable the U.S. to stage, launch, and logistically sustain combat operations. We combined expert knowledge of regions with publicly available information on critical infrastructure to arrive at our overall assessment of this metric.<sup>119</sup>

The U.S. has developed an extensive network of bases in the Middle East region and has acquired substantial operational experience in combatting regional threats. At the same time, however, many of America's allies are hobbled by political instability, economic problems, internal security threats, and mushrooming transnational threats. Although the region's overall score remains "moderate," as it was last year, it is in danger of falling to "poor" because of political instability and growing bilateral tensions with allies over the security implications of the proposed nuclear agreement with Iran and how best to fight the Islamic State.

With this in mind, we arrived at these average scores for the Middle East (rounded to the nearest whole number):

- Alliances: 3-Moderate
- Political Stability: 2-Unfavorable

• U.S. Military Positioning: **3—Moderate** 

• Infrastructure: **3**—**Moderate** 

Leading to a regional score of: **Moderate** 

## **Operating Environment: Middle East**

	VERY POOR	UNFAVORABLE	MODERATE	FAVORABLE	EXCELLENT
Alliances			✓		
Political Stability		✓			
U.S. Military Posture			✓		
Infrastructure			✓		
OVERALL			✓		

#### **Endnotes**

- 1. For example, during a 1916 meeting in Downing Street, Sir Mark Sykes, Britain's lead negotiator with the French on carving up the Ottoman Empire in the Middle East, pointed to the map and told the Prime Minister that for Britain's sphere of influence in the Middle East, "I should like to draw a line from the e in Acre [modern-day Israel] to the last k in Kirkuk [modern-day Iraq]." See James Barr, A Line in the Sand: Britain, France, and the Struggle That Shaped the Middle East (London: Simon & Schuster U.K., 2011), pp. 7–20. See also Margaret McMillan, Paris 1919: Six Months That Changed the World (New York: Random House, 2003).
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## Asia

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E ver since the founding of the American Republic, Asia has been a key U.S. area of interest for both economic and security reasons. One of the first ships to sail under an American flag was the aptly named Empress of China, which inaugurated America's participation in the lucrative China trade in 1784. In the more than 235 years since then, the United States has held to the strategic assumption that allowing any single nation to dominate Asia would be inimical to American interests. Asia is too important a market and too great a source of key resources for the United States to be denied access. Thus, beginning with U.S. Secretary of State John Hay's "Open Door" policy toward China in the 19th century, the United States has worked to prevent the rise of a regional hegemon in Asia, whether it was imperial Japan or the Soviet Union.

In the 21st century, Asia's importance to the United States will continue to grow. Asia is a key source of vital natural resources and a crucial part of the global value chain in areas like electronic components. Through 2021, six of America's top 10 trading partners were found in Asia:<sup>1</sup>

- China (third);
- Japan (fourth);
- South Korea (sixth);
- Taiwan (eighth);
- India (ninth); and
- Vietnam (10th).

America's economic connections with these countries and others in the region and beyond contribute to a closely integrated global economy characterized by ties in production, finance, services, information, and investment. When one part of the system sneezes, other parts of the economic body get sick—as demonstrated recently and most starkly by the COVID-19 pandemic. The impact of that crisis on both supply and demand, especially with respect to technology, continues to affect defense planning, budgeting, and production in the United States and across the region. Tensions in the U.S.–China economic relationship have had a similar impact.

Economics is central to understanding political dynamics in Asia, but that is not the only important consideration. Several of the world's largest militaries are there, including those of China, India, North and South Korea, Pakistan, Russia, and Vietnam. The United States also maintains a network of treaty alliances and security partnerships, as well as a significant military presence, in Asia, and five Asian states (China, North Korea, India, Pakistan, and Russia) possess nuclear weapons.

The region is a focus of American security concerns both because of its substantial military forces and because of its legacy of conflict. Both of the two major "hot" wars fought by the United States during the Cold War (Korea and Vietnam) were fought in Asia. Moreover, the Asian security environment is unstable. For one thing, the Cold War has not ended in Asia. Of the four states divided between Communism and democracy by the Cold War, three (China, Korea, and Vietnam) are in Asia. Neither the Korean situation nor the China–Taiwan situation has been

resolved despite the fall of the Berlin Wall and the collapse of the Soviet Union.

The Cold War itself was an ideological conflict layered atop long-standing—and still lingering—historical animosities. Asia is home to several major territorial disputes, among them disputes between or among:

- Japan and Russia (Northern Territories/ Southern Kurils);
- Japan, China, and Taiwan (Senkakus/Diaoyutai/Diaoyu Dao);
- Korea and Japan (Dok-do/Takeshima);
- Vietnam, China, and Taiwan (Paracels/Xisha Islands);
- China, Taiwan, Vietnam, Brunei, Malaysia, and the Philippines (Spratlys/Nansha Islands);
- · India and Pakistan (Kashmir); and
- India and China (Aksai Chin and parts of the Indian state of Arunachal Pradesh).

Several of these unresolved differences could devolve into war. Chinese air and sea incursions around Taiwan—especially since Russia's invasion of Ukraine—have generated increased concern about Taiwan's survival as an independent nation. The situation on the Korean Peninsula is perpetually tense. And China's increasingly aggressive presence at sea is bringing Beijing ever closer to conflict with the U.S. military and the forces of its treaty allies and security partners. On the China–India border, the two sides have come to blows in recent years.

It is in light of this instability and the reluctance of many states in the region to align with great powers that one should weigh the region's lack of a political–security architecture. There is no Asian equivalent of NATO despite an ultimately failed mid-20th century effort to forge a parallel multilateral security architecture through the Southeast Asia Treaty Organization (SEATO). Regional security entities like the Five Power Defense Arrangement (involving the United Kingdom, Australia, New Zealand, Malaysia, and Singapore in a peacetime "arrangement" rather than an alliance) or discussion forums like

the ASEAN Regional Forum (ARF) and groupings like the ASEAN Defence Ministers Meeting-Plus (ADMM-Plus) have been far weaker. There also is no Asian equivalent of the Warsaw Pact.

Instead, Asian security has been marked by a combination of bilateral alliances, mostly centered on the United States, and individual nations' efforts to maintain their own security. In recent years, these core aspects of the regional security architecture have been supplemented by "minilateral" consultations like the U.S.–Japan–Australia and India–Japan–Australia trilaterals and the U.S.–Japan–Australia–India quadrilateral dialogue (popularly known as "the Quad").

Nor is Asia undergirded by any significant economic architecture. Despite substantial trade and expanding value chains among the various Asian states, as well as with the rest of the world, formal economic integration is limited. There are many trade agreements among the nations of the region and among these nations and countries outside of Asia, most prominently the 15-nation Regional Comprehensive Economic Partnership (RCEP) and 11-nation Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), but there is no counterpart to the European Union or even to the European Economic Community or the European Coal and Steel Community, the precursor to European economic integration.

The Association of Southeast Asian Nations (ASEAN) is a far looser agglomeration of disparate states, although they have succeeded in expanding economic linkages among themselves over the past 50 years through a range of economic agreements like the ASEAN Free Trade Area (AFTA). The South Asia Association of Regional Cooperation (SAARC), which includes Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka, has been less important to regional stability. It is largely ineffective, both because of the lack of regional economic integration and because of the historical rivalry between India and Pakistan.

# Important Alliances and Bilateral Relations in Asia

The keys to America's position in the Western Pacific are its alliances with Japan, the Republic of Korea (ROK), the Philippines, Thailand, and Australia, supplemented by very close security relationships with New Zealand and Singapore, an emerging

strategic partnership with India, and evolving relationships with Southeast Asian partners like Vietnam, Malaysia, and Indonesia. The U.S. also has a robust unofficial relationship with Taiwan.

The United States also benefits from the interoperability gained from sharing common weapons and systems with many of its allies. Many nations, for example, have equipped their ground forces with M-16/M-4-based infantry weapons and share the same 5.56 mm ammunition; they also field F-15 and F-16 combat aircraft and employ LINK-16 data links among their naval forces. Australia, Japan, and South Korea are partners in production of the F-35 Joint Strike Fighter, and all three countries have taken delivery of the aircraft. Partners like India and Australia operate American-made P-8 maritime surveillance aircraft and C-17 transport aircraft.

Consequently, in the event of conflict, the region's various air, naval, and even land forces would be able to share information in such key areas as air defense and maritime domain awareness. This advantage is enhanced by the constant ongoing range of both bilateral and multilateral exercises, which acclimate various forces to operating together and familiarize both American and local commanders with each other's standard operating procedures (SOPs), as well as training, tactics, and (in some cases) war plans. In addition, "enabling" military agreements allow the United States and several of its regional partners to access each other's military facilities, share intelligence and encrypted communications and equipment, and refuel each other's warships at sea.

While it does not constitute a formal alliance, in November 2017, Australia, Japan, India, and the U.S. reconstituted the Quad. Officials from the four countries agreed to meet in the quadrilateral format twice a year to discuss ways to strengthen strategic cooperation and combat common threats. In 2019, the group held its first meeting at the ministerial level and added a counterterrorism tabletop exercise to its agenda. In 2020, officials from the four countries participated in a series of conference calls to discuss responses to the COVID-19 pandemic that also included government representatives from New Zealand, South Korea, and Vietnam. In March 2021, the leaders of the four nations held their first virtual summit, marking a new level of interaction. In September 2021, the four leaders held the first in-person Quad summit; it is expected that a second will be held in Japan during 2022.

**Japan.** The U.S.–Japan defense relationship is the linchpin of America's network of relations in the Western Pacific. The U.S.–Japan Treaty of Mutual Cooperation and Security, signed in 1960, provides for a deep alliance between two of the world's largest economies and most sophisticated military establishments. Changes in Japanese defense policies are now enabling an even greater level of cooperation on security issues, both between the two allies and with other countries in the region.

Since the end of World War II, Japan's defense policy has been distinguished by Article 9 of the Japanese constitution, which states in part that "the Japanese people forever renounce war as a sovereign right of the nation and the threat or use of force as means of settling international disputes." In effect, this article prohibits the use of force by Japan's governments as an instrument of national policy. It also has led to several other associated policies.

One such policy was a prohibition against "collective self-defense." Japan recognized that nations have a right to employ their armed forces to help other states defend themselves (in other words, to engage in collective defensive operations) but rejected that policy for itself: Japan would employ its forces only in defense of Japan. This changed in 2015. Japan passed legislation that enabled its military to exercise limited collective self-defense in certain cases involving threats to both the U.S. and Japan as well as in multilateral peacekeeping operations.

In recent years, Japan has increased its security cooperation with other Indo-Pacific democracies. This cooperation has included enhancing security agreements, participating in more multilateral military exercises, and providing ships to Southeast Asian coast guard forces.

Tokyo relies heavily on the United States—and Washington's extended deterrence guarantee of nuclear, conventional, and missile defense forces—for its security. Japan has developed a formidable military by implementing significant changes in security legislation and procuring an impressive array of sophisticated weapons. Yet because of its pacifist constitution and the devastation wrought by its quest for regional dominance in World War II, progress in altering Japan's security posture has always lagged behind faster-moving regional threats. The Japanese people remain deeply suspicious of any use of the military as a policy instrument—and fearful that any easing of constraints will lead Japan

into military conflict. Each incremental step in expanding the role of Japan's Self-Defense Forces has therefore been immensely controversial.

As part of its relationship with Japan, the United States maintains some 54,000 military personnel and another 8,000 Department of Defense (DOD) civilian employees in Japan under the rubric of U.S. Forces Japan (USFJ).<sup>3</sup> These forces include, among other things, a forward-deployed carrier battle group centered on the USS *Ronald Reagan*; an amphibious ready group at Sasebo centered on the LHA-6 *America*, an aviation-optimized amphibious assault ship; and the bulk of the Third Marine Expeditionary Force (III MEF) on Okinawa. U.S. forces exercise regularly with their Japanese counterparts, and this collaboration has expanded in recent years to include joint amphibious exercises in addition to air and naval exercises.

The American presence is supported by a substantial American defense infrastructure throughout Japan, including Okinawa. These major bases provide key logistical and communications support for U.S. operations throughout the Western Pacific, cutting travel time substantially compared with deployments from Hawaii or the West Coast of the United States. They also provide key listening posts for the monitoring of Russian, Chinese, and North Korean military operations. This capability is supplemented by Japan's growing array of space systems, including new reconnaissance satellites.

The Japanese government "pays roughly \$2 billion per year to defray the cost of stationing U.S. military personnel in Japan." These funds cover approximately 75 percent of the cost of deployed U.S. forces, including the costs of utility and labor at U.S. bases, improvements in U.S. facilities in Japan, and relocation of training exercises away from populated areas in Japan. Japan paid nearly all of the cost of new U.S. military facilities at Futenma and Iwakuni as well as a third of the cost of new facilities in Guam. It also purchases 90 percent of its weapons and defense systems from the United States.

During bilateral Special Measures Agreement negotiations, the Trump Administration sought a 400 percent increase in Japanese contributions for remuneration above the cost of stationing U.S. troops in Japan. In January 2022, the Biden Administration reached an agreement with Japan on a new five-year cost-sharing agreement that includes incremental

increases in Japanese funding, thereby resolving a major irritant in the bilateral relationship.<sup>7</sup>

The United States has long sought to expand Japanese participation in international security affairs. Japan's political system, grounded in the country's constitution, legal decisions, and popular attitudes, has generally resisted this effort. However, in recent years, Tokyo has become increasingly alarmed by China's surging defense expenditures, rapidly expanding and modernizing military capabilities, and escalating aerial and maritime incursions into Japan's territorial waters and contiguous areas. In response, Japan has reoriented its forces so that they can better counter the Chinese threat to its remote southwest islands. It also has acquired new capabilities, built new facilities, deployed new units and augmented others, improved its amphibious warfare capabilities, increased its air and sea mobility, and enhanced its command-and-control capabilities for joint and integrated operations.

Recently, the growing potential for a Taiwan crisis has led senior Japanese officials to issue increasingly bold public statements of support for Taipei and more directly align Japan's national interests with the protection of Taiwan's security. As yet, however, there have been no declared Japanese policy changes and no pledge to intervene directly in a military conflict to defend Taiwan or even to allow U.S. defense of Taiwan from bases in Japan.

Similarly, heightened Japanese concern about the growing North Korean missile and nuclear threats has triggered a resurgence of debate about whether the country should augment its defenses by acquiring strike capabilities, which would enable Japan to conduct an attack against targets in an opponent's country. Japan's legal interpretation of what is allowed under its peace constitution is not static. It has evolved in response to increasing regional threats, Japan's improving military capabilities, and Tokyo's perception of the strength of its alliance with Washington.

Prime Minister Fumio Kishida has stated that Japan should consider building a missile-strike capability as a "viable option" against China and North Korea, to be implemented in response to initial attacks. Pursuing strike capabilities would be the subject of great controversy—both among the Japanese people and among the people of neighboring countries—and would require deft public diplomacy to overcome strong resistance to such a significant

shift in Japan's post–World War II security posture. Although this is now being discussed more openly by politicians, Japanese strike capability is still only at the theoretical debate stage. Tokyo has yet to articulate strike policy, strategy, a doctrine of employment, triggering events, procurement, deployment, or how offensive systems would train in Japan.

Contentious historical issues from Japan's brutal 1910-1945 occupation of the Korean Peninsula have been serious enough to torpedo efforts to improve defense cooperation between Seoul and Tokyo. South Korean-Japanese relations took a major downturn in 2018 when the South Korean Supreme Court ruled that Japanese companies could be forced to pay occupation reparations. In December 2018, an incident between a South Korean naval ship and a Japanese air force plane further exacerbated tensions. Japan responded in July 2019 by imposing restrictions on exports to South Korea of three chemicals that are critical to the production of semiconductors and smartphones.9 Seoul then threatened to withdraw from the bilateral General Security of Military Information Agreement (GSOMIA), which enables the sharing of classified intelligence and military information on the North Korean nuclear and missile threat. The Moon Jae-in administration relented and maintained the agreement, but there was public criticism of U.S. pressure.

The election of new leaders in South Korea and Japan has raised hopes that it might be possible to reduce tensions by separating difficult historic issues from the necessity of addressing present-day security threats. Prime Minister Kishida was responsible for two Japanese–South Korean agreements<sup>10</sup> while he served as foreign minister, and South Korean President Yoon Seok-youl, elected in March 2022, has vowed to build a "future-oriented relationship" with Japan.<sup>11</sup>

Republic of Korea. The United States and the Republic of Korea signed their Mutual Defense Treaty in 1953. That treaty codified the relationship that had grown from the Korean War, when the United States dispatched troops to help South Korea defend itself against invasion by Communist North Korea. Since then, the two states have forged an enduring alliance supplemented by a substantial trade and economic relationship that includes a free trade agreement.

The U.S. is committed to maintaining 28,500 troops on the Korean Peninsula. This presence is

centered mainly on the U.S. 2nd Infantry Division, rotating brigade combat teams, and a significant number of combat aircraft.

The U.S.-ROK defense relationship involves one of the more integrated and complex command-and-control structures. A United Nations Command (UNC) established in 1950 was the basis for the American intervention and remained in place after the armistice was signed in 1953. UNC has access to seven bases in Japan to support U.N. forces in Korea. In concrete terms, however, it oversaw only South Korean and American forces as other nations' contributions were gradually withdrawn or reduced to token elements.

Although the 1953 armistice ended the Korean War, UNC retained operational control (OPCON) of South Korean forces until 1978, when it was transferred to the newly established Combined Forces Command (CFC). Headed by the American Commander of U.S. Forces Korea, who is also Commander, U.N. Command, CFC reflects an unparalleled degree of U.S.–South Korean military integration. CFC returned peacetime OPCON of South Korean forces to Seoul in 1994. If war became imminent, South Korean forces would become subordinate to the CFC commander, who in turn remains subordinate to both countries' national command authorities.

In 2007, then-President Roh Moo-hyun requested that the United States return wartime OPCON of South Korean forces to Seoul. This decision engendered significant opposition within South Korea and raised serious military questions about the transfer's impact on unity of command. Faced with various North Korean provocations, including a spate of missile tests as well as attacks on South Korean military forces and territory in 2010, Washington and Seoul agreed in late 2014 to postpone wartime OPCON transfer and adopt a conditions-based rather than timeline-based policy. After wartime OPCON transfer, the CFC commander would be a South Korean general with a U.S. general as deputy commander. The U.S. general would continue to serve as commander of UNC and U.S. Forces Korea (USFK). The CFC commander, regardless of nationality, would always remain under the direction and guidance of U.S. and South Korean political and military national command authorities.

President Moon Jae-in advocated for an expedited OPCON transition during his administration, but critical conditions, including improvement in South Korean forces and a decrease in North Korea's nuclear program, have yet to be met.<sup>12</sup> President Yoon Seok-youl, elected in March 2009, criticized Moon's push for a premature return of wartime OPCON from United Nations Command before Seoul had fulfilled the agreed-upon conditions.

The domestic political constraints under which South Korea's military operates are less stringent than those that govern the operations of the Japanese military. South Korea has fought alongside the United States in every conflict since the Korean War. Seoul sent 300,000 troops to the Vietnam War, and 5,000 of them were killed. At one point, it fielded the third-largest troop contingent in Iraq after the United States and Britain. It also has conducted anti-piracy operations off the coast of Somalia and has participated in peacekeeping operations in Afghanistan, East Timor, and elsewhere.

South Korean defense planning remains focused on North Korea, especially as Pyongyang has deployed its forces in ways that optimize a southward advance and has carried out several penetrations of ROK territory by ship, submarine, commandos, and drones. The sinking of the South Korean frigate *Cheonan* and shelling of Yongpyeong-do in 2010, which together killed 48 military personnel, wounded 16, and killed two civilians, have only heightened concerns about North Korea.

In response to Pyongyang's expanding nuclear strike force, South Korea created a "3K" tiered defense strategy comprised of Kill Chain (preemptive attack); the Korea Air and Missile Defense (KAMD) system; and the Korea Massive Punishment and Retaliation (KMPR) system. The South Korean military is a sizeable force with advanced weapons and innovative military education and training. South Korean military spending has increased, and Seoul appears to be procuring the right mix of capabilities. U.S.–South Korean interoperability has improved, partly because of continued purchases of U.S. weapons systems.

Over the past several decades, the American presence on the peninsula has slowly declined. In the early 1970s, President Richard Nixon withdrew the 7th Infantry Division, leaving only the 2nd Infantry Division on the peninsula. Those forces have been positioned farther back so that few Americans are now deployed on the Demilitarized Zone (DMZ).

Traditionally, U.S. military forces have engaged regularly in major exercises with their ROK

counterparts, including the Key Resolve and Foal Eagle series, both of which involved the deployment of substantial numbers of forces and were intended partly to deter Pyongyang as well as to give U.S. and ROK forces a chance to practice operating together. However, after the 2018 U.S.–North Korean Summit, President Donald Trump announced unilaterally that he was cancelling major bilateral military exercises because he thought they were provocative and expensive. The President made this decision without consulting the DOD, U.S. Forces Korea, or allies South Korea and Japan. During the next four years, the U.S. and South Korea cancelled numerous exercises and imposed constraints on additional exercises.

North Korea did not reciprocate with any diplomatic gesture or military constraints in response to this unilateral U.S. concession. The outbreak of COVID-19 in South Korea in 2020 led to the additional curtailment of training activity, raising the possibility that allied deterrence and defense capabilities could be further degraded. In March 2022, the U.S. conducted its first aircraft carrier exercise near Korea since 2018, and the Biden Administration appears likely to resume large-scale allied military exercises in South Korea.<sup>14</sup>

The ROK government provides substantial resources to defray the costs of U.S. Forces Korea. The bilateral, cost-sharing Special Measures Agreement has offset the non-personnel costs of stationing U.S. forces in South Korea since 1991 and is renegotiated every five years. In February 2019, South Korea agreed to increase its share of the cost by approximately 8 percent to \$924 million. Later in 2019, President Trump demanded a fivefold increase of \$5 billion a year and threatened to reduce or remove U.S. forces from South Korea. In April 2021, the Biden Administration signed an agreement accepting an incremental increase in Seoul's contribution in line with previous agreements, thereby defusing tensions within the alliance.

South Korea spends 2.6 percent of its gross domestic product (GDP) on defense—more than is spent by any European ally. Seoul absorbs costs not covered in the cost-sharing agreement, including \$10 billion, or 93 percent, of the cost of constructing Camp Humphreys, the largest U.S. base on foreign soil. During the past four years, South Korea has purchased \$13 billion in arms from the United States. <sup>15</sup>

**The Philippines.** America's oldest defense relationship in Asia is with the Philippines. The

United States seized the Philippines from the Spanish more than a century ago as a result of the Spanish-American War and a subsequent conflict with indigenous Philippine nationalist forces. Unlike other colonial powers, however, the U.S. put in place a mechanism by which the Philippines could transition through a period as a commonwealth until receiving full independence in 1946. Just as important, substantial numbers of Filipinos fought alongside the United States against Japan in World War II, establishing a bond between the two peoples. Following World War II and after assisting the newly independent Filipino government against the Communist Hukbalahap movement in the 1940s, the United States and the Philippines signed a mutual defense treaty (MDT).

For much of the period between 1898 and the end of the Cold War, the largest American bases in the Pacific were in the Philippines, centered on the U.S. Navy base in Subic Bay and the complex of airfields that developed around Clark Field (later Clark Air Base). While the Philippines have never had the ability to provide substantial financial support for the American presence, the unparalleled base infrastructure provided replenishment and repair facilities and substantially extended deployment periods throughout the East Asian littoral.

These bases, being reminders of the colonial era, were often centers of controversy. In 1991, a successor to the Military Bases Agreement between the U.S. and the Philippines was submitted to the Philippine Senate for ratification. After a lengthy debate, the Philippines rejected the treaty, thereby compelling American withdrawal from Philippine bases. Given the effects of the 1991 eruption of Mount Pinatubo, which devastated Clark Air Base and damaged many Subic Bay facilities, and the end of the Cold War, it was not felt that closure of the bases would fundamentally damage America's posture in the region.

Moreover, despite the closing of the American bases and consequent slashing of American military assistance, U.S.-Philippine military relations remained close, and assistance began to increase again after 9/11 as U.S. forces supported Philippine efforts to counter Islamic terrorist groups, including the Abu Sayyaf Group (ASG), in the South of the archipelago. From 2002–2015, the U.S. rotated 500–600 special operations forces regularly through the Philippines to assist in counterterrorism operations. That operation, Joint Special Operations

Task Force-Philippines (JSOTF-P), ended during the first part of 2015.

The U.S. presence in Mindanao continued at a reduced level until the Trump Administration, alarmed by the terrorist threat there, began Operation Pacific Eagle–Philippines (OPE–P). The presence of 200–300 American advisers proved very valuable to the Philippines in its 2017 battle against Islamist insurgents in Marawi. <sup>16</sup>

Continued on-the-ground military assistance for the counterterrorism challenge in Mindanao and other security cooperation in the Philippines received a boost in July 2021 when the Philippines, during a visit by American Secretary of Defense Lloyd Austin, retracted its intention to abrogate the 1998 U.S.-Philippines Visiting Forces Agreement (VFA). Since February 2020, the VFA has operated on serial six-month extensions offered by the Philippine President. An instrument of the MDT, the VFA specifies the procedures governing the deployment of U.S. forces and equipment to the Philippines. It also governs the application of domestic Philippine law to U.S. personnel, which is the most substantive part of the VFA and historically its most controversial.

The VFA undergirds approximately 280 U.S.-Philippine annual exercises—more than are conducted with any other military in Southeast Asia. Its abrogation would have slowed the rate of these interactions, conditioned their composition, and exposed each element of them to political pressures in the Philippines. Its preservation, on the other hand, not only sheds these constraints, but also enables the expansion of cooperation. The most recent example was the conduct of annual Balikatan exercises, billed by both sides as the largest ever held.<sup>17</sup> The U.S. embassy reported deployment of "nearly 9,000" troops, "more than 50 aircraft, four ships, 10 amphibious craft, four HIMARS rocket system launchers, and four Patriot missile systems" as well as "approximately 40 personnel from the Australian Defense Force."18 The U.S. and the Philippines have also resumed plans for base improvement and sharing arrangements under the 2014 U.S.-Philippine Enhanced Defense Cooperation Agreement (EDCA).<sup>19</sup>

The U.S. government has long made it clear that any attack on Philippine government ships or aircraft or on the Philippine armed forces—for example, by China—would be covered under the U.S.–Philippine mutual defense treaty.<sup>20</sup> This makes

it incumbent on the U.S., consistent with its constitutional procedures, to come to the defense of the Philippines. U.S. Secretary of State Antony Blinken reiterated this commitment in two separate calls with the Philippine Secretary of Foreign Affairs in January and April 2021.<sup>21</sup> Secretary of Defense Austin made a similar statement in September, also reiterating the treaty's application to the South China Sea, an issue that was once subject to some doubt.<sup>22</sup>

**Thailand.** The U.S.-Thai security relationship is built on the 1954 Manila Pact, which established the now-defunct SEATO, and the 1962 Thanat-Rusk agreement.<sup>23</sup> These were supplemented by the Joint Vision Statements for the Thai-U.S. Defense Alliance of 2012 and 2020.<sup>24</sup> In addition, Thailand gained improved access to American arms sales in 2003 when it was designated a "major, non-NATO ally."

Thailand's central location has made it an important part of the network of U.S. alliances in Asia. During the Vietnam War, American aircraft based in Thailand ranged from fighter-bombers and B-52s to reconnaissance aircraft. In the first Gulf War and again in the Iraq War, some of those same air bases were essential for the rapid deployment of American forces to the Persian Gulf. Access to these bases remains critical to U.S. global operations.

U.S. and Thai forces exercise together regularly, most notably in the annual Cobra Gold exercises, which were initiated in 1982. This builds on a partnership that began with the dispatch of Thai forces to the Korean War, during which Thailand lost more than 1,200 of the approximately 6,000 troops it had deployed. The Cobra Gold exercise is the world's longest-running international military exercise<sup>25</sup> and one of its largest. The most recent, in 2022, although again scaled back because of concern for the COVID pandemic, involved 1,200 American troops and 2,000 Thai troops<sup>26</sup> as well as participants from a range of other countries, including India, Indonesia, Japan, South Korea, and Australia.<sup>27</sup> For many years, a small number of Chinese personnel have also participated. Because of pandemic concerns, "[a]ctivities like live fire drills, amphibious landings and evacuation operations" were excluded.<sup>28</sup>

In contrast to the close relations between their militaries, U.S.–Thailand political relations have been strained since 2006. A coup that year and another in 2014 limited military-to-military relations for more than 10 years. This was due partly to standing U.S. law prohibiting assistance to governments

that result from coups against democratically elected governments and partly to policy choices by the U.S. government.

The U.S. and Thailand, however, have managed to salvage much of their military-to-military cooperation and now look to normalize relations. This has been made possible by two developments: elections in 2019, which led to a new civilian government, and Washington's new strategic focus on great-power competition with China. As a result, the U.S. accepted the flawed Thai electoral model as an opportunity to encourage the relationship. This encompassed high-level engagement and arms transfers to the Thai military of major systems like Stryker armored vehicles and Black Hawk helicopters. Under the Biden Administration, this trend may lead to the sale of the F-35.

Over several decades, amid uncertainty in the U.S. commitment to the relationship, Thailand has been drifting geopolitically away from the U.S. and toward China. This process has been accelerating partly because of expanding economic relations between the two states and partly because of complications in U.S.—Thai relations arising from the political situation in Thailand and a general difference in threat perception concerning China. The U.S. considers China its greatest long-term security challenge; Thailand has no such concern.

Relations between the Thai and Chinese militaries have improved steadily over the years. Intelligence officers began formal meetings in 1988. Thai and Chinese military forces have engaged in joint naval exercises since 2005, joint counterterrorism exercises since 2007, and joint marine exercises since 2010 and conducted their first joint air force exercises in 2015. The Thais conduct more bilateral exercises with the Chinese than are conducted by any other military in Southeast Asia. The

The Thais also have been buying Chinese military equipment for many years. Purchases in recent years have included significant buys of battle tanks and armored personnel carriers.<sup>32</sup> According to the Stockholm International Peace Research Institute (SIPRI), from 2006–2021, China has been a significantly bigger supplier than the U.S.<sup>33</sup> These deals, however, have not been without difficulty. Thailand's 2017 acquisition of submarines, for example, has been stalled first by a combination of budget restraints, the priority of COVID-19 response, and public protest<sup>34</sup> and more recently by Germany's

refusal to allow export of the engines the boats require. <sup>35</sup> Submarines could be particularly critical to Sino–Thai relations because their attendant training and maintenance will require a greater Chinese military presence at Thai military facilities.

Australia. Australia is one of America's most important allies in the Indo-Pacific. U.S.-Australia security ties date back to World War I when U.S. forces fought under Australian command on the Western Front in Europe, and they deepened during World War II when, after Japan commenced hostilities in the Western Pacific (and despite British promises), Australian forces committed to the North Africa campaign were not returned to defend the continent. As Japanese forces attacked the East Indies and secured Singapore, Australia turned to the United States to bolster its defenses, and American and Australian forces cooperated closely in the Pacific War. Those ties and America's role as the main external supporter of Australian security were codified in the Australia-New Zealand-U.S. (ANZUS) pact of 1951.

Today, the two nations' chief defense and foreign policy officials meet annually (most recently in August 2020) in the Australia–United States Ministerial (AUSMIN) process to address such issues of mutual concern as security developments in the Asia–Pacific region, global security and development, and bilateral security cooperation. Australia also has long granted the United States access to a number of joint facilities, including space surveillance facilities at Pine Gap, which has been characterized as "arguably the most significant American intelligence-gathering facility outside the United States," and naval communications facilities on the North West Cape of Australia. 88

In 2011, cooperation and U.S. access were expanded with the U.S. Force Posture Initiatives (USFPI), which included Marine Rotational Force–Darwin and Enhanced Air Cooperation. The rotation of up to 2,500 U.S. Marines for a set of six-month exercises near Darwin, Australia, began in 2012. The current rotation is comprised of 2,200 Marines<sup>39</sup> and an Army detachment.<sup>40</sup> In the past, these forces have deployed with assets including a tilt-rotor MV-22 Osprey squadron, UH-1Y Venom utility and AH-1Z Viper attack helicopters, and RQ-21A Blackjack drones.

The USFPI's Enhanced Air Cooperation component began in 2017 building on preexisting schedules of activity. New activities under the initiative

include "fifth generation integration, aircraft maintenance integration, aeromedical evacuation (AME) integration, refuelling certification, and combined technical skills and logistics training."<sup>41</sup> It has been accompanied by the buildout of related infrastructure at Australian bases and, of note most recently, a massive fuel storage facility in Darwin.<sup>42</sup> Other improvements are underway at training areas and ranges in Australia's Northern Territories.<sup>43</sup>

In 2021, the U.S., Australia, and the U.K., which already enjoyed close security cooperation, moved bilaterally and in the context of the Five Eyes intelligence-sharing arrangement to formalize and deepen these ties through the Australia-United Kingdom-United States partnership (AUKUS). This trilateral partnership is focused on current defense-related technology. Central to and most immediate among its stated priorities is support for Australia's acquisition of "a conventionally armed, nuclear powered submarine capability at the earliest possible date, while upholding the highest nonproliferation standards."44 The White House has reported either "strong progress" or "recently initiated work" in several areas beyond submarine technology, which is already underway. These areas include (among others) undersea robotic autonomous systems, quantum technologies, artificial intelligence, and hypersonic capabilities. 45

This new, cutting-edge cooperation under the USFPI and AUKUS comes on top of long-standing joint U.S.—Australia training, the most prominent example of which is Talisman Saber. These biannual exercises involve U.S. Army, Navy, Air Force, and Marines as well as almost two-dozen ships, multiple civilian agencies, and participants embedded from other partner countries. 46 COVID forced the 2021 iteration to downsize, but the 2019 version included more than 34,000 personnel from the U.S. and Australia.

**Singapore.** Singapore is America's closest non-ally partner in the Western Pacific. The agreements that support this security relationship are the 2015 U.S.–Singapore Defense Cooperation Agreement (DCA), which is an update of a similar 2005 agreement, and the 1990 Memorandum of Understanding Regarding United States Use of Facilities in Singapore, which was renewed in 2019 for another 15 years. Pursuant to these agreements and other understandings, Singapore hosts U.S. naval ships and aircraft as well as the principal logistics support node for the U.S. Seventh Fleet.

Singapore trains approximately 1,000 military personnel in the United States each year on such American-produced equipment as F-15SG and F-16C/D fighter aircraft and CH-47 Chinook and AH-64 Apache helicopters.<sup>47</sup> Along with American allies Australia, Japan, and South Korea, Singapore also has ordered and been approved to buy the F-35.<sup>48</sup> Like others of its assets, the F-35s will be housed at training facilities in the U.S.<sup>49</sup> and perhaps on Guam under an agreement reached in 2019.<sup>50</sup>

**New Zealand.** For much of the Cold War, U.S. defense ties with New Zealand were similar to those between America and Australia. In 1986, however, as a result of controversies over U.S. Navy employment of nuclear power and the possible deployment of U.S. naval vessels with nuclear weapons, the U.S. suspended its obligations to New Zealand under the 1951 ANZUS Treaty.

Defense relations improved in the early 21st century as New Zealand committed forces to Afghanistan and dispatched an engineering detachment to Iraq. The 2010 Wellington Declaration and 2012 Washington Declaration, while not restoring full security ties, allowed the two nations to resume high-level defense dialogues.<sup>51</sup> As part of this warming of relations, New Zealand rejoined the multinational U.S.-led RIMPAC (Rim of the Pacific) naval exercise in 2012 and has participated in each iteration since then.

In 2013, U.S. Secretary of Defense Chuck Hagel and New Zealand Defense Minister Jonathan Coleman announced the resumption of military-to-military cooperation, and in July 2016, the U.S. accepted an invitation from New Zealand to make a single port call, reportedly with no change in U.S. policy to confirm or deny the presence of nuclear weapons on the ship.<sup>52</sup> At the time of the visit in November 2016, both sides claimed to have satisfied their respective legal requirements.<sup>53</sup> The prime minister expressed confidence that the vessel was not nuclear-powered and did not possess nuclear armaments, and the U.S. neither confirmed nor denied this.

The November 2016 visit occurred in a unique context, including an international naval review and a relief response to the Kaikoura earthquake. Since then, there have been several other ship visits by the U.S. Coast Guard, and in 2017, New Zealand lent the services of one its naval frigates to the U.S. Seventh Fleet following a deadly collision between the destroyer USS *Fitzgerald* and a Philippine container

ship that killed seven American sailors. Another U.S. naval warship did not visit New Zealand until November 2021, when the guided-missile destroyer USS *Howard* made a port call.<sup>54</sup>

New Zealand is a member of the elite Five Eyes intelligence alliance with the U.S., Canada, Australia, and the U.K. $^{55}$ 

**Taiwan.** When the United States shifted its recognition of the government of China from the Republic of China (on Taiwan) to the People's Republic of China (PRC, the mainland), it also declared certain commitments concerning the security of Taiwan. These commitments are embodied in the Taiwan Relations Act (TRA) and the subsequent "Six Assurances."

The TRA is an American law, not a treaty. Under the TRA, the United States maintains programs, transactions, and other relations with Taiwan through the American Institute in Taiwan (AIT). Except for the Sino–U.S. Mutual Defense Treaty, which had governed U.S. security relations with Taiwan and was terminated by President Jimmy Carter following the shift in recognition to the PRC, all other treaties and international agreements made between the Republic of China and the United States remain in force.

Under the TRA, it is U.S. policy "to provide Taiwan with arms of a defensive character." The TRA also states that the U.S. "will make available to Taiwan such defense articles and services in such quantity as may be necessary to enable Taiwan to maintain a sufficient self-defense capability." The U.S. has implemented these provisions of the act through sales of weapons to Taiwan.

The TRA states that it is also U.S. policy "to consider any effort to determine the future of Taiwan by other than peaceful means, including by boycotts or embargoes, a threat to the peace and security of the Western Pacific area and of grave concern to the United States" and "to maintain the capacity of the United States to resist any resort to force or other forms of coercion that would jeopardize the security, or the social or economic system, of the people on Taiwan." To this end:

The President is directed to inform the Congress promptly of any threat to the security or the social or economic system of the people on Taiwan and any danger to the interests of the United States arising therefrom. The President

and the Congress shall determine, in accordance with constitutional processes, appropriate action by the United States in response to any such danger.<sup>59</sup>

Supplementing the TRA are the "Six Assurances" issued by President Ronald Reagan in a secret July 1982 memo, later publicly released and the subject of hearings held by the Senate Committee on Foreign Relations and the House Committee on Foreign Affairs in August 1982. 60 These assurances were intended to moderate the third Sino–American communiqué, itself generally seen as one of the "Three Communiqués" that form the foundation of U.S.–PRC relations. These assurances of July 14, 1982, were that:

In negotiating the third Joint Communiqué with the PRC, the United States:

- has not agreed to set a date for ending arms sales to Taiwan;
- 2. has not agreed to hold prior consultations with the PRC on arms sales to Taiwan;
- 3. will not play any mediation role between Taipei and Beijing;
- has not agreed to revise the Taiwan Relations Act:
- 5. has not altered its position regarding sovereignty over Taiwan;
- 6. will not exert pressure on Taiwan to negotiate with the PRC.<sup>61</sup>

Although the United States sells Taiwan a variety of military equipment and sends observers to its major annual exercises, it does not engage in joint exercises with Taiwan's armed forces. Some Taiwan military officers, however, attend professional military education institutions in the United States. There also are regular high-level meetings between senior U.S. and Taiwan defense officials, both uniformed and civilian.

The United States does not maintain any bases in Taiwan. However, in late 2021, after reports of an uptick in the number of U.S. military advisers in Taiwan, Taiwan's President acknowledged their presence, 62 going back at least to 2008. The numbers involved are in the dozens 4 with most of these advisers involved in the provision of training on U.S.-sourced military equipment.

Vietnam, Malaysia, and Indonesia. On a region-wide basis, the U.S. has two major ongoing defense-related initiatives to expand its relationships and diversify the geographical spread of its forces. The Maritime Security Initiative is intended to improve the security capacity of U.S. partners, and the Pacific Deterrence Initiative (PDI) bolsters America's military presence and makes it more accountable. Among the most important of the bilateral partnerships in this effort, beyond those listed above, are Vietnam, Malaysia, and Indonesia. None of these relationships is as extensive and formal as America's relationship with Singapore, India, and U.S. treaty allies, but all are of growing significance.

Since shortly after the normalization of diplomatic relations between the two countries in 1995, the U.S. and Vietnam also have gradually normalized their defense relationship. The relationship was codified in 2011 with a Memorandum of Understanding Advancing Bilateral Defense Cooperation. In 2015, the MOU was updated with the Joint Vision Statement on Defense Cooperation, which includes references to such issues as "defense technology exchange,"65 and was implemented under a three-year 2018-2020 Plan of Action for United States-Viet Nam Defense Cooperation that was agreed upon in 2017.66 According to USINDOPACOM's 2022 command posture statement, the U.S. and Vietnam "are expected to issue a new Defense Cooperation Plan of Action for 2022–2024 and an updated Defense MOU Annex codifying new cooperation areas, including defense trade, pilot training, cyber, and personnel accounting (POW/MIA)."67

The most significant development with respect to security ties over the past several years has been relaxation of the ban on sales of arms to Vietnam. The U.S. lifted the embargo on maritime security–related equipment in the fall of 2014 and then ended the embargo on arms sales completely in 2016. The embargo had long served as a psychological obstacle to Vietnamese cooperation on security issues; lifting it, however, has not changed the nature of the articles that are likely to be sold.

Transfers to date have been to the Vietnamese Coast Guard. These include provision under the Excess Defense Articles (EDA) program of two decommissioned *Hamilton*-class cutters, with a possible third on the way,<sup>68</sup> and 24 Metal Shark patrol boats as well as infrastructure support.<sup>69</sup> Vietnam is scheduled to take delivery of six unmanned Boeing-made

Scan Eagle aerial vehicles (UAVs) for its Coast Guard. The U.S. is also providing T-6 turboprop trainer aircraft. Agreement has yet to be reached with respect to sales of bigger-ticket items like refurbished P-3 maritime patrol aircraft, although they have been discussed.

The U.S.–Vietnam Cooperative Humanitarian and Medical Storage Initiative (CHAMSI) is designed to enhance cooperation on humanitarian assistance and disaster relief by, among other things, prepositioning related American equipment in Da Nang, Vietnam.<sup>72</sup> This is a sensitive issue for Vietnam and is not often referenced publicly, but it was emphasized during Vietnamese Prime Minister Nguyen Xuan Phuc's visit to Washington in 2017 and again during Secretary of Defense James Mattis's visit to Vietnam in 2018. In the same year, Vietnam participated in RIMPAC for the first time. It did not participate in the exercise in 2020, when it was scaled down because of COVID-19,<sup>73</sup> or in 2022.

There have been two high-profile port calls to Vietnam since 2018. Early that year, the USS *Carl Vinson* visited Da Nang with its escort ships in the first port call by a U.S. aircraft carrier since the Vietnam War, and another carrier, USS *Theodore Roosevelt*, visited Da Nang in March 2020. These are significant signals from Vietnam about its receptivity to partnership with the U.S. military—messages underscored very subtly in Vietnam's *2019 Viet Nam National Defence* white paper.<sup>74</sup>

Nevertheless, significant limits on the U.S.-Vietnam security relationship persist, including a Vietnamese defense establishment that is very cautious in its selection of defense partners, party-to-party ties between the Communist Parties of Vietnam and China, and a Vietnamese foreign policy that seeks to balance relationships with all major powers. The U.S., like others among Vietnam's security partners, remains officially restricted to one port call a year with an additional one to two calls on Vietnamese bases being negotiable.

The U.S. and Malaysia, despite occasional political differences, "have maintained steady defense cooperation since the 1990s." Examples of this cooperation include Malaysian assistance in the reconstruction of Afghanistan and involvement in anti-piracy operations "near the Malacca Strait and...off the Horn of Africa" as well as "jungle warfare training at a Malaysian facility, bilateral exercises like Kris Strike, and multilateral exercises like Cobra Gold,

which is held in Thailand and involves thousands of personnel from several Asian countries plus the United States."<sup>75</sup> The U.S. has occasionally flown P-3 and/or P-8 patrol aircraft out of Malaysian bases in Borneo.

The U.S. relationship with Malaysia was strengthened under President Barack Obama and continued on a positive trajectory under the Trump Administration. In addition to cooperation on counterterrorism, the U.S. is focused on helping Malaysia to ensure maritime domain awareness. In 2020, then-Deputy Assistant Secretary of Defense for South and Southeast Asia Reed B. Werner summarized recent U.S. assistance in this area:

[M]aritime domain awareness is important for Malaysia, given where it sits geographically. Since 2017, we have provided nearly US\$200 million (RM853 million) in grant assistance to the Malaysian Armed Forces to enhance maritime domain awareness, and that includes ScanEagle unmanned aerial vehicles (UAV), maritime surveillance upgrades, and longrange air defence radar.<sup>76</sup>

The upgrading of its F-18 fleet is the most significant U.S. defense program currently underway with Malaysia.<sup>77</sup> Malaysia reportedly also "is hoping to buy Kuwait's entire fleet of Boeing F/A-18 Hornet multi-role fighter jets, although discussions between both governments over the sale have yet to begin."<sup>78</sup>

The U.S.–Indonesia defense relationship was revived in 2005 following a period of estrangement caused by American concerns about human rights. It now includes regular joint exercises, port calls, and sales of weaponry. Because of their impact on the operating environment in and around Indonesia, as well as the setting of priorities in the U.S.–Indonesia relationship, the U.S. has also worked closely with Indonesia's defense establishment to reform Indonesia's strategic defense planning processes.

U.S.–Indonesia military cooperation is governed by the 2010 Framework Arrangement on Cooperative Activities in the Field of Defense and the 2015 Joint Statement on Comprehensive Defense Cooperation<sup>79</sup> as well as the 2010 Comprehensive Partnership. These agreements have encompassed "more than 200 bilateral military engagements a year" and cooperation in six areas: "maritime security and domain awareness; defense procurement and joint research and development; peacekeeping operations and training; professionalization; HA/DR [High Availability/Disaster Recovery]; and countering transnational threats such as terrorism and piracy."80

In 2021, the agreements framed new progress in the relationship that included breaking ground on a new coast guard training base, <sup>81</sup> inauguration of a new Strategic Dialogue, <sup>82</sup> and the largest-ever U.S.–Indonesia army exercise. <sup>83</sup> This exercise, Garuda Shield, involved a combined 4,500 troops. In a major 2022 development, the U.S. agreed to sell Indonesia up to 36 F-15s and related equipment and munitions worth \$14 billion. <sup>84</sup> As of March 2021, the U.S. "ha[d] \$1.88 billion in active government-to-government sales cases with Indonesia under the Foreign Military Sales (FMS) system."

The U.S. and Indonesia also have signed two of the four foundational information-sharing agreements that the U.S. maintains with its closest partners: the General Security of Military Information Agreement (GSOMIA) and Communications Interoperability and Security Memorandum of Agreement (CISMOA).

Afghanistan. On October 7, 2001, U.S. forces invaded Afghanistan in response to the September 11, 2001, terrorist attacks on the United States. This marked the beginning of Operation Enduring Freedom to combat al-Qaeda and its Taliban supporters. The U.S., in alliance with the U.K. and the anti-Taliban Afghan Northern Alliance forces, ousted the Taliban from power in December 2001. Most Taliban and al-Qaeda leaders fled across the border into Pakistan's Federally Administered Tribal Areas where they regrouped and initiated an insurgency in Afghanistan in 2003.

In August 2003, NATO joined the war in Afghanistan and assumed control of the International Security Assistance Force (ISAF). In 2011, at the height of the war, there were 50 troop-contributing nations and nearly 150,000 NATO and U.S. forces on the ground in Afghanistan. On December 28, 2014, NATO formally ended combat operations and relinquished responsibility to the Afghan security forces, which numbered around 352,000 (including army and police). <sup>86</sup>

In 2018, U.S. Special Envoy Zalmay Khalilzad initiated talks with the Taliban in Doha, Qatar, in an attempt to find a political solution to the conflict and encourage the group to negotiate with the Afghan

government. In February 2020, Ambassador Khalilzad and Taliban co-founder and chief negotiator Abdul Ghani Baradar signed a tentative peace agreement in which the Taliban agreed that it would not allow al-Qaeda or any other transnational terrorist group to use Afghan soil. It also agreed not to attack U.S. forces as long as they provided and remained committed to a withdrawal timeline, eventually set at May 2021.

In April 2021, President Joseph Biden announced that the U.S. would be withdrawing its remaining 2,500 soldiers from Afghanistan by September 11, 2021, remarking that America's "reasons for remaining in Afghanistan are becoming increasingly unclear." As the final contingent of U.S. forces was leaving Afghanistan in August 2021, the Taliban launched a rapid offensive across the country, seizing provincial capitals and eventually the national capital, Kabul, in a matter of weeks. During the Taliban offensive, President Ghani fled the country for the United Arab Emirates (UAE), and the Afghan security forces largely abandoned their posts. 88

Having left the air force base at Bagram in July, the U.S. and other countries were left trying to evacuate their citizens and allies from the Kabul International Airport as the Taliban assumed control of the capital. Amid the chaos, a suicide bombing attack on the airport perimeter on August 26 killed 13 U.S. military personnel and nearly 200 Afghans. IS-K, the local branch of ISIS, claimed responsibility for the attack, and the Biden Administration subsequently launched drone strikes on two IS-K targets. <sup>89</sup> The last U.S. forces were withdrawn on August 30, 2021.

Early in September, the Taliban formed a new government comprised almost entirely of hardline elements of the Taliban and Haqqani Network, including several individuals on the U.S. government's Specially Designated Global Terrorists list.90 Sirajuddin Haqqani, arguably the most powerful figure in the new Afghan government, carries a \$10 million U.S. bounty. Since seizing power, the Taliban government has hunted down and executed hundreds of former government officials and members of the Afghan security forces. It also has cracked down on Afghanistan's free press, banned education for girls beyond sixth grade while the daughters of several Taliban leaders attend school in Pakistan and the UAE, and curtailed the rights of women and minorities.

Like most of the world's other governments, the U.S. government has refused to offer the new Taliban government diplomatic recognition. In October 2021, Under Secretary of Defense for Policy Colin Kahl admitted that both al-Qaeda and ISIS-K were operating in Afghanistan with the intent to conduct terrorist attacks abroad, including against the U.S. Specifically, Kahl estimated that "[w]e could see ISIS-K generate that capability in somewhere between 6 or 12 months" and that "Al Qaeda would take a year or two to reconstitute that capability."

**Pakistan.** During the early stages of the war in Afghanistan, the U.S. and NATO relied heavily on logistical supply lines running through Pakistan to resupply anti-Taliban coalition forces. Supplies and fuel were carried on transportation routes from the port at Karachi to Afghan–Pakistani border crossing points at Torkham in the Khyber Pass and Chaman in Baluchistan province. For roughly the first decade of the war, approximately 80 percent of U.S. and NATO supplies traveled through Pakistani territory. Those amounts progressively decreased as the U.S. and allied troop presence shrank.

By the late 2000s, tensions emerged in the relationship over accusations by U.S. analysts and officials that Pakistan was providing a safe haven to the Taliban and its allies as they intensified their insurgency in Afghanistan. The Taliban's leadership council or "shura" was located in Quetta, the capital of Pakistan's Baluchistan province. With relations already tense, U.S.-Pakistan relations suffered an acrimonious rupture in 2011 when U.S. special forces conducted a raid on Osama bin Laden's hideout in Abbottabad less than a mile from a prominent Pakistani military academy. Relations deteriorated further in 2017 when President Donald Trump suspended billions of dollars of U.S. military assistance to Pakistan and declared that "[w]e can no longer be silent about Pakistan's safe havens for terrorist organizations, the Taliban, and other groups that pose a threat to the region and beyond."92

Between 2001 and 2016, Pakistan received approximately \$30 billion in aid and "reimbursements" from the U.S. in the form of coalition support funds (CSF) for its military deployments and operations along the border with Afghanistan. In 2016, reflecting the growing congressional resistance to military assistance for Pakistan, Congress blocked funds for the provision of eight F-16s. According to the Congressional Research Service, U.S. aid appropriations

and military reimbursements have fallen continuously since fiscal year (FY) 2013; CSF reimbursements fell to zero in FY 2017 and remained at that level through FY 2020. $^{93}$ 

Since 2015, U.S. Administrations have refused to certify that Pakistan has met requirements to crack down on the Haqqani Network, an Afghan terrorist group with known links to Pakistan's Inter-Services Intelligence Agency. In addition to suspending aid, the Trump Administration supported the addition of Pakistan to the Financial Action Task Force (FATF) "grey list" for failing to fulfill its obligations to prevent the financing of terrorism and its designation as a "Countr[y] of Particular Concern under the International Religious Freedom Act of 1998 for having engaged in or tolerated 'systematic, ongoing, [and] egregious violations of religious freedom." Pakistan remains on the grey list in 2022.

Despite harboring and supporting a variety of known terrorist groups that operate in Afghanistan and Kashmir, Pakistan has also been the victim of terrorism from anti-state extremist groups, including the Pakistani Taliban or TTP. In the late 2000s and early 2010s, the TTP engaged in a bloody campaign of terrorism against the Pakistani state; from 2008–2013, approximately 2,000 civilians were killed in terrorist attacks each year. <sup>96</sup> The Pakistan military launched a series of operations against these groups in 2014 and succeeded in progressively reducing terrorist violence in the years that followed. <sup>97</sup>

However, since the Afghan Taliban assumed power in Kabul, the number of attacks on Pakistan civilian and military targets has spiked dramatically with the TTP and the local affiliate of the Islamic State taking credit for most of these attacks. Islamabad has repeatedly accused the Taliban government in Kabul of harboring these groups or failing to rein in their activities. Tensions reached a tipping point in April 2022 when the Taliban accused Pakistan of launching cross-border raids into Afghanistan to target these militant groups, causing dozens of civilian casualties in the process. 99

Pakistan–U.S. relations improved modestly from 2018–2021 as Pakistan involved itself as a key player in bringing the Afghan Taliban to the negotiating table with the U.S. government. However, relations remained generally frosty and have improved little under the Biden Administration, with President Biden reportedly refusing to engage in direct

communications with Prime Minister Imran Khan and Pakistan declining an invitation to attend President Biden's December 2021 Summit for Democracy. Deputy Secretary of State Wendy Sherman visited Pakistan in October 2021 to discuss "the importance of holding the Taliban accountable to the commitments they have made." Days earlier, she noted: "We don't see ourselves building a broad relationship with Pakistan. And we have no interest in returning to the days of hyphenated India–Pakistan." 100

Pakistan's Nuclear Weapons Stockpile. In September 2021, the *Bulletin of the Atomic Scientists* estimated that Pakistan "now has a nuclear weapons stockpile of approximately 165 warheads." The report added that "[w]ith several new delivery systems in development, four plutonium production reactors, and an expanding uranium enrichment infrastructure, however, Pakistan's stockpile...could grow to around 200 warheads by 2025, if the current trend continues." <sup>101</sup>

The possibility that terrorists could gain effective access to Pakistani nuclear weapons is contingent on a complex chain of circumstances. Concern about the safety and security of Pakistan's nuclear weapons increases when India–Pakistan tensions increase. If Pakistan were to move its nuclear assets or (worse) take steps to mate weapons with delivery systems, the likelihood of theft or infiltration by terrorists could increase.

Increased reliance on tactical nuclear weapons (TNWs) is of particular concern because launch authorities for TNWs are typically delegated to lower-tier field commanders far from the central authority in Islamabad. Another concern is the possibility that miscalculations could lead to regional nuclear war if India's leaders were to lose confidence that nuclear weapons in Pakistan are under government control or, conversely, were to assume that they were under Pakistani government control after they ceased to be.

There are additional concerns that Islamist extremist groups with links to the Pakistan security establishment could exploit those links to gain access to nuclear weapons technology, facilities, and/or materials. The realization that Osama bin Laden stayed for six years within a mile of Pakistan's premier defense academy has fueled concern that al-Qaeda can operate relatively freely in parts of Pakistan. Pakistan's weapons-grade materials were ranked the 19th least secure by the Nuclear Threat

Initiative (NTI) in 2018, with only Iran's and North Korea's ranking less secure at 21st and 22nd, respectively. In its 2020 report, the NTI assessed that the "[m]ost improved among countries with materials in 2020 is Pakistan, which was credited with adopting new on-site physical protection and cybersecurity regulations, improving insider threat prevention measures, and more." 103

There is the additional (though less likely) scenario of extremists gaining access through a collapse of the state. While Pakistan remains unstable because of its weak economy, regular terrorist attacks, sectarian violence, civil–military tensions, and the growing influence of religious extremist groups, a total collapse of the Pakistani state is highly unlikely. The country's most powerful institution, the 550,000-strong army that has ruled Pakistan for almost half of its existence, would almost certainly intervene and assume control once again if the political situation began to unravel. The potential breakup of the Pakistani state would have to be preceded by the disintegration of the army, which currently is not plausible.

**Pakistan–India Conflict.** India and Pakistan have fought four wars since partition in 1947, including conflicts in 1947, 1965, 1971, and 1999. Deadly border skirmishes across the Line of Control (LoC) in Kashmir, a disputed territory claimed in full by both India and Pakistan, are commonplace.

With terrorist groups operating relatively freely in Pakistan and maintaining links to its military and intelligence services, there is a moderate risk that the two countries might eventually engage in all-out conflict. Pakistan's recent focus on incorporating tactical nuclear weapons into its warfighting doctrine has also raised concern that conflict now involves a higher risk of nuclear exchange. In early 2019, Pakistan conducted several tests of its nuclear-capable, short-range NASR ballistic missiles. 104

The military and strategic dynamic between India and Pakistan has grown more volatile since the May 2014 election of Bharatiya Janata Party (BJP) leader Narendra Modi as India's prime minister. Modi invited Pakistani Prime Minister Nawaz Sharif to his swearing-in ceremony, but in August 2014, the two sides engaged in intense firing and shelling along their international border and the Line of Control that divides Kashmir. A similar escalation in border tensions occurred again in October 2014 when a series of firing incidents claimed

more than a dozen casualties with several dozen more injured.<sup>105</sup>

On December 25, 2015, Modi made an impromptu visit to Lahore—the first visit to Pakistan by an Indian leader in 12 years—to meet with Sharif. The visit created enormous goodwill between the two countries and raised hope that official dialogue would soon resume. Again, however, violence marred the new opening. One week after the meeting, militants attacked an Indian airbase at Pathankot, killing seven Indian security personnel. <sup>106</sup>

A comprehensive India—Pakistan dialogue has remained frozen ever since, although the two governments still regularly communicate with one another. New Delhi has insisted that Pakistan take concrete verifiable steps to crack down on terrorist groups before a comprehensive dialogue covering all outstanding issues—including the Kashmir dispute—can resume. Unfortunately, the past few years have been marred by additional terrorist attacks and cross-border shelling.

The Pakistan-based Jaish-e-Mohammed (JeM) terrorist group was responsible for a January 2, 2016, attack on the Indian airbase at Pathankot, a February 2018 attack on an Indian army camp in Kashmir, and a February 2019 attack on Indian security forces in Kashmir—the deadliest single terrorist attack in the disputed region since the eruption of an insurgency in 1989.<sup>107</sup>

Following a deadly attack on Indian security forces in Pulwama, Kashmir, in February 2019, India launched an even more daring cross-border raid. For the first time since the Third India–Pakistan War of 1971, the Indian air force crossed the LoC and dropped ordnance inside Pakistan proper (as opposed to disputed Kashmir), targeting several JeM training camps in Khyber Pakhtunkhwa province. Delhi stressed that the "non-military" operation was designed to avoid civilian casualties and was preemptive in nature because India had credible intelligence that JeM was attempting other suicide attacks in the country.

In response, Pakistan launched fighter jets to conduct their own strike on targets located on India's side of the LoC in Kashmir, prompting a dogfight that resulted in the downing of an Indian MiG-21. Pakistan released the captured MiG-21 pilot days later, ending the brief but dangerous crisis. Nevertheless, both militaries continued to engage in artillery attacks along the disputed border throughout 2019.

Pakistan reported more than 45 casualties, including 14 soldiers, from Indian shelling between January 2019 and October 2019. India reported 21 casualties and over 2,000 cease-fire violations during the same period.<sup>109</sup>

Skirmishes at the LoC continued and even accelerated in 2020 with India's Home Ministry registering "5,133 instances of ceasefire violations along the Line of Control (LoC) with Pakistan last year, which resulted in 46 fatalities." In early 2021, however, India and Pakistan experienced at least a partial diplomatic thaw as both countries combated the COVID-19 global pandemic. In February, both countries agreed to observe a strict cease-fire along the LOC, and in March, Pakistan's Chief of Army Staff, General Qamar Javed Bajwa, declared in a speech that "it is time to bury the past and move forward." In the standard of the control of the countries agreed to bury the past and move forward."

In March 2022, India accidentally fired a cruise missile into Pakistan. The unarmed missile flew roughly 100 kilometers into Pakistan and crashed harmlessly without casualties. The Indian government blamed a "technical malfunction" during "routine maintenance." Pakistan called the launch irresponsible and demanded a "joint probe to accurately establish the facts" in a response that one correspondent characterized as "measured." 114

**India.** During the Cold War, U.S.-Indian military cooperation was minimal except for a brief period during and after the China-India border war in 1962 when the U.S. provided India with supplies, arms, and ammunition. The rapprochement was shortlived, and the U.S. suspended arms and aid to India following the Second Indo-Pakistan War of 1965. The relationship was largely characterized by mistrust in the 1970s under the Nixon Administration. America's ties with India hit a nadir during the Third Indo-Pakistan war of 1971 when the U.S. deployed the aircraft carrier USS Enterprise toward the Bay of Bengal in a show of support for Pakistani forces. Months earlier, India had signed a major defense treaty with Moscow. India's close defense ties to Russia and America's close defense ties to Pakistan left the two countries estranged for the duration of the Cold War.

Military ties between the U.S. and India have improved significantly over the past two decades (particularly since the signing of a 10-year defense partnership and civil nuclear deal in 2005) as the two sides have established a robust strategic partnership based on mutual concerns about China's increasingly belligerent behavior and converging

interests in countering regional terrorism and promoting a "free and open Indo-Pacific." The U.S. has supplied India more than \$25 billion worth of U.S. military equipment since 2008, including C-130J and C-17 transport aircraft, P-8 maritime surveillance aircraft, Chinook airlift helicopters, Apache attack helicopters, artillery batteries, and Firefinder radar. The two countries also have several information-sharing and intelligence-sharing agreements in place, including one that covers "white" or commercial shipping in the Indian Ocean.

Defense ties have advanced at an accelerated rate since the election of Prime Minister Modi in 2014. In 2015, the U.S. and India agreed to renew and upgrade their 10-year Defense Framework Agreement. In 2016, the two governments finalized the text of the Logistics Exchange Memorandum of Agreement (LEMOA), which allows each country to access the other's military supplies and refueling capabilities through ports and military bases, and the U.S. designated India a "major defense partner," a designation unique to India that is intended to facilitate its access to American defense technology. Since then, Indian and U.S. warships have begun to offer each other refueling and resupply services at sea. 116 In October 2020, U.S. P-8 maritime surveillance aircraft were refueled for the first time at an Indian military base in the Andaman and Nicobar Islands.

America's strategic and defense ties with India advanced in several important ways during the Trump Administration. In 2018, India was granted STA-1 status, easing controls on exports of advanced defense technology. India is only the third Asian country after Japan and South Korea to be granted STA-1 status. In the same year, India established a permanent naval attaché representative to U.S. Central Command in Bahrain, fulfilling a long-standing request from New Delhi.

In 2018, the two countries also signed the Communications Compatibility and Security Agreement (COMCASA), which will allow the U.S. to sell India encrypted communications equipment and create secure channels for communication between the Indian and U.S. militaries. In 2020, the U.S. and India signed the Basic Exchange Cooperation Agreement (BECA), which creates a framework for the sharing of geospatial intelligence.

Beyond these "foundational" or "enabling" military agreements, in recent years, the two countries have also signed an agreement on Helicopter

Operations from Ships Other Than Aircraft Carriers (HOSTAC) and an Industrial Security Annex (ISA) that allows the U.S. to share classified information with private Indian defense firms. During the Trump Administration, the two countries also initiated a new 2+2 defense and foreign ministers dialogue while reviving the Quad grouping (which joins India and the U.S. with Australia and Japan) in 2017. <sup>117</sup> In 2020, the four countries held the first Quad naval exercise since 2007. When a deadly crisis erupted at the China–India border in 2020, the Trump Administration provided India with two advanced surveillance drones and cold-weather gear for Indian soldiers.

In recent years, India has made additional purchases of U.S. military hardware, including C-17 transport aircraft, Apache attack helicopters, MH-60R Seahawk multi-mission helicopters, Sig Sauer assault rifles, and M777 ultralight howitzer artillery guns. It also is reportedly considering the purchase of 30 armed MQ-9 reaper drones (10 each for the three branches of its military) for \$3 billion and a half-dozen highly capable P-8I maritime aircraft (to supplement the dozen currently in operation) for nearly \$2 billion.

New Delhi and Washington regularly hold joint annual military exercises across all services. They include the Yudh Abhyas army exercises, Red Flag air force exercises, and Malabar naval exercise, which added Japan and Australia as permanent participants in 2012 and 2020, respectively. In late 2019, India and the U.S. held their first-ever tri-service military exercise, nicknamed "Tiger Triumph."

At the April 2022 2+2 defense and foreign policy dialogue, which was held in Washington, the two sides signed "a Space Situational Awareness arrangement" and "agreed to launch an inaugural Defense Artificial Intelligence Dialogue." They also committed to exploring the coproduction of Air-Launched Unmanned Aerial Vehicles under the Defense Trade and Technology Initiative (DTTI). In addition, India agreed "to join the Combined Maritime Forces Task Force...to expand multilateral cooperation in the Indian Ocean," and the two sides agreed to "explore possibilities of utilizing Indian shipyards for repair and maintenance of ships of the U.S. Maritime Sealift Command to support mid-voyage repair of U.S. Naval ships."118 The U.S. Department of Defense assessed that these initiatives "will allow the U.S. and Indian militaries to work more seamlessly together

across all domains of potential conflict" and "jointly meet the challenges of this century." <sup>119</sup>

#### Quality of Key Allied or Partner Armed Forces in Asia

Because Asia lacks an integrated, regional security architecture along the lines of NATO, the United States partners with most of the region's nations on a bilateral basis. This means that there is no single standard to which all local militaries aspire; instead, the region is characterized by a wide range of capabilities that are influenced by local threat perceptions, institutional interests, physical conditions, historical factors, and budgetary considerations.

Moreover, most Asian militaries have limited combat experience, particularly in high-intensity air or naval combat. Some, like Malaysia, have never fought an external war since gaining independence in the mid-20th century. The Indochina wars, the most recent high-intensity conflicts, are now more than 50 years in the past. It is therefore unclear how well Asia's militaries have trained for future warfare and whether their doctrine will meet the exigencies of wartime realities.

Based on examinations of equipment, however, we assess that several Asian allies and friends have substantial potential military capabilities that are supported by robust defense industries and significant defense spending. The defense budgets of Japan, South Korea, and Australia are estimated to be among the world's 15 largest, and the three countries' military forces field some of the world's most advanced weapons, including F-15s in the Japan Air Self Defense Force and ROK Air Force; airborne early warning (AEW) platforms; Aegis-capable surface combatants and modern diesel-electric submarines; and third-generation main battle tanks. As noted, all three nations are also involved in the production and purchase of F-35 fighters.

At this point, both the Japanese and Korean militaries arguably are more capable than most European militaries, at least in terms of conventional forces. Japan's Self Defense Forces, for example, field more tanks, principal surface combatants, and combat-capable aircraft than their British counterparts field. Similarly, South Korea fields more tanks, principal surface combatants, and combat-capable aircraft than Germany fields.

Both the ROK and Japan are also increasingly interested in developing missile defense capabilities,

including joint development and coproduction in the case of Japan. After much negotiation and indecision, South Korea deployed America's Terminal High Altitude Area Defense (THAAD) missile defense system on the peninsula in 2017. It is also pursuing an indigenous missile defense capability.

As for Japan, its Aegis-class destroyers are equipped with SM-3 missiles, and it decided in 2017 to install the Aegis Ashore missile defense system to supplement its Patriot missile batteries. <sup>120</sup> In June 2020, Tokyo unexpectedly cancelled plans to build two Aegis Ashore missile defense sites, citing the potential for the interceptor missile's first-stage booster to fall onto populated areas. Other likely factors in the decision include the overall cost of the program, inept handling of the site-selection process, and government unwillingness to press national objectives over local resistance. <sup>121</sup> Currently, Tokyo plans to build an additional two Aegis-capable ships to compensate for the cancellation of the Aegis Ashore project.

Australia also has very capable armed forces. They are smaller than NATO militaries but have major operational experience, having deployed to Iraq and Afghanistan as well as to help the Philippines with its Southern insurgency. Australia's military has several operations underway in the region from the Southwest Pacific islands, which are so critically important to it, to its partnership with Malaysia in the North Indian Ocean and South China Sea, to the Korean Peninsula. 122

Singapore's small population and physical borders limit the size of its military, but in terms of equipment and training, it has Southeast Asia's largest defense budget123 and fields some of the region's highest-quality forces. Singapore's ground forces can deploy third-generation Leopard II main battle tanks, and its fleet includes four conventional submarines (to be replaced by four new, more capable submarines from Germany)124 and six frigates and eight missile-armed corvettes. Its air force has F-15E Strike Eagles and F-16s as well as one of Southeast Asia's largest fleets of airborne early warning and control aircraft (G550-AEW aircraft) and a squadron of KC-130 tankers that can help to extend range or time on station.<sup>125</sup> In January 2020, the U.S. Department of State cleared Singapore to purchase "four short-takeoff-and-vertical-landing F-35 variants with an option for eight more of the 'B' models." Delivery is scheduled to begin in 2026.<sup>126</sup>

At the other extreme, the Armed Forces of the Philippines are among the region's weakest military forces. Having long focused on waging counterinsurgency campaigns while relying on the United States for its external security, the Philippines spent only 1.0 percent of GDP on its military in 2020. The most modern ships in the Philippine navy are three former U.S. *Hamilton*-class Coast Guard cutters. It has also taken delivery of new South Korean–built frigates and is set to buy two more smaller South Korean naval vessels. The Philippines also has purchased 12 light attack fighter aircraft from South Korea and has been cleared to acquire 12 new American F-16s. The Philippines also

The armed forces of American allies from outside the region, particularly those of France and the United Kingdom, should also be mentioned. France has overseas bases in New Caledonia and the South Pacific, locally based assets, and 2,900 personnel in the region. <sup>131</sup> It also conducts multiple naval deployments each year out of Metropolitan France. The U.K. is likewise very active in the region and, given its unparalleled integration with U.S. forces, can employ its capability directly in pursuit of shared objectives. It has a naval logistics facility in Singapore and Royal Gurkhas stationed in Brunei and has been an integral part of a U.S.-led mission to monitor seaborne evasions.

#### Current U.S. Presence in Asia

**U.S. Indo-Pacific Command.** Established in 1947 as U.S. Pacific Command (PACOM), USIN-DOPACOM is the oldest and largest of America's unified commands. According to its website:

USINDOPACOM protects and defends, in concert with other U.S. Government agencies, the territory of the United States, its people, and its interests. With allies and partners, USINDOPACOM is committed to enhancing stability in the Asia-Pacific region by promoting security cooperation, encouraging peaceful development, responding to contingencies, deterring aggression, and, when necessary, fighting to win. This approach is based on partnership, presence, and military readiness.<sup>132</sup>

USINDOPACOM's area of responsibility (AOR) includes not only the expanses of the Pacific, but also Alaska and portions of the Arctic, South Asia, and the Indian Ocean. Its 36 nations represent more than

50 percent of the world's population and include two of the three largest economies and nine of the 10 smallest; the most populous nation (China); the largest democracy (India); the largest Muslim-majority nation (Indonesia); and the world's smallest republic (Nauru). The region is a vital driver of the global economy and includes the world's busiest international sea-lanes and nine of its 10 largest ports. By any meaningful measure, the Indo-Pacific is also the world's most militarized region, with "seven of the world's ten largest standing militaries and five of the world's declared nuclear nations." <sup>1133</sup>

INDOPACOM has several "component and sub-unified commands" that include:

- U.S. Army Pacific. USARPAC is the Army's component command in the Pacific. Headquartered in Hawaii and with approximately 80,000 soldiers, it supplies Army forces as necessary for various global contingencies and "has sent peacekeeping forces to the Sinai Peninsula, Haiti, East Timor and Bosnia." Among its 12 subordinate commands are U.S. Army Japan, the 500th Military Intelligence Brigade, and U.S. Army Alaska.
- **U.S. Pacific Air Force.** PACAF is responsible for planning and conducting defensive and offensive air operations in the Asia-Pacific region. It has three numbered air forces under its command: 5th Air Force in Japan; 7th Air Force in Korea; and 11th Air Force, headquartered in Alaska. These air forces field two squadrons of F-15s, two squadrons of F-22s, five squadrons of F-16s, and a single squadron of A-10 ground attack aircraft as well as two squadrons of E-3 early-warning aircraft, tankers, and transports. Other forces that regularly come under PACAF command include B-52, B-1, and B-2 bombers. In 2020, PACAF activated two F-35A squadrons at Eielson Air Force Base in Alaska. It completed the integration of 54 "combat-coded" F-35A aircraft in April 2022, increasing the number of squadrons to four.136
- U.S. Pacific Fleet. PACFLT normally controls all U.S. naval forces committed to the Pacific, which usually represents 60 percent of the Navy's fleet. It is organized into Seventh Fleet, headquartered in Japan, and Third Fleet,

headquartered in California. Seventh Fleet comprises the forward-deployed element of PACFLT and includes the only American carrier strike group (CTF-70, ported at Yokosuka, Japan) and amphibious group (CTF-76, ported at Sasebo, Japan) that are home-ported abroad. The Third Fleet's AOR spans the West Coast of the United States to the International Date Line and includes the Alaskan coastline and parts of the Arctic. In recent years, the involvement of the Third Fleet's five carrier strike groups in the Western Pacific has been eased by the blurring of this boundary between the two fleets' areas of operation under a concept called "Third Fleet Forward." Beginning in 2015, the conduct of Freedom of Navigation Operations (FONOPS) that challenge excessive maritime claims (a part of the Navy's mission since 1979) has assumed a higher profile as a result of several well-publicized operations in the South China Sea. Under the Trump Administration, the frequency of these operations increased significantly.

- U.S. Marine Forces Pacific. With its headquarters in Hawaii, MARFORPAC controls elements of the U.S. Marine Corps operating in the Asia-Pacific region. Because of its extensive responsibilities and physical span, MARFORPAC controls two-thirds of Marine Corps forces: the I Marine Expeditionary Force (MEF), centered on the 1st Marine Division, 3rd Marine Air Wing, and 1st Marine Logistics Group, and the III Marine Expeditionary Force, centered on the 3rd Marine Division, 1st Marine Air Wing, and 3rd Marine Logistics Group. The I MEF is headquartered at Camp Pendleton, California, and the III MEF is headquartered on Okinawa, although each has various subordinate elements deployed at any time throughout the Pacific on exercises, to maintain presence, or engaged in other activities. MARFORPAC is responsible for supporting three different commands: It is the U.S. Marine Corps component of USINDOPACOM, provides the Fleet Marine Forces to PACFLT, and provides Marine forces for U.S. Forces Korea (USFK).
- U.S. Special Operations Command Pacific. SOCPAC has operational control of various

special operations forces, including Navy SEALs; Naval Special Warfare units; Army Special Forces (Green Berets); and Special Operations Aviation units in the Pacific region, including elements in Japan and South Korea. It supports the Pacific Command's Theater Security Cooperation Program as well as other plans and contingency responses. SOCPAC forces also support various operations in the region other than warfighting, such as counterdrug operations, counterterrorism training, humanitarian assistance, and demining activities.

Because of the unique situation on the Korean Peninsula, two subcomponents of USINDOPA-COM—U.S. Forces Korea (USFK) and U.S. Eighth Army—are based in Korea. USFK, a joint headquarters led by a four-star U.S. general, is in charge of the various U.S. military elements on the peninsula. U.S. Eighth Army operates in conjunction with USFK as well as with the United Nations presence in the form of United Nations Command.

Other forces, including space capabilities, cyber capabilities, air and sealift assets, and additional combat forces, may be made available to USINDOPACOM depending on requirements and availability.

## Key Infrastructure That Enables Expeditionary Warfighting Capabilities

Any planning for operations in the Pacific will be dominated by the "tyranny of distance." Because of the extensive distances that must be traversed in order to deploy forces, even Air Force units will take one or more days to deploy, and ships measure steaming time in weeks. For instance, a ship sailing at 20 knots requires nearly five days to get from San Diego to Hawaii. From there, it takes seven more days to get to Guam; seven days to Yokosuka, Japan; and eight days to Okinawa—if ships encounter no interference along the journey.<sup>137</sup>

China's growing anti-access/area denial (A2/AD) capabilities, ranging from an expanding fleet of modern submarines to anti-ship ballistic and cruise missiles, increase the operational risk for deployment of U.S. forces in the event of conflict. China's capabilities not only jeopardize American combat forces

that would flow into the theater for initial combat, but also would continue to threaten the logistical support needed to sustain American combat power during the subsequent days, weeks, and months.

American basing structure in the Indo-Pacific region, including access to key allied facilities, is therefore both necessary and increasingly at risk.

#### **American Facilities**

**Hawaii.** Much as it was in the 20th century, Hawaii remains the linchpin of America's ability to support its position in the Western Pacific. If the United States cannot preserve its facilities in Hawaii, both combat power and sustainability become moot. The United States maintains air and naval bases, communications infrastructure, and logistical support on Oahu and elsewhere in the Hawaiian Islands. Hawaii is also a key site for undersea cables that carry much of the world's communications and data, as well as for satellite ground stations.

Guam. The American territory of Guam is located 4,600 miles farther west. Obtained from Spain as a result of the Spanish-American War, Guam became a key coaling station for U.S. Navy ships. It was seized by Japan in World War II, was liberated by U.S. forces in 1944, and after the war became an unincorporated, organized territory of the United States. Key U.S. military facilities on Guam include U.S. Naval Base Guam, which houses several attack submarines and possibly a new aircraft carrier berth, and Andersen Air Force Base, one of a handful of facilities that can house B-2 bombers. U.S. task forces can stage out of Apra Harbor, drawing weapons from the Ordnance Annex in the island's South Central Highlands. The Marine Corps is working to expand a major facility, Marine Corps Base Camp Blaz, activated on October 1, 2020.138 Upon completion in 2025, the base will host 5,000 Marines comprising various aviation and ground combat, combat support, logistics, and headquarters units. 139 There is also a communications and data relay facility on the island.

Guam's facilities have improved steadily over the past 20 years. B-2 bombers, for example, began to operate from Andersen Air Force Base in March 2005. 140 These improvements have been accelerated and expanded even as China's A2/AD capabilities have raised doubts about the ability of the U.S. to sustain operations in the Asian littoral. The concentration of air and naval assets as well as logistical infrastructure, however, makes the island an

attractive potential target in the event of conflict. The increasing reach of Chinese and North Korean ballistic missiles reflects this growing vulnerability.

Guam and Saipan. The U.S. military has non-combatant maritime prepositioning ships (MPS), which contain large amounts of military equipment and supplies, in strategic locations from which they can reach areas of conflict relatively quickly as associated U.S. Army or Marine Corps units located elsewhere arrive in the areas. U.S. Navy units on Guam and in Saipan, Commonwealth of the Northern Marianas, support prepositioning ships that can supply Army or Marine Corps units deployed for contingency operations in Asia.

#### **Allied and Other Friendly Facilities**

For the United States, access to bases in Asia has long been a vital part of its ability to support military operations in the region. Even with the extensive aerial refueling and replenishment skills of the U.S. Air Force and U.S. Navy, it is still essential that the United States retain access to resupply and replenishment facilities, at least in peacetime. The ability of those facilities to survive and function will directly influence the course of any conflict in the Western Pacific region. Moreover, a variety of support functions, including communications, intelligence, and space support, cannot be accomplished without facilities in the region.

Today, maintaining maritime domain awareness or space situational awareness would be extraordinarily difficult without access to facilities in the Asia–Pacific region. The American alliance network is therefore a matter both of political partnership and of access to key facilities on allied soil.

**Japan.** In Japan, the United States has access to more than 100 different facilities, including communications stations, military and dependent housing, fuel and ammunition depots, and weapons and training ranges in addition to such major bases as the air bases at Misawa, Yokota, and Kadena and naval facilities at Yokosuka, Atsugi, and Sasebo. The naval facilities support the USS *Ronald Reagan* carrier strike group (CSG), which is home-ported in Yokosuka, and a Navy-Marine Expeditionary Strike Group (ESG) centered on the USS *America*, home-ported at Sasebo. The skilled workforce at places like Yokosuka is needed to maintain American forces and repair equipment in time of conflict. Replacing them would take years if not decades.

This combination of facilities and workforce, in addition to physical location and political support, makes Japan an essential part of any American military response to contingencies in the Western Pacific. Japanese financial support for the American presence also makes these facilities some of the most cost-effective in the world.

The status of one critical U.S. base has been a matter of public debate in Japan for many years. The U.S. Marine Corps' Third Marine Expeditionary Force, based on Okinawa, is the U.S. rapid reaction force in the Pacific. The Marine Air-Ground Task Force, comprised of air, ground, and logistics elements, enables quick and effective response to crises or humanitarian disasters. To improve the political sustainability of U.S. forces by reducing the impact on the local population in that densely populated area, the Marines are relocating some units to Guam and less-populated areas of Okinawa. The latter includes moving a helicopter unit from Futenma to a new facility in a more remote location in northeastern Okinawa. Because of local resistance, construction of the Futenma Replacement Facility at Camp Schwab will not be complete until at least 2025, but the U.S. and Japanese governments have affirmed their support for the project.

**South Korea.** The United States also maintains an array of facilities in South Korea. The Army's footprint in South Korea is larger than its footprint in Japan because the United States and South Korea remain focused on deterring North Korean aggression and preparing for any possible North Korean contingencies. The Army maintains four major facilities (which in turn control a number of smaller sites) at Daegu, Yongsan in Seoul, and Camps Red Cloud/Casey and Humphreys. These facilities support the U.S. 2nd Infantry Division, which is based in South Korea. Other key facilities include air bases at Osan and Kunsan and a naval facility at Chinhae near Pusan.

The Philippines. In 1992, the United States ended a nearly century-long presence in the Philippines when it withdrew from its base in Subic Bay as the base's lease ended. The eruption of Mount Pinatubo had already forced the closure of Clark Air Base; the costs of repairing the facility were deemed too high to be worthwhile. In 2014, however, spurred by China's growing assertiveness in the South China Sea, including against Philippine claims such as Mischief Reef (seized in 1995) and Scarborough Shoal

(2012), the U.S. and the Philippines negotiated the Enhanced Defense Cooperation Agreement, which allowed for the rotation of American forces through Philippine military bases.

In 2016, the two sides agreed on an initial list of five bases to be used in the Philippines. Geographically distributed across the country, they are Antonio Bautista Air Base in Palawaan, closest to the Spratlys; Basa Air Base, located on the main Philippine island of Luzon and closest to the hotly contested Scarborough Shoal; Fort Magsaysay, also on Luzon and the only facility on the list that is not an air base; Lumbia Air Base in Mindanao, where Manila remains engaged in low-intensity combat with Islamist insurgents; and Mactan-Benito Ebuen Air Base in the central Philippines. 141 In 2018, construction was completed on a humanitarian assistance and disaster relief warehouse located at Basa Air Base. 142 American F-16s based in South Korea deployed there for a 12-day exercise with Philippine fighter jets in 2019<sup>143</sup> and exercised there again in 2020.144 With the resolution of disputes over the status of America's Visiting Forces Agreement with the Philippines, it is expected that building out of the other EDCA sites will begin as well.

It remains unclear precisely which additional forces would be rotated through the Philippines as a part of this agreement, which in turn affects the kinds of facilities that would be most needed. The base upgrades and deployments pursuant to the EDCA are part of a broader expansion of U.S.—Philippine defense ties begun under the Aquino government and continued under President Duterte with some adjustments.

Singapore. The United States does not have bases in Singapore, but it is allowed access to several key facilities that provide essential support for American forward presence. Since the closure of its facilities at Subic Bay, the United States has been allowed to operate the principal logistics command for the Seventh Fleet out of the Port of Singapore Authority's Sembawang Terminal. The U.S. Navy also has access to Changi Naval Base, one of the few docks in the world that can handle a 100,000-ton American aircraft carrier. A small U.S. Air Force contingent operates out of Paya Lebar Air Base to support U.S. Air Force combat units visiting Singapore and Southeast Asia, and Singapore hosts Littoral Combat Ships (LCS) and rotating P-8 aircraft.<sup>145</sup>

**Australia.** The most prominent element of the U.S. presence in Australia is the deployment of U.S.

Marines to Darwin in northern Australia. In keeping with Australian sensitivities about permanent American bases on Australian soil, however, the Marines do not maintain a permanent presence in the country. He Similarly, the United States jointly staffs the Joint Defence Facility Pine Gap and the Joint Geological and Geophysical Research Station at Alice Springs and has access to the Harold E. Holt Naval Communication Station, including its space surveillance radar system, in the western part of the country. He

Finally, the United States is granted access to a number of facilities in Asian states on a contingency or crisis basis. Thus, U.S. Air Force units transited Thailand's U-Tapao Air Base and Sattahip Naval Base during the first Gulf War and during the Iraq War, but they do not maintain a permanent presence there. Additionally, the U.S. Navy conducts hundreds of port calls throughout the region.

**Diego Garcia.** The American facilities on the British territory of Diego Garcia are vital to U.S. operations in the Indian Ocean and Afghanistan and provide essential support for operations in the Middle East and East Asia. The island is home to the Military Sealift Command's Maritime Prepositioning Squadron-2 (MPSRON-2), which works with Maritime Prepositioning Squadron-3 (MPSRON-3) "to deliver a strategic power-projection capability for the Marine Corps, Army and Air Force, known as the Maritime Prepositioning Force (MPF)."<sup>148</sup>

Specifically, "MPF ships deliver a forward presence and rapid crisis response capability by pre-positioning equipment and supplies to various locations at sea." <sup>149</sup> Several elements of the U.S. global space surveillance and communications infrastructure, as well as basing facilities for the B-2 bomber, are also located on the island.

#### Conclusion

The Asian strategic environment is extremely expansive. It includes half the globe and is characterized by a variety of political relationships among states that possess wildly varying capabilities. The region includes long-standing American allies with relationships dating back to the beginning of the Cold War as well as recently established states and some long-standing adversaries such as North Korea.

American conceptions of the region must therefore recognize the physical limitations imposed by the tyranny of distance. Moving forces within the region (never mind to it) will take time and require extensive strategic lift assets as well as sufficient infrastructure (such as sea and aerial ports of debarkation that can handle American strategic lift assets) and political support. At the same time, the complicated nature of intra-Asian relations, especially unresolved historical and territorial issues, means that the United States, unlike Europe, cannot necessarily count on support from all of its regional allies in responding to any given contingency.

#### Scoring the Asia Operating Environment

As with the operating environments of Europe and the Middle East, we assessed the characteristics of Asia as they could be expected to facilitate or inhibit America's ability to conduct military operations to defend its vital national interests against threats. Our assessment of the operating environment utilized a five-point scale that ranges from "very poor" to "excellent" conditions and covers four regional characteristics of greatest relevance to the conduct of military operations:

 Very Poor. Significant hurdles exist for military operations. Physical infrastructure is insufficient or nonexistent, and the region is politically unstable. The U.S. military is poorly placed or absent, and alliances are nonexistent or diffuse.

- 2. **Unfavorable.** A challenging operating environment for military operations is marked by inadequate infrastructure, weak alliances, and recurring political instability. The U.S. military is inadequately placed in the region.
- **3. Moderate.** A neutral to moderately favorable operating environment is characterized by adequate infrastructure, a moderate alliance structure, and acceptable levels of regional political stability. The U.S. military is adequately placed.
- **4. Favorable.** A favorable operating environment includes good infrastructure, strong alliances, and a stable political environment. The U.S. military is well placed for future operations.

5. Excellent. An extremely favorable operating environment includes well-established and well-maintained infrastructure, strong and capable allies, and a stable political environment. The U.S. military is exceptionally well placed to defend U.S. interests.

The key regional characteristics consist of:

- a. Alliances. Alliances are important for interoperability and collective defense, as allies would be more likely to lend support to U.S. military operations. Indicators that provide insight into the strength or health of an alliance include whether the U.S. trains regularly with countries in the region, has good interoperability with the forces of an ally, and shares intelligence with nations in the region.
- b. Political Stability. Political stability brings predictability for military planners when considering such things as transit, basing, and overflight rights for U.S. military operations. The overall degree of political stability indicates whether U.S. military actions would be hindered or enabled and reflects, for example, whether transfers of power in the region are generally peaceful and whether there have been any recent instances of political instability in the region.
- c. U.S. Military Positioning. Having military forces based or equipment and supplies staged in a region greatly facilitates the ability of the United States to respond to crises and,

- presumably, achieve successes in critical "first battles" more quickly. Being routinely present also helps the United States to maintain familiarity with a region's characteristics and the various actors that might act to assist or thwart U.S. actions. With this in mind, we assessed whether or not the U.S. military was well positioned in the region. Again, indicators included bases, troop presence, prepositioned equipment, and recent examples of military operations (including training and humanitarian) launched from the region.
- d. Infrastructure. Modern, reliable, and suitable infrastructure is essential to military operations. Airfields, ports, rail lines, canals, and paved roads enable the U.S. to stage, launch operations from, and logistically sustain combat operations. We combined expert knowledge of regions with publicly available information on critical infrastructure to arrive at our overall assessment of this metric.<sup>150</sup>

For Asia, we arrived at these average scores (rounded to the nearest whole number):

- Alliances: 4—Favorable
- Political Stability: 3—Moderate
- U.S. Military Positioning: 4—Favorable
- Infrastructure: 4-Favorable

Aggregating to a regional score of: **Favorable** 

#### **Operating Environment: Asia**

	VERY POOR	UNFAVORABLE	MODERATE	FAVORABLE	EXCELLENT
Alliances				<b>✓</b>	
Political Stability			✓		
U.S. Military Posture				✓	
Infrastructure				✓	
OVERALL				<b>✓</b>	

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# Conclusion: Scoring the Global Operating Environment

The United States is a global power with global security interests, and threats to those interests can emerge from any region. Consequently, the U.S. military must be ready to operate in any region when called upon to do so and must account for the range of conditions that it might encounter when planning for potential military operations. These considerations necessarily inform its decisions about the type and amount of equipment it purchases (especially to transport and sustain the force); the location or locations from which it might operate; and how easily it can or cannot project and sustain combat power when engaged with the enemy.

Aggregating the three regional scores provides a global operating environment score of **FAVOR-ABLE** in the *2023 Index*.

**Europe.** Overall, the European region remains a stable, mature, and friendly operating environment. Russia remains the preeminent military threat to the region, both conventionally and unconventionally, and its invasion of Ukraine marks a serious escalation of its efforts to exert influence on its periphery. China continues to have a significant presence in Europe through its propaganda, influence operations, and investments in key sectors. By mitigating the effect of sanctions, it also has been a key enabler

of the Russian government's ability to conduct the war in Ukraine. Both NATO and many non-NATO European countries have reason to be increasingly concerned about the behavior and ambitions of both Russia and China, although agreement on a collective response to these challenges remains elusive.

The past year saw continued U.S. military and political reengagement with the continent along with increases in European allies' defense budgets and capability investment. Additional deployments to Europe following the invasion of Ukraine have made the U.S. military presence in Europe the strongest it has been for several years. The economic, political, and societal impacts of the invasion are only beginning to be felt and will undoubtedly have to be reckoned with for years to come. However, NATO has maintained its collective defense posture throughout despite the draining of its material resources as the alliance sends equipment and munitions into Ukraine to strengthen that country's ability to defend itself.

It is difficult to predict whether NATO's renewed emphasis on collective defense and its reinvigorated defense spending will continue over the long term or is merely a short-term response to Russia's invasion. Given the potential for Russia to replace its

#### **Global Operating Environment**

	VERY POOR	UNFAVORABLE	MODERATE	FAVORABLE	EXCELLENT
Europe				<b>~</b>	
Middle East			✓		
Asia				<b>~</b>	
OVERALL				<b>~</b>	

#### **Global Operating Environment: Summary**

**VERY POOR** 

**UNFAVORABLE** 

**MODERATE** 

**FAVORABLE** 

**EXCELLENT** 

battlefield losses with newer, more modern equipment, NATO defense spending on capability will be an important issue in the medium to long terms.

Scores for Europe remained steady this year as they did in 2021 (assessed in the *2022 Index*), with no substantial changes in any individual categories or average scores. The *2023 Index* again assesses the European operating environment as "favorable."

The Middle East. The Middle East region is now highly unstable, in large measure because of the erosion of authoritarian regimes and the fact that the region remains a breeding ground for terrorism. Overall, regional security has continued to deteriorate. Although Iraq has restored its territorial integrity since the defeat of ISIS, the political situation and future relations between Baghdad and the United States will remain difficult as long as a government that is sympathetic to Iran is in power. U.S. relations in the region will remain complex, but this has not stopped the U.S. military from operating as needed.

The supremacy of the nation-state is being challenged in many countries by non-state actors that wield influence and power comparable to those of small states. The region's primary challenges—continued meddling by Iran and surging transnational terrorism—are made more difficult by Sunni–Shia sectarian divides, the more aggressive nature of Iran's Islamist revolutionary nationalism, and the proliferation of Sunni Islamist revolutionary groups. COVID-19 exacerbated these economic, political, and regional crises during 2020 and 2021 and continued to do so throughout 2022. The result could well be further destabilization of the post-pandemic operational environment for U.S. forces.

In the Middle East, the U.S. benefits from operationally proven procedures that leverage bases, infrastructure, and the logistical processes needed to maintain a large force that is forward deployed thousands of miles away from the homeland. The personal links between allied armed forces are also present, and joint training exercises improve interoperability and provide an opportunity for the U.S. to influence some of the region's future leaders.

America's relationships in the region are based pragmatically on shared security and economic concerns. As long as these issues remain relevant to both sides, the U.S. is likely to have an open door to operate in the Middle East when its national interests require that it do so.

Although circumstances in all measured areas vary throughout the year, in general terms, the 2023 Index assesses the Middle East operating environment as "moderate," but the region's political stability continues to be "unfavorable" and will remain a dark cloud over everything else.

**Asia.** The Asian strategic environment includes half of the globe and is characterized by a variety of political relationships among states with wildly varying capabilities. This makes Asia far different from Europe, which in turn makes America's relations with the region different from its relations with Europe. American conceptions of Asia must recognize the physical limitations imposed by the tyranny of distance and the need to move forces as necessary to respond to challenges from China and North Korea.

The complicated nature of intra-Asian relations and the lack of an integrated, regional security architecture along the lines of NATO make defense of U.S. security interests in Asia more challenging than many Americans appreciate. However, the U.S. has strong relations with allies in the region, and their willingness to host bases helps to offset the vast distances that must be covered.

The militaries of Japan and the Republic of Korea are larger and more capable than European militaries, and both countries are becoming more interested in developing missile defense capabilities that will be essential in combatting the regional threat posed by North Korea. In Japan, there is a growing public awareness of the need to adopt a more "normal" military posture in response to China's increasingly aggressive actions. This indicates a break with the pacifist tradition among the Japanese that has lasted since the end of World War II and could lead to improved military capabilities and the prospect of joining the U.S. in defense measures beyond the immediate vicinity of Japan.

We continue to assess the Asia region as "favorable" to U.S. interests in terms of alliances, overall political stability, militarily relevant infrastructure, and the presence of U.S. military forces.

Summarizing the condition of each region enables us to get a sense of how they compare in terms of the difficulty that would be involved in projecting U.S. military power and sustaining combat operations in each one. As a whole, the global operating environment maintains a score of "favorable," which means that the United States should be able to project military power anywhere in the world to defend its interests without substantial opposition or high levels of risk.

# Threats to U.S. Vital Interests

### Assessing Threats to U.S. Vital Interests

Because the United States is a global power with global interests, scaling its military power to threats requires judgments with regard to the importance and priority of those interests, whether the use of force is the most appropriate and effective way to address the threats to those interests, and how much and what types of force are needed to defeat such threats.

This *Index* focuses on three fundamental, vital national interests:

- Defense of the homeland;
- Successful conclusion of a major war that has the potential to destabilize a region of critical interest to the U.S.; and
- Preservation of freedom of movement within the global commons: the sea, air, outer space, and cyberspace domains through which the world conducts business.

The geographical focus of the threats in these areas is further divided into three broad regions: Asia, Europe, and the Middle East.

Obviously, these are not America's only interests. Among many others are the growth of economic freedom in trade and investment, the observance of internationally recognized human rights, and the alleviation of human suffering beyond our borders. None of these other interests, however, can be addressed principally and effectively by the use of military force, and threats to them would not necessarily result in material damage to the foregoing vital national interests. Therefore, however important these additional American interests may be, we do not use them in assessing the adequacy of current U.S. military power.

There are many publicly available sources of information on the status, capabilities, and activities of countries with respect to military power. Perhaps the two most often cited as references are *The Military Balance*, published annually by the London-based International Institute for Strategic Studies (IISS),¹ and the "Annual Threat Assessment of the U.S. Intelligence Community."<sup>2</sup> The former is an unmatched resource for researchers who want to know, for example, the strength, composition, and disposition of a country's military services. The latter serves as a reference point produced by the Office of the Director of National Intelligence (ODNI).

Comparison of our detailed, peer-reviewed analysis of specific countries with *The Military Balance* and the ODNI's "Annual Assessment" reveals two stark limitations in these external sources.

- The Military Balance is an excellent, widely consulted source, but it is primarily a count of military hardware, often without context in terms of equipment capability, maintenance and readiness, training, manpower, integration of services, doctrine, or the behavior of competitors that threaten the national interests of the U.S. as defined in this *Index*. Each edition of the publication includes topical essays and a variety of focused discussions about some aspect of a selected country's capabilities, but there is no overarching assessment of military power referenced against a set of interests, potential consequences of use, or implications for the interaction of countries.
- The ODNI's "Annual Assessment" omits many threats, and its analysis of those that it does address is limited. Moreover, it does not reference underlying strategic dynamics that are key to the evaluation of threats and that may be more predictive of future threats than is a simple extrapolation of current events.

#### **Threat Categories**

Behavior	HOSTILE	AGGRESSIVE	TESTING	ASSERTIVE	BENIGN
Capability	FORMIDABLE	GATHERING	CAPABLE	ASPIRATIONAL	MARGINAL

We suspect that this is a consequence of the U.S. intelligence community's withholding from public view its very sensitive assessments, which are derived from classified sources and/or result from analysis of unclassified, publicly available documents with the resulting synthesized insights being classified because of what they reveal about U.S. determinations and concerns. The need to avoid the compromising of sources, methods of collection, and national security findings makes such a policy understandable, but it also causes the ODNI's annual threat assessments to be of limited value to policymakers, the public, and analysts working outside of the government. Consequently, we do not use the ODNI's assessment as a reference, given its quite limited usefulness, but trust that the reader will double-check our conclusions by consulting the various sources cited in the following pages as well as other publicly available reporting that is relevant to the challenges to core U.S. security interests that are discussed in this section.

Measuring or categorizing a threat is problematic because there is no absolute reference that can be used in assigning a quantitative score. Two fundamental aspects of threats, however, are germane to this *Index*:

- The threatening entity's desire or intent to achieve its objective and
- Its physical ability to do so.

Physical ability is the easier of the two to assess; intent is quite difficult. A useful surrogate for intent is observed behavior because this is where intent becomes manifest through action. Thus, a provocative, belligerent pattern of behavior that seriously threatens U.S. vital interests would be very worrisome. Similarly, a comprehensive ability to accomplish objectives even in the face of U.S. military power would be of serious concern to U.S. policymakers, and weak or very limited abilities would lessen U.S. concern even if an entity behaved provocatively vis-à-vis U.S.

interests. It is the combination of the two—behavior and capability—that informs our final score for each assessed actor.

Each categorization used in the *Index* conveys a word picture of how troubling a threat's behavior and set of capabilities have been during the assessed year. The five ascending categories for observed behavior are:

- · Benign,
- Assertive,
- Testing,
- · Aggressive, and
- · Hostile.

The five ascending categories for physical capability are:

- Marginal,
- Aspirational,
- Capable,
- · Gathering, and
- · Formidable.

As noted, these characterizations—behavior and capability—form two halves of an overall assessment of the threats to U.S. vital interests.

The most current and relatable example of this interplay between behavior and capability is Russia's brutal assault on Ukraine. Throughout its buildup of forces along Ukraine's border during 2021, Russia consistently downplayed observers' concerns that its actions were a prelude to war. Regardless of its protestations, however, one could not dismiss the potential for grievous harm that was inherent in

Russia's forces and their disposition. Russia's behavior, combined with the military capability it had deployed in posture and geographic position, belied its official pronouncements.

The same thing can be said about China, Iran, and North Korea. Like Russia, each of these countries typically tries to refute observers' concerns that its military activities, posturing, and investments threaten the interests of neighbors, as well as distant competitors like the U.S., but no rational country can ignore the potential that is inherent in the forces that each country fields, the investments it is making to improve and expand its capabilities, and

a pattern of behavior that reveals its regime's preference for intimidation and coercion over diplomacy and mutually beneficial economic interaction. It is therefore in the core interest of the United States to take stock of the capabilities and behaviors of its chief adversaries as it considers the capacity, capability, and readiness of its own military forces.

We always hold open the possibility of adding to or deleting from our list of threat actors. The inclusion of any state or non-state entity is based solely on our assessment of its ability to present a meaningful challenge to a critical U.S. interest during the assessed year.

#### **Endnotes**

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# China

# Dean Cheng

In its 2021 Interim National Security Strategic Guidance, the Biden Administration made clear that it sees China as a major and growing threat: "China...has rapidly become more assertive" and "is the only competitor potentially capable of combining its economic, diplomatic, military, and technological power to mount a sustained challenge to a stable and open international system.<sup>1</sup>

While this is labeled an interim guidance, it probably will be reflected eventually in the Administration's full National Security Strategy when it is issued.

#### Threats to the Homeland

Both China and Russia are seen as revisionist powers, but they pose very different challenges to the United States. The People's Republic of China (PRC) has the world's second-largest gross domestic product (GDP), and its economy as measured in terms of purchasing power parity (PPP) is far larger than the U.S. economy.2 China is also an integral and important part of the global supply chain for crucial technologies, especially those relating to information and communications technology. As a result, it has the resources to support a comprehensive military modernization program that has been ongoing for more than two decades and spans the conventional, space, and cyber realms as well as weapons of mass destruction, an area that includes a multipronged nuclear modernization effort.

At the same time, the PRC has been acting more assertively—even aggressively—against a growing number of its neighbors. Unresolved land and maritime disputes have led Beijing to adopt an increasingly confrontational attitude toward territorial disputes in the South China Sea, in the East China Sea, and along the China–India border, and Beijing's

reaction to the Democratic Progressive Party's victories in Taiwan's 2016 and 2020 elections has heightened cross-Strait tensions.

In May 2020, the U.S.–China Economic and Security Review Commission reported that, "[w]ith the world distracted by COVID-19, China also intensified its multi-faceted pressure campaign against Taiwan. Chinese military aircraft crossed the median line of the Taiwan Strait three times in the early months of 2020 after only one such incursion in 2019." The commission further noted that China conducted several provocative military exercises around the island and "continued its efforts to poach Taiwan's remaining diplomatic allies as the virus spread." Since then, China has been intruding regularly across the median line of the Taiwan Strait with ever-larger groups of aircraft.

Meanwhile, China's attempts to obscure the origins of the COVID-19 pandemic and stifle international investigations into the matter have undermined global health efforts. Beijing has also sought to exclude Taiwan from multilateral efforts to combat the pandemic.

Growing Conventional Capabilities. The Chinese People's Liberation Army (PLA) remains one of the world's largest militaries, but its days of largely obsolescent equipment are in the past. Nearly two decades of officially acknowledged double-digit growth in the Chinese defense budget have resulted in a comprehensive modernization program that has benefited every part of the PLA. This has been complemented by improvements in Chinese military training and, in 2015, the largest reorganization in the PLA's history. The PLA has lost 300,000 personnel since those reforms, but its overall capabilities have increased as newer, much more sophisticated systems have replaced older platforms.

A major part of the 2015 reorganization was the establishment of a separate ground forces headquarters and bureaucracy; previously, the ground forces had been the default service providing staffs and commanders. Now the PLA Army (PLAA), responsible for the PLA's ground forces, is no longer automatically in charge of war zones or higher headquarters functions. At the same time, the PLAA has steadily modernized its capabilities, incorporating both new equipment and a new organization. It has shifted from a division-based structure toward a brigade-based one and has been improving its mobility, including heliborne infantry and fire support. These forces are increasingly equipped with modern armored fighting vehicles, air defenses, both tube and rocket artillery, and electronic support equipment.

The PLA Navy (PLAN) is Asia's largest navy "and within the past few years...has surpassed the U.S. Navy in numbers of battle force ships (meaning the types of ships that count toward the quoted size of the U.S. Navy)." According to the U.S. Department of Defense (DOD):

The PLAN is the largest navy in the world with a battle force of approximately 355 platforms, including major surface combatants, submarines, aircraft carriers, ocean-going amphibious ships, mine warfare ships, and fleet auxiliaries. This figure does not include 85 patrol combatants and craft that carry anti-ship cruise missiles (ASCMs). The PLAN's overall battle force is expected to grow to 420 ships by 2025 and 460 ships by 2030.<sup>7</sup>

Although the total number of ships has dropped, the PLAN has fielded increasingly sophisticated and capable multi-role ships. Multiple classes of surface combatants are now in series production, including the Type 055 cruiser and the Type 052C and Type 052D guided missile destroyers, each of which fields long-range surface-to-air missile (SAM) and anti-ship cruise missile systems, as well as the Type 054 frigate and Type 056 corvette.

The PLAN has similarly been modernizing its submarine force. Since 2000, the PLAN has consistently fielded between 50 and 60 diesel-electric submarines, but the age and capability of the force have been improving as older boats, especially 1950s-vintage *Romeo*-class boats, are replaced with newer designs. These include a dozen *Kilo*-class submarines

purchased from Russia and domestically designed and manufactured *Song* and *Yuan* classes. All of these are believed to be capable of firing both torpedoes and anti-ship cruise missiles.<sup>8</sup> The Chinese have also developed variants of the *Yuan*, with an air-independent propulsion (AIP) system that reduces the boats' vulnerability by removing the need to use noisy diesel engines to recharge batteries, and are "expected to produce a total of 25 or more Yuan class submarines by 2025."

The PLAN has been expanding its amphibious assault capabilities as well. The PLA Marine Corps, for example, is China's counterpart to the U.S. Marine Corps. According to the DOD:

The PLANMC previously consisted of two brigades (approximately 10,000 personnel) and was limited in geography and mission to amphibious assault and defense of South China Sea outposts. In 2020, the PLANMC continued to mature an enlarged force structure of eight brigades intended to be scalable and mobile, modernize its capabilities for joint expeditionary operations—including operations beyond the First Island Chain—and become more proficient in conventional and irregular warfare. Throughout 2020, the PLANMC continued to work towards fully equipping and training its four newly established maneuver brigades (in addition to its two previously existing brigades), a SOF brigade, and an aviation (helicopter) brigade. 10

To move this force, the Chinese have begun to build more amphibious assault ships, including Type 071 amphibious transport docks. Each can carry about 800 naval infantrymen and move them to shore by means of four air-cushion landing craft and four helicopters.

Supporting these expanded naval combat forces is a growing fleet of support and logistics vessels. The 2010 PRC defense white paper noted the accelerated construction of "large support vessels." It also noted specifically that the navy is exploring "new methods of logistics support for sustaining long-time maritime missions." These include tankers and fast combat support ships that extend the range of Chinese surface groups and allow them to operate for more prolonged periods away from main ports. Chinese naval task forces dispatched to the Gulf of Aden have typically included such vessels.

The PLAN has also been expanding its naval aviation capabilities, the most publicized element of which has been the growing Chinese carrier fleet. This currently includes not only the *Liaoning*, purchased from Ukraine over a decade ago, but a domestically produced copy, the *Shandong*, that completed its first exercise in 2021. Both of these ships have ski jumps for their air wing, but the Chinese are also building several conventional takeoff/barrier landing (CATOBAR) carriers (like American or French aircraft carriers) that will employ catapults and therefore allow their air complement to carry more ordnance and/or fuel. 14

The PLAN's land-based element is modernizing as well, with a variety of long-range strike aircraft, anti-ship cruise missiles, and unmanned aerial vehicles (UAVs) entering the inventory. In addition to more modern versions of the H-6 twin-engine bomber (a version of the Soviet/Russian Tu-16 Badger), the PLAN's Naval Aviation force has added a range of other strike aircraft to its inventory. These include the JH-7/FBC-1 Flying Leopard, which can carry between two and four YJ-82 anti-ship cruise missiles, and the Su-30 strike fighter.

The PLA Air Force (PLAAF), with more than 1,700 combat aircraft, is Asia's largest air force. It has shifted steadily from a force focused on homeland air defense to one that is capable of power projection, including long-range precision strikes against both land and maritime targets. The DOD's 2021 report on Chinese capabilities notes that:

Although they currently have limited power projection capability, both the PLAAF and PLAN Aviation are seeking to extend their reach. The PLAAF, in particular, has received repeated calls from its leadership to become a truly "strategic" air force, able to project power at long distances and support Chinese national interests wherever they extend.<sup>15</sup>

The PLAAF currently has more than 700 fourth-generation fighters that are comparable to the U.S. F-15, F-16, and F-18. They include the domestically designed and produced J-10 as well as the Su-27/Su-30/J-11 system, which is comparable to the F-15 or F-18 and dominates both the fighter and strike missions. <sup>16</sup> China is also believed to be preparing to field two stealthy fifth-generation fighter designs. The J-20 is the larger aircraft and resembles

the American F-22 fighter. The J-31 appears to resemble the F-35 but with two engines rather than one. The production of advanced combat aircraft engines remains one of the greatest challenges to Chinese fighter design.

The PLAAF is also deploying increasing numbers of H-6 bombers, which can undertake longer-range strike operations including operations employing land-attack cruise missiles. Although the H-6, like the American B-52 and Russian Tu-95, is a 1950s-era design copied from the Soviet-era Tu-16 Badger bomber, the latest versions (H-6K) are equipped with updated electronics and engines and are made of carbon composites. In addition, China is developing the H-20, a flying wing-type stealth bomber that is probably similar to the U.S. B-2.<sup>17</sup>

Equally important, the PLAAF has been introducing a variety of support aircraft, including airborne early warning (AEW), command and control (C2), and electronic warfare (EW) aircraft. These systems field state-of-the-art radars and electronic surveillance systems that allow Chinese air commanders to detect potential targets, including low-flying aircraft and cruise missiles, more quickly and gather additional intelligence on adversary radars and electronic emissions. China's combat aircraft are also increasingly capable of undertaking mid-air refueling, which allows them to conduct extended, sustained operations, and the Chinese aerial tanker fleet, which is based on the H-6 aircraft, has been expanding.

At the biennial Zhuhai Air Show, Chinese companies have displayed a variety of unmanned aerial vehicles that reflect substantial investments and research and development efforts. The surveillance and armed UAV systems include the Xianglong (Soaring Dragon) and Sky Saber systems. The DOD's 2019 report on Chinese capabilities stated that China had "successfully tested the AT-200, which it claims is the 'world's first large cargo UAV," and further specified that "[t]his drone can carry up to 1.5 tons of cargo and... may be especially suited to provide logistic support to PLA forces in the South China Sea."18 Chinese UAVs have been included in various military parades over the past several years, suggesting that they are being incorporated into Chinese forces, and the DOD's 2021 report on Chinese capabilities states that "The PLAAF continues to modernize with the delivery of domestically built aircraft and a wide range of UAVs."19

The PLAAF is also responsible for the Chinese homeland's strategic air defenses. Its array of surface-to-air missile batteries is one of the world's largest and includes the Russian S-300 (SA-10B/SA-20) and its Chinese counterpart, the Hongqi-9 long-range SAM. The S-400 series of Russian longrange SAMs, delivery of which began in 2018, mark a substantial improvement in PLAAF air defense capabilities, as the S-400 has both anti-aircraft and anti-missile capabilities.<sup>20</sup> China has deployed these SAM systems in a dense, overlapping belt along its coast, protecting the nation's economic center of gravity. Key industrial and military centers such as Beijing are also heavily defended by SAM systems.

China's airborne forces are part of the PLAAF. The 15th Airborne Corps has been reorganized from three airborne divisions to six airborne brigades in addition to a special operations brigade, an aviation brigade, and a support brigade. These forces have been incorporating indigenously developed airborne mechanized combat vehicles for the past decade, giving them more mobility and a better ability to engage armored forces.

**Nuclear Capability.** Chinese nuclear forces are the responsibility of the PLA Rocket Forces (PLARF), one of the three new services created on December 31, 2015. China's nuclear ballistic missile forces include land-based missiles with a range of 13,000 kilometers that can reach the U.S. and CSS-4 and submarine-based missiles that can reach the U.S. when the submarine is deployed within missile range.

The PRC became a nuclear power in 1964 when it exploded its first atomic bomb as part of its "two bombs, one satellite" effort. China then exploded its first thermonuclear bomb in 1967 and orbited its first satellite in 1970, demonstrating the capability to build a delivery system that can reach the ends of the Earth. China chose to rely primarily on a land-based nuclear deterrent instead of developing two or three different basing systems as the United States did.

Unlike the United States or the Soviet Union, China chose to pursue only a minimal nuclear deterrent. The PRC fielded only a small number of nuclear weapons: 100–150 weapons on medium-range ballistic missiles and approximately 60 intercontinental ballistic missiles (ICBMs). Its only ballistic missile submarine (SSBN) conducted relatively few deterrence patrols (perhaps none),<sup>21</sup> and its first-generation submarine-launched ballistic missile (SLBM),

the JL-1, if it ever attained full operational capability had limited reach. The JL-1's 1,700-kilometer range makes it comparable to the first-generation Polaris A1 missile fielded by the U.S. in the 1960s.

After remaining stable for several decades, China's nuclear force became part of Beijing's two-decade modernization effort. The result has been both modernization and expansion of the Chinese nuclear deterrent. The core of China's ICBM force is the DF-31 series, a solid-fueled, road-mobile system, along with a growing number of longer-range, road-mobile DF-41 missiles that may already be in the PLA operational inventory. The DOD's 2019 report on Chinese capabilities characterized the DF-41 as "a new MIRV-capable, road-mobile ICBM,"22 and its 2021 report (as have previous reports) again states that "China appears to be considering additional DF-41 launch options, including rail-mobile and silo basing."23 China's medium-range nuclear forces have similarly shifted to mobile, solid-rocket systems so that they are both more survivable and more easily maintained.

This past year has seen a sudden inflation in the number of strategic nuclear warheads available to the PLA Rocket Force. Imagery analysts at several think tanks discovered at least three fields of silos under construction in western China. <sup>24</sup> Each appears to contain around 100 silos, indicating that China could expand its land-based nuclear deterrent component by more than an order of magnitude.

Notably, the Chinese are also expanding their ballistic missile submarine fleet. Replacing the one Type 092 *Xia*-class SSBN are six Type 094 *Jin*-class SSBNs, all of which are operational. Equipped with the longer-range JL-2 SLBM, "the PLAN's six operational Jin class SSBNs represent the PRC's first credible sea-based nuclear deterrent." In addition, "[e]ach Jin class SSBN can carry up to 12 JL-2 SLBMs."<sup>25</sup>

There is some possibility that the Chinese nuclear arsenal now contains land-attack cruise missiles. The CJ-20, a long-range, air-launched cruise missile carried on China's H-6 bomber, may be nuclear-tipped, although there is not much evidence that China has pursued such a capability. China is also believed to be working on a cruise missile submarine that, if equipped with nuclear cruise missiles, would further expand the range of its nuclear attack options.<sup>26</sup>

As a result of its modernization efforts, China's nuclear forces appear to be shifting from a minimal

deterrent posture, suited only to responding to an attack and then with only limited numbers, to a more robust but still limited deterrent posture. While the PRC will still likely field fewer nuclear weapons than either the United States or Russia, it will field a more modern and diverse set of capabilities than India, Pakistan, or North Korea, its nuclear-armed neighbors, are capable of fielding. If there are corresponding changes in doctrine, modernization will enable China to engage in limited nuclear options in the event of a conflict.

This assessment changes, however, if the missiles going into the newly discovered silos are equipped with MIRVs (multiple independently targetable reentry vehicles). With five MIRVs atop each missile, for example, 300 new ICBMs would have some 1,500 warheads—equivalent to the U.S. and Russian numbers allowed under New START. Even with fewer than 300 ICBMs, the new SLBMs and new bombers would enable China, within a few years, to field as large a nuclear force as the United States or Russia is capable of fielding.

In addition to strategic nuclear forces, the PLARF has responsibility for medium-range and intermediate-range ballistic missile (MRBM and IRBM) forces. These include (among others) the DF-21 MRBM, which has a range of approximately 1,500 kilometers, and the DF-26 IRBM, which has a range of approximately 3,000 kilometers and "is capable of conducting precision conventional or nuclear strikes against ground targets, such as U.S. military bases on Guam, as well as against maritime targets."27 It is believed that Chinese missile brigades equipped with these systems may have both nuclear and conventional responsibilities, making any deployment from garrison much more ambiguous from a stability perspective. The expansion of these forces also raises questions about the total number of Chinese nuclear warheads.

While it is unclear whether they are nuclear-armed, China's hypersonic glide vehicles also pose a growing threat to the United States and its allies. Hypersonic glide vehicles are slower than ICBMs—Mach 5 for a hypersonic vehicle as opposed to Mach 25 for an ICBM warhead—but are designed to maneuver during their descent, making interception far more difficult. During a Chinese test in August 2021, a hypersonic vehicle apparently went into orbit.<sup>28</sup> This creates a fundamentally different threat, as a fractional orbital bombardment system

(FOBS) could allow attacks from southern trajectories (that is, from over the South Pole) or even the placement of warheads in orbit, which would make them almost impossible to intercept. Even without a nuclear warhead, an orbiting hypersonic vehicle could do enormous damage to a city or a military facility such as an air base or an ICBM silo. Notably, because of the strategic instability that FOBS programs would introduce, neither the U.S. nor the Soviet Union ever pursued them.

Cyber and Space Capabilities. The PLA's major 2015 reorganization included creation of the PLA Strategic Support Force (PLASSF), which brings the Chinese military's electronic, network (including cyber), and space warfare forces under a single service umbrella. Previously, these capabilities had been embedded in different departments across the PLA's General Staff Department and General Armaments Department. By consolidating them into a single service, the PLA has created a Chinese "information warfare" force that is responsible for offensive and defensive operations in the electromagnetic and space domains.

Chinese network warfare forces are known to have conducted a variety of cyber and network reconnaissance operations as well as cyber economic espionage. In 2014, the U.S. Department of Justice charged PLA officers from Unit 61398, then of the General Staff Department's 3rd Department, with the theft of intellectual property and implanting of malware in various commercial firms.<sup>29</sup> Members of that unit are thought also to be part of Advanced Persistent Threat-1, a group of computer hackers believed to be operating on behalf of a nation-state rather than a criminal group. In 2020, the Department of Justice charged several PLA officers with one of the largest breaches in history: stealing the credit ratings and records of 147 million people from Equifax.30

The PRC has been conducting space operations since 1970 when it first orbited a satellite, but its space capabilities didn't gain public prominence until 2007 when the PLA conducted an anti-satellite (ASAT) test in low-Earth orbit against a defunct Chinese weather satellite. The test became one of the worst debris-generating incidents of the space age: Many of the several thousand pieces of debris that were generated will remain in orbit for more than a century.

Equally important, Chinese counter-space efforts have been expanding steadily. The PLA not only has

tested ASATs against low-Earth orbit systems, but also is believed to have tested a system designed to attack targets at geosynchronous orbit (GEO) approximately 22,000 miles above the Earth. As many vital satellites are at GEO, including communications and missile early-warning systems, China's ability to target such systems constitutes a major threat. In early 2022, China's Shijian-22 towed a dead Chinese satellite into a "graveyard" orbit above the GEO belt. While this was officially touted as a servicing operation, the ability to attach one satellite to another and then tow it also has potential military implications.

The creation of the PLASSF, incorporating counter-space forces, reflects the movement of counter-space systems, including direct-ascent ASATs, out of the testing phase to fielding with units. In 2018, for example, the U.S. National Air and Space Intelligence Center (NASIC) noted that "China has military units that have begun training with anti-satellite missiles."<sup>32</sup>

#### Threats to the Commons

The U.S. has critical sea, air, space, and cyber interests at stake in the East Asia and South Asia international common spaces. These interests include an economic interest in the free flow of commerce and the military use of the commons to safeguard America's own security and contribute to the security of its allies and partners.

Washington has long provided the security backbone in these areas, and this in turn has supported the region's remarkable economic development. However, China is taking increasingly assertive steps—including the construction of islands atop previously submerged features—to secure its own interests, and two things seem obvious: China and the United States do not share a common conception of international space, and China is actively seeking to undermine American predominance in securing international common spaces.

In addition, as China expands its naval capabilities, it will be present farther and farther away from its home shores. As part of this effort, it established its first formal overseas military base in 2017 pursuant to an agreement with the government of Djibouti.

**Dangerous Behavior in the Maritime and Airspace Common Spaces.** The aggressiveness of the Chinese navy, maritime law enforcement forces, and air forces in and over the waters of the East

China Sea and South China Sea, coupled with ambiguous, extralegal territorial claims and assertion of control there, poses an incipient threat to American and overlapping allied interests. Chinese military writings emphasize the importance of establishing dominance of the air and maritime domains in any future conflict.

Although the Chinese do not necessarily have sufficient capacity to prevent the U.S. from operating in local waters and airspace, the ability of the U.S. to take control at acceptable costs in the early stages of a conflict has become a matter of greater debate.33 A significant factor in this calculus is the fact that China has "fully militarized at least three of several islands it built in the disputed South China Sea, arming them with anti-ship and anti-aircraft missile systems, laser and jamming equipment and fighter jets in an increasingly aggressive move that threatens all nations operating nearby."34 China also has been intensifying its challenges to long-standing rivals Vietnam and the Philippines and has begun to push toward Indonesia's Natuna Islands and into waters claimed by Malaysia.

It is unclear whether China is yet in a position to enforce an air defense identification zone (ADIZ) consistently, but the steady two-decade improvement of the PLAAF and PLAN naval aviation will eventually provide the necessary capabilities. Chinese observations of recent conflicts, including wars in the Persian Gulf, the Balkans, and Afghanistan, have emphasized the growing role of airpower and missiles in conducting "non-contact, non-linear, non-symmetrical" warfare. This growing parity, if not superiority, constitutes a radical shift from the Cold War era when the U.S. and its allies clearly would have dominated air and naval operations in the Pacific.

China has also begun to employ nontraditional methods of challenging foreign military operations in what Beijing regards as its territorial waters and airspace. It has employed lasers, for example, against foreign air and naval platforms, endangering pilots and sailors by threatening to blind them.<sup>36</sup>

Increased Military Space Activity. One of the key force multipliers for the United States is its extensive array of space-based assets. Through its various satellite constellations, the U.S. military can track opponents, coordinate friendly forces, engage in precision strikes against enemy forces, and conduct battle-damage assessments so that its munitions are expended efficiently. Because the American military is expeditionary—meaning that its wars are fought far from the homeland—its reliance on space-based systems is greater than that of many other militaries. Consequently, it requires global rather than regional reconnaissance, communications and data transmission, and meteorological information and support. At this point, only space-based systems can provide this sort of information on a real-time basis. No other country is capable of leveraging space as the U.S. does, and that is a major advantage. However, this heavy reliance on space systems is also a key American vulnerability.

China fields an array of space capabilities, including its own BeiDou/Compass system of navigation and timing satellites, and has claimed a capacity to refuel satellites.<sup>37</sup> It has four satellite launch centers. China's interest in space dominance includes not only accessing space, but also denying opponents the ability to do the same. As one Chinese assessment notes, space capabilities provided 70 percent of battlefield communications, more than 80 percent of battlefield reconnaissance and surveillance, and 100 percent of meteorological information for American operations in Kosovo. Moreover, 98 percent of precision munitions relied on space for guidance information. In fact, "[i]t may be said that America's victory in the Kosovo War could not [have been] achieved without fully exploiting space."38

To this end, the PLA has been developing a range of anti-satellite capabilities that include both hardkill and soft-kill systems. The former include direct-ascent kinetic-kill vehicles (DA-KKV) such as the system famously tested in 2007, but they also include more advanced systems that are believed to be capable of reaching targets in mid-Earth orbit and even geosynchronous orbit.39 The latter include anti-satellite lasers for either dazzling or blinding purposes.<sup>40</sup> This is consistent with PLA doctrinal writings, which emphasize the need to control space in future conflicts. "Securing space dominance has already become the prerequisite for establishing information, air, and maritime dominance," says one Chinese teaching manual, "and will directly affect the course and outcome of wars."41

Soft-kill attacks need not come only from dedicated weapons, however. The case of Galaxy-15, a communications satellite owned by Intelsat Corporation, showed how a satellite could disrupt communications simply by always being in "switched on"

mode.<sup>42</sup> Before it was finally brought under control, it had drifted through a portion of the geosynchronous belt, forcing other satellite owners to move their assets and juggle frequencies. A deliberate such attempt by China (or any other country) could prove far harder to handle, especially if conducted in conjunction with attacks by kinetic systems or directed-energy weapons.

Most recently, China has landed an unmanned probe at the lunar south pole on the far side of the Moon. This is a major accomplishment because the probe is the first spacecraft ever to land at either of the Moon's poles. To support this mission, the Chinese deployed a data relay satellite to Lagrange Point-2, one of five points where the gravity wells of the Earth and Sun "cancel out" each other, allowing a satellite to remain in a relatively fixed location with minimal fuel consumption. While the satellite itself may or may not have military roles, the deployment highlights that China will now be using the enormous volume of cis-lunar space (the region between the Earth and the Moon) for various deployments. This will greatly complicate American space situational awareness efforts by forcing the U.S. to monitor a vastly greater area of space for possible Chinese spacecraft. The Chinese Chang'e-5 lunar sample retrieval mission in 2020 and the recent Chinese landing on Mars underscore China's effort to move beyond Earth orbit to cis-lunar and interplanetary space.

Cyber Activities and the Electromagnetic **Domain.** As far back as 2013, the Verizon Risk Center identified China as the "top external actor from which [computer] breaches emanated, representing 30 percent of cases where country-of-origin could be determined."43 Given the difficulties of attribution, country of origin should not necessarily be conflated with perpetrator, but forensic efforts have associated at least one Chinese military unit with cyber intrusions, albeit many years ago.44 The Verizon report similarly concluded that China was the source of 95 percent of state-sponsored cyber espionage attacks. Since the 2015 summit meeting between Chinese President Xi Jinping and U.S. President Barack Obama, during which the two sides reached an understanding to reduce cyber economic espionage, Chinese cyber actions have shifted. Although the overall level of activity appears to be unabated, the Chinese seem to have moved toward more focused attacks mounted from new sites.

China's cyber espionage efforts are often aimed at economic targets, reflecting China's much more holistic view of both security and information. Rather than creating an artificial dividing line between military security and civilian security, much less information, the PLA plays a role in supporting both aspects and seeks to obtain economic intellectual property as well as military electronic information.

This is not to suggest that the PLA has not emphasized the military importance of cyber warfare. Chinese military writings since the 1990s have emphasized a fundamental transformation in global military affairs. Future wars will be conducted through joint operations involving multiple services, not through combined operations focused on multiple branches within a single service, and will span not only the traditional land, sea, and air domains, but also outer space and cyberspace. The latter two arenas will be of special importance because warfare has shifted from an effort to establish material dominance (characteristic of industrial age warfare) to establishing information dominance. This is due to the rise of the information age and the resulting introduction of information technology into all areas of military operations.

Consequently, according to PLA analysis, future wars will most likely be "informationized local wars." That is, they will be wars in which information and information technology will be both widely applied and a key basis of victory. The ability to gather, transmit, analyze, manage, and exploit information will be central to winning such wars: The side that is able to do these things more accurately and more quickly will be the side that wins. This means that future conflicts will no longer be determined by platform-versus-platform performance and not even by system against system: Conflicts are now clashes between rival systems of systems.<sup>45</sup>

Chinese military writings suggest that a great deal of attention has been focused on developing an integrated computer network and electronic warfare (INEW) capability. This would allow the PLA to reconnoiter a potential adversary's computer systems in peacetime, influence opponent decision-makers by threatening those same systems in times of crisis, and disrupt or destroy information networks and systems by cyber and electronic warfare means in the event of conflict. INEW capabilities would complement psychological warfare and physical attack efforts to secure "information dominance," which

Chinese military writings emphasize as essential for fighting and winning future wars.

It is essential to recognize, however, that the PLA views computer network operations as part of information operations, or information combat. Information operations are specific operational activities that are associated with striving to establish information dominance. They are conducted in both peacetime and wartime with the peacetime focus on collecting information, improving its flow and application, influencing opposing decision-making, and effecting information deterrence.

Information operations involve four mission areas:

- Command and Control Missions. An essential part of information operations is the ability of commanders to control joint operations by disparate forces. Command, control, communications, computers, intelligence, surveillance, and reconnaissance structures therefore constitute a key part of information operations by providing the means for collecting, transmitting, and managing information.
- Offensive Information Missions. These are intended to disrupt the enemy's battlefield command and control systems and communications networks, as well as to strike the enemy's psychological defenses.
- **Defensive Information Missions.** Such missions are aimed at ensuring the survival and continued operation of information systems. They include deterring an opponent from attacking one's own information systems, concealing information, and combating attacks when they do occur.
- Information Support and Information-Safeguarding Missions. The ability to provide the myriad types of information necessary to support extensive joint operations and to do so on a continuous basis is essential to their success. 46

Computer network operations are integral to all four of these overall mission areas. They can include both strategic and battlefield network operations and can incorporate both offensive and defensive measures. They also include protection not only of data, but also of information hardware and operating software.

Finally, computer network operations will not stand alone; they will be integrated with electronic warfare operations as reflected in the phrase "network and electronics unified." Electronic warfare operations are aimed at weakening or destroying enemy electronic facilities and systems while defending one's own.<sup>47</sup> The combination of electronic and computer network attacks will produce synergies that affect everything from finding and assessing the adversary, to locating one's own forces, to weapons guidance, to logistical support and command and control. The creation of the PLASSF is intended to integrate these forces and make them more complementary and effective in future "local wars under informationized conditions."

### Threat of Regional War

Three issues, all involving China, threaten American interests and embody the "general threat of regional war" noted at the outset of this section: the status of Taiwan, the escalation of maritime and territorial disputes, and border conflict with India.

**Taiwan.** China's long-standing threat to end the de facto independence of Taiwan and ultimately to bring it under the authority of Beijing—by force if necessary—is both a threat to a major American security partner and a threat to the American interest in peace and stability in the Western Pacific.

After easing for eight years, tensions across the Taiwan Strait have worsened as a result of Beijing's reaction to the outcome of Taiwan's 2016 and 2020 presidential elections. Beijing has suspended most direct government-to-government discussions with Taipei and is using a variety of aid and investment efforts to deprive Taiwan of its remaining diplomatic partners.

Beijing has also undertaken significantly escalated military activities directed at Taiwan. For example:

- In 2021, China sent more than 150 aircraft into Taiwan's air defense identification zone.<sup>48</sup>
- In 2022, 39 Chinese aircraft, including fighters, bombers, and support aircraft, conducted the largest single incursions into Taiwanese airspace.

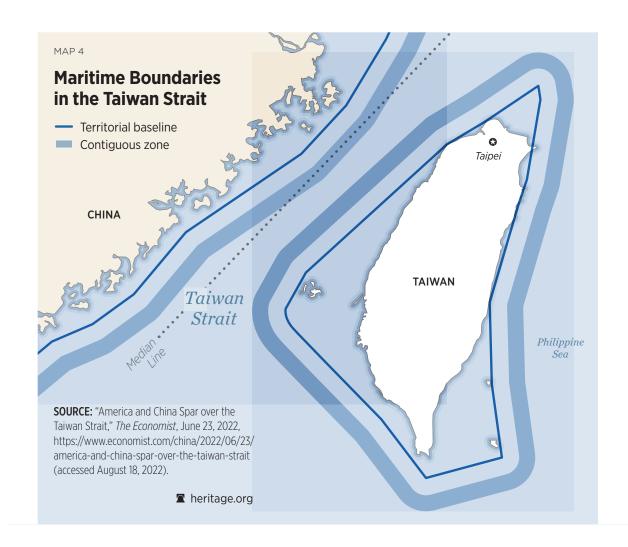
- Chinese fighters, along with airborne early warning aircraft, have increased their exercises southwest of Taiwan, demonstrating a growing ability to conduct flexible air operations and reduced reliance on ground-based control.<sup>50</sup>
- For at least six months in 2021, the Chinese maintained a warship between Taiwan and the string of Japanese islands southwest of Kyushu.<sup>51</sup>
- The PLA has undertaken sustained joint exercises to simulate extended air operations, employing both air and naval forces including its aircraft carriers.<sup>52</sup>

These activities continued unabated and, in some ways, even intensified in the wake of China's struggle with COVID-19. $^{53}$ 

Regardless of the state of the relationship at any given time, Chinese leaders from Deng Xiaoping and Mao Zedong to Xi Jinping have consistently emphasized the importance of ultimately reclaiming Taiwan. The island—along with Tibet—is the clearest example of a geographical "core interest" in Chinese policy. China has never renounced the use of force, and it continues to employ political warfare against Taiwan's political and military leadership.

For the Chinese leadership, the failure to effect unification, whether peacefully or by using force, would reflect fundamental political weakness. For this reason, China's leaders cannot back away from the stance of having to unify the island with the mainland, and the island remains an essential part of the PLA's "new historic missions," shaping its acquisitions and military planning.

It is widely posited that China's anti-access/area-denial (A2/AD) strategy—the deployment of an array of overlapping capabilities, including anti-ship ballistic missiles (ASBMs), submarines, and long-range cruise missiles, satellites, and cyber weapons—is aimed largely at forestalling American intervention in support of friends and allies in the Western Pacific, including Taiwan. By holding at risk key American platforms and systems (for example, aircraft carriers), the Chinese seek to delay or even deter American intervention in support of key friends and allies, thereby allowing the PRC to achieve a fait accompli. The growth of China's military capabilities is specifically oriented



toward countering America's ability to assist in the defense of Taiwan.

Moreover, China's efforts to reclaim Taiwan are not limited to overt military means. The "three warfares" highlight Chinese political warfare methods, including legal warfare/lawfare, public opinion warfare, and psychological warfare. The PRC employs such approaches to undermine both Taiwan's will to resist and America's willingness to support Taiwan. The Chinese goal would be to "win without fighting"—to take Taiwan without firing a shot or with only minimal resistance before the United States could organize an effective response.

**Escalation of Maritime and Territorial Dis- putes.** The PRC and other countries in the region see active disputes over the East and South China Seas not as differences regarding the administration of international common spaces, but rather as matters of territorial sovereignty. As a result, there exists the threat of armed conflict between China and

American allies that are also claimants, particularly Japan and the Philippines.

Because its economic center of gravity is now in the coastal region, China has had to emphasize maritime power to defend key assets and areas. This need is exacerbated by China's status as the world's foremost trading state. China increasingly depends on the seas for its economic well-being. Its factories are powered by imported oil, and its diets contain a growing percentage of imported food. China relies on the seas to move its products to markets. Consequently, it not only has steadily expanded its maritime power, including its merchant marine and maritime law enforcement capabilities, but also has acted to secure the "near seas" as a Chinese preserve.

Beijing prefers to accomplish its objectives quietly and through nonmilitary means. In both the East China Sea and the South China Sea, China has sought to exploit "gray zones," gaining control incrementally and deterring others without resorting to

the lethal use of force. It uses military and economic threats, bombastic language, and enforcement through legal warfare (including the employment of Chinese maritime law enforcement vessels) as well as military bullying. Chinese paramilitary-implemented, military-backed encroachment in support of expansive extralegal claims could lead to an unplanned armed clash.

The growing tensions between China and Japan and among a number of claimants in the South China Sea are especially risky. In the former case, the most proximate cause is the dispute over the Senkakus.

China has intensified its efforts to assert claims of sovereignty over the Senkaku Islands of Japan in the East China Sea. Beijing asserts both exclusive economic rights within the disputed waters and recognition of "historic" rights to dominate and control those areas as part of its territory. Chinese fishing boats (often believed to be elements of the Chinese maritime militia) and Chinese Coast Guard (CCG) vessels have been encroaching steadily on the territorial waters within 12 nautical miles of the uninhabited islands. In 2020, CCG or other government vessels repeatedly entered the waters around the Senkakus. In the summer of 2016, China deployed a naval unit (as opposed to the CCG) into the area.

Beijing's 2013 ADIZ declaration was just part of a broader Chinese pattern of using intimidation and coercion to assert expansive extralegal claims of sovereignty and/or control incrementally. For example:

- In June 2016, a Chinese fighter made an "unsafe" pass near a U.S. RC-135 reconnaissance aircraft in the East China Sea area.
- In March 2017, Chinese authorities warned the crew of an American B-1B bomber operating in the area of the ADIZ that they were flying illegally in PRC airspace. In response to the incident, the Chinese Foreign Ministry called for the U.S. to respect the ADIZ.<sup>57</sup>
- In May 2018, the Chinese intercepted an American WC-135, also over the East China Sea.<sup>58</sup>

There have been no publicly reported ADIZ-related confrontations since then.

In the South China Sea, overlapping Chinese, Bruneian, Philippine, Malaysian, Vietnamese, and Taiwanese claims raise the prospect of

confrontation. This volatile situation has led to a variety of confrontations between China and other claimants, as well as with Indonesia, which is not claiming territory or rights disputed by anyone except (occasionally) China.

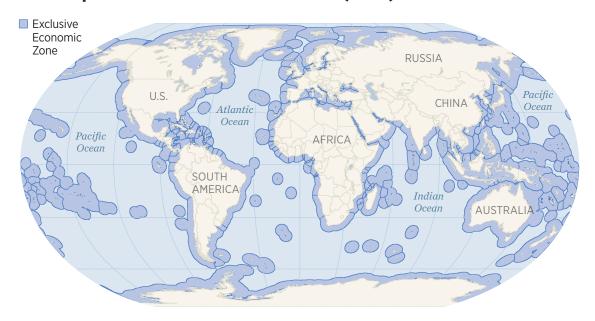
China–Vietnam tensions in the region, for example, were on display again in 2020 when CCG vessels twice rammed and sank Vietnamese fishing boats near the disputed Paracel islands.<sup>59</sup> Vietnam has also protested China's decision to create additional administrative regions for the South China Sea, one centered on the Paracels and the other centered on the Spratlys.<sup>60</sup> This is part of Beijing's "legal warfare" efforts, which employ legal and administrative measures to underscore China's claimed control of the South China Sea region. For this reason, conflict often occurs around Chinese enforcement of unilaterally determined and announced fishing bans.<sup>61</sup>

Because of the relationship between the Philippines and the United States, tensions between Beijing and Manila are the most likely to lead to American involvement in these disputes. There have been several incidents going back to the 1990s. The most contentious occurred in 2012 when a Philippine naval ship operating on behalf of the country's coast guard challenged private Chinese poachers in waters around Scarborough Shoal. The resulting escalation left Chinese government ships in control of the shoal, after which the Philippines successfully challenged Beijing in the Permanent Court of Arbitration regarding its rights under the U.N. Convention on the Law of the Sea (UNCLOS). There is no indication that the Chinese have reclaimed land around the shoal as they did in the Spratlys, but they continue to control access to the reef, and the presence of the Chinese Coast Guard remains a source of confrontation.62

In March and April of 2021, a similar dispute seemed to be simmering around Whitsun Reef in the Spratlys. The presence of more than two hundred Chinese fishing boats, among them known assets of China's maritime militia, 63 sparked protests from Manila. After a stay of a few weeks—which Beijing claimed was necessary because of the poor weather—most of the ships departed. The unprecedented gathering of fishing boats and maritime militia could be an attempt to establish a basis within the Philippines exclusive economic zone (EEZ) for a subsequent return backed by the Chinese Coast Guard.

MAP 5

# The Scope of Exclusive Economic Zones (EEZs)



As shown in the map above, EEZs and other waters under national jurisdiction account for 40 percent of the world's oceans. U.S. freedom of navigation worldwide would be compromised if national governments were granted expansive authority to restrict foreign militaries from operating in their EEZs. The South China Sea, virtually all of which is covered by various EEZ claims (see map at right), has become a particular flashpoint as China has sought to restrict freedom of navigation for U.S. military vessels there.



**SOURCE:** Heritage Foundation research.

▲ heritage.org

MAP 6

# **Exclusive Economic Zone (EEZ) Claims in the South China Sea**



**SOURCE:** "China Has Militarised the South China Sea and Got Away with It," *The Economist*, June 23, 2018, https://www.economist.com/asia/2018/06/21/china-has-militarised-the-south-china-sea-and-got-away-with-it (accessed July 23, 2021).

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In each of these cases, the situation is exacerbated by rising Chinese nationalism.<sup>64</sup> In the face of persistent economic challenges, nationalist themes are becoming an increasingly strong undercurrent and affecting policymaking. Although the nationalist phenomenon is not new, it is gaining force and complicating efforts to maintain regional stability.

Governments may choose to exploit nationalism for domestic political purposes, but they also run the risk of being unable to control the genie that they have released. Nationalist rhetoric is mutually reinforcing, which makes countries less likely to back down than they might have been in the past. The increasing power that the Internet and social media provide to the populace, largely outside of government control, adds elements of unpredictability to future clashes. China's refusal to accept the 2016 Permanent Court of Arbitration findings, which overwhelmingly favored the Philippines, despite both Chinese and Philippine accession to UNCLOS is a partial reflection of such trends.

In case of armed conflict between China and the Philippines or between China and Japan, either by intention or because of an accidental incident at sea, the U.S. could be required to exercise its treaty

## **Chinese Fault Lines**



China-India Border. The Line of Actual Control represents one of the world's longest disputed borders and has been the site of several standoffs between the Chinese and Indian militaries in recent years, including a border crisis in 2020 that resulted in the first casualties from hostilities at the border in more than 40 years.

East China Sea. China claims the disputed Senkaku/Diaoyu Islands, which are currently administered by Japan. In recent years, Chinese aircraft

**SOURCE:** Heritage Foundation research.

and naval vessels have entered the airspace and territorial sea around the islands with growing frequency.

Taiwan. The sovereignty of Taiwan remains unsettled. The People's Republic of China disputes this status and regularly conducts provocative military maneuvers near Taiwan.

South China Sea. The South China Sea hosts several territorial disputes between China and Taiwan and its Southeast Asian neighbors. China's unlawful claims in the sea and attempts to restrict freedom of navigation there have also produced tensions with the U.S., which has sent aircraft and naval vessels through the South China Sea to signal its objections to the nature of China's claims. This has resulted in a number of confrontations between Chinese and U.S. vessels.

# **Disputed Borders Between India and China**



Western Sector. Aksai Chin, a barren plateau that was part of the former princely state of Jammu and Kashmir, has been administered by the Chinese since they seized control of the territory in the 1962 Sino-Indian border conflict. One of the main causes of that war was India's discovery of a road China had built through the region, which India considered its territory.

**SOURCE:** Heritage Foundation research.

Middle Sector. The Middle
Sector, where the Indian states
of Uttarakhand and Himachal
Pradesh meet the Tibet
Autonomous Region, is the
least contentious of the three
main disputed "sectors," with
the least amount of territory
contested. It is also the only
sector for which the Chinese
and Indian governments have
formally exchanged maps
delineating their claims.

Eastern Sector. China claims nearly the entire Indian state of Arunachal Pradesh, which Beijing calls South Tibet. The McMahon Line, which has served as the de facto Line of Actual Control since 1962, was established in 1914 by the British and Tibetan representatives and is not recognized by China. The U.S. recognizes Arunachal Pradesh as sovereign Indian territory.

commitments.<sup>65</sup> Escalation of a direct U.S.–China incident is also not unthinkable. Keeping an inadvertent incident from escalating into a broader military confrontation would be difficult. This is particularly true in the East and South China Seas, where naval as well as civilian law enforcement vessels from both China and the U.S. operate in what the U.S. considers to be international waters.

The most significant development in the South China Sea during the past three years has been Chinese reclamation and militarization of seven artificial islands or outposts. In 2015, President Xi promised President Obama that China had no intention of militarizing the islands. That pledge has never been honored. In fact, as described by Admiral John Aquilino, Commander, U.S. Indo-Pacific Command,

in his March 2022 posture statement to the Senate Committee on Armed Services:

[T]he PLA has deployed anti-ship cruise missiles, surface-to-air missiles, and jamming equipment to its artificial Spratly Islands features since 2018 and flown aircraft from those locations since 2020. The PLA has emplaced expansive military infrastructure in the SCS by building aircraft hangars sufficient to accommodate multiple fighter brigades, protective shelters for surface-to-air and anti-ship missiles, and significant fuel storage facilities.<sup>67</sup>

According to the DOD's 2021 annual report on the Chinese military, "[n]o substantial land has been reclaimed at any of the outposts since the PRC completed its extensive artificial manipulation in the Spratly Islands in late 2015, after adding more than 3,200 acres of land to the seven features it occupies in the Spratlys."<sup>68</sup> This would seem to suggest that the process has been completed.

There is the possibility that China will ultimately try to assert its authority over the entire area by declaring an ADIZ above the South China Sea. <sup>69</sup> There also are concerns that under the right circumstances, China will move against vulnerable targets like Philippines-occupied Second Thomas Shoal or Reed Bank, where a Chinese fishing boat in 2019 rammed and sank a Philippine boat, causing a controversy in Manila. There is also consistent speculation in the Philippines about when the Chinese will start reclamation work at Scarborough. This development in particular would facilitate the physical assertion of Beijing's claims and enforcement of an ADIZ, regardless of the UNCLOS award.

**Border Conflict with India.** The possibility of armed conflict between India and China, while currently remote, poses an indirect threat to U.S. interests because it could disrupt the territorial status quo and raise nuclear tensions in the region. A border conflict between India and China could also prompt Pakistan to add to regional instability by trying to take advantage of the situation.

Long-standing border disputes that led to a Sino–Indian war in 1962 have again become a flashpoint in recent years. In April 2013, the most serious border incident between India and China in more than two decades occurred when Chinese troops settled for three weeks several miles inside northern Indian

territory on the Depsang Plains in Ladakh. A visit to India by Chinese President Xi Jinping in September 2014 was overshadowed by another flare-up in border tensions when hundreds of Chinese PLA forces reportedly set up camps in the mountainous regions of Ladakh, prompting Indian forces to deploy to forward positions in the region. This border standoff lasted three weeks until both sides agreed to pull their troops back to previous positions.

In 2017, Chinese military engineers were building a road to the Doklam plateau, an area claimed by both Bhutan and China, and this led to a confrontation between Chinese and Indian forces, the latter requested by Bhutanese authorities to provide assistance. The crisis lasted 73 days; both sides pledged to pull back, but Chinese construction efforts in the area have continued. Improved Chinese infrastructure not only would give Beijing the diplomatic advantage over Bhutan, but also could make the Siliguri corridor that links the eastern Indian states with the rest of the country more vulnerable.

In June 2020, the situation escalated even further. Clashes between Indian and Chinese troops using rocks, clubs, and fists led to at least 20 Indian dead and (as the Chinese authorities recently admitted) at least four Chinese killed in the Galwan Valley area of Ladakh. In September, reports of shots exchanged near the Pangong Lake region signaled further potential escalation.

India claims that China occupies more than 14,000 square miles of Indian territory in the Aksai Chin along its northern border in Kashmir, and China lays claim to more than 34,000 square miles of India's northeastern state of Arunachal Pradesh. The issue is also closely related to China's concern for its control of Tibet and the presence in India of the Tibetan government in exile and Tibet's spiritual leader, the Dalai Lama.

China is building up military infrastructure and expanding a network of road, rail, and air links in its southwestern border areas. To meet these challenges, the Indian government has committed to expanding infrastructure development along the disputed border, although China currently holds a decisive military edge.

#### Conclusion

China presents the United States with the region's most comprehensive security challenge. It poses various threat contingencies across all three

areas of vital American national interests: homeland; regional war, including potential attacks on overseas U.S. bases as well as against allies and friends; and international common spaces. China's provocative behavior is well documented. It is challenging the U.S. and its allies such as Japan at sea, in the air, and in cyberspace; it has raised concerns on its border with India; and it is a standing threat to Taiwan. Despite a lack of official transparency, publicly available sources shed considerable light on China's rapidly growing military capabilities.

The Chinese launched their first homegrown aircraft carrier during the past year and are fielding large numbers of new platforms for their land, sea,

air, and outer-space forces as well as in the electromagnetic domain. The PLA has been staging larger and more comprehensive exercises, including major exercises in the East China Sea near Taiwan, that are improving the ability of the Chinese to operate their abundance of new systems. It also has continued to conduct probes of both the South Korean and Japanese ADIZs, drawing rebukes from both Seoul and Tokyo.

This *Index* assesses the overall threat from China, considering the range of contingencies, as "aggressive" for level of provocation of behavior and "formidable" for level of capability.

## **Threats: China**

	HOSTILE	AGGRESSIVE	TESTING	ASSERTIVE	BENIGN
Behavior		<b>✓</b>			
	FORMIDABLE	GATHERING	CAPABLE	ASPIRATIONAL	MARGINAL
Capability	<b>✓</b>				

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# Russia

# Alexis Mrachek

n February 24, 2022, Russia invaded Ukraine. Employing a force of nearly 200,000 troops replete with armor, rocket and conventional artillery, and combat aircraft, President Vladimir Putin ordered a "special military operation" to seize Ukraine, destabilize if not overthrow its government, and neutralize its military. In addition to the tremendous losses borne by both sides, the war has depleted the military inventories of countries providing material support to Ukraine. The assault on Ukraine is glaring proof that Putin's Russia is a profound threat to the U.S., its interests, and the security and economic interests of its allies, particularly in Europe but also more broadly given the reach of Russia's military and the destructive ripple effect its use is having and can have across countries and regions of special importance to the United States.

From the Arctic to the Baltics, Ukraine, and the South Caucasus, and increasingly in the Mediterranean, Russia continues to foment instability in Europe. Despite its economic problems, Russia continues to prioritize the rebuilding of its military and funding for its military operations abroad. Russia remains antagonistic to the United States both militarily and politically, and its efforts to undermine U.S. institutions and the NATO alliance continue unabated. In Europe, Russia uses its energy position along with espionage, cyberattacks, and information warfare to exploit vulnerabilities in an effort to divide the transatlantic alliance and undermine faith in government and societal institutions.

Overall, Russia possesses significant conventional and nuclear capabilities and remains the principal threat to European security. Its aggressive stance in a number of theaters, including Ukraine, Georgia, the Balkans, and Syria, continues to encourage destabilization and threaten U.S. interests.

**Military Capabilities.** According to the International Institute for Strategic Studies (IISS):

- Among the key weapons in Russia's inventory are 339 intercontinental ballistic missiles (ICBMs); 2,927 main battle tanks; 5,180 armored infantry fighting vehicles; more than 6,050 armored personnel carriers; and more than 4,894 pieces of artillery.
- The navy has one aircraft carrier; 49 submarines (including 11 ballistic missile submarines); four cruisers; 11 destroyers; 16 frigates; and 129 patrol and coastal combatants.
- The air force has 1,172 combat-capable aircraft.
- The army has 280,000 soldiers.
- There is a total reserve force of 2,000,000 for all armed forces.<sup>1</sup>

Russia has suffered significant losses of tanks and other military hardware as a result of its assault on Ukraine, but in the coming years, it will come back with a vengeance in rebuilding its military. It will be replacing the destroyed tanks and equipment with newly developed versions, not the old Soviet versions. In addition, Russian deep-sea research vessels include converted ballistic missile submarines, which hold smaller auxiliary submarines that can operate on the ocean floor.<sup>2</sup>

In recent years, Russia has increasingly deployed paid private volunteer troops trained at Special Forces bases and often under the command of Russian Special Forces in order to avoid political blowback from military deaths abroad. It has used such volunteers in Libya, Syria, and Ukraine because they help the Kremlin to "keep costs low and maintain a degree of deniability," and "[a]ny personnel losses could be shrouded from unauthorized disclosure."<sup>3</sup>

In January 2019, reports surfaced that 400 Russian mercenaries from the Wagner Group were in Venezuela to prop up the regime of Nicolás Maduro.<sup>4</sup> Russian propaganda in Venezuela has supported the regime and stoked fears of American imperialism. In March 2022, Russian Foreign Minister Sergei Lavrov met with Venezuelan Vice President Delcy Rodriguez to discuss "their countries' strategic alliance," and after Russia invaded Ukraine, Maduro "assured Vladimir Putin of his 'strong support."

During the past few years, as the crisis has metastasized and protests against the Maduro regime have grown, Russia has begun to deploy troops and supplies to strengthen Maduro's security forces. In March 2019, for example, Russia deployed approximately 100 troops and military staff to Caracas. Russia also exports billions in arms to Venezuela (and has loaned the regime money to purchase Russian arms) along with \$70 million–\$80 million yearly in nonmilitary goods. 9

In July 2016, Putin signed a law creating a National Guard with a total strength (both civilian and military) of 340,000, controlled directly by him.10 He created this force, which is responsible for "enforcing emergency-situation regimes, combating terrorism, defending Russian territory, and protecting state facilities and assets," by amalgamating "interior troops and various law-enforcement agencies." In November 2020, the Russian National Guard (Rosgvardia) and the Belarusian Ministry of the Interior signed an official cooperation deal specifying that either side "may carry out law-enforcement-type operations on the other's territory."12 Rosgvardia also has been involved in the war in Ukraine. In March 2022, Rosgvardia Director Viktor Zolotov stated that "National Guard units are not only involved in the fight against [the so-called Ukrainian] nationalists, [but] also fight to ensure public order and security in liberated localities, guard important strategic facilities, [and] protect humanitarian aid convoys." Specifically, Rosgvardia was sent to seize control of various Ukrainian cities.<sup>13</sup>

The Russian economy rebounded during the latter part of the COVID-19 pandemic,<sup>14</sup> but after Moscow launched its second invasion of Ukraine in

February 2022, Western sanctions had a significant effect on the economy.<sup>15</sup>

In 2021, Russia spent \$65.9 billion on its military-6.37 percent more than it spent in 2020-and remained one of the world's top five nations in terms of defense spending.16 Much of Russia's military expenditure has been directed toward modernization of its armed forces. The U.S. Intelligence Community "expect[s] Moscow to sustain military modernization and enhance its armed forces, enabling it to defend Russia's national security while projecting influence globally and challenging the interests of the United States and its allies."17 From 2010 to 2019 (the most recent year for which data are publicly available), close to 40 percent of Russia's total military spending was on arms procurement.<sup>18</sup> Taking into account total military expenditure, Russia spent 3.77 percent of its GDP on defense in 2021, a slight decrease from 2020.19 This will surely increase as combat losses and consumption of war materiel in Ukraine continue to mount.

In early 2018, Russia introduced its new State Armament Program 2018–2027, a \$306 billion investment in new equipment and force modernization. According to the IISS, the program continues its predecessor's emphasis on modernization, but some of its aims are more modest than they were. The extent to which modernization efforts are affected by the Russo–Ukraine war cannot yet be known, but it seems reasonable to assume that Russia will not be content with a reduced and damaged military regardless of the outcome of the war. Consequently, general defense expenditures and investments in modernization programs are likely to increase, especially as they are enabled by historically high energy revenues.

Russia has prioritized modernization of its nuclear capabilities and claims that its nuclear trifecta is more than 89 percent of the way through its modernization from the Soviet era. <sup>21</sup> Russia has been planning to deploy the RS-28 (Satan 2) ICBM as a replacement for the RS-36, which is being phased out in the 2020s. <sup>22</sup> In June 2022, Putin announced in a speech that the missile had been "successfully tested" and, "with nuclear capability, will be deployed by the end of 2022." In a television interview, Alexei Zhuravlyov, a member of the Russian State Duma, boasted "that the [RS-28] would reduce the United States to 'nuclear ashes' if they 'think Russia should not exist." <sup>23</sup>

In April 2020, the Kremlin stated that it had begun state trials for its T-14 Armata main battle tank in Syria. After a series of delays, Russian troops allegedly will receive more than 40 Armata tanks in 2023. Aside from the T-14 Armata, 10 new-build T-90M main battle tanks, contracted in 2017, were delivered to the 2nd Motor-Rifle Division in the Moscow region in 2020. At the Army-2021 Forum, according to TASS, the Russian Defense Ministry signed a contract with the Uralvagonzavod plant (part of the Rostec state corporation) stipulating the delivery of another batch of T-90M Proryv tanks and modernization of T-90 tanks to T-90M level.

Russia's fifth-generation Su-27 fighter has fallen short of expectations, particularly with regard to stealth capabilities. In May 2018, the government cancelled mass production of the Su-27 because of its high costs and limited capability advantages over upgraded fourth-generation fighters. Russia lost one of its Su-27 jets near the Crimean coast during a planned mission in March 2020. In July 2021, Russia premiered the prototype for its Su-75 LTS Checkmate, which will be "the world's second single-engine fighter plane to incorporate the most sophisticated radar-evasion and command systems." The only other plane in this category is the F-35.

In December 2019, Russia's sole aircraft carrier, the *Admiral Kuznetsov*, caught on fire during repair work.<sup>31</sup> The carrier was scheduled to begin sea trials in 2022,<sup>32</sup> but the addition of a propeller-rudder system, hull repairs, and an assortment of delays in other maintenance work have caused the trials to be delayed until 2024.<sup>33</sup> In May 2019, reports surfaced that Russia is seeking to begin construction of a new nuclear-powered aircraft carrier in 2023 for delivery in the late 2030s, but the procurement's financial and technological feasibility remains questionable.<sup>34</sup>

Following years of delays, the *Admiral Gorshkov* stealth guided missile frigate was commissioned in July 2018. According to one report, the Russian Navy is expected to add 10 new *Gorshkov*-class frigates and 14 *Steregushchiy*-class corvettes by 2027. Russia is also significantly upgrading its nuclear-powered battle cruiser *Admiral Nakhimov*, which is expected to become the "most powerful surface vessel in the Russian Navy" and be ready for sailing in 2023.<sup>35</sup>

Russia plans to procure eight *Lider*-class guided missile destroyers for its Northern and Pacific Fleets, but procurement has faced consistent delay.<sup>36</sup> In

April 2020, it was reported that Russia's Severnoye Design Bureau had halted development of the frigates because of financial setbacks.<sup>37</sup>

In November 2018, Russia sold four *Admiral Grigorovich*–class frigates to India, which should take delivery of all four by 2026.<sup>38</sup> The ships had been intended for the Black Sea Fleet, but Russia found itself unable to produce a replacement engine following the imposition of Ukraine-related sanctions. Of the planned 14 frigates, Russia had engines for only two, but in January 2021, India procured gas turbine engines from Ukraine "and handed [them] over to Russia to install them on the Admiral Grigorovich-class guided-missile stealth frigates that are being made for the Indian Navy by a Russian shipyard as part of \$2.5 billion deal."<sup>39</sup>

Russia's naval modernization continues to prioritize submarines. In June 2020, the first Project 955A Borei-A ballistic-missile submarine, the *Knyaz Vladimir*, was delivered to the Russian Northern Fleet as an addition to the three original Project 955 Boreis. <sup>40</sup> In December 2021, Russia launched *Knyaz Oleg* and *Novosibirsk*, part of the Borei-A and Yasen-M submarine classes, respectively, <sup>41</sup> in addition to *Generalissimo Suvorov*, the third of the upgraded Borei-A class submarines. <sup>42</sup> The *Novosibirsk* is equipped with Kalibr cruise missiles. <sup>43</sup> Russia reportedly will construct a total of 10 Borei-A class submarines; so far, five have been delivered. <sup>44</sup>

The *Laika*-class submarines (previously called *Khaski*) are planned fifth-generation stealth nuclear-powered submarines. They are slated to begin construction in 2023 and to be armed with Zircon hypersonic missiles, which have a reported speed of from Mach 5 to Mach 6.<sup>45</sup> According to a Russian vice admiral, these submarines will be two times quieter than current subs.<sup>46</sup> Construction of the first *Laika* is scheduled for the end of 2030.<sup>47</sup>

Russia also continues to upgrade its diesel electric *Kilo*-class subs. <sup>48</sup> It reportedly inducted the first improved Project 636.6 *Kilo*-class submarine into its Pacific Fleet in November 2019. <sup>49</sup> Russia launched the third of six Project 06363 improved *Kilo*-class subs in March 2021, and all six are to be built by 2024. <sup>50</sup> According to one assessment, the submarines' improved noise reduction has caused them to be nicknamed "Black Holes," but "the submarine class lacks a functioning air-independent propulsion system, which reduced the boats' overall stealth capabilities." <sup>51</sup>

Transport remains a nagging problem, and Russia's defense minister has stressed the paucity of transport vessels. According to a RAND report:

In 1992, just after the collapse of the Soviet Union, the Russian Federation military had more than 500 transport aircraft of all types, which were capable of lifting 29,630 metric tons. By 2017, there were just over 100 available transport aircraft in the inventory, capable of lifting 6,240 metric tons, or approximately one-fifth of the 1992 capacity.<sup>52</sup>

That number is even lower now. At least two Russian transport aircraft were shot down right after Russia's second invasion of Ukraine, which began on February 24, 2022.<sup>53</sup>

Although budget shortfalls have hampered modernization efforts overall, Russia continues to focus on development of such high-end systems as the S-500 surface-to-air missile system. As of March 2021, the Russian Ministry of Defense was considering the most fitting ways to introduce its new S-500 Prometheus surface-to-air missile system, which can detect targets at up to 1,200 miles and uses a missile with a range of approximately 250 miles, "as part of its wider air-defense modernization." According to one report, the S-500 system will enter full service by 2025.<sup>54</sup>

Russia's counterspace and countersatellite capabilities are formidable. According to the U.S. Intelligence Community:

Russia continues to train its military space elements and field new antisatellite weapons to disrupt and degrade U.S. and allied space capabilities, and it is developing, testing, and fielding an array of nondestructive and destructive counterspace weapons—including jamming and cyberspace capabilities, directed energy weapons, on-orbit capabilities, and ground-based ASAT capabilities—to target U.S. and allied satellites.<sup>55</sup>

In November 2021, Russia conducted an anti-satellite missile test that reportedly "endangered the crew aboard the International Space Station (ISS)" because it created more than 1,500 pieces of trackable orbital debris and "hundreds of thousands of pieces of smaller orbital debris."<sup>56</sup> In September 2021, it was revealed that three Voronezh radars will be modernized as part of Russia's missile attack early warning system by 2028.<sup>57</sup>

**Military Exercises.** Russian military exercises, especially snap exercises, are a source of serious concern because they have masked real military operations in the past. Their purpose is twofold: to project strength and to improve command and control. In March 2022, Air Force General Tod D. Wolters, then Commander, U.S. European Command (EUCOM), testified that:

Russia maintains a large conventional force presence along NATO's borders and conducts snap exercises to increase instability. Russia employs unconventional tools, ranging from disinformation campaigns, malicious cyber activities, and the manipulation of energy markets to support Moscow's efforts at political subversion and economic intimidation. These tools and others are intended to coerce, weaken, and divide our Allies and Partners in the European theater and beyond.<sup>58</sup>

Concerns were heightened and eventually validated when Russia used such exercises in the spring and fall of 2021 to position forces close to Ukraine's borders with Russia and Belarus—forces that it ultimately used to invade Ukraine.

Exercises in the Baltic Sea in January 2022 amid heightened tensions between Moscow and the West over Russia's military buildup on the Ukrainian border were meant as a message. Twenty Russian navy vessels performed "exercises focused on naval and anti-aircraft defence." Right before the exercises occurred, the U.S. announced that it might send extra troops to NATO's eastern flank. It is possible that Moscow used this announcement as its reason for initiating the exercises.

Russia's snap exercises are conducted with little or no warning and often involve thousands of troops and pieces of equipment.<sup>61</sup> In April 2021, for example, between 150,000 and 300,000 Russian troops massed at the Ukrainian border and in Crimea to conduct snap exercises that also involved approximately 35,000 combat vehicles, 900 aircraft, and 190 navy ships.<sup>62</sup> In February 2022, just before Moscow's second invasion of Ukraine, Russia and Belarus held joint snap exercises reportedly with 30,000 combat troops and special operation forces, fighter

jets, Iskander dual-capable missiles, and S-400 air defense systems.<sup>63</sup>

#### Threats to the Homeland

Russia is the only state adversary in the Europe region that possesses the capability to threaten the U.S. homeland with both conventional and nonconventional means. Although there does not currently appear to be a strong likelihood that Russia will use its nuclear capabilities against the United States directly, Putin "casts the war [in Ukraine] as an inevitable confrontation with the United States, which he accuses of threatening Russia by meddling in its backyard and enlarging the NATO military alliance," and CIA Director William Burns has said that "none of us can take lightly the threat posed by a potential resort to tactical nuclear weapons or low-yield nuclear weapons" in Ukraine.<sup>64</sup>

Russia's most recent National Security Strategy does not mention NATO directly, but it does assert that the U.S. is planning to deploy medium-range and short-range missiles in Europe—a possibility that NATO firmly denies. The same document also clearly states that Russia will use every means at its disposal to achieve its strategic goals. Among its "basic concepts" is "ensuring national security—the implementation by public authorities in cooperation with civil society institutions and organizations of political, legal, military, socio-economic, informational, organizational and other measures aimed at countering threats to national security."<sup>65</sup>

The most recent Russian military doctrine, which Putin signed in December 2014, specifically emphasizes the threat allegedly posed by NATO and global strike systems.<sup>66</sup>

**Strategic Nuclear Threat.** Russia possesses the largest arsenal of nuclear weapons (including short-range nuclear weapons) among the nuclear powers.<sup>67</sup> It is one of the few nations with the capability to destroy many targets in the U.S. homeland and in U.S.-allied nations as well as the capability to threaten and prevent free access to the commons by other nations.

Russia has both intercontinental-range and short-range ballistic missiles and a varied arsenal of nuclear weapons that can be delivered by sea, land, and air. It also is investing significant resources in modernizing its arsenal and maintaining the skills of its workforce, and "modernization of Russia's strategic nuclear triad is expected to remain a priority"

under the new state armament program.<sup>68</sup> Modern weapons and equipment allegedly now constitute 89 percent of Russia's nuclear triad.<sup>69</sup>

Russia currently relies on its nuclear arsenal to ensure its invincibility against any enemy, intimidate European powers, and deter counters to its predatory behavior in its "near abroad," primarily in Ukraine, where it uses the threat of nuclear attack to deter other countries from supporting Ukraine's defense, but also in the Baltic States. To This arsenal serves both as a deterrent to large-scale attack and as a protective umbrella under which Russia can modernize its conventional forces at a deliberate pace, but Russia also needs a modern and flexible military to fight local wars such as those against Georgia in 2008 and the renewed offensive against Ukraine that began in 2022.

Under Russian military doctrine, the use of nuclear weapons in conventional local and regional wars would be de-escalatory because it would cause an enemy to concede defeat. In April 2022, for example, "Russia's Foreign Minister said...that if the U.S. and Ukraine's other Western allies continue to arm the country as it battles Moscow's invading forces, the risk of the war escalating into a nuclear conflict 'should not be underestimated."<sup>71</sup>

General Wolters discussed the risks presented by Russia's possible use of tactical nuclear weapons in his 2022 EUCOM posture statement:

Russia's nuclear arsenal and strike capability remains an enduring, existential threat to the United States, democracy, and our peaceful Allies and Partners. A central concern is Russia's non-strategic nuclear weapons stockpile and the Kremlin's potential to use these weapons in crisis or conflict.

Russia pursues malign activities, including military aggression, aimed at undermining democracy, the rules-based international order, and has a willingness to use force to achieve its aims. Russia pursues these activities despite widespread international condemnation and economic sanctions. President Putin leverages coercive and aggressive policies to counter Western influence and threaten peace and stability in Europe.<sup>72</sup>

Item 19 in Putin's June 2020 executive order, "Basic Principles of State Policy of the

Russian Federation on Nuclear Deterrence," outlines four "conditions specifying the possibility of nuclear weapons use by the Russian Federation." They include:

- The "arrival of reliable data on a launch of ballistic missiles attacking the territory of the Russian Federation and/or its allies";
- The "use of nuclear weapons or other types of weapons of mass destruction by an adversary against the Russian Federation and/or its allies";
- An "attack by [an] adversary against critical governmental or military sites of the Russian Federation, disruption of which would undermine nuclear forces response actions"; and
- "[A]ggression against the Russian Federation with the use of conventional weapons when the very existence of the state is in jeopardy."<sup>73</sup>

Russia's reliance on nuclear weapons is based partly on their small cost relative to the cost of conventional weapons, especially in terms of their effect, and on Russia's inability to attract sufficient numbers of high-quality servicemembers. In other words, Russia sees its nuclear weapons as a way to offset the lower quantity and quality of its conventional forces.

Just as it is doing to deter Western support for Ukraine, Moscow has repeatedly threatened U.S. allies in Europe with nuclear deployments and even preemptive nuclear strikes. <sup>74</sup> The Russians justify their aggressive behavior by pointing to deployments of U.S. missile defense systems in Europe. In the past, these systems were not scaled or postured to mitigate Russia's advantage in ballistic missiles and nuclear weapons to any significant degree, but Pentagon officials have said that laser-armed Strykers are set to arrive by September 2022 and that new Eastern European batteries and sea-based interceptors are set to arrive by 2023. <sup>75</sup>

Russia continues to violate the Intermediate-Range Nuclear Forces (INF) Treaty, which bans the testing, production, and possession of intermediate-range missiles. <sup>76</sup> Russia first violated the treaty in 2008 and then systematically escalated its violations, moving from testing to producing to deploying the prohibited missile into the field. Russia

fully deployed the SSC-8 cruise missile in violation of the INF Treaty early in 2017 and has deployed battalions with the missile at the Kapustin Yar missile test site in southern Russia; at Kamyshlov near the border with Kazakhstan; in Shuya east of Moscow; and in Mozdok in occupied North Ossetia.<sup>77</sup> U.S. officials consider the banned SSC-8 cruise missiles to be fully operational.<sup>78</sup>

In December 2018, in response to Russian violations, the U.S. declared Russia to be in material breach of the INF Treaty, a position with which NATO allies were in agreement.<sup>79</sup> The U.S. provided its six-month notice of withdrawal from the INF treaty on February 2, 2019, and officially withdrew from the treaty on August 2.<sup>80</sup>

Russia's sizable nuclear arsenal remains the only threat to the existence of the U.S. homeland emanating from Europe and Eurasia. While the potential for use of this arsenal remains low, the fact that Moscow continues to threaten Europe with nuclear attack demonstrates that this substantial nuclear capability will continue to play a central strategic role in shaping both Russian military and political thinking and the level of Russia's aggressive behavior with respect to other countries.

#### Threat of Regional War

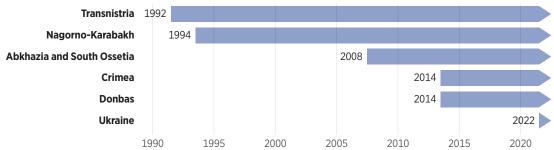
Many U.S. allies regard Russia as a genuine threat. At times, this threat is of a military nature, as seen in Russia's war against Ukraine. At other times, it involves less conventional tactics such as cyberattacks, exploitation of Russia's status as a source of energy, and propaganda. Today, as in the days of Imperial Russia, Moscow uses both the pen and the sword to exert its influence. Organizations like the Collective Security Treaty Organization (CSTO) and the Eurasian Economic Union (EEU), for example, embody Russia's attempt to bind regional capitals to Moscow through a series of agreements and treaties.

Russia also uses espionage in ways that are damaging to U.S. interests. For example:

- In October 2019, the U.S. released and deported to Russia Maria Butina, a convicted Russian operative who had infiltrated American conservative political groups to interfere with the 2016 presidential election.<sup>81</sup>
- In February 2022, the U.S. expelled 12 officials from Russia's mission to the United Nations.

# **Russian Interference Zones**





**Transnistria.** Russia has stationed troops in Transnistria since 1992 when a cease-fire ended the Moldovan civil war.

Nagorno-Karabakh. In September 2020, major fighting broke out in the Nagorno-Karabakh region, which Armenia had been occupying since 1994. The fighting ended in November 2020 when Armenia and Azerbaijan signed a Russian-brokered cease-fire. Russian peacekeeping troops remain in Nagorno-Karabakh for now.

Abkhazia and South Ossetia. Russian troops have been stationed in both Abkhazia and South Ossetia since Russia's 2008 invasion of Georgia and the subsequent five-day war. Ukraine. In February 2022, Russia launched a full-scale invasion of Ukraine. Early on, Russian forces attempted to capture Ukraine's capital of Kyiv but failed. Russia maintains control of Crimea and parts of Donbas while fighting continues across Eastern Ukraine with a large contingent of Russia's army engaged in the conflict.

**SOURCE:** Heritage Foundation research.

▲ heritage.org

According to the U.S. Mission to the U.N., the officials had "abused their privileges of residency in the U.S. by engaging in espionage activities that are adverse to our national security."

In 2019, the European External Action Service, diplomatic service of the European Union (EU), estimated that 200 Russian spies were operating in Brussels, which is the headquarters of NATO.<sup>83</sup> In March 2022, Brussels expelled 21 Russian diplomats for "alleged threats and posing threats to security."<sup>84</sup> According to one report, Russian spies are becoming harder to track because they infiltrate companies, schools, and even the government.<sup>85</sup> In addition, the expulsion of Russian spies is not a permanent solution for Western nations because "Russia tends to send back new spies to replace the ones who have left."<sup>86</sup>

On March 4, 2018, Sergei Skripal, a former Russian GRU colonel who was convicted in 2006 of selling secrets to the United Kingdom and freed in a spy swap between the U.S. and Russia in 2010, and his daughter Yulia were poisoned with Novichok nerve agent by Russian security services in Salisbury, U.K. Hundreds of residents could have been contaminated, including a police officer who was exposed to the nerve agent after responding. Fit took a year and the work of about 190 U.K. Army and Royal Air Force personnel, supported by "specialist contractors," to complete the physical cleanup of Salisbury. L.S. intelligence officials have reportedly linked Russia to the deaths of 14 people in the U.K. alone, many of them Russians who ran afoul of the Kremlin.

Russian intelligence operatives are reportedly mapping U.S. telecommunications infrastructure around the United States, focusing especially on fiber-optic cables.<sup>90</sup>

- In March 2022, U.S. intelligence analysts concluded that Russian military spy hackers were responsible for a multifaceted cyberattack on satellite broadband service, administered by U.S.-based Viasat, in Ukraine and Europe at the onset of Russia's renewed offensive in Ukraine.
- In March 2017, the U.S. charged four people, including two Russian intelligence officials, with directing hacks of user data involving Yahoo and Google accounts.<sup>92</sup>

• Undersea cables in the United States are also at risk of being tapped for valuable intelligence. Fourteen Russian sailors who died aboard a submarine that caught fire in July 2019 were suspected of attempting to tap information flowing from American undersea cables.<sup>93</sup>

Russia has also used its relations with friendly nations-especially Nicaragua-for espionage purposes. In April 2017, Nicaragua began using a Russian-provided satellite station at Managua that, even though the Nicaraguan government denies it is intended for spying, is of concern to the U.S.94 In November 2017, the Russian-built "counter-drug" center at Las Colinas opened, its future purpose being to support "Russian security engagement with the entire region."95 According to a Foreign Policy Research Institute report, "Aside from the center, Russian forces have participated in joint raids and operations against drug trafficking [in Nicaragua], capturing as many as 41 presumed traffickers in one particular operation" since 2017. Moscow also has an agreement with Nicaragua, signed in 2015, that "facilitate[s] Russian access to the ports of Corinto and Bluefields."97

# Pressure on Central and Eastern Europe. Moscow poses a security challenge to members of NATO that border Bussia, Until recently, a conven-

NATO that border Russia. Until recently, a conventional Russian attack against a NATO member was thought unlikely, but Russia's assault on Ukraine and its threatening of NATO members that are supporting Ukraine raise the specter of a larger conflict involving NATO. Russia continues to use cyberattacks, espionage, its significant share of the European energy market, and propaganda to sow discord among NATO member states and undermine the alliance. The Estonian Foreign Intelligence Service's International Security and Estonia 2019 report states clearly that "[t]he only serious threat to regional security, including the existence and sovereignty of Estonia and other Baltic Sea states, emanates from Russia, It involves not only asymmetrical, covert or political subversion, but also a potential military threat."98

After decades of Russian domination, the countries of Central and Eastern Europe factor Russia into their military planning and foreign policy formulation in a way that is simply unimaginable in many Western European countries and North America. Estonia and Latvia have sizable ethnic Russian populations, and there is concern that Russia might

exploit this as a pretext for aggression—a view that is not without merit in view of Moscow's irredentist rhetoric and Russia's use of this technique to invade Ukraine in 2014 and 2022.

According to Lithuania's *National Threat Assessment 2022*:

Russia is and will remain the greatest and potentially existential threat to Lithuania and other countries of the region. By threatening to invade Ukraine and spark a conflict in Europe, Russia seeks to force the West to acknowledge its right to determine political choices of other independent states to decide on the ways how to ensure national and regional security. Moscow is also taking advantage of instability generated by [Belarusian dictator Alexander] Lukashenka and together with Beijing further challenging the West....

Moscow attempts to persuade the country's population that the West is to blame for the economic and social problems and society's discontent with the regime; however, it is clearly an outcome of ineffective political system and poor management of national resources and priorities. Therefore, the regime employs increasingly aggressive tactics in fighting against the perceived internal and external opponents, escalates military threats to neighbouring states and the West thus seeking to allegedly prevent threats to Russia.<sup>99</sup>

In language that still applies today, Lithuania's *National Threat Assessment 2019* states that Russia "exploits democratic freedoms and rights for its subversive activity" and "actually promotes its aggressive foreign policy" while "pretending to develop cultural relations" in Lithuania.<sup>100</sup>

Latvian authorities describe the means used by Russia to claim that it is defending the rights of citizens or Russian "compatriots" in similar terms. "[O]ne of the priorities of Russian propaganda," for example, "has been promoting the 'correct' interpretation of historical events [including the Second World War] in line with the interests of the Kremlin." Other means include "spread[ing] lies at [the] international level about the Latvian government's policies, which are allegedly aimed at restricting Russian-speakers' rights," as well as "a series of

measures to attract new leaders for the 'compatriot' policy" and "expanded...efforts to consolidate young people who could potentially become the next promoters of the Kremlin's worldview in Latvia." The principal "directions of Russia's 'compatriot' policy [are] consolidation of the Russian diaspora abroad, protection of the rights of 'compatriots', support for 'compatriot' youth organisations, [and] the protection of the Russian language and 'ethnocultural identity."<sup>101</sup>

In March 2017, General Curtis Scaparrotti, then Commander, U.S. European Command, and NATO Supreme Allied Commander Europe, testified that Russian propaganda and disinformation should be viewed as an extension of Russia's military capabilities: "The Russians see this as part of that spectrum of warfare, it's their asymmetric approach." <sup>102</sup> In 2020, for example, "Russian -sponsored actors released a forged letter online where Polish Brigadier General Ryszard Parafianowicz appeared to criticize openly the American presence in his country during the US-led exercise Defender-Europe 20."103 Today, "[t]he threat of influence no longer exists only during deployment but also in garrison because of 'the collapsed nature of communication...and...porous boundaries between war and everyday life,' which means geography is no longer enough to act as a defense."104

Russia also has sought to use disinformation to undermine NATO's Enhanced Forward Presence (eFP) in the Baltics. A disinformation campaign nicknamed "ghostwriter," for example, has been ongoing since 2017. Russian hackers often have leveraged "website compromises or spoofed email accounts to disseminate fabricated content." In one case in 2019, a fake message published on the Polish War Studies Academy website, purportedly from the organization's commander, called for troops "to fight against 'the American occupation." In 2020, hackers falsified an interview transcript, claiming that Lieutenant General Christopher Cavoli, then Commander of U.S. Army Europe, was criticizing the Baltic states' militaries.

U.S. troops stationed in Poland for NATO's eFP have been the target of similar Russian disinformation campaigns. <sup>108</sup> A fabricated interview with General Cavoli that was published online was meant to undermine NATO's reputation among the public. <sup>109</sup> One report summarized that "Russia's state propaganda channels RT and Sputnik remain very keen to

exploit to the maximum any incidents involving eFP personnel, and to repeat the Kremlin's anti-NATO and anti-eFP narrative." In particular, more recent Russian propaganda has focused on portraying eFP as an "occupying force." III

In February 2022, the Baltics and Poland together urged the largest social media companies to restrict Russian disinformation about the war in Ukraine from "spreading across [their] platforms." The Baltic states also banned a number of Russian and Belarusian channels that allegedly were disseminating propaganda to justify Moscow's war.<sup>112</sup>

Russia has also demonstrated a willingness to use military force to change the borders of modern Europe. When Kremlin-backed Ukrainian President Viktor Yanukovych failed to sign an Association Agreement with the EU in 2013, months of street demonstrations led to his ouster early in 2014. Russia responded by sending troops, aided by pro-Russian local militia, to occupy the Crimean Peninsula under the pretext of "protecting Russian people." This led to Russia's eventual annexation of Crimea, the first such forcible annexation of territory in Europe since the Second World War.<sup>113</sup> Then, in February 2022, Russia invaded Ukraine a second time, presumably with the goal of bringing the entire nation under Putin's control. At the time this book was being prepared, Russia occupied one-fifth of Ukraine, an area that includes most of Ukraine's industrial sector, its port cities on the Black Sea, and the major transport corridors for grain exports. It is likely that Russia will not relinquish by negotiation what it has taken by force, preferring instead to formalize ownership of the area it controls by simply annexing it.

Russia's annexation of Crimea effectively cut Ukraine's coastline in half, and Russia has claimed rights to underwater resources off the Crimean Peninsula. Ha May 2018, Russia inaugurated the first portion of a \$7.5 billion, 11.8-mile bridge connecting Russia with Kerch in occupied Crimea. The effect on Ukraine's regional economic interests can be seen in the fact that 30 percent of the cargo ships that served Mariupol could not clear the span. December 2019, Russia completed a new rail bridge over the Kerch Strait that the EU condemned as "yet another step towards a forced integration of the illegally annexed peninsula."

Russia has deployed 30,000 troops to Crimea and has embarked on a major program to build housing,

restore airfields, and install new radars there. The Monolit-B radar system, for instance, has a passive range of 450 kilometers, and its deployment "provides the Russian military with an excellent real-time picture of the positions of foreign surface vessels operating in the Black Sea." In addition, "Russian equipment there includes 40 main battle tanks, 680 armored personnel carriers and 174 artillery systems of various kinds" along with 113 combat aircraft. These numbers may well be different now given Russia's renewed war in Ukraine and the losses of Russian personnel and equipment from Ukrainian defensive actions.

Control of Crimea has allowed Russia to use the Black Sea as a platform to launch and support naval operations along the Ukrainian coastline as part of the renewed offensive against Ukraine. 122 Russia also has been using the naval base at Sevastopol for operations in the Eastern Mediterranean, but Turkey's closure of the Bosporus Strait to military traffic in response to Russia's war against Ukraine has ended this option, at least temporarily.123 Before Turkey closed the Strait, the Black Sea fleet had received six Kilo diesel submarines and three Admiral Grigorovich-class frigates equipped with Kalibr-NK long-range cruise missiles. 124 Russia was also planning to add 10 Gorshkov-class frigates and 14 Steregushchiv-class corvettes to its Black Sea fleet.125 Kalibrs have a range of at least 2,500 kilometers, placing cities from Rome to Vilnius within range of Black Sea-based cruise missiles. 126 In April 2022, in a significant operational and symbolic loss for Russia, Ukrainian forces sank Russia's *Moskva* guided missile cruiser, which had been the flagship of its Black Sea Fleet.127

Russia has deployed five S-400 air defense systems with a potential range of approximately 250 miles to Crimea. Russia's new S-350 air defense systems also could be deployed to Crimea, but that is somewhat unlikely. In addition, "local capabilities [in Crimea] have been strengthened by the Pantsir-S1 (SA-22 Greyhound) short-to-mediumrange surface-to-air missile (SAM) and anti-air-craft artillery weapons system, which particularly complements the S-400." Russia also deploys the Bastion P coastal defenses armed with the P-800 Oniks anti-ship cruise missile, which "has a range of up to 300 kilometers and travels at nearly Mach 2.5, making it extraordinarily difficult to defeat with kinetic means."

In Moldova, Russia supports the breakaway enclave of Transnistria, where yet another frozen conflict festers to Moscow's liking. According to the Congressional Research Service:

Russia stations about 1,500 soldiers in Transnistria, a few hundred of which Moldova accepts as peacekeepers. In 2017, Moldova's Constitutional Court ruled that Russia's non-peacekeeping troop presence was unconstitutional. In 2018, the U.N. General Assembly passed a resolution calling on Russia to withdraw its troops from Moldova "unconditionally and without further delay."

A conflict resolution process operates in a "5+2" format under the chairpersonship of the Organization for Security and Cooperation in Europe (OSCE), with the OSCE, Russia, and Ukraine as mediators and the EU and the United States as observers. The EU also supports conflict management through the EU Border Assistance Mission to Moldova and Ukraine, which seeks to help the two countries combat transborder crime, facilitate trade, and resolve the conflict over Transnistria.<sup>132</sup>

Russia continues to occupy 12 percent of Moldova's territory. On January 22, 2019, in an effort to enhance its control of the breakaway region, Russia opened an office in Moscow for the Official Representation of the Pridnestrovian Moldavian Republic in the Russian Federation. In February 2022, a few weeks before Russia's second invasion of Ukraine, Russian armed forces staged military drills in Transnistria. The exercises followed a Ukrainian warning that "Russian special services could be preparing false flag provocations' against Russian troops stationed in [Transnistria] to justify a broader invasion of Ukraine." Concerns that Russian troops stationed in Transnistria could be mobilized for the war in Ukraine persist.

Russia's permanent stationing of Iskander missiles in Kaliningrad in 2018 occurred a year to the day after NATO's eFP deployed to Lithuania. <sup>136</sup> Russia reportedly has deployed tactical nuclear weapons, the S-400 air defense system, and P-800 anti-ship cruise missiles to Kaliningrad. <sup>137</sup> Additionally, Russia established a new tank regiment, comprised of approximately 93 tanks, after 2018. <sup>138</sup> According to

the IISS, the majority of Russian air force pilot graduates in 2019 were sent to Kaliningrad "to improve staffing" in the air force units located there.  $^{139}$ 

Russia also has outfitted a missile brigade in Luga, Russia, just 74 miles from the Estonian city of Narva, with Iskander missiles. 140 It also has deployed Iskanders to the Southern Military District at Mozdok near Georgia, and Russian military officials have reportedly asked manufacturers to increase the Iskander missiles' range and improve their accuracy. 141 In addition, Russia has been firing Iskanders with "mystery munitions," described as "decoys meant to trick air-defense radars and heat-seeking missiles," at targets in Ukraine. 142

Nor is Russia deploying missiles only in Europe. In September 2019, Russia announced its plans to deploy additional missile systems on Paramushir and Matua, two islands in the northern portion of the Kuril Island chain claimed by Japan. <sup>143</sup> In December 2020, Russia announced the deployment of S-300V4 air defense missile systems on Iturup. <sup>144</sup> In December 2021, Russia deployed Bastion coastal defense missile systems to Matua. <sup>145</sup> In March 2022, Russia conducted military drills on the Kuril Islands that involved more than 3,000 troops and hundreds of pieces of army equipment. <sup>146</sup>

Russia represents a real and potentially existential threat to NATO member countries in Eastern and Central Europe. In addition to its aggression in Georgia and Ukraine, Russia has threatened countries that provide support to Ukraine. It also has threatened Finland and Sweden for moving to join NATO. Given this pattern of aggressive behavior, the possibility of a conventional attack against a NATO member cannot be discounted. In all likelihood, however, Russia will continue to use nonlinear means in an effort to pressure and undermine the NATO alliance and any non-NATO country that opposes Moscow's political objectives.

**Militarization of the High North.** Russia has a long history in the Arctic and, as an Arctic nation, has interests there. However, Russia's ongoing militarization of the region, coupled with its bellicose behavior toward its neighbors, makes the Arctic a security concern.

Because nationalism is on the rise in Russia, Vladimir Putin's Arctic strategy is popular among the population. For Putin, the Arctic is an area that allows Russia to flex its muscles without incurring any significant geopolitical risk.

Russia is also eager to promote its economic interests in the region. Half of the world's Arctic territory and half of the Arctic region's population are located in Russia. It is well known that the Arctic is home to large stockpiles of proven but unexploited oil and gas reserves. Most of these reserves are thought to be located in Russia. In particular, Russia hopes that the Northern Sea Route (NSR) will become one of the world's most important shipping lanes.

Russia has invested heavily in the Arctic region, opening a series of Arctic bases and investing in cold-weather equipment, coastal defense systems, underground storage facilities, and specialized training. According to one report, "[t]he Kremlin's dominance due to its unique topography and overwhelming military presence has made it impregnable in the Arctic." Additionally, "Russian hardware in the High North area includes bombers and MiG31BM jets, and new radar systems close to the coast of Alaska." <sup>148</sup>

Russia also has staged a series of statement activities in the Arctic. In 2007, Artur Chilingarov, then a member of the Russian Duma, led a submarine expedition to the North Pole and planted a Russian flag on the seabed. Later, he declared: "The Arctic is Russian." In July 2017, Russia released a new naval doctrine citing the alleged "ambition of a range of states, and foremost the United States of America and its allies, to dominate the high seas, including in the Arctic, and to press for overwhelming superiority of their naval forces." <sup>150</sup>

In May 2017, Russia announced that its buildup of the Northern Fleet's nuclear capacity is intended "to phase 'NATO out of [the] Arctic." In a March 2021 statement exercise, three Russian ballistic missile submarines punched through the Arctic ice near the North Pole. In June 2022, Russia withdrew from a nuclear safety program in the Arctic region, raising concerns in the West "about a new period of heightened nuclear risks." Russia also has stationed a floating nuclear power plant on the northern coast of Siberia. "If the venture is successful," according to one account, "it will represent another milestone in Moscow's efforts to tame the melting Northern Sea Route, which...could become a direct trade route between Europe and Asia."

Although the Arctic region has been an area of low conflict among the Arctic powers, NATO should consider the implications of Russia's recent

aggressive military behavior. NATO is a collective security organization that is designed to defend the territorial integrity of its members. Five NATO members (Canada, Denmark, Iceland, Norway, and the United States) are Arctic countries, and all five have territory above the Arctic Circle. Two closely allied nations, Finland and Sweden, are awaiting NATO membership and also have Arctic territory. NATO ambassadors signed the necessary Accession Protocols, the first step in ratification of both countries' membership in the alliance, on July 5, 2022. <sup>155</sup>

In recent years, the U.S. has begun to pay increased attention to the Arctic theater in Europe. One way it has done this is by maintaining an enhanced presence in Norway. In April 2021, the two nations signed the Supplementary Defense Cooperation Agreement, which in part allows the U.S. to build additional infrastructure at Rygge and Sola air stations in southern Norway as well as Evenes air station and Ramsund naval station above the Arctic Circle. Construction at Evenes will support Norwegian and allied maritime patrol aircraft in their monitoring of Russian submarine activity.

Because Russia is an Arctic power, its military presence in the region is to be expected, but it should be viewed with some caution because of Russia's pattern of aggression. In the Arctic, sovereignty equals security. Respecting national sovereignty in the Arctic would ensure that the chances of armed conflict in the region remain low. Since NATO is an intergovernmental alliance of sovereign nation-states built on the consensus of all of its members, it has a role to play in Arctic security. In the words of NATO Secretary-General Jens Stoltenberg:

Russia's military build-up is the most serious challenge to stability and Allied security in the High North.... A strong, firm and predictable Allied presence is the best way to ensure stability and protect our interests. We cannot afford a security vacuum in the High North. It could fuel Russian ambitions, expose NATO, and risk miscalculation and misunderstandings. 157

In March 2017, a decree signed by Putin gave the Federal Security Service (FSB), which controls law enforcement along the Northern Sea Route, an Arctic shipping route linking Asia and Europe as well as additional powers to confiscate land "in areas with special objects for land use, and in the border areas."<sup>158</sup> Russia's Arctic territory is included within this FSB-controlled border zone. The FSB and its subordinate coast guard have added patrol vessels and have built up Arctic bases, including a coast guard base in Murmansk that was opened in December 2018.<sup>159</sup>

The Russian National Guard, which reports to Putin, is likewise taking on an increased role in the Arctic and is now charged with protecting infrastructure sites that are deemed to be of strategic importance, including a new liquefied natural gas (LNG) export terminal at Sabetta that was opened in December 2017. In April 2021, shareholders of Novatek, Russia's second-largest natural gas producer, "approved external financing of \$11 billion for the Arctic LNG 2 project, which [was] expected to start production of [LNG] in 2023. In However, the imposition of Western sanctions against Russian banks because of the war in Ukraine could force Novatek to halt development of the Arctic LNG 2 terminal.

In May 2018, Putin issued a presidential degree setting a target of 80 million tons shipped across the NSR by 2024. However, in October 2021, Russian Deputy Prime Minister Yuri Trutnev announced that Russia "plans to begin year-round shipping via the Northern Sea Route...in 2022 or 2023," leaven earlier than previously planned.

Russia also has been investing in military bases in the Arctic. Its Arctic Trefoil base on Alexandra Land Island, commissioned in 2017, can house 150 soldiers for up to 18 months. <sup>165</sup> In addition, old Soviet-era facilities have been reopened.

In September 2018, the Northern Fleet announced construction plans for a new military complex to house a 100-soldier garrison and anti-aircraft units at Tiksi. In January 2019, Russian authorities claimed that the base was 95 percent completed, <sup>166</sup> But in March 2020, Russia appeared to be "significantly behind in its plans for Tiksi." In 2018, Russia also opened an Arctic airfield at Nagurskoye that is equipped with a 2,500-meter landing strip and a fleet of MiG-31 or Su-34 Russian fighters. <sup>168</sup> The landing strip "can handle all types of aircraft, including nuclear-capable strategic bombers." <sup>169</sup>

Air power in the Arctic is increasingly important to Russia, which has 14 operational airfields in the region along with 16 deep-water ports, "a new command, and roughly 50 icebreakers...some of which are nuclear powered." In February 2021, it was reported that:

Recently released photos and video show MiG-31BM Foxhound interceptors in action at Rogachevo Air Base in the Novaya Zemlya archipelago, above the Arctic Circle, an increasingly strategic region that's home to a resurgent Russian military presence. Russia's Ministry of Defense provided the imagery as a new rotation of MiG-31BMs arrived at the base, undertaking what the defense ministry describes as "experimental combat duty to protect the state border of the Russian Federation in the Arctic airspace." 171

In March 2019, Mayor General Igor Kozhin, head of the Russian Naval Air Force, claimed that Russia had successfully tested a new airstrip cover that is effective in "temperatures down to minus 30 centigrades."<sup>172</sup>

Russia resumed regular fighter jet combat patrols in the Arctic in 2019. The Ministry of Defense, for example, announced that in January 2019, two Tu-160 bombers flew for 15 hours in international airspace over the Arctic. Ver the course of one week in April 2019, Russian fighter and bomber jets flew near the coast of Norway twice. In one instance, two Tu-60 bombers and a MiG-31 flew 13 hours over the Barents, Norwegian, and North Seas. British and Danish jets scrambled to meet the Russian aircraft.

In 2017, Russia activated a new radar complex on Wrangel Island. <sup>176</sup> In 2019, it announced plans to lay a nearly 8,000-mile fiber-optic cable across its Arctic coast, linking military installations along the way from the Kola Peninsula through Vladivostok. <sup>177</sup> Construction of the cable began in August 2021 and is due to be completed in 2026. <sup>178</sup>

In November 2019, Russia announced rocket firings in the Norwegian Sea 20 to 40 nautical miles from the Norwegian coast. The test firings, with little advance notice, were designed to send a message as they took place in an area through which NATO ships were sailing during the Trident Juncture exercise. <sup>179</sup> In March 2021, Russia's *Admiral Gorshkov* frigate successfully "launched an Oniks cruise missile and hit a coastal target on Novaya Zemlya, about 300 kilometers from launch position." <sup>180</sup> In September 2021, it was reported that "Russia's Northern Fleet had begun preparations to deploy the air-launched ballistic missile Kh-47M2 Kinzhal on MiG-31K carriers." <sup>181</sup>

Russia's ultimate goal is encapsulated in a June 2019 study published by the Royal Institute of International Affairs:

Since the mid-2010s, the Kremlin has deployed substantive force and capabilities along the coast of its northern border in the AZRF [Arctic Zone of the Russian Federation]. Parts of the armed forces are now Arctic-capable, and have developed concepts of operations tailored to that environment. With the creation of OSK Sever [Joint Strategic Command North] in 2013, the Russian armed forces have been slowly reshaping their Arctic command structure. The Arctic forces are primarily focused on air and naval operations, with the aim of creating an integrated combined-arms force for the region.<sup>182</sup>

For a few years, Russia was developing three new nuclear icebreakers, and in May 2019, it launched its third and final *Arktika*. The *Arktika*, currently the world's largest and most powerful nuclear icebreaker, sailed straight to the North Pole in October 2020. 184 In January 2022, the *Arktika* completed its first sail across the eastern part of the NSR. 185 That same month, Russia's newest nuclear-powered icebreaker, the *Sibir*, the second of Project 22220, arrived at its home port of Murmansk. 186

Russia's Northern Fleet is also building newly refitted submarines, including a newly converted Belgorod nuclear-powered submarine that was launched in April 2019.187 The Belgorod is expected to carry six Poseidon drones, also known as nuclear torpedoes, and will carry out "a series of special missions."188 The submarine will have a smaller minisub that will potentially be capable of tampering with or destroying undersea telecommunications cables. 189 According to Russian media reports, the Belgorod "will be engaged in studying the bottom of the Russian Arctic shelf, searching for minerals at great depths, and also laying underwater communications."190 Two similar submarines, the Khabarovsk and *Ulyanovsk*, which will also carry Poseidon drones, are scheduled to be commissioned in 2024 and 2025, respectively.<sup>191</sup> In addition, the Northern Fleet received 13 new ships in 2021, adding to the "more than four dozen already in service." 192

Russia continues to develop and increase its military capabilities in the Arctic region. The likelihood of armed conflict remains low, but physical changes

in the region mean that the posture of players will continue to evolve. It is clear that Russia intends to exert a dominant influence. According to a U.S. Department of State official:

[The U.S. has] concerns about Russia's military buildup in the Arctic. Its presence has grown dramatically in recent years with the establishments of new Arctic commands, new Arctic brigades, refurbished airfields and other infrastructure, deep water ports, new military bases along its Arctic coastline, an effort to establish air defense and coastal missile systems, early warning radars, and a variety of other things along the Arctic coastline. We've seen an enhanced ops [operations] tempo of the Russian military in the Arctic, including last October one of the largest Russian military exercises in the Arctic since the end of the Cold War. So there is some genuine and legitimate concern there on the part of the United States and our allies and partners about that behavior in the Arctic.193

Destabilization in the South Caucasus. The South Caucasus sits at a crucial geographical and cultural crossroads and has been strategically important, both militarily and economically, for centuries. Although the countries in the region (Armenia, Georgia, and Azerbaijan) are not part of NATO and therefore do not receive a security guarantee from the United States, they have participated to varying degrees in NATO and U.S.-led operations. This is especially true of Georgia, which aspires to join NATO.

Russia views the South Caucasus as part of its natural sphere of influence and stands ready to exert its influence by force if necessary. In August 2008, Russia invaded Georgia, coming as close as 15 miles to the capital city of Tbilisi. A decade later, several thousand Russian troops occupied the two Georgian regions of South Ossetia and Abkhazia.

Russia has sought to deepen its relationship with the two occupied regions. In 2015, it signed so-called integration treaties with South Ossetia and Abkhazia that, among other things, call for a coordinated foreign policy, creation of a common security and defense space, and implementation of a streamlined process for Abkhazians and South Ossetians to receive Russian citizenship. <sup>194</sup> The Georgian Foreign Ministry criticized the treaties as a step toward

"annexation of Georgia's occupied territories," both of which are still internationally recognized as part of Georgia.

In January 2018, Russia ratified an agreement with the de facto leaders of South Ossetia to create a joint military force—an agreement that the U.S. condemned.196 South Ossetia's former leader, Anatoli Bibilov, had planned to hold a referendum on whether the region should join Russia on July 17, 2022, but his successor, Alan Gagloev, has cancelled the plebiscite as "premature." Russia's "creeping annexation" of Georgia has left towns split in two and families separated by military occupation and the imposition of an internal border (known as "borderization").198 In May 2020, the U.S. embassy in Tbilisi reported that Russian-led security forces were continuing to erect unauthorized fences and reinforcing existing illegal "borderization" efforts near a number of Georgian villages. 199

Moscow continues to exploit ethnic divisions and tensions in the South Caucasus to advance pro-Russian policies that are often at odds with America's or NATO's goals in the region, but Russia's influence is not restricted to soft power. In the South Caucasus, the coin of the realm is military might. It is a dangerous neighborhood surrounded by instability and insecurity that is reflected in terrorism, religious fanaticism, centuries-old sectarian divides, and competition for natural resources.

Russia maintains a sizable military presence in Armenia based on an agreement that gives Moscow access to bases in that country at least until 2044. 200 The bulk of Russia's forces, consisting of 3,500 soldiers, dozens of fighter planes and attack helicopters, 74 T-72 tanks, and an S-300 air defense system, are based around the 102nd Military Base. 201 Russia and Armenia have also signed a Combined Regional Air Defense System agreement. Despite the election of Prime Minister Nikol Pashinyan in 2018 following the so-called Velvet Revolution, Armenia's cozy relationship with Moscow remains unchanged. 202 Armenian troops even deployed alongside Russian troops in Syria to the dismay of U.S. policymakers. 203

Another source of regional instability is the Nagorno–Karabakh conflict, which began in 1988 when Armenia made territorial claims to Azerbaijan's Nagorno–Karabakh Autonomous Oblast.<sup>204</sup> By 1992, Armenian forces and Armenian-backed militias had occupied 20 percent of Azerbaijan, including the

Nagorno–Karabakh region and seven surrounding districts. A cease-fire agreement was signed in 1994, and the conflict has been described as frozen since then. In 2020, major fighting broke out along the front lines. After six weeks of fighting, Azerbaijan liberated its internationally recognized territory, "which had been under Armenian occupation since the early 1990s."

The conflict ended on November 9, 2020, when Armenia and Azerbaijan signed a Russian-brokered cease-fire agreement. <sup>206</sup> As part of the nine-point cease-fire plan, nearly 2,000 Russian peacekeeping soldiers were deployed to certain parts of Nagorno–Karabakh that are populated largely by ethnic Armenians. In May 2021, tensions rose again in the region but for a different reason—the demarcation of the Armenian–Azerbaijani border. <sup>207</sup>

The Nagorno-Karabakh conflict offers another opportunity for Russia to exert malign influence and consolidate power in the region. Russia "has long been Azerbaijan's main arms supplier" but "also provides military equipment to Armenia." Additionally:

In conjunction with controlling the negotiation process on the Armenian–Azerbaijani conflict over Karabakh, Moscow exploits its role as a major supplier of weapons to Azerbaijan in order to maintain its influence over Baku. In this realm, Russia plays a unique role between Azerbaijan and Armenia. As a main arms supplier of both, Moscow is also the main power broker between the two South Caucasus rivals.<sup>208</sup>

As noted by Eurasia expert Eduard Abrahamyan, "for years, Moscow has periodically sought to use the local authorities in Karabakh as a proxy tool of coercive diplomacy against both Baku and Yerevan."<sup>209</sup>

The South Caucasus might seem distant to many American policymakers, but the spillover effect of ongoing conflict in the region can have a direct impact both on U.S. interests and on the security of America's partners, as well as on Turkey and other countries that depend on oil and gas transiting the region. Russia views the South Caucasus as a vital theater and uses a multitude of tools that include military aggression, economic pressure, and the stoking of ethnic tensions to exert influence and control, usually to promote outcomes that are at odds with U.S. interests.

### Increased Activity in the Mediterranean.

Russia has had a military presence in Syria for decades, but in September 2015, it became the decisive actor in Syria's ongoing civil war, having saved Bashar al-Assad from being overthrown and having strengthened his hand militarily, thus enabling government forces to retake territory lost during the war. Although conflicting strategic interests cause the relationship between Assad and Putin to be strained at times, Assad still needs Russian military support to take back Idlib province, a goal that he and Putin probably share.<sup>210</sup> Russia's Hmeymim Air Base is located close to Idlib, making it vulnerable to attacks from rebel fighters and terrorist groups, and Moscow instinctively desires to protect its assets. Assad's only goal is to restore sovereignty over all of Syria; Russia generally is more focused on eliminating terrorism in the region and must manage its relationship with Turkey.

In January 2017, Russia signed an agreement with the Assad regime to "expand the Tartus naval facility, Russia's only naval foothold in the Mediterranean, and grant Russian warships access to Syrian waters and ports.... The agreement will last for 49 years and could be prolonged further."<sup>211</sup> According to a May 2020 report, Russia is reinforcing its naval group in the Mediterranean Sea with warships and submarines armed with Kalibr cruise missiles. <sup>212</sup> In May 2021, the Voice of America reported that Russia is expanding its navy base at Tartus and "planning to construct a floating dock to boost the port's ship repair facilities."<sup>213</sup>

The agreement with Syria also includes upgrades to the Hmeymim air base at Latakia, including repairs to a second runway.<sup>214</sup> Russia is extending one of its two runways by 1,000 feet, which would "allow the base to support more regular deployments of larger and more heavily-laden aircraft."215 Russia deployed the S-400 anti-aircraft missile system to Hmeymim in late 2015.<sup>216</sup> It also has deployed the Pantsir S1 system. "The two systems working in tandem provide a 'layered defense,'" according to one account, "with the S-400 providing long-ranged protection against bombers, fighter jets, and ballistic missiles, and the Pantsir providing medium-ranged protection against cruise missiles, low-flying strike aircraft, and drones."217 Russia currently operates out of Hmeymim air base on a 40-year agreement and continues to entrench its position there, as demonstrated by its recent building of reinforced

concrete aircraft shelters.<sup>218</sup> In August 2020, Syria agreed to give Russia additional land and coastal waters to expand its Hmeymim air base.<sup>219</sup>

According to Lieutenant General Ben Hodges, former Commander, U.S. Army Europe, Russia has used its intervention in Syria as a "live-fire training opportunity."<sup>220</sup> The IISS similarly reports that Russia has used Syria as "a test bed for the development of joint operations and new weapons and tactics."<sup>221</sup> In fact, Russia has tested hundreds of pieces of new equipment in Syria. In December 2018:

Russian Deputy Prime Minister Yury Borisov detailed to local media...the various new weapons systems [that] have been introduced to the conflict. These included the Pantsir S1 anti-aircraft and Iskander-M ballistic missile systems on the ground, Tupolev Tu-160 supersonic strategic bombers, Tu-22M3 supersonic bombers and Tu-95 propeller-driven bombers, as well as Mikoyan MiG-29K fighters and Ka-52K Katran helicopters in the air.<sup>222</sup>

Overall, Russia reportedly sold \$28 billion worth of weaponry to 45 countries, including Syria, between 2016 and  $2020.^{223}$ 

Russian pilots have occasionally acted dangerously in the skies over Syria. In May 2017, for example, a Russian fighter jet intercepted a U.S. KC-10 tanker, performing a barrel roll over the top of the KC-10.<sup>224</sup> That same month, Russia stated that U.S. and allied aircraft would be banned from flying over large areas of Syria because of a deal agreed to by Russia, Iran, and Turkey. The U.S. responded that the deal does not "preclude anyone from going after terrorists wherever they may be in Syria."<sup>225</sup>

The U.S. and Russia have a deconfliction hotline to avoid midair collisions and incidents, but incidents have occurred on the ground as well as in the air. In November 2018, Ambassador James Jeffrey, U.S. Special Representative for Syria Engagement, told news media that "American and Russian forces have clashed a dozen times in Syria—sometimes with exchanges of fire." <sup>226</sup> In February 2022, U.S. F-16 fighter jets and other coalition aircraft escorted three Russian aircraft in eastern Syria when the Russians flew into coalition-restricted airspace. <sup>227</sup>

In October 2018, Egyptian President Abdel Fattah al-Sisi signed a strategic cooperation treaty with Russia.<sup>228</sup> In November 2018, Russia sought to

solidify its relations with Egypt, approving a five-year agreement for the two countries to use each other's air bases. Russia is a major exporter of arms to Egypt, which agreed to purchase 20 Su-35 fighter jets in 2018 for \$2 billion. Production of the Su-35 jets began in May 2020. In August 2021, Russia and Egypt signed an additional bilateral strategic cooperation treaty.

In Libya, Russia continues to support Field Marshal Khalifa Haftar with weapons and military advisers. <sup>233</sup> According to the U.S. Department of Defense, Russia's Wagner Group continues to be involved militarily in Libya. <sup>234</sup> Despite its ties to Haftar, Russia has also focused on expanding business ties with the Libyan government in Tripoli. <sup>235</sup>

Russia has stepped up its military operations in the Mediterranean significantly, often harassing U.S. and allied vessels involved in operations against the Islamic State. In April 2020, for example, a Russian Su-35 jet intercepted a U.S. Navy aircraft flying over the Mediterranean Sea. It was the second time in four days that "Russian pilots [had] made unsafe maneuvers while intercepting US aircraft." The Russian jet had taken off from Hmeymin air base in Syria. In April 2022, "three P-8A maritime patrol and reconnaissance aircraft experienced unprofessional intercepts by Russian aircraft' while 'flying in international airspace over the Mediterranean Sea." 237

From April–August 2017, the U.S. along with British, Dutch, and Spanish allies tracked the *Krasnodar*, a *Kilo*-class submarine, as it sailed from the Baltic Sea to a Russian base in occupied Crimea. The submarine stopped twice in the eastern Mediterranean to launch cruise missiles into Syria and conducted drills in the Baltic Sea and off the coast of Libya. <sup>238</sup> In February 2020, General Wolters revealed that Russian submarines are becoming more active and harder for the United States to track. <sup>239</sup> On February 24, 2022, the day Russian submarines were seen in the eastern Mediterranean. <sup>240</sup> In March 2022, the Russian Navy allegedly "deployed an Akula-class nuclear submarine in the Mediterranean."

Russia's position in Syria, including its expanded area-access/area-denial capabilities and increased warship and submarine presence, underscores the growing importance of the Mediterranean theater in ensuring Europe's security.

**The Balkans.** Security has improved dramatically in the Balkans since the 1990s, but violence

based on religious and ethnic differences remains an ongoing possibility. These tensions are exacerbated by sluggish economies, high unemployment, and political corruption.

Russia's interests in the Western Balkans are at odds with the ongoing desire of the U.S. and its European allies to encourage closer ties between the region and the transatlantic community.

Russia seeks to sever the transatlantic bond forged with the Western Balkans...by sowing instability. Chiefly Russia has sought to inflame preexisting ethnic, historic, and religious tensions. Russian propaganda magnifies this toxic ethnic and religious messaging, fans public disillusionment with the West, as well as institutions inside the Balkan nations, and misinforms the public about Russia's intentions and interests in the region.<sup>242</sup>

Senior members of the Russian government have alleged that NATO enlargement in the Balkans is one of the biggest threats to Russia. ANATO now includes four Balkan countries: Albania and Croatia, both of which became member states in April 2009; Montenegro, which became NATO's 29th member state in June 2017; and North Macedonia, which became NATO's 30th member state in March 2020.

Russia stands accused of being behind a failed plot to break into Montenegro's parliament on election day in 2016, assassinate its former prime minister, and install a pro-Russian government. In May 2019, two Russian nationals who were believed to be the masterminds behind the plot were convicted in absentia along with 12 other individuals for organizing and carrying out the failed coup.

The presiding trial judge, Suzan Mugosa, said on May 9 that [Eduard] Shishmakov and [Vladimir] Popov "pursued a joint decision to make intentional attempts to contribute significantly to the carrying out of the planned criminal actions with the intention to seriously threaten the citizens of Montenegro, to attack the lives and bodies of others, and to seriously threaten and damage Montenegro's basic constitutional, political, and social structures in order to stop Montenegro from joining the NATO alliance." 244

After Russia annexed Crimea, the Montenegrin government backed European sanctions against Moscow and even implemented its own sanctions. Nevertheless, Russia has significant economic influence in Montenegro and in 2015 sought unsuccessfully to gain access to Montenegrin ports for the Russian navy to refuel and perform maintenance. Russia was the largest investor in Montenegro until October 2020 when it was surpassed by China. <sup>245</sup>

In March 2022, the Montenegrin government joined European sanctions on Russia, "without specifying what they were," after Russia's second invasion of Ukraine. <sup>246</sup> In April 2022, Montenegro's government suspended broadcasting by Russia Today (RT) and Sputnik in coordination with EU sanctions on Russia. <sup>247</sup>

North Macedonia's accession to NATO was similarly targeted by Russia, which had warned the nation against joining the alliance and sought to derail the Prespa agreement that paved the way for membership by settling long-standing Greek objections to Macedonia's name.248 In 2018, after North Macedonia was invited to join NATO, Russia's ambassador to the EU stated that "there are errors that have consequences."249 In July 2018, Greece expelled two Russian diplomats and banned entry by two Russian nationals because of their efforts to undermine the name agreement; Russian actions in Macedonia included disinformation surrounding the vote, websites and social media posts opposing the Prespa agreement, and payments to protestors as well as politicians and organizations that opposed the agreement.<sup>250</sup>

Serbia in particular has long served as Russia's foothold in the Balkans.

Russia's influence in the Balkans centers on Serbia, a fellow religiously orthodox nation with whom it enjoys a close economic, political, and military relationship. Serbia and Russia have an agreement in place allowing Russian soldiers to be based at Niš airport in Serbia. The two countries signed a 15-year military cooperation agreement in 2013 that includes sharing of intelligence, officer exchanges, and joint military exercises. In October [2017], Russia gave Serbia six MiG-29 fighters (which while free, will require Serbia to spend \$235 million to have them overhauled). Additionally, Russia plans to supply Serbia with helicopters, T-72 tanks,

armored vehicles, and potentially even surface-to-air missile systems.  $^{251}$ 

The so-called Russian–Serbian Humanitarian Center at Niš is "widely believed to be a Russian spy base" and is located "only 58 miles from NATO's Kosovo Force mission based in Pristina."<sup>252</sup>

In February 2020, Serbia purchased the Pantsir S1 air-defense system from Russia despite objections and potential sanctions from the United States. <sup>253</sup> Russia has used its cultural ties to increase its role in Serbia, positioning itself as the defender of orthodoxy and investing funds in the refurbishing of orthodox churches. It also has helped to establish more than 100 pro-Russian non-governmental organizations and media outlets in Macedonia. <sup>254</sup>

Serbia and Russia have signed a strategic partnership agreement that is focused on economic issues. Russia's inward investment is focused on the transport and energy sectors. Except for those in the Commonwealth of Independent States, Serbia is the only country in Europe that has a free trade deal with Russia. In January 2019, Serbia and Russia signed 26 agreements relating to energy, railway construction, and strategic education cooperation. <sup>255</sup> Further proof of Belgrade's loyalty to Moscow is seen in Serbia's unwillingness or inability to "take a firm stand against Russia's war on Ukraine."

In a January 2019 state visit to Serbia, Vladimir Putin expressed a desire for a free trade agreement between Serbia and the Russian-led Eurasian Economic Union. An agreement between the two countries was signed in October 2019 "following veiled warnings from the European Union." Russia also has held out the possibility of \$1.4 billion in infrastructure aid to Serbia aimed at building the Turk-Stream pipeline and increasing Russia's energy leverage in the region. In May 2022, Serbia reached a three-year agreement with Russia for natural gas supplies at "the most favorable price in Europe." 258

However, Serbia still participates in military exercises far more often without Russia than with Russia. In 2017, for example, "Serbian forces participated in 2 joint exercises with Russia and Belarus but held 13 exercises with NATO members and 7 with U.S. units." Like Russia, Serbia is a member of NATO's Partnership for Peace program. Additionally, Serbia has partnered with the State of Ohio in the U.S. National Guard's State Partnership Program since 2006.

Russia is also active in Bosnia and Herzegovina—specifically, the ethnically Serb Republika Srpska, one of two substate entities inside Bosnia and Herzegovina that emerged from that country's civil war in the 1990s. Moscow knows that exploiting internal ethnic and religious divisions among the country's Bosniak, Croat, and Serb populations is the easiest way to prevent Bosnia and Herzegovina from entering the transatlantic community.

Republika Srpska's current unofficial leader, Milorad Dodik, has long advocated independence for the region and has enjoyed a very close relationship with the Kremlin. President Željka Cvijanović also claims that Republika Srpska will continue to maintain its partnership with Russia. Events in Ukraine, especially the annexation of Crimea, have inspired more separatist rhetoric in Republika Srpska, but Russia's second invasion of Ukraine allegedly has delayed Republika Srpska's plans to withdraw from Bosnia and Herzegovina's state institutions. In June 2022, in an interview with the public broadcaster of Republika Srpska, Russian Foreign Minister Sergei Lavrov declared that Dodik is "a friend of Russia."

In many ways, Russia's relationship with Republika Srpska is akin to its relationship with Georgia's South Ossetia and Abkhazia occupied regions: more like a relationship with another sovereign state than a relationship with a semiautonomous region inside Bosnia and Herzegovina. When Putin visited Serbia in October 2014, Dodik was treated like a head of state and invited to Belgrade to meet with him. In September 2016, Dodik was treated like a head of state on a visit to Moscow just days before a referendum that chose January 9 as Republika Srpska's "statehood day," a date filled with religious and ethnic symbolism for the Serbs.<sup>263</sup> In October 2018, just days before elections, Dodik was hosted by Putin as they watched the Russian Grand Prix in a VIP box.<sup>264</sup> In December 2021, Dodik again visited Moscow. The Kremlin refrained from announcing this latest meeting ahead of time, but Russian presidential spokesman Dmitry Peskov asserted that "this by no means belittle[d] the importance of the meeting."265 Republika Srpska continues to host its "statehood day" in defiance of a ruling by Bosnia's federal constitutional court that both the celebration and the referendum establishing it are illegal.<sup>266</sup>

Russia has reportedly trained a Republika Srpska paramilitary force in Russia at the nearby Niš air base to defend the Serbian entity. It has been reported that "[s]ome of its members fought as mercenaries alongside the Kremlin's proxy separatists in Ukraine."<sup>267</sup> Veterans organizations in Russia and Republika Srpska have developed close ties.<sup>268</sup>

Russia has cultivated strong ties with the security forces of Republika Srpska. Russian police take part in exchanges with the security forces, and Russian intelligence officers reportedly teach at the police academy and local university. On April 4, 2018, the Republika Srpska authorities opened a new \$4 million training center "at the site of a former army barracks in Zaluzani, outside Banja Luka." The site serves as the headquarters for "anti-terrorist units, logistics units, and a department to combat organized crime." <sup>269</sup>

Russia also has continued to oppose the recognition of Kosovo as an independent sovereign country<sup>270</sup> and has condemned Kosovo's creation of its own army. Moscow does not want Kosovo to be seen as a successful nation pointed toward the West. Rather, it seeks to derail Kosovo's efforts to integrate into the West, often by exploiting the Serbian minority's grievances. In the most jarring example, a train traveling from Belgrade to Mitrovica, a heavily Serb town in Kosovo, in January 2017 was stopped at the Kosovar border. The Russian-made train was "painted in the colors of the Serbian flag and featured pictures of churches, monasteries, and medieval towns, as well as the words 'Kosovo is Serbian' in 21 languages."<sup>271</sup>

The U.S. has invested heavily in the Balkans since the end of the Cold War. Tens of thousands of U.S. servicemembers have served in the Balkans, and the U.S. has spent billions of dollars in aid there, all in the hope of creating a secure and prosperous region that eventually will be part of the transatlantic community.

The foremost external threat to the Balkans is Russia. Russia's interests in the Balkans are at odds with the U.S. goal of encouraging the region to progress toward the transatlantic community. Russia seeks to sever the transatlantic bond forged with the Western Balkans by sowing instability and increasing its economic, political, and military footprint in the region.

### Threats to the Commons

Other than cyberspace and (to some extent) airspace, the commons are relatively secure in the

European region. Despite Russia's periodic aggressive maneuvers near U.S. and NATO vessels—and with the significant exception of the Kerch Strait—this remains largely true with respect to the security of and free passage through shipping lanes. The maritime domain is heavily patrolled by the navies and coast guards of NATO and NATO partner countries, and except in remote areas in the Arctic Sea, search and rescue capabilities are readily available. Moreover, maritime-launched terrorism is not a significant problem, and piracy is virtually nonexistent.

**Sea.** In May 2018, 17 Russian fighter jets buzzed the HMS *Duncan*, which was serving as the flagship of Standing NATO Maritime Group Two (SNMG2), operating in the Black Sea. Commodore Mike Utley, who was leading SNMG2, stated that the ship was "probably the only maritime asset that has seen a raid of that magnitude in the last 25 years," and then-British Defense Minister Gavin Williamson described the pilots' behavior as "brazen Russian hostility." In June 2021, Russian fighter jets repeatedly harassed a Dutch frigate in the Black Sea. 273

Russian threats to the maritime theater also include activity near undersea fiber-optic cables. In July 2019, a Russian submarine reportedly was trying to tap information flowing through undersea cables near Russia's northern shore in the Barents Sea. The cables "carry 95 percent of daily worldwide communications" in addition to "financial transactions worth over \$10 trillion a day."<sup>274</sup> Thus, any disruption would cause a catastrophic reduction in the flow of capital.

The *Yantar*, a mother ship to two Russian mini submersibles, is often seen near undersea cables, which it is capable of tapping or cutting, and has been observed collecting intelligence near U.S. naval facilities including the submarine base at Kings Bay, Georgia.<sup>275</sup> In September 2021, it was caught loitering in the English Channel.<sup>276</sup> The Russian spy ship *Viktor Leonov* was spotted collecting intelligence within 30 miles of Groton, Connecticut, in February 2018 and off the coast of South Carolina and Georgia in December 2019.<sup>277</sup>

**Airspace.** Russia has continued its provocative military flights near U.S. and European airspace in recent years. In April 2021, Lieutenant General David Krumm from Joint Base Elmendorf–Richardson, Alaska, revealed that during the previous year, there was a large increase in Russian activity and that the U.S. had intercepted more than 60 Russian aircraft

in the "most action the Alaska Air Defense Identification Zone—a region spanning 200 nautical miles that reaches past U.S. territory and into international airspace—ha[d] seen since the Soviet Union fell in 1991."<sup>278</sup> In October 2020, F-22 Raptor stealth fighter jets scrambled "to intercept Russian long-range bombers and fighters flying off Alaska's coast" in "the 14th such incident off Alaska's coast in 2020."<sup>279</sup>

In March and April 2019, the Royal Air Force scrambled fighters twice in five days to intercept Russian bombers flying near U.K. airspace off the Scottish coast while the U.S., Australia, and 11 NATO allies were taking part in the Joint Warrior exercise in Scotland. <sup>280</sup> In February 2022, U.S. fighter jets and Norwegian and British military planes intercepted Russian aircraft flying near NATO-allied airspace over the North Atlantic. <sup>281</sup>

Aggressive Russian flying has occurred near North American airspace as well. In January 2019, two U.S. F-22s and two Canadian CF-18 fighters scrambled when two Russian Tu-160 Blackjack bombers flew into Arctic airspace patrolled by the Royal Canadian Air Force.<sup>282</sup>

Russian flights have also targeted U.S. ally Japan. In March 2022, Japan scrambled a fighter jet to "warn off a helicopter believed to be Russian" that entered Japanese airspace. <sup>283</sup> In May 2022, when the QUAD<sup>284</sup> was meeting in Tokyo, Japan again scrambled jets to warn off Russian and Chinese warplanes as they neared Japanese airspace. <sup>285</sup> Nor is it only maritime patrol aircraft that fly near Japan; Russian Su-24 attack aircraft, for example, were intercepted in December 2018 and January 2019 incidents. <sup>286</sup> Between April 1, 2018, and March 31, 2019, Japan had to scramble jets 343 times to intercept Russian aircraft, although that was 47 times less than had been necessary in the preceding year. <sup>287</sup>

The main threat from Russian airspace incursions, however, remains near NATO territory in Eastern Europe, specifically in the Black Sea and Baltic regions. In March 2021, NATO fighter jets scrambled 10 times in one day "to shadow Russian bombers and fighters during an unusual peak of flights over the North Atlantic, North Sea, Black Sea and Baltic Sea." In February 2022, near NATO allied airspace over the Baltic Sea, U.S. F-15Es scrambled and intercepted Russian fighter jets. That same day, "Norwegian and British aircraft intercepted Russian aircraft in flying from the Barents [Sea] into the North Sea." In April 2022, around both the Baltic

and Black Seas, NATO fighter jets scrambled multiple times over the span of four days "to track and intercept Russian aircraft near Alliance airspace."<sup>290</sup>

There have been several incidents involving Russian military aircraft flying in Europe without using their transponders. In April 2020, two maritime Tu-142 reconnaissance and anti-submarine warfare planes flew over the Barents, Norwegian, and North Seas but had switched off their transponders. As a result, two Norwegian F-16s were scrambled to identify the planes. 291 In September 2019, a Russian Air Force Sukhoi Su-34 fighter flew over Estonian airspace without filing a flight plan or maintaining radio contact with Estonian air navigation officials because the plane's transponder had been switched off. This was the second violation of Estonia's airspace by a Russian aircraft in 2019.<sup>292</sup> In August 2019, two Russian Su-27 escort jets flew over the Baltic Sea without a flight plan and without turning on their transponders.<sup>293</sup>

Russia's violation of the sovereign airspace of NATO member states is a probing and antagonistic policy that is designed both to test the defense of the alliance and as practice for potential future conflicts. Similarly, Russia's antagonistic behavior in international waters is a threat to freedom of the seas.

Russia's reckless aerial activity in the region also remains a threat to civilian aircraft flying in European airspace. That the provocative and hazardous behavior of the Russian armed forces or Russian-sponsored groups poses a threat to civilian aircraft in Europe was amply demonstrated by the July 2014 downing of Malaysia Airlines Flight MH17, killing all 283 passengers and 15 crewmembers, over the skies of southeastern Ukraine.

**Cyberspace.** Russian cyber capabilities are sophisticated and active, regularly threatening economic, social, and political targets around the world. Moscow also appears to be increasingly aggressive in its use of digital techniques, often employing only the slightest veneer of deniability in an effort to intimidate targets and openly defy international norms and organizations.

Russia clearly believes that these online operations will be essential to its domestic and foreign policy for the foreseeable future. As former Chief of the Russian General Staff General Yuri Baluyevsky has observed, "a victory in information warfare 'can be much more important than victory in a classical military conflict, because it is bloodless, yet the

impact is overwhelming and can paralyse all of the enemy state's power structures."<sup>294</sup>

Russia continues to probe U.S. critical infrastructure. The U.S. Intelligence Community assesses that:

Russia is particularly focused on improving its ability to target critical infrastructure, including underwater cables and industrial control systems, in the United States as well as in allied and partner countries, because compromising such infrastructure improves and demonstrates its ability to damage infrastructure during a crisis.<sup>295</sup>

Russia continued to conduct cyberattacks on government and private entities in 2020 and 2021. In 2020, Russian hackers "reportedly infiltrated several US government agencies," including the Defense, Treasury, Commerce, State, Energy, and Homeland Security Departments and the National Nuclear Security Administration, as well as private-sector companies like Microsoft and Intel. SolarWinds, the company whose software was compromised, "told the [Securities and Exchange Commission] that up to 18,000 of its customers installed updates that left them vulnerable to hackers." It was estimated that "it could take months to identify all [the hackers'] victims and remove whatever spyware they installed." 296

In April 2021, the U.S. Treasury sanctioned Russia for the SolarWinds hack. It also sanctioned 32 Russian "entities and individuals" that had carried out "Russian government-directed attempts to influence the 2020 U.S. presidential election, and other acts of disinformation and interference."

In May 2021, a Russia-based hacking group known as DarkSide launched a cyberattack against Colonial Pipeline, "the operator of one of the nation's largest fuel pipelines." <sup>298</sup> The 5,500-mile pipeline, "responsible for carrying fuel from refineries along the Gulf Coast to New Jersey," was down for six days. <sup>299</sup> Colonial Pipeline paid DarkSide \$90 million in Bitcoin as a ransom payment, but the Department of Justice was able to recover approximately \$2.3 million of that amount a few weeks later. <sup>300</sup> In June 2021, REvil, a Russian cybercriminal group, launched a ransomware attack on JBS, "the world's largest meat processing company." <sup>301</sup> As a result of the cyberattack, JBS was forced to shut down all nine of its U.S. plants for a brief period. <sup>302</sup>

However, the United States is not Russia's only target. In February 2020, the U.S. and its key allies accused Russia's main military intelligence agency, the GRU, of a broad cyberattack against the Republic of Georgia "that disrupted 'several thousand Georgian government and privately-run websites and interrupted the broadcast of at least two major television stations." It was hoped that the accusation would help to deter Moscow from intervening in the 2020 presidential election.

In February 2022, "[t]he European Union and its Member States, together with its international partners, strongly condemned the malicious cyber activity conducted by the Russian Federation against Ukraine, which targeted the satellite KA-SAT network, owned by Viasat." The attack "interrupted service for tens of thousands of broadband customers across Europe," including in Ukraine, and "reportedly disrupted service for thousands of European wind turbines." <sup>305</sup>

In addition to official intelligence and military cyber assets, Russia employs allied criminal organizations (so-called patriotic hackers) to help it engage in cyber aggression. Using these hackers gives Russia greater resources and can help to shield its true capabilities. Patriotic hackers also give the Russian government deniability. In June 2017, for example, Putin stated that "[i]f they (hackers) are patriotically-minded, they start to make their own contribution to what they believe is the good fight against those who speak badly about Russia. Is that possible? Theoretically it is possible."

Russia's cyber capabilities are advanced and of key importance in realizing the state's strategic aims. Russia has used cyberattacks to further the reach and effectiveness of its propaganda and disinformation campaigns, and its ongoing cyberattacks against election processes in the U.S. and European countries are designed to undermine citizens' belief in the veracity of electoral outcomes and erode support for democratic institutions in the longer term. Russia also has used cyberattacks to target physical infrastructure including electrical grids, air traffic control, and gas distribution systems.

Russia's increasingly bold use of cyber capabilities, coupled with the sophistication of those capabilities and Moscow's willingness to use them aggressively, presents a serious challenge both to the U.S. and to its interests abroad.

#### Conclusion

Overall, the threat to the U.S. homeland originating from Europe remains low, but the threat to America's interests and allies in the region remains significant, especially given Russia's war in Ukraine. Although Russia has the military capability to harm and (in the case of its nuclear arsenal) to pose an existential threat to the U.S., it has not conclusively demonstrated the intent to do so.

The situation is different with respect to America's allies in the region. Through NATO, the U.S. is obliged by treaty to come to the aid of the alliance's European members. Russia continues its efforts to undermine the NATO alliance and presents an existential threat to U.S. allies in Eastern Europe. NATO has been the cornerstone of European security and stability ever since its creation in 1949, and it is in America's interest to ensure that it maintains both the military capability and the political will to fulfill its treaty obligations.

While Russia is not the threat to U.S. global interests that the Soviet Union was during the Cold War, it does pose challenges to a range of America's interests and those of its allies and friends that are closest to Russia's borders. Russia possesses a full range of capabilities from ground forces to air, naval, space, and cyber. It still maintains the world's largest nuclear arsenal, and although a strike on the U.S. is highly unlikely, the latent potential for such a strike still gives these weapons enough strategic value visà-vis America's NATO allies and interests in Europe to ensure their continued relevance.

Russian provocations that are much less serious than any scenario involving a nuclear exchange pose the most serious challenge to American interests, particularly in Central and Eastern Europe, the Arctic, the Balkans, and the South Caucasus. As the Intelligence Community's most recent Annual Threat Assessment states:

Moscow will continue to employ an array of tools to advance its own interests or undermine the interests of the United States and its allies. These will be primarily military, security, and intelligence tools, with economic cooperation playing a smaller role.... Russia probably will continue to expand its global military, intelligence, security, commercial, and energy footprint and build partnerships aimed at undermining U.S. influence and boosting its own.<sup>307</sup>

Though Russia has expended much of its arsenal of munitions and has suffered significant losses in its war against Ukraine, high energy prices and the decision by several countries to continue trading with Russia despite sanctions placed on the country are ensuring a steady flow of funds into Russia's accounts that Putin will assuredly use to replenish stocks and replace losses. The result will be a Russian military rebuilt with new equipment and

seasoned by combat experience gained in Ukraine. Russia will therefore continue to be a significant security concern both for its NATO partners and other allies.

For these reasons, the *Index of U.S. Military Strength* continues to assess the threat from Russia as "aggressive" for level of provocation of behavior and "formidable" for level of capability.

### **Threats: Russia**

	HOSTILE	AGGRESSIVE	TESTING	ASSERTIVE	BENIGN
Behavior		✓			
	FORMIDABLE	GATHERING	CAPABLE	ASPIRATIONAL	MARGINAL

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# Iran

# James Phillips

adical Islamist terrorism in its many forms  $oldsymbol{\Gamma}$ remains the most immediate global threat to the safety and security of U.S. citizens at home and abroad, and Iran-supported terrorist groups and proxy militias pose some of the greatest potential threats. The Lebanon-based Hezbollah (Party of God) has a long history of executing terrorist attacks against American targets in the Middle East at Iran's direction, and it could be activated to launch attacks inside the United States in the event of a conflict with Iran. Such state-sponsored terrorist attacks pose the greatest potential Iranian threats to the U.S. homeland, at least until Iran develops a long-range ballistic missile capable of targeting the United States or acquires the capability to launch devastating cyberattacks against critical U.S. infrastructure.

#### Threats to the Homeland

Hezbollah Terrorism. Hezbollah, the radical Lebanon-based Shia revolutionary movement, poses a clear terrorist threat to international security. Hezbollah terrorists have murdered Americans, Israelis, Lebanese, Europeans, and citizens of many other nations. Originally founded with support from Iran in 1982, this Lebanese group has evolved into a global terrorist network that is strongly backed by regimes in Iran and Syria. Its political wing has dominated Lebanese politics and is funded by Iran and a dark web of charitable organizations, criminal activities, and front companies.

Hezbollah regards terrorism not only as a useful tool for advancing its revolutionary agenda, but also as a religious duty as part of a "global jihad." It helped to introduce and popularize the tactic of suicide bombings in Lebanon in the 1980s, developed a strong guerrilla force and a political apparatus in the 1990s, provoked a war with Israel in 2006,

intervened in the Syrian civil war after 2011 at Iran's direction, and has become a major destabilizing influence in the ongoing Arab–Israeli conflict.

Before September 11, 2001, Hezbollah had murdered more Americans than any other terrorist group. Despite al-Qaeda's increased visibility since then, Hezbollah remains a bigger, better equipped, better organized, and potentially more dangerous terrorist organization, partly because it enjoys the support of the world's two chief state sponsors of terrorism: Iran and Syria. Hezbollah's demonstrated capabilities led former Deputy Secretary of State Richard Armitage to characterize it colorfully as "the A-Team of Terrorists."

Hezbollah has expanded its operations from Lebanon to regional targets in the Middle East and far beyond the region. Today, it is a global terrorist threat that draws financial and logistical support from its Iranian patrons as well as from the Lebanese Shiite diaspora in the Middle East, Europe, Africa, Southeast Asia, North America, and South America. Hezbollah fundraising and equipment procurement cells have been detected and broken up in the United States and Canada, and Europe is believed to contain many more of these cells.

Hezbollah has been involved in numerous terrorist attacks against Americans, including:

- The April 18, 1983, suicide truck bombing of the U.S. embassy in Beirut, which killed 63 people including 17 Americans;
- The October 23, 1983, suicide truck bombing of the Marine barracks at Beirut Airport, which killed 241 Marines and other personnel deployed as part of the multinational peacekeeping force in Lebanon;

- The September 20, 1984, suicide truck bombing of the U.S. embassy annex in Lebanon, which killed 23 people including two Americans; and
- The June 25, 1996, Khobar Towers bombing, which killed 19 American servicemen stationed in Saudi Arabia.

#### In addition:

- Hezbollah operatives were later found to have been responsible for the 1984 murder of American University of Beirut President Malcolm Kerr and the June 14, 1985, murder of U.S. Navy diver Robert Stethem, who was a passenger on TWA Flight 847, which was hijacked and diverted to Beirut International Airport.
- In March 1984, Hezbollah kidnapped William Buckley, the CIA station chief in Beirut, who died in captivity in 1985 after being tortured for more than a year.<sup>2</sup>
- Hezbollah was involved in the kidnapping of several dozen Westerners, including 14 Americans, who were held as hostages in Lebanon in the 1980s. The American hostages eventually became pawns that Iran used as leverage in the secret negotiations that led to the Iran-Contra affair in the mid-1980s.
- Hezbollah kidnapped Colonel William Higgins, a Marine officer serving with the United Nations Truce Supervision Organization in Lebanon, in February 1988 and killed him in 1989.

Hezbollah has launched numerous attacks outside of the Middle East. It perpetrated the two deadliest terrorist attacks in the history of South America: the March 1992 bombing of the Israeli embassy in Buenos Aires, Argentina, that killed 29 people and the July 1994 bombing of a Jewish community center in Buenos Aires that killed 96 people. The trial of those who were implicated in the 1994 bombing revealed an extensive Hezbollah presence in Argentina and other countries in South America.

Hezbollah has escalated its terrorist attacks against Israeli targets in recent years as part of Iran's shadow war against Israel. In 2012, Hezbollah killed five Israeli tourists and a Bulgarian bus driver in a suicide bombing near Burgas, Bulgaria. Hezbollah terrorist plots against Israelis were foiled in Thailand and Cyprus during that same year.

Hezbollah deployed personnel to Iraq after the 2003 U.S. intervention to train and assist pro-Iranian Iraqi Shia militias that were battling the U.S.-led coalition. In addition, Hezbollah has deployed personnel in Yemen to train and assist the Iranbacked Houthi rebels. In 2013, Hezbollah admitted that it had deployed several thousand militia members to fight in Syria on behalf of the Assad regime. By 2015, Hezbollah forces had become crucial to the survival of the Assad regime after the Syrian army was hamstrung by casualties, defections, and low morale.

Although Hezbollah operates mostly in the Middle East, it has a global reach and has established a presence inside the United States. Cells in the United States generally are focused on fundraising, including criminal activities such as those perpetrated by more than 70 used-car dealerships identified as part of a scheme to launder hundreds of millions of dollars of cocaine-generated revenue that flowed back to Hezbollah.<sup>3</sup>

Covert Hezbollah cells could morph into other forms and launch terrorist operations inside the United States. Given Hezbollah's close ties to Iran and past record of executing terrorist attacks on Tehran's behalf, there is a real danger that Hezbollah terrorist cells could be activated inside the United States in the event of a conflict between Iran and the U.S. or between Iran and Israel.

On June 1, 2017, two naturalized U.S. citizens were arrested and charged with providing material support to Hezbollah and conducting preoperational surveillance of military and law enforcement sites in New York City and at Kennedy Airport, the Panama Canal, and the American and Israeli embassies in Panama.<sup>4</sup> Nicholas Rasmussen, then Director of the National Counterterrorism Center, noted that the June arrests were a "stark reminder" of Hezbollah's global reach and warned that Hezbollah "is determined to give itself a potential homeland option as a critical component of its terrorism playbook," which "is something that those of us in the counterterrorism community take very, very seriously."<sup>5</sup>

On July 9, 2019, a New Jersey man who served as a U.S.-based operative for Hezbollah's terrorism-planning wing for years, was arrested and charged with providing material support to the terrorist group.

Alexei Saab, a 42-year-old Lebanese immigrant and naturalized U.S. citizen, scouted such New York City landmarks as the Statue of Liberty and the Empire State Building for possible attacks. When he was indicted in September 2019, he was "at least the third American [to have been] charged since 2017 with being an agent for Hezbollah."

In January 2020, after a series of attacks on U.S. military personnel and the U.S. embassy in Iraq provoked a U.S. unmanned aerial vehicle (UAV) strike that killed Iranian General Qassem Soleimani, leader of the Quds Force of Iran's Islamic Revolutionary Guard Corps (IRGC), U.S. intelligence officials warned about the potential Hezbollah threat to the U.S. homeland. The Department of Homeland Security warned in a January 4, 2020, bulletin that "Iran and its partners, such as Hizballah, have demonstrated the intent and capability to conduct operations in the United States." Four days later, the U.S. intelligence community warned that if Iran decided to carry out a retaliatory attack in the United States, it "could act directly or enlist the cooperation of proxies and partners, such as Lebanese Hezbollah."8 Then, on January 12, Hezbollah leader Hassan Nasrallah publicly threatened U.S. forces in the Middle East: "The U.S. administration and the assassins will pay a heavy price, and they will discover their miscalculation."9

Hezbollah also has a long history of cooperation with criminal networks. On May 27, 2020, U.S. prosecutors announced the indictment of a former Venezuelan politician who sought to recruit terrorists from Hezbollah and Hamas to orchestrate attacks against U.S. interests. Adel El Zabayar, a Venezuelan citizen of Syrian descent who is a close associate of Venezuelan President Nicolás Maduro, traveled to the Middle East in 2014 to obtain weapons and recruit members of Hezbollah and Hamas to train at hidden camps in Venezuela. The goal of this "unholy alliance," according to the U.S. Attorney's Office for the Southern District of New York, was to "create a large terrorist cell capable of attacking United States interests on behalf of the Cartel de Los Soles," a criminal organization that "conspired to export literally tons of cocaine into the U.S."10

**Iran's Ballistic Missile Threat.** Iran has an extensive missile development program that has received key assistance from North Korea, as well as (until the imposition of sanctions by the U.N. Security Council) more limited support from Russia

and China. Although the U.S. intelligence community assesses that Iran does not have an ICBM capability (an intercontinental ballistic missile with a range of 5,500 kilometers or about 2,900 miles), Tehran has worked diligently to develop one under the guise of its space program. Iran is not likely to develop missiles capable of reaching the United States until 2025 at the earliest. However, it has launched several satellites with space launch vehicles that use similar technology, which could also be adapted to develop an ICBM capability. <sup>12</sup>

On April 22, 2020, Iran launched a military satellite with a new launch vehicle that included such new features as a light carbon fiber casing and a moving nozzle for flight control that is also used in longrange ballistic missiles—clear evidence that Iran continues to improve its capabilities. Tehran's missile arsenal primarily threatens U.S. bases and allies in the Middle East, but Iran eventually could expand the range of its missiles to include the continental United States. Iran is the only country that is known to have developed missiles with a range of 2,000 kilometers without first having nuclear weapons. 14

### Threat of Regional War

The Middle East region is one of the most complex and volatile threat environments faced by the United States and its allies. Iran, Hezbollah, and Iran-supported proxy groups pose actual or potential threats both to America's interests and to those of its allies.

Iranian Threats in the Middle East. Iran is led by an anti-Western revolutionary regime that seeks to tilt the regional balance of power in its favor by driving out the U.S. military presence, undermining and overthrowing opposing governments, and establishing its hegemony over the oil-rich Persian Gulf region. It also seeks to radicalize Shiite communities and advance their interests against Sunni rivals. Iran has a long record of sponsoring terrorist attacks against American targets and U.S. allies in the region.

Iran's conventional military forces, although relatively weak by Western standards, are large compared to those of Iran's smaller neighbors. Iran's armed forces remain dependent on major weapons systems and equipment that were imported from the U.S. before the country's 1979 revolution, and Western sanctions have limited the regime's ability to maintain or replace these aging weapons systems,

many of which were depleted in the 1980–1988 Iran–Iraq war. Iran also has not been able to import large numbers of modern armor, combat aircraft, longer-range surface-to-surface missiles, or major naval warships.

Tehran, however, has managed to import modern Russian and Chinese air-to-air, air-to-ground, air defense, anti-armor, and anti-ship missiles to upgrade its conventional military and asymmetric forces.<sup>15</sup> It also has developed its capacity to reverse engineer and build its own versions of ballistic missiles, rockets, UAVs, minisubmarines, and other weapon systems. To compensate for its limited capability to project conventional military power, Tehran has focused on building up its asymmetric warfare capabilities, proxy forces, and ballistic missile and cruise missile capabilities. For example, partly because of the limited capabilities of its air force, Iran developed UAVs during the Iran-Iraq war, including at least one armed model that carried up to six RPG-7 rounds in what was perhaps the world's first use of UAVs in combat.<sup>16</sup>

The July 2015 Iran nuclear agreement—formally known as the Joint Comprehensive Plan of Action (JCPOA)—lifted nuclear-related sanctions on Iran in January 2016, gave Tehran access to about \$100 billion in restricted assets, and allowed Iran to expand its oil and gas exports, the chief source of its state revenues. Relief from the burden of sanctions helped Iran's economy and enabled Iran to enhance its strategic position, military capabilities, and support for surrogate networks and terrorist groups.

In May 2016, Tehran announced that it was increasing its military budget for 2016–2017 to \$19 billion—90 percent more than the previous year's budget. Testimating total defense spending is difficult both because of Tehran's opaque budget process and because spending on some categories, including Iran's ballistic missile program and military intervention in Syria, is hidden. Nevertheless, the International Institute for Strategic Studies (IISS) has estimated that after the Trump Administration withdrew from the nuclear agreement and reimposed sanctions, Iran's defense spending fell from \$21.9 billion in 2018 to \$17.4 billion in 2019. In 2020, according to the IISS, defense spending declined again to an estimated \$14.1 billion.

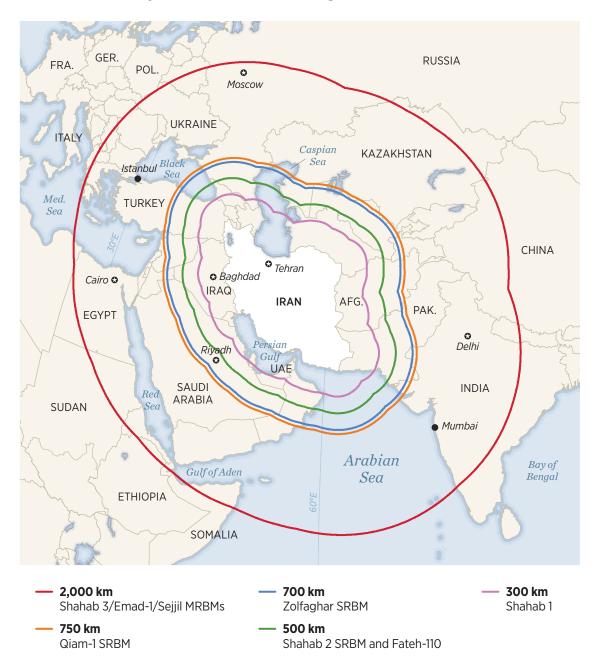
The 2015 nuclear agreement also enabled Tehran to emerge from diplomatic isolation and strengthen strategic ties with Russia.

- Russian President Vladimir Putin traveled to Iran in November 2015 to meet with Supreme Leader Ayatollah Ali Khamenei and other officials. Both regimes called for enhanced military cooperation, particularly in Syria where both had deployed military forces in support of President Bashir al-Assad's brutal regime.
- During Iranian President Hassan Rouhani's visit to Russia in March 2017, Putin proclaimed his intention to raise bilateral relations to the level of a "strategic partnership."<sup>20</sup>
- On June 9, 2018, during the Shanghai Cooperation Organization (SCO) summit, Putin noted that Iran and Russia were "working well together to settle the Syrian crisis" and promised Rouhani that he would support Iran's entry into the SCO.<sup>21</sup>
- On September 16, 2019, in Ankara, Turkey, ahead of a trilateral meeting with Turkish President Recep Tayyip Erdogan to discuss the situation in Syria, the two presidents met again, and Putin praised Iran's support for the Assad regime.

This growing strategic relationship has strengthened Iran's military capabilities. In April 2016, Tehran announced that Russia had begun deliveries of up to five S-300 Favorit long-range surface-to-air missile systems, which can track up to 100 aircraft and engage six of them simultaneously at a range of 200 kilometers. <sup>22</sup> The missile system, which was considered a defensive weapon not included in the U.N. arms embargo on Iran, was deployed and became operational in 2017, giving Iran a "generational improvement in capabilities over its other legacy air defense systems" according to Defense Intelligence Agency Director Lieutenant General Robert Ashley. <sup>23</sup>

In 2016, Iranian Defense Minister Hossein Dehghan traveled to Moscow "to negotiate a series of important weapons deals with Russia" that included the purchase of advanced Sukhoi Su-30 Flanker fighter jets. These warplanes would significantly improve Iran's air defense and long-range strike capabilities, although under the terms of the 2015 Iran nuclear agreement, they could not be delivered until after the U.N. arms embargo expired in October 2020. It was also reported that Tehran was "close to

# **Iranian Missile Systems: Maximum Ranges**



**SOURCE:** U.S. Department of Defense, Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Military Dominance*, 2019, p. 43, https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Iran\_Military\_Power\_LR.pdf (accessed July 23, 2021).

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finalizing a deal for purchase and licensed production of Russia's modern T-90S main battle tank."<sup>24</sup>

In 2019, the Defense Intelligence Agency assessed that Iran was interested in buying Russian Su-30 fighters, Yak-130 trainers, T-90 tanks, S-400 air defense systems, and Bastian coastal defense systems.25 So far, Russia and Iran have not announced any arms deals, but Moscow may be waiting to see whether the Iran nuclear agreement can be renegotiated, which would enable it to receive payments from Iran after U.S. financial sanctions were lifted. In January 2022, President Ebrahim Raisi met with President Putin in Moscow. The two agreed to accelerate the construction of Russian nuclear reactors in Bushehr, Iran, but Putin appeared to be lukewarm about the draft of a strategic cooperation agreement that Raisi brought with him.<sup>26</sup> Clearly, Iran needs Russia more than Russia needs Iran.

If Iran should succeed in reviving the lapsed nuclear agreement, Russian–Iranian security cooperation could expand significantly. After the 2015 nuclear agreement, Iran and Russia escalated their strategic cooperation in propping up Syria's embattled Assad regime. Iran's growing military intervention in Syria was partly eclipsed by Russia's military intervention and launching of an air campaign against Assad's enemies in September 2015, but Iran's Islamic Revolutionary Guard Corps and surrogate militia groups have played the leading role in spearheading the ground offensives that have retaken territory from Syrian rebel groups and tilted the military balance in favor of Assad's regime.

- From 2013–2015, "Iran expanded its intervention in Syria to as many as 2,000 Iranian military personnel...including IRGCQF, IRGC ground force, and even some *Artesh* (Iran national military) personnel."
- From 2013–2017, "[t]he IRGC-QF recruited other Shia fighters to operat[e] under Iranian command in Syria...with numbers ranging from 24,000–80,000. These figures include not only Lebanese Hezbollah fighters but also Iraqi militias and brigades composed of Afghan and Pakistani Shias."<sup>28</sup>
- In 2018, Iran reportedly "command[ed] up to 80,000 fighters in Syria—all members of Shiite militias and paramilitary forces loyal to the

leadership in Iran—and [had] effectively secured a land corridor via Iraq and Syria reaching Hezbollah in Lebanon."<sup>29</sup>

Working closely with Russia, Iran expanded its military efforts and helped to consolidate a costly victory for the Assad regime. At the height of the fighting in August 2016, Russia temporarily deployed Tu-22M3 bombers and Su-34 strike fighters to an air base at Hamedan in western Iran to strike rebel targets in Syria.30 After the fall of Aleppo in December 2016, which inflicted a crushing defeat on the armed opposition, Tehran sought to entrench a permanent Iranian military presence in Syria, establishing an elaborate infrastructure of military bases, intelligence centers, UAV airfields, missile sites, and logistical facilities. The IRGC also sought to secure a logistical corridor to enable the movement of heavy equipment, arms, and matériel through Iraq and Syria to bolster Hezbollah in Lebanon.

Iran's military presence in Syria and continued efforts to provide advanced weapons to Hezbollah through Syria have fueled tensions with Israel. Israel has launched more than 2,000 air strikes against Hezbollah and Iranian forces in Syria to prevent the transfer of sophisticated arms and prevent Iran-backed militias from deploying near Israel's border. On February 10, 2018, Iranian forces in Syria launched an armed drone that penetrated Israeli airspace before being shot down. Israel responded with air strikes on IRGC facilities in Syria. On May 9, 2018, Iranian forces in Syria launched a salvo of 20 rockets against Israeli military positions in the Golan Heights, provoking Israel to launch groundto-ground missiles, artillery salvos, and air strikes against all known Iranian bases in Syria.31

Although Russia reportedly helped to arrange the withdrawal of Iranian heavy weapons to positions 85 kilometers from Israeli military positions in the Golan Heights, Moscow later "turned a blind eye" to Iranian redeployments and the threat to Israel that deployment of long-range Iranian weapon systems in Syria represents. <sup>32</sup> On January 13, 2019, Israel launched an air strike against an Iranian arms depot at Damascus International Airport, and the Israeli government revealed that it had launched over 2,000 missiles at various targets in Syria in 2018. <sup>33</sup> Israel remains determined to prevent Iran from establishing forward bases near its borders, and another clash could rapidly escalate into a regional conflict.

By early 2020, Iran reportedly had reduced its military forces in Syria after defeating the rebel military challenge to the Assad regime.<sup>34</sup> However, Iran continues to bolster the strength of its proxies and allies in Syria, particularly Hezbollah, which has embedded itself in the Syrian army's 1st Corps and is recruiting Syrian fighters near the Golan Heights for future attacks on Israel.<sup>35</sup> In January 2021, Israel launched a series of air strikes against Iranian forces and proxy militias in eastern Syria, reportedly to prevent Iranian ballistic missiles, cruise missiles, and UAVs that have been deployed in western Iraq from being deployed inside Syria.<sup>36</sup>

Israel also has targeted Iranian forces and ballistic missiles inside Iraq.<sup>37</sup> On March 12, 2022, the IRGC launched up to 12 short range ballistic missiles at a building near Erbil, Iraq, that it claimed was a base used by Israeli intelligence officers.<sup>38</sup> The IRGC publicly claimed responsibility for the attack—a rare admission that signals the intensification of the shadow war between Iran and Israel.

Iran's Proxy Warfare. Iran has adopted a political warfare strategy that emphasizes irregular warfare, asymmetric tactics, and the extensive use of proxy forces. The Islamic Revolutionary Guard Corps has trained, armed, supported, and collaborated with a wide variety of radical Shia and Sunni militant groups as well as Arab, Palestinian, Kurdish, and Afghan groups that do not share its radical Islamist ideology. The IRGC's elite Quds (Jerusalem) Force has cultivated, trained, armed, and supported numerous proxies, particularly the Lebanon-based Hezbollah; Iraqi Shia militant groups; Palestinian groups such as Hamas and Palestinian Islamic Jihad; and insurgent groups that have fought against the governments of Afghanistan, Bahrain, Egypt, Israel, Iraq, Jordan, Kuwait, Morocco, Saudi Arabia, Turkey, the United Arab Emirates (UAE), and Yemen.

Iran is the world's foremost state sponsor of terrorism and has made extensive efforts to export its radical Shia brand of Islamist revolution. It has established a network of powerful Shia revolutionary groups in Lebanon and Iraq; has cultivated links with Afghan Shia and Taliban militants; and has stirred Shia unrest in Bahrain, Iraq, Lebanon, Saudi Arabia, and Yemen. In recent years, naval forces have regularly intercepted Iranian arms shipments off the coasts of Bahrain and Yemen, and Israel has repeatedly intercepted Iranian arms shipments,

including long-range rockets, bound for Palestinian militants in Gaza.

U.S. troops in the Middle East have been targeted by Iranian proxies in Lebanon in the 1980s, in Saudi Arabia in 1996, and in Iraq since the 2003 overthrow of Saddam Hussein. In April 2019, the Pentagon released an updated estimate of the number of U.S. personnel killed by Iran-backed militias in Iraq, revising the number upward to at least 603 dead between 2003 and 2011. These casualties, about 17 percent of the American death toll in Iraq, "were the result of explosively formed penetrators (EFP), other improvised explosive devices (IED), improvised rocket-assisted munitions (IRAM), rockets, mortars, rocket-propelled grenades (RPG), small-arms, sniper, and other attacks in Iraq" according to a Pentagon spokesman.<sup>39</sup>

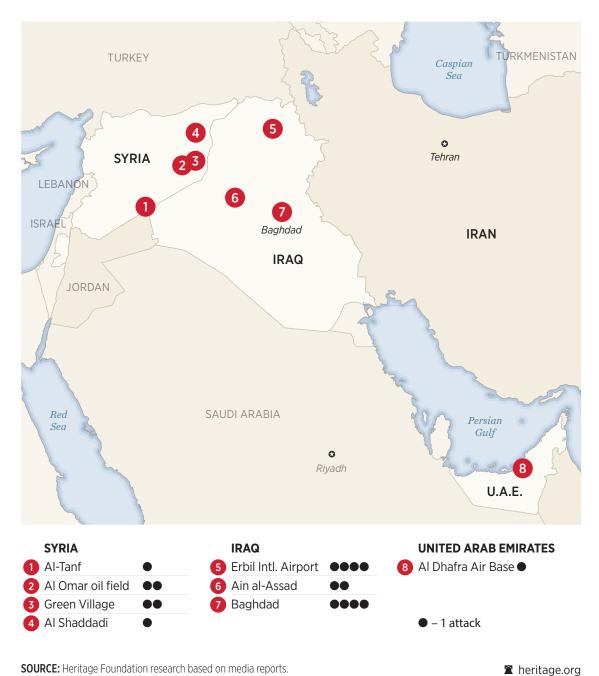
In 2019, Tehran ratcheted up surrogate attacks against U.S. troops in Iraq as part of its aggressive campaign to push back against the U.S. "maximum pressure" sanctions campaign and block the negotiation of a revised nuclear agreement with tighter restrictions. After scores of rocket attacks on Iraqi military bases that hosted U.S. personnel, Iran-controlled Shia militias succeeded in killing an American contractor on December 27, 2019. The ensuing crisis quickly escalated. The U.S. launched air strikes against the Kataib Hezbollah militia that launched the attack; pro-Iranian militia members retaliated by trying to burn down the U.S. embassy in Baghdad; and Washington responded on January 2, 2020, with a drone strike that killed General Oassem Soleimani, leader of the IRGC Quds Force, which was orchestrating the attacks. Iran responded with additional proxy attacks and a ballistic missile attack that failed to kill any U.S. troops stationed at Iraqi military bases.40

After a February 15, 2021, rocket attack on an airport in Erbil, Iraq, killed a U.S. contractor, the U.S. retaliated with air strikes against seven targets inside Syria that were controlled by two Iran-backed Iraqi militias—Kataib Hezbollah and Kataib Sayyid al-Shuhada—that were found to have been responsible for the Erbil attack.<sup>41</sup> Attacks by Iran-backed militias have continued in Iraq, including UAV strikes that pose a growing threat to the 2,500 U.S. troops that train and support Iraqi security forces.<sup>42</sup>

Iran-backed militias also launched attacks against U.S. military forces in Syria, including an October 20, 2021, strike using at least five suicide

# **Iranian Proxies Strike U.S. Targets**

From April 2021 to April 2022, Iranian proxy groups have conducted at least 17 attacks against eight U.S. targets in Syria, Iraq, and the United Arab Emirates.



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drones against the small American garrison at Al Tanf. Because of a timely Israeli warning, there were no casualties, but the U.S. failure to respond forcefully to this attack and scores of others has increased the risks to U.S. troops. 43 As far back as April 20, 2021, Marine Corps General Kenneth McKenzie, then Commander, United States Central Command, had already warned that Iran's "small- and medium-sized [unmanned aerial system attacks] proliferating across the [USCENTCOM area of responsibility] present a new and complex threat to our forces and those of our partners and allies. For the first time since the Korean War, we are operating without complete air superiority."44 Pro-Iranian Iraqi militias also launched a failed drone strike in an attempt to assassinate Iraqi Prime Minister Mustafa al-Kadhimi on November 7, 2021.

**Terrorist Threats from Hezbollah.** Hezbollah is a close ally of, frequent surrogate for, and terrorist subcontractor for Iran's revolutionary Islamist regime. Iran played a crucial role in creating Hezbollah in 1982 as a vehicle that it could use to export its revolution, mobilize Lebanese Shia, and develop a terrorist surrogate for attacks on its enemies.

Tehran provides the lion's share of Hezbollah's foreign support: arms, training, logistical support, and money. After the nuclear deal, which offered Tehran substantial relief from sanctions, Tehran increased its aid to Hezbollah, providing as much as \$800 million per year according to Israeli officials.45 In 2020, the U.S. Department of State estimated that Hezbollah was receiving \$700 million a year from Iran. 46 Tehran has been lavish in stocking Hezbollah's expensive and extensive arsenal of rockets, sophisticated land mines, small arms, ammunition, explosives, anti-ship missiles, anti-aircraft missiles, and even UAVs that Hezbollah can use for aerial surveillance or remotely piloted terrorist attacks. Iranian Revolutionary Guards have trained Hezbollah terrorists in Lebanon's Bekaa Valley and in Iran.

Iran has used Hezbollah as a club to hit not only Israel and Tehran's Western enemies, but many Arab countries as well. Tehran's revolutionary ideology has fueled Iran's hostility to other Middle Eastern governments, many of which it seeks to overthrow and replace with radical allies. During the 1980–1988 Iran–Iraq war, Iran used Hezbollah to launch terrorist attacks against Iraqi targets and against Arab states that sided with Iraq. Hezbollah launched

numerous terrorist attacks against Saudi Arabia and Kuwait, which extended strong financial support to Iraq's war effort, and participated in several other terrorist operations in Bahrain and the UAE.

Iranian Revolutionary Guards conspired with the Saudi Arabian branch of Hezbollah to conduct the 1996 Khobar Towers bombing that killed 19 American military personnel. Hezbollah collaborated with the IRGC's Quds Force to destabilize Iraq after the 2003 U.S. occupation and helped to train and advise the Mahdi Army, the radical anti-Western Shiite militia led by militant Iraqi cleric Moqtada al-Sadr, as well as other Iraqi militias. Hezbollah detachments also have cooperated with IRGC forces in Yemen to train and assist the Houthi rebel movement.

Hezbollah threatens the security and stability of the Middle East and Western interests in the Middle East on many fronts. In addition to its murderous actions against Israel, Hezbollah has used violence to impose its radical Islamist agenda and subvert democracy in Lebanon. Some experts mistakenly believed that Hezbollah's participation in the 1992 Lebanese elections and subsequent inclusion in Lebanon's parliament and coalition governments would moderate its behavior, but political inclusion did not lead it to renounce terrorism.

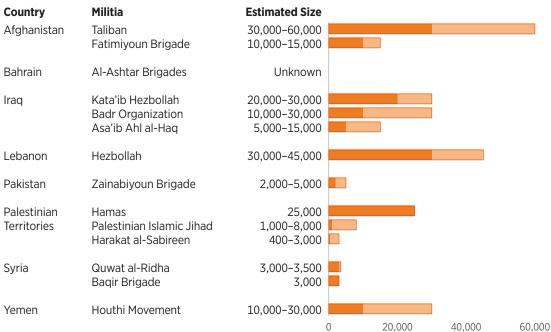
Hezbollah also poses a potential threat to America's NATO allies in Europe. It established a presence inside European countries in the 1980s amid the influx of Lebanese citizens who were seeking to escape Lebanon's civil war and took root among Lebanese Shiite immigrant communities throughout Europe. German intelligence officials have estimated that about 1,250 Hezbollah members and supporters were living in Germany in 2020.<sup>47</sup> Hezbollah also has developed an extensive web of fundraising and logistical support cells throughout Europe.<sup>48</sup>

France and Britain have been the principal European targets of Hezbollah terrorism, partly because both countries opposed Hezbollah's agenda in Lebanon and were perceived as enemies of Iran, Hezbollah's chief patron. Hezbollah has been involved in many terrorist attacks against Europeans, including:

 The October 1983 suicide truck bombing of the French contingent of the multinational peacekeeping force in Lebanon, which killed 58 French soldiers on the same day that the U.S. Marine barracks was bombed;

# **Countries with Iranian Proxy Groups**





**SOURCE:** Kali Robinson and Will Merrow, "Iran's Regional Armed Network," Council on Foreign Relations, last updated March 1, 2021, https://www.cfr.org/article/irans-regional-armed-network (accessed August 9, 2022).

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- The April 1985 bombing of a restaurant near a U.S. base in Madrid, Spain, which killed 18 Spanish citizens;
- A campaign of 13 bombings in France in 1986 that targeted shopping centers and railroad facilities, killing 13 people and wounding more than 250; and
- A March 1989 attempt to assassinate British novelist Salman Rushdie that failed when a bomb exploded prematurely, killing a terrorist in London.

Hezbollah's attacks in Europe trailed off in the 1990s after the group's Iranian sponsors accepted a truce in their bloody 1980–1988 war with Iraq and no longer needed a surrogate to punish states that Tehran perceived as supporting Iraq. However, if Hezbollah decided to revive its aggressive operations in southern Lebanon, European participation in Lebanese peacekeeping operations, which became a lightning rod for Hezbollah terrorist attacks in the 1980s, could again become an issue. Troops from European Union (EU) member states could someday find themselves attacked by Hezbollah with weapons financed by Hezbollah supporters in their home countries.

Hezbollah operatives have been deployed in countries throughout Europe, including Belgium, Bulgaria, Cyprus, France, Germany, and Greece.<sup>49</sup> On April 30, 2020, Germany designated Hezbollah as a terrorist organization after Israel provided intelligence on a stockpile of ammonium nitrate that was stored in a German warehouse and that Hezbollah intended to use to make explosives.

**Mounting Missile Threat.** Iran "possesses the largest and most diverse missile arsenal in the Middle East." Testifying before the Senate Armed Services Committee in March 2022, General McKenzie estimated that Iran has "over 3,000 ballistic missiles of various types, some of which can reach Tel Aviv, to give you an idea of range. None of them can reach Europe yet, but over the last 5 to 7 years...they have invested heavily in their ballistic missile program." <sup>51</sup>

In June 2017, Iran launched mid-range missiles from its territory against opposition targets in Syria. This was Iran's first such operational use of midrange missiles in almost 30 years, but it was not as successful as Tehran might have hoped. It was

reported that three of the five missiles that were launched missed Syria altogether and landed in Iraq and that the remaining two landed in Syria but missed their intended targets by miles.<sup>52</sup>

Iran launched a much more successful attack on September 14, 2019, using at least 18 UAVs and three low-flying cruise missiles to destroy parts of the Saudi oil processing facility at Abqaiq and the oil fields at Khurais. The precisely targeted attack shut down half of Saudi Arabia's oil production, which was approximately equivalent to 5 percent of global oil production. Although Iran denied responsibility, U.S. intelligence sources identified the launch site as the Ahvaz air base in southwest Iran about 650 kilometers north of Abqaiq.<sup>53</sup>

Iran also used ballistic missiles to attack two Iraqi bases hosting U.S. military personnel on January 8, 2020, in retaliation for an earlier U.S. strike that killed IRGC Quds Force commander General Qassem Soleimani. Of the 16 short-range ballistic missiles launched from three bases inside Iran, 12 reached their targets: 11 struck al-Asad air base in western Iraq, and one struck a base near the northern Iraqi city of Irbil. <sup>54</sup> No U.S. personnel were killed, but more than 100 were later treated for traumatic brain injuries.

The backbone of the Iranian ballistic missile force is the Shahab series of road-mobile surface-to-surface missiles. Based on Soviet-designed Scud missiles, the Shahabs are potentially capable of carrying nuclear, chemical, or biological warheads in addition to conventional high-explosive warheads. Their relative inaccuracy (compared to NATO ballistic missiles) limits their effectiveness unless they are employed against large soft targets like cities. Tehran's heavy investment in such weapons has fueled speculation that the Iranians intend eventually to replace the conventional warheads on their longer-range missiles with nuclear warheads. As noted, Iran is the only country known to have developed missiles with a range of 2,000 kilometers that did not already have a nuclear capability.<sup>55</sup>

Iran is not a member of the Missile Technology Control Regime. Instead, it has sought aggressively to acquire, develop, and deploy a wide spectrum of ballistic missile, cruise missile, and space launch capabilities. During the Iran–Iraq war, Iran acquired Soviet-made Scud-B missiles from Libya and later acquired North Korean–designed Scud-C and Nodong missiles, which it renamed the Shahab-2 (with

an estimated range of 500 kilometers or 310 miles) and Shahab-3 (with an estimated range of 900 kilometers or 560 miles). It now can produce its own variants of these missiles as well as longer-range Ghadr-1 and Qiam missiles. <sup>56</sup>

Iran's Shahab-3 and Ghadr-1, which is a modified version of the Shahab-3 with a smaller warhead but greater range (about 1,600 kilometers or 1,000 miles), are considered more reliable and advanced than the North Korean No-dong missile from which they are derived. Although early variants of the Shahab-3 missile were relatively inaccurate, "Iran has employed Chinese guidance technology on later variants to significantly improve strike accuracy." In 2014, then-Defense Intelligence Agency Director Lieutenant General Michael T. Flynn warned that:

Iran can strike targets throughout the region and into Eastern Europe. In addition to its growing missile and rocket inventories, Iran is seeking to enhance [the] lethality and effectiveness of existing systems with improvements in accuracy and warhead designs. Iran is developing the Khalij Fars, an anti-ship ballistic missile which could threaten maritime activity throughout the Persian Gulf and Strait of Hormuz. Iran's Simorgh space launch vehicle shows the country's intent to develop intercontinental ballistic missile (ICBM) technology<sup>58</sup>

Iran's ballistic missiles threaten U.S. bases and allies from Turkey, Israel, and Egypt to the west to Saudi Arabia and the other Gulf States to the south and Afghanistan and Pakistan to the east. Iran also has become a center for missile proliferation by exporting a wide variety of ballistic missiles, cruise missiles, and rockets to the Assad regime in Syria and such proxy groups as Hezbollah, Hamas, Palestinian Islamic Jihad, the Houthi rebels in Yemen, and Iraqi militias. The Houthi Ansar Allah group has launched hundreds of Iranian-supplied ballistic missiles and armed drones against targets in Saudi Arabia and the UAE, which launched a military campaign against them in 2015 in support of Yemen's government. On January 24, 2022, the Houthis launched two ballistic missiles at Al Dhafra air base in the UAE, which hosts roughly 2,000 U.S. military personnel who took shelter in security bunkers as the incoming missiles were intercepted by Patriot surface-to-air missiles.<sup>59</sup>

However, it is Israel, which has fought a shadow war with Iran and its terrorist proxies, that is most at risk from an Iranian missile attack. In case the Israeli government had any doubt about Iran's implacable hostility, the Revolutionary Guard Corps, which controls most of Iran's strategic missile systems, displayed a message written in Hebrew on the side of one of the Iranian missiles tested in March 2016: "Israel must be wiped off the earth." The development of nuclear warheads for Iran's ballistic missiles would significantly degrade Israel's ability to deter major Iranian attacks (an ability that the existing but not officially acknowledged Israeli nuclear weapons arsenal currently provides).

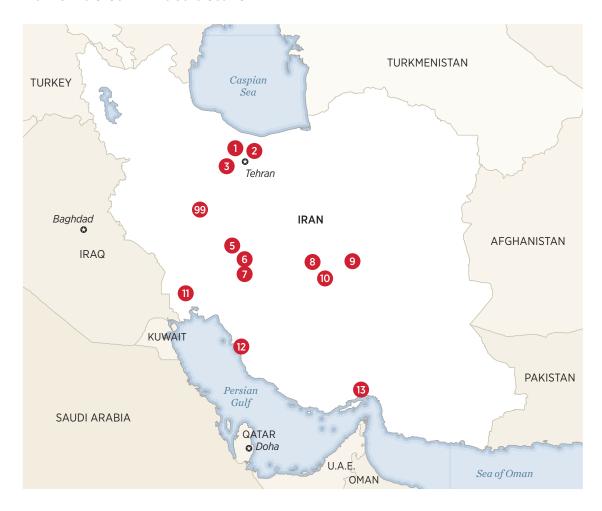
For Iran's radical regime, hostility to Israel, which Tehran sometimes calls the "Little Satan," is second only to hostility to the United States, which the leader of Iran's 1979 revolution, Ayatollah Khomeini, dubbed the "Great Satan." However, Iran poses a greater immediate threat to Israel than it does to the United States: Israel is a smaller country, has fewer military capabilities, and is located much closer to Iran and already within range of Iran's Shahab-3 missiles.

Moreover, all of Israel can be hit with the thousands of shorter-range rockets that Iran has provided to Hezbollah in Lebanon and to Hamas and Palestinian Islamic Jihad in Gaza. In April 2021, Hamas and Palestinian Islamic Jihad launched more than 4,000 rockets and missiles in an 11-day miniwar with Israel. 61 Hezbollah, which targeted Israel with more than 4,000 rockets and missiles in the 2006 war, has an arsenal of as many as 150,000 rockets and missiles that it could use to bombard Israel with an estimated 1,500 strikes per day.62 If Iran and Israel escalate their shadow war to a full-scale war, Israel is likely to be attacked by Iranian rockets, missiles, and drones launched not only by Iranian military forces, but also by Iranian proxy groups based in Lebanon, Syria, Gaza, Iraq and Yemen.

Weapons of Mass Destruction. Tehran has invested tens of billions of dollars since the 1980s in a nuclear weapons program that it sought to conceal within its civilian nuclear power program. It built clandestine but subsequently discovered underground uranium enrichment facilities near Natanz and Fordow and a heavy-water reactor near Arak that would generate plutonium to give it a second potential route to nuclear weapons. <sup>63</sup>

Before the 2015 nuclear deal, Iran had accumulated enough low-enriched uranium to build eight

### Iran's Nuclear Infrastructure



- Karaj Agricultural and Medical Center
- 2 Tehran Research Reactor
- 3 Fordow Fuel Enrichment Plant
- 5 Arak Heavy-Water Reactor
- 5 Isfahan Nuclear Research Center
- 6 Isfahan Uranium Conversion Facility
- 7 Fuel Manufacturing Plant
- 8 Nataz Fuel Enrichment Plant
- Saghand Mine
- 10 Yellow Cake Production Plant
- 11 Darkhovin Nuclear Power Plant
- 12 Bushehr Nuclear Power Plant
- 13 Gchine Mine

**SOURCE:** International Crisis Group, "The Iran Nuclear Deal at Six: Now or Never," *Middle East Report* No. 230, January 17, 2022, https://www.crisisgroup.org/middle-east-north-africa/gulf-and-arabian-peninsula/iran/230-iran-nuclear-deal-six-now-never (accessed August 11, 2022).

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nuclear bombs (assuming that the uranium was enriched to weapon-grade levels). In November 2015, the Wisconsin Project on Nuclear Arms Control reported that "[b]y using the approximately 9,000 first generation centrifuges operating at its Natanz Fuel Enrichment Plant as of October 2015, Iran could theoretically produce enough weapon-grade uranium to fuel a single nuclear warhead in less than 2 months."

Clearly, the development of a nuclear bomb would greatly amplify the threat posed by Iran. Even if Iran did not use a nuclear weapon or pass it on to one of its terrorist surrogates to use, the regime could become emboldened to expand its support for terrorism, subversion, and intimidation, assuming that its nuclear arsenal would protect it from retaliation as has been the case with North Korea.

On July 14, 2015, President Barack Obama announced that the United States and Iran, along with China, France, Germany, Russia, the United Kingdom, and the EU High Representative for Foreign Affairs and Security Policy, had reached "a comprehensive, long-term deal with Iran that will prevent it from obtaining a nuclear weapon." The short-lived agreement, however, did a much better job of dismantling sanctions against Iran than it did of dismantling Iran's nuclear infrastructure, much of which was allowed to remain functional subject to weak restrictions, some of them only temporary. This flaw led President Donald Trump to withdraw the U.S. from the agreement on May 8, 2018, and reimpose sanctions. 66

In fact, the agreement did not specify that any of Iran's covertly built facilities would have to be dismantled. The Natanz and Fordow uranium enrichment facilities were allowed to remain in operation, although the latter facility was to be repurposed at least temporarily as a research site. The heavy-water reactor at Arak was also retained with modifications that would reduce its yield of plutonium. All of these facilities, built covertly and housing operations prohibited by multiple U.N. Security Council resolutions, were legitimized by the agreement.

The Iran nuclear agreement marked a risky departure from more than five decades of U.S. nonproliferation efforts under which Washington opposed the spread of sensitive nuclear technologies such as uranium enrichment even to allies. Iran got a better deal on uranium enrichment under the agreement than such U.S. allies as the UAE, South Korea, and

Taiwan have received from Washington in the past. In fact, the Obama Administration gave Iran better terms on uranium enrichment than President Gerald Ford's Administration gave the Shah of Iran, a close U.S. ally before the 1979 revolution, who was denied independent reprocessing capabilities.

President Trump's decision to withdraw from the nuclear agreement marked a return to long-standing U.S. nonproliferation policy. Iran, Britain, France, Germany, the EU, China, and Russia sought to salvage the agreement but were unable to offset the strength of U.S. nuclear sanctions that were fully reimposed by November 4, 2018, after a 180-day wind-down period.

Iran initially adopted a policy of "strategic patience," seeking to preserve as much of the agreement's relief from sanctions as it could while hoping to outlast the Trump Administration and deal with a more pliable successor Administration after the 2020 elections. The Trump Administration, however, increased sanctions to unprecedented levels under its "maximum pressure" campaign. On April 8, 2019, it designated Iran's Revolutionary Guards as a foreign terrorist organization. Because the Revolutionary Guards are extensively involved in Iran's oil, construction, and defense industries, this allowed U.S. sanctions to hit harder at strategic sectors of Iran's economy.<sup>67</sup> On April 22, 2019, Secretary of State Mike Pompeo announced that the Administration would eliminate waivers for Iran's remaining oil exports on May 2 and seek to zero them out entirely.68

Although President Trump made it clear that he sought a new agreement on Iran's nuclear program, Tehran refused to return to the negotiating table. Instead, it sought to pressure European states into protecting it from the effects of U.S. sanctions.

On May 8, 2019, Iranian President Rouhani announced that Iran would no longer comply with the 2015 nuclear agreement's restrictions on the size of Iran's stockpiles of enriched uranium and heavy water. <sup>69</sup> Tehran gave the Europeans 60 days to deliver greater sanctions relief, specifically with respect to oil sales and banking transactions, and warned that if the terms of its ultimatum were not met by July 7, 2019, it would incrementally violate the restrictions set by the JCPOA. Since then, Iran has escalated its noncompliance with the agreement in a series of major violations that include breaching the caps on uranium enrichment, research and development of

advanced centrifuges, numbers of operating centrifuges, and resuming enrichment at the fortified Fordow facility. When announcing the fifth breach in January 2020, Iran stated that its uranium enrichment program no longer faced any restrictions.<sup>70</sup>

By February 2021, Iran had accumulated about 4,390 kilograms of low-enriched uranium and had reduced its estimated breakout time (the time needed to produce enough weapon-grade uranium for one nuclear weapon) to as little as 2.7 months with enough enriched uranium to arm three nuclear weapons within six months if it continued to enrich to higher levels. In April 2021, Iran began to enrich its uranium to 60 percent, a short step away from the weapon-grade level of 90 percent. By June 2022, Iran's breakout time had fallen to zero. It had acquired enough highly enriched uranium to arm a bomb within weeks if further enriched and could acquire enough for five bombs within six months. In the same step is a supplied to the same step is a sup

Although Tehran has not enriched to weapon-grade levels so far, it essentially has become a threshold nuclear power and seeks to leverage that status to gain additional concessions from the U.S. at the multilateral nuclear negotiations in Vienna, Austria. Those talks, begun in April 2021, had been frozen since March 2022, largely because of Iran's insistence that it gain sanctions relief for the IRGC, which Washington has designated as a foreign terrorist organization. Two days of new "last-gasp talks," facilitated by representatives from the European Union, were attempted in Doha in June 2022 but ended abruptly when disputes about sanctions and Iran's request for a guarantee that no future U.S. government would seek to withdraw from the agreement could not be resolved.73

Iran's accelerating nuclear program prompted Israel to step up its covert efforts to sabotage Iran's nuclear progress. Israel had worked with the U.S. to sabotage Iran's centrifuge operations with the Stuxnet virus cyberattacks before the 2015 agreement and had unilaterally launched operations to assassinate Iranian nuclear scientists.

Israel paused the assassination campaign during the runup to the 2015 nuclear agreement but then escalated its covert efforts after the 2018 U.S. withdrawal from the agreement. Iran's top nuclear scientist, Mohsen Fakhrizadeh, was killed by a remote-controlled machine gun on November 27, 2020.<sup>74</sup> On April 11, 2021, Iran's uranium enrichment efforts were disrupted by an explosion that cut

Iran also is a declared chemical weapons power that used chemical weapons in its war against Iraq after the Iraqis conducted chemical attacks. Tehran claims to have destroyed all of its stockpiles of chemical weapons, but it has never fully complied with the Chemical Weapons Convention or declared its holdings. U.S. intelligence agencies have assessed that Iran maintains "the capability to produce chemical warfare (CW) agents and 'probably' has the capability to produce some biological warfare agents for offensive purposes, if it made the decision to do so."

Iranian Threats to Israel. In addition to ballistic missile threats from Iran, Israel faces the constant threat of attack from Palestinian, Lebanese, Egyptian, Syrian, and other Arab terrorist groups, including many that are supported by Iran. The threat posed by Arab states, which lost four wars against Israel in 1948, 1956, 1967, and 1973 (Syria and the PLO lost a fifth war in 1982 in Lebanon), has gradually declined. Egypt, Jordan, the UAE, Bahrain, and Morocco have signed peace treaties with Israel, and Iraq, Libya, Syria, and Yemen have been distracted by civil wars. At the same time, however, unconventional military and terrorist threats from an expanding number of substate actors have risen substantially.

Iran has systematically bolstered many of these groups, including some whose ideology it does not necessarily share. Today, for example, Iran's surrogates Hezbollah and Palestinian Islamic Jihad, along with more distant ally Hamas, pose the chief immediate security threats to Israel. After Israel's May 2000 withdrawal from southern Lebanon and the September 2000 outbreak of fighting between Israelis and Palestinians, Hezbollah stepped up its support for such Palestinian extremist groups as Hamas, Palestinian Islamic Jihad, the al-Aqsa Martyrs'

Brigades, and the Popular Front for the Liberation of Palestine. It also expanded its own operations in the West Bank and Gaza and provided funding for specific attacks launched by other groups.

In July 2006, Hezbollah forces crossed the Lebanese border to kidnap Israeli soldiers inside Israel, igniting a military clash that claimed hundreds of lives and severely damaged the economies on both sides of the border. Hezbollah has since rebuilt its depleted arsenal with help from Iran and Syria and has amassed at least 130,000 rockets and missilesmore than all of the European members of NATO combined.79 Some of the most dangerous are longrange Iranian-made missiles capable of striking cities throughout Israel.80 In recent years, under cover of the war in Syria, Iran has provided Hezbollah with increasingly sophisticated, accurate, and longer-range weapons as well as guidance kits that upgrade the accuracy of older rockets.81 Iran and Hezbollah also have established another potential front against Israel in Syria.

Since Israel's withdrawal from the Gaza Strip in 2005, Hamas, Palestinian Islamic Jihad, and other terrorist groups have fired more than 11,000 rockets into Israel during brief wars in 2008–2009, 2012, and 2014. More than 5 million Israelis out of a total population of 8.1 million live within range of rocket attacks from Gaza, although the successful operation of the Iron Dome anti-missile system has greatly mitigated this threat in recent years. In the 2014 Gaza war, Hamas also unveiled a sophisticated tunnel network that it used to infiltrate Israel so that it could launch attacks on Israeli civilians and military personnel.

In early May 2019, Palestinian Islamic Jihad ignited another round of fighting in Gaza during which "Hamas and other groups fired about 700 rockets into Israel on May 4 alone—for comparison, in 2014 they fired fewer than 200 rockets per day." In May 2021, Hamas and Palestinian Islamic Jihad launched another 11-day war during which they fired about 4,300 rockets at Israel, killing 12 Israelis while suffering more than 240 Palestinian deaths, including roughly 200 militants, according to Israel. 4 Gaza remains a flash point that could trigger another conflict with little warning.

Threats to Saudi Arabia and Other Members of the Gulf Cooperation Council. In 1981, Saudi Arabia and the five other Arab Gulf States—Bahrain, Kuwait, Oman, Qatar, and the UAE—formed the Gulf

Cooperation Council (GCC) to deter and defend against Iranian aggression. Iran remains the primary external threat to their security. Tehran has supported groups that launched terrorist attacks against Bahrain, Iraq, Kuwait, Saudi Arabia, and Yemen.

Iran sponsored the Islamic Front for the Liberation of Bahrain, a surrogate group that plotted a failed 1981 coup against Bahrain's ruling Al Khalifa family, the Sunni rulers of the predominantly Shia country. Iran also has long backed Bahraini branches of Hezbollah and the Dawa Party. When Bahrain was engulfed in a wave of Arab Spring protests in 2011, its government charged that Iran again exploited the protests to back the efforts of Shia radicals to overthrow the royal family. Saudi Arabia, fearing that a Shia revolution in Bahrain would incite its own restive Shia minority, led a March 2011 GCC intervention that backed Bahrain's government with about 1,000 Saudi troops and 500 police from the UAE.

Bahrain has repeatedly intercepted shipments of Iranian arms, including sophisticated bombs employing explosively formed penetrators. The government withdrew its ambassador to Tehran when two Bahrainis with ties to the IRGC were arrested after their arms shipment was intercepted off Bahrain's coast in July 2015.

Iranian hard-liners have steadily escalated their pressure on Bahrain. In March 2016, a former IRGC general who is a close adviser to Ayatollah Khamenei stated that "Bahrain is a province of Iran that should be annexed to the Islamic Republic of Iran." After Bahrain stripped a senior Shiite cleric, Sheikh Isa Qassim, of his citizenship, General Qassim Suleimani, commander of the IRGC's Quds Force, threatened to make Bahrain's royal family "pay the price and disappear." 66

Saudi Arabia has criticized Iran for supporting radical Saudi Shiites, intervening in Syria, and supporting Shiite Islamists in Lebanon, Iraq, and Yemen. In January 2016, Saudi Arabia executed a Shiite cleric charged with sparking anti-government protests and cut diplomatic ties with Iran after Iranian mobs responded to the execution by attacking and setting fire to the Saudi embassy in Tehran.<sup>87</sup>

In addition to military threats from Iran, Saudi Arabia and the other GCC states face terrorist threats and possible rebellions by Shia or other disaffected internal groups supported by Tehran. Iran has backed Shiite terrorist groups against Saudi Arabia, Bahrain, Iraq, and Kuwait and has supported the

Shiite Houthi rebels in Yemen. In March 2015, Saudi Arabia led a 10-country coalition that launched a military campaign against Houthi forces and provided support for ousted Yemeni President Abdu Rabu Mansour Hadi, who took refuge in Saudi Arabia. The Saudi Navy also established a blockade of Yemeni ports to prevent Iran from aiding the rebels.

The Houthis have retaliated by launching Iranian-supplied missiles at military and civilian targets in Saudi Arabia and the UAE, including ballistic missile attacks on airports, Riyadh, and other cities as well as cruise missile strikes. In December 2017, the Houthis launched a cruise missile attack on an unfinished nuclear reactor in Abu Dhabi.

The Houthis also have made extensive use of UAVs and UCAVs (unmanned combat aerial vehicles, or armed drones). A Houthi UCAV attacked a military parade in Yemen in January 2019, killing at least six people including Yemen's commander of military intelligence, and longer-range UCAVs were used in a coordinated attack on Saudi Arabia's East-West pipeline on May 14, 2019. The Houthis have employed Iranian Sammad-2 and Sammad-3 UCAVs in strikes against Riyadh, Abu Dhabi International Airport in the UAE, and other targets.

In addition, the Houthis have steadily increased their attacks. During the first nine months of 2021, Houthi attacks against Saudi Arabia averaged 78 a month, more than double the number from the same period in 2020 when the average was 38 per month. Of A cease-fire reached in April 2022 to allow negotiations has reduced the scale of the fighting in Yemen, but cross-border attacks could resume if peace negotiations break down.

#### Threats to the Commons

The United States has critical interests at stake in the Middle Eastern commons: sea, air, space, and cyber. The U.S. has long provided the security backbone in these areas, and this security has supported the region's economic development and political stability.

**Sea.** Maintaining the security of the sea lines of communication in the Persian Gulf, Arabian Sea, Red Sea, and Mediterranean Sea is a high priority for strategic, economic, and energy security purposes. "In 2021," according to the U.S. Energy Administration, "the seven countries in the Persian Gulf produced about 30% of total world crude oil, and they held about 48% of world proved crude oil

reserves at the start of 2020."<sup>91</sup> The Persian Gulf is a crucial source of oil and gas for energy-importing states, particularly China, India, Japan, South Korea, and many European countries. Interstate conflict or terrorist attacks could easily interrupt the flow of that oil.

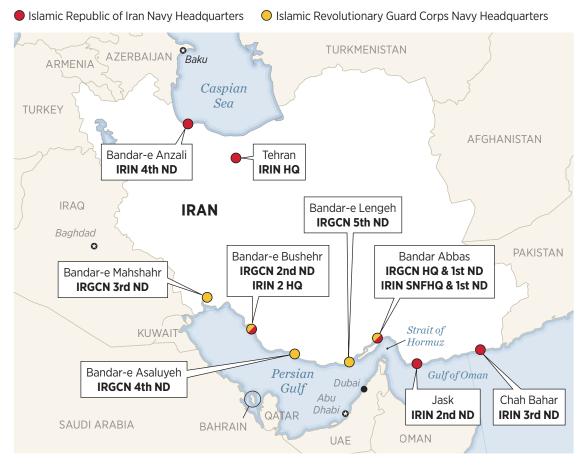
Bottlenecks such as the Strait of Hormuz, Suez Canal, and Bab el-Mandeb Strait are potential choke points for restricting the flow of oil, international trade, and the deployment of U.S. and allied naval forces. Although the United States has reduced its dependence on oil exports from the Gulf, it still would sustain economic damage in the event of a spike in world oil prices, and many of its European and Asian allies and trading partners import a substantial portion of their oil needs from the region.

The world's most important maritime choke point and the jugular vein through which most Gulf oil exports flow to Asia and Europe is the Strait of Hormuz. In 2018, the "daily oil flow [through the Strait of Hormuz] averaged 21 million barrels per day (b/d), or the equivalent of about 21% of global petroleum liquids consumption." The chief potential threat to the free passage of ships through the strait is Iran, whose Supreme Leader, Ayatollah Ali Khamenei, proclaimed in 2006 that "[i]f the Americans make a wrong move toward Iran, the shipment of energy will definitely face danger, and the Americans would not be able to protect energy supply in the region."

Iranian officials often reiterate these threats during periods of heightened tension. For example, the chief of staff of Iran's army, Major General Mohammad Baqeri, warned on April 28, 2019, that "if our oil does not pass, the oil of others shall not pass the Strait of Hormuz either." Less than one month later, Iran began to intensify its intimidation tactics against international shipping near the strait.

On May 12, 2019, four oil tankers were damaged by mysterious explosions off the coast of the UAE in the Gulf of Oman. Then-U.S. National Security Adviser John Bolton stated that it was "naval mines almost certainly from Iran" that caused the damage. On June 13, two more tankers were attacked in the Gulf of Oman. Even though Iranian Revolutionary Guards were filmed removing an unexploded limpet mine from one of the damaged ships, Tehran continued to deny its involvement in all of the attacks. On June 19, an IRGC surface-to-air missile shot down a U.S. surveillance drone in international air

### **Iranian Naval Headquarters**



ND — Naval district

**SOURCE:** U.S. Department of Defense, Defense Intelligence Agency, *Iran Military Power: Ensuring Regime Survival and Securing Military Dominance*, 2019, p. 48, https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Iran Military Power LR.pdf (accessed July 23, 2021).

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space. The U.S. initially planned to launch retaliatory strikes, but President Trump called off the operation. <sup>97</sup> In September, Iran continued its aggressive behavior by launching a sophisticated UCAV and cruise missile attack on Saudi oil facilities.

Then, in late 2019, Iranian-controlled Iraqi militias launched a series of rocket attacks on Iraqi bases containing U.S. troops, provoking U.S. retaliatory air strikes against those militias and the January 2020 UCAV strike that killed General Qassem Soleimani. Rocket attacks by Iraqi militias have continued, and tensions remain high in Gulf waters.

On May 10, 2020, a missile launched from an Iranian Navy frigate struck another Iranian naval vessel during a military exercise in the Gulf of Oman, killing at least 19 sailors and wounding 15.98 The incident raised questions about the competence and training of Iran's naval forces. The June 2, 2021, sinking of the *Kharg*, Iran's largest warship, raised similar questions. The *Kharg*, a naval replenishment ship, caught fire and sank in the Gulf of Oman during a training exercise. Iran sustained another setback when its newest frigate, the *Talayieh*, capsized in its dry dock on December 5, 2021.

However, while Iran's military forces have suffered numerous accidents because of lax maintenance and safety practices, there also was speculation that some of the incidents may have resulted from covert Israeli attacks. Israel reportedly has attacked at least 12 Iranian vessels transporting oil, arms, and other cargo to Syria to prop up the Assad regime and Hezbollah.99 It also has been suspected of triggering the April 6, 2021, explosion that damaged the Saviz, a converted cargo ship permanently moored in the Red Sea near the coast of Yemen to collect intelligence and support Iran's Houthi allies. 100 For its part, Iran is suspected of at least two attacks on Israeli-owned cargo ships: one on February 25, 2021, in the Gulf of Oman and another on March 25, 2021, in the Arabian Sea. 101 Although its contours remain murky, it is clear that the Iran-Israel shadow war has expanded to include maritime attacks.

Iran has a long history of attacking oil shipments in the Gulf. During the Iran–Iraq war, each side targeted the other's oil facilities, ports, and oil exports. Iran escalated attacks to include neutral Kuwaiti oil tankers and terminals and clandestinely laid mines in Persian Gulf shipping lanes while its ally Libya clandestinely laid mines in the Red Sea. The United States defeated Iran's tactics by reflagging Kuwaiti oil tankers, clearing the mines, and escorting ships through the Persian Gulf, but several commercial vessels were damaged during the so-called Tanker War from 1984 to 1987.

Iran's demonstrated willingness to disrupt oil traffic through the Persian Gulf to pressure Iraq economically is a red flag to U.S. military planners. During the 1980s Tanker War, Iran's ability to strike at Gulf shipping was limited by its aging and outdated weapons systems and the arms embargo imposed by the U.S. after the 1979 revolution. Since the 1990s, however, Iran has been upgrading its military with new weapons from North Korea, China, and Russia in addition to domestically manufactured weapons.

Since the Iran–Iraq war, Tehran has invested heavily in developing its naval forces, particularly the IRGC Navy, along unconventional lines. Today, Iran boasts an arsenal of Iranian-built missiles based on Russian and Chinese designs that represent significant threats to oil tankers as well as warships. Iran has deployed mobile anti-ship missile batteries along its 1,500-mile Gulf coast and on many of the 17 Iranian-controlled islands in the Gulf in addition to modern anti-ship missiles

mounted on fast attack boats, submarines, oil platforms, and vessels disguised as civilian fishing boats. Six of Iran's 17 islands in the Gulf—Forur, Bani Forur, Sirri, and three islands seized from the UAE: Abu Musa, Greater Tunb, and Lesser Tunb—are particularly important because they are located close to the shipping channels that all ships must use near the Strait of Hormuz.

Iran has imported Russian submarines, North Korean minisubmarines, and a wide variety of advanced Chinese anti-ship missiles. It also has a significant stock of Chinese-designed anti-ship cruise missiles, including the older HY-2 Seersucker and the more modern CSS-N-4 Sardine and CSS-N-8 Saccade models, and has reverse engineered Chinese missiles to produce its own Ra'ad and Noor anti-ship cruise missiles. More recently, Tehran has produced and deployed more advanced anti-ship cruise missiles, the Nasir and Qadir. Shore-based missiles deployed along Iran's coast would be augmented by aircraft-delivered laser-guided bombs and missiles as well as by television-guided bombs.

Iran has a large supply of anti-ship mines, including modern mines that are far superior to the simple World War I–style contact mines that it used in the 1980s. In addition to expanding the quantity of its mines from an estimated 1,500 during the Iran–Iraq war to more than 5,000 in 2019, Tehran has increased their quality. It has acquired significant stocks of "smart mines" including versions of the Russian MDM-6, Chinese MC-52, and Chinese EM-11, EM-31, and EM-55 mines. One of Iran's most lethal mines is the Chinese-designed EM-52 "rocket" mine, which remains stationary on the sea floor and fires a homing rocket when a ship passes overhead.

Iran can deploy mines or torpedoes from its three *Kilo*-class submarines, purchased from Russia and based at Bandar Abbas, Iran's largest seaport and naval base. These submarines could be difficult to detect for brief periods when running silent and remaining stationary on a shallow bottom just outside the Strait of Hormuz. <sup>105</sup> Iran also could use minisubmarines, helicopters, or small boats disguised as fishing vessels to deploy its mines. Iran's robust mine warfare capability and the U.S. and allied navies' limited capacity for countermine operations are major challenges to Gulf maritime security. <sup>106</sup>

Iran has developed two separate naval forces. The regular navy takes the lead in the Caspian Sea and outside the Strait of Hormuz in the Gulf of Oman, and the Islamic Revolutionary Guard Corps Navy is Iran's dominant force inside the Persian Gulf. The IRGC Navy has developed an effective asymmetric naval warfare strategy that could enable it to counter the superior firepower and technology of the U.S. Navy and its GCC allies, at least for a short period. It has adopted swarming tactics using well-armed fast attack boats to launch surprise attacks against larger and more heavily armed naval adversaries.

The commander of the IRGC Navy bragged in 2008 that it had brought guerilla warfare tactics to naval warfare: "We are everywhere and at the same time nowhere." The IRGC has honed such unconventional tactics as deploying remote-controlled radar decoy boats and boats packed with explosives to confuse defenses and attack adversaries. It also could deploy naval commandos trained to attack using small boats, minisubmarines, and even Jet Skis as well as underwater demolition teams that could attack offshore oil platforms, moored ships, ports, and other facilities.

On April 28, 2015, the Revolutionary Guard naval force seized the Maersk Tigris, a container ship registered in the Marshall Islands, near the Strait of Hormuz. Tehran claimed that it seized the ship because of a previous court ruling ordering the Maersk Line, which charters the ship, to make a payment to settle a dispute with a private Iranian company. The ship was later released after being held for more than a week.<sup>108</sup> Then, on May 14, 2015, the Alpine Eternity, a Singapore-flagged oil tanker, was surrounded and attacked by Revolutionary Guard gunboats in the Strait of Hormuz when it refused to be boarded. Iranian authorities alleged that it had damaged an Iranian oil platform in March, but the ship's owners maintained that it had hit an uncharted submerged structure.109

The Revolutionary Guard's aggressive tactics in using commercial disputes as pretexts for illegal seizures of transiting vessels prompted the U.S. Navy to escort American and British-flagged ships through the Strait of Hormuz for several weeks in May 2015 before tensions eased. Iran again resorted to pirate tactics when it seized two Greek tankers on May 27, 2022, in retaliation for Greece's seizure of an Iranian oil tanker in April 2022.

The July 2015 nuclear agreement did not alter the Revolutionary Guard's confrontational tactics in the Gulf. II RGC naval forces have challenged U.S. naval

forces in a series of incidents. IRGC missile boats launched rockets within 1,500 yards of the carrier *Harry S. Truman* near the Strait of Hormuz in late December 2015, <sup>112</sup> have flown drones over U.S. warships, <sup>113</sup> and detained and humiliated 10 American sailors in a provocative January 12, 2016, incident. <sup>114</sup> Even though the two U.S. Navy boats carrying the sailors had drifted inadvertently into Iranian territorial waters and had the right of innocent passage, their crews were disarmed, forced onto their knees, filmed, and exploited in propaganda videos.

In 2017, for unknown reasons, Iran temporarily halted the harassment of U.S. Navy ships. According to U.S. Navy reports, Iran instigated 23 "unsafe and/or unprofessional" interactions with U.S. Navy ships in 2015, 35 in 2016, and 14 in the first eight months of 2017 with the last incident occurring on August 14, 2017.<sup>115</sup> The provocations resumed in April 2020 when 11 IRGC Navy gunboats harassed six U.S. Navy vessels that were conducting exercises in the international waters of the North Arabian Gulf.<sup>116</sup> One week later, President Trump warned that U.S. Navy forces were authorized to destroy any Iranian vessels that harassed them. Iran's naval harassment subsided for a time but resumed in April 2021 when the IRGC Navy staged two incidents, forcing U.S. naval vessels to take evasive action in the first and fire warning shots in the second.117

Iran has been accused of spoofing satellite navigation systems to lure foreign ships into its territorial waters so that it can seize them. This may have occurred in 2016 when 10 U.S. sailors were captured near an Iranian island and in 2019 when the *Stena Impero* tanker was seized in the Strait of Hormuz. Iran also may have used a similar technique to divert a U.S. UAV from Afghan airspace to Iran where it was captured and put on display in 2011.

If Tehran were to attack ships transiting the Strait of Hormuz, the United States and its allies have the capacity to counter Iran's maritime threats and restore the flow of oil exports, but "the effort would likely take some time—days, weeks, or perhaps months—particularly if a large number of Iranian mines need to be cleared from the Gulf." In May 2019, naval warfare experts estimated that by using its combined coastal missile batteries, mines, submarines, and naval forces, Iran could close the strait for up to four weeks. Iran could close the strait for up to strait would also block Iran's oil exports

and many of its imports, including imports of food and medicine. Moreover, most of Iran's naval forces, naval bases, and other military assets could be destroyed in the resulting conflict.

In addition to using its own forces, Tehran could use its extensive network of clients in the region to sabotage oil pipelines and other infrastructure or to strike oil tankers in port or at sea. Iranian Revolutionary Guards deployed in Yemen reportedly played a role in the unsuccessful October 9 and 12, 2016, missile attacks launched by Houthi rebels against the USS Mason, a U.S. Navy warship, near the Bab el-Mandeb Strait in the Red Sea.<sup>121</sup> The Houthis denied that they launched the missiles, but they did claim responsibility for an October 1, 2016, attack on a UAE naval vessel and the February 2017 suicide boat bombing of a Saudi warship. On January 3, 2022, Houthi naval forces seized a UAE freighter in the Red Sea off Yemen's west coast.

Houthi irregular forces have deployed mines along Yemen's coast, used a remote-controlled boat packed with explosives in an unsuccessful July 2017 attack on the Yemeni port of Mokha, and have launched several unsuccessful naval attacks against ships in the Red Sea. Houthi gunboats also attacked and damaged a Saudi oil tanker near the port of Hodeidah on April 3, 2018.

U.N. investigators have concluded that the Houthis also operate UAVs with a range of up to 1,500 kilometers (930 miles), several of which were used to attack Saudi Arabia's East-West pipeline on May 14, 2019.122 This attack and attacks on oil tankers in the Gulf of Oman two days earlier were likely a signal from Tehran that it can also disrupt oil shipments outside the Persian Gulf in a crisis. The Houthis have staged numerous UCAV attacks on Saudi targets along with a cruise missile attack on June 12, 2019, and an attack by 10 ballistic missiles on August 25, 2019.123 The Houthis also claimed responsibility for the September 14, 2019, attacks on Saudi oil facilities at Abgaig, but U.S. officials asserted that intelligence reports identified Iran as the staging ground for the attacks. <sup>124</sup> On March 7, 2021, the Houthis launched long-range UAVs and ballistic missiles provided by Iran at Saudi Arabia's Ras Tanura oil shipment facility, which is the world's largest, driving oil prices up to over \$70 per barrel for the first time since the COVID-19 pandemic depressed the global economy.<sup>125</sup>

**Air.** The Middle East is particularly vulnerable to attacks on civilian aircraft. Large quantities of arms, including man-portable air defense systems, were looted from arms depots in Libya, Iraq, Syria, and Yemen during their civil wars and could be in the hands of Iranian-supported groups. Iran has provided anti-aircraft missiles to Hezbollah, Iraqi militias, and the Houthi rebels in Yemen. The Houthis also have attacked Saudi airports with ballistic missiles and armed drones, although they may have been targeting nearby military facilities. 126

Perhaps the greatest Iranian threat to civil aviation would come in the event of a military clash in the crowded skies over the Persian Gulf. On May 16, 2019, during a period of heightened tensions with Iran, the U.S. Federal Aviation Administration warned commercial airlines that civilian planes risked being targeted by the Iranian military as a result of "miscalculation or misidentification." <sup>127</sup>

Tragically, this warning foreshadowed the January 8, 2020, shooting down of Ukraine International Airlines Flight 752 that killed 176 passengers and crew, most of them Iranians. Several hours earlier, Iran had launched a ballistic missile attack on Iraqi bases hosting U.S. troops, and Iranian officials later admitted that they had kept Tehran's airport open in the hope that the presence of passenger jets could act as a deterrent against an American attack on the airport or a nearby military base. 128

**Space.** Iran has launched satellites into orbit, but there is no evidence that it has an offensive space capability. Tehran successfully launched three satellites in February 2009, June 2011, and February 2012 using the Safir space launch vehicle, which uses a modified Ghadr-1 missile for its first stage and has a second stage that is based on the obsolete Soviet R-27 submarine-launched ballistic missile. <sup>129</sup> The technology probably was transferred by North Korea, which built its BM-25 missiles using the R-27 as a model. <sup>130</sup> Safir technology could be used to develop long-range ballistic missiles.

In December 2013, Iran claimed that it had "sent a monkey into space for the second time, representing the nation's latest step toward sending humans into space."<sup>131</sup> Tehran also announced in June 2013 that it had established its first space tracking center to monitor objects in "very remote space" and help manage the "activities of satellites."<sup>132</sup> On July 27, 2017, Iran tested a Simorgh (Phoenix) space launch vehicle that it claimed could place a satellite

weighing up to 250 kilograms (550 pounds) in an orbit of 500 kilometers (311 miles). The satellite launch failed, as did another Simorgh-boosted satellite launch in January 2019. 134

In April 2020, Tehran finally discarded the pretense that its space program was dedicated exclusively to peaceful purposes. On April 22, Iran's Revolutionary Guards launched a Noor (Light) satellite into a low Earth orbit from a secret missile base to celebrate the 41st anniversary of the IRGC's founding. The spy satellite's path takes it over North Africa and the central Mediterranean, putting Israel within its potential field of vision approximately every 90 minutes. 135 General Jay Raymond, Commander, U.S. Space Command, dismissed the satellite as a "tumbling webcam in space," 136 but Iran's real achievement focused more on the previously unheard-of satellite carrier, the Qased (Messenger), a three-stage system that used both solid and liquid fuel.137 The technical advances required to launch a satellite are similar to those required to launch an ICBM, and the use of solid fuel could allow Iran to launch a missile more quickly—something that is crucial in an offensive weapon.

On February 2, 2021, Iran's Defense Ministry announced the successful development of a new satellite launch vehicle, the Zuljanah. The first two stages of the three-stage rocket use solid fuel, and the rocket can be launched from a mobile launch pad—two characteristics that are more suitable for a weapons system than for a satellite launch system. <sup>138</sup> In February 2022, a Zuljanah launch vehicle apparently blew up on a launch pad at the Imam Khomeini Spaceport. <sup>139</sup> Despite frequent failures, Iran's satellite launches have been criticized by the United States and other countries for defying a U.N. Security Council resolution calling on Tehran to undertake no activity related to ballistic missiles that are capable of delivering nuclear weapons.

**Cyber.** Iranian cyber capabilities present a significant threat to the U.S. and its allies. Iran has developed offensive cyber capabilities as a tool of espionage and sabotage and claims "to possess the fourth largest' cyber force in the world—a broad network of quasi-official elements, as well as regime-aligned hacktivists,' who engage in cyber activities broadly consistent with the Islamic Republic's interests and views." <sup>140</sup>

The creation of the Iranian Cyber Army in 2009 marked the beginning of a cyber offensive against

those whom the Iranian regime regards as enemies. The Ajax Security Team, a hacking group believed to be operating out of Iran, has used malware-based attacks to target U.S. defense organizations and has breached the Navy Marine Corps Intranet. <sup>141</sup> The group also has targeted dissidents within Iran, seeding versions of anti-censorship tools with malware and gathering information about users of those programs. <sup>142</sup> Iran has invested heavily in cyber activity, reportedly spending "over \$1 billion on its cyber capabilities in 2012 alone."

An April 2015 study released by the American Enterprise Institute reported that hostile Iranian cyber activity had increased significantly since the beginning of 2014 and could threaten U.S. critical infrastructure. The Islamic Revolutionary Guard Corps and Sharif University of Technology are two Iranian institutions that investigators have linked to efforts to infiltrate U.S. computer networks.<sup>144</sup>

Iran allegedly has used cyber weapons to engage in economic warfare, most notably the sophisticated and debilitating "[distributed] denial-of-service (DDoS) attacks against a number of U.S. financial institutions, including the Bank of America, JPMorgan Chase, and Citigroup." <sup>145</sup> In February 2014, Iran launched a crippling cyberattack against the Sands Casino in Las Vegas, owned by Sheldon Adelson, a leading supporter of Israel and critic of the Iranian regime. <sup>146</sup> In 2012, Tehran was suspected of launching both the Shamoon virus attack on Saudi Aramco, the world's largest oil-producing company—an attack that destroyed approximately 30,000 computers—and an attack on Qatari natural gas company Rasgas's computer networks. <sup>147</sup>

Israel has been a major target of Iranian cyberattacks. In 2014, Iranian hackers launched denial-of-service attacks against the infrastructure of the Israel Defense Forces. On April 24, 2020, an Iranian cyberattack targeted the command and control center of Israel's Water Authority, disrupting operations of Israeli water and sewage facilities. According to an Israeli cyber expert, the operation was "a first-of-its-kind attack and they were not far from inflicting human casualties."148 Israel retaliated with a May 9, 2020, cyberattack that disrupted operations at one of Iran's most important port facilities, the Shahid Rajaee terminal in Bandar Abbas. 149 In September 2020, according to the Israeli cybsersecurity company Clearsky, a hacker group linked to Iran targeted "many prominent Israeli

organizations." The group, named MuddyWater, used malware disguised as ransomware that would encrypt files and demand payment but not allow the files to be accessed.<sup>150</sup>

In the fall of 2015, U.S. officials warned of a surge of sophisticated Iranian computer espionage that would include a series of cyberattacks against State Department officials.<sup>151</sup> In March 2016, the Justice Department indicted seven Iranian hackers for penetrating the computer system that controlled a dam in the State of New York. 152 In April 2020, Iranlinked hackers targeted staff at the World Health Organization and the U.S. pharmaceutical company Gilead Sciences Inc., a leader in developing a treatment for the COVID-19 virus. 153 FBI Director Christopher Wray revealed in a June 1, 2022, speech in Boston that the FBI had thwarted an attempted Iranian government-sponsored cyberattack on Boston Children's Hospital in the summer of 2021, characterizing Iran's action as "one of the most despicable cyberattacks I've ever seen."154

The growing sophistication of these and other Iranian cyberattacks, together with Iran's willingness to use these weapons, has led various experts to characterize Iran as one of America's most cyber-capable opponents. Russia reportedly "has helped Iran become a cyber-power by supplying it with cyber weapons, information, and capabilities. In turn, Iran passed its expertise to its terrorist proxy Hizballah." Iranian cyber forces have gone so far as to create fake online personas in order to extract information from U.S. officials through such accounts as LinkedIn, YouTube, Facebook, and Twitter. 156

Significantly, the FBI sent the following cyber alert to American businesses on May 22, 2018:

The FBI assesses [that] foreign cyber actors operating in the Islamic Republic of Iran could potentially use a range of computer network operations—from scanning networks for potential vulnerabilities to data deletion attacks—against U.S.-based networks in response to the U.S. government's withdrawal from the Joint Comprehensive Plan of Action (JCPOA).<sup>157</sup>

On November 4, 2020, the U.S. Department of Justice announced that it had seized 27 domain names used by Iran's IRGC in a global covert influence campaign. <sup>158</sup> A National Intelligence Council report released on March 16, 2021, assessed that during the 2020 U.S. presidential election:

Iran carried out a multi-pronged covert influence campaign intended to undercut former President Trump's reelection prospects—though without directly promoting his rivals—undermine public confidence in the electoral process and US institutions, and sow division and exacerbate societal tensions in the US.<sup>159</sup>

Iran's election influence efforts were primarily focused on sowing discord in the United States and exacerbating societal tensions—including by creating or amplifying social media content that criticized former President Trump—probably because they believed that this advanced Iran's longstanding objectives and undercut the prospects for the former President's reelection without provoking retaliation.<sup>160</sup>

#### Conclusion

Iran represents by far the most significant security challenge to the United States, its allies, and its interests in the greater Middle East. Its open hostility to the United States and Israel, sponsorship of terrorist groups, and history of threatening the commons underscore the problem. Today, Iran's provocations are mostly a concern for the region and America's allies, friends, and assets there. Iran relies heavily on irregular (to include political) warfare against others in the region and fields more ballistic missiles than any of its neighboring countries field. The development of its ballistic missiles and potential nuclear capability also mean that it poses a significant long-term threat to the security of the U.S. homeland.

This *Index* therefore assesses the overall threat from Iran, considering the range of contingencies, as "aggressive." Iran's capability score holds at "gathering." <sup>161</sup>

## **Threats: Iran**

	HOSTILE	AGGRESSIVE	TESTING	ASSERTIVE	BENIGN
Behavior		✓			
	FORMIDABLE	GATHERING	CAPABLE	ASPIRATIONAL	MARGINAL
Capability		✓			

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- 160. Ibid., pp. 5-6.
- 161. This *Index* scores threat capability as it relates to the vital national interests of the United States and the role and utility of U.S. military forces. Terrorist groups clearly have the ability to conduct attacks using improvised explosive devices (IEDs), firearms, and even hijacked airplanes. The bombing of the Boston Marathon in April 2013, an attempted car bomb attack in New York City's Times Square in May 2010, and al-Qaeda's attacks on September 11, 2001, are stark examples. Often, the U.S. has handled terrorism as a law enforcement and intelligence collection matter, especially within the United States and when it presents a threat to particular U.S. interests in other countries. Compared to the types of threats posed by such states as China or Russia, terrorism is a lesser sort of threat to the security and viability of the U.S. as a global power. This *Index* does not dismiss the deaths, injuries, and damage that terrorists can inflict on Americans at home and abroad; it places the threat posed by terrorism in context with substantial threats to the U.S. homeland, the potential for major regional conflict, and the potential to deny U.S. access to the global commons. With this in mind, terrorist groups seldom have the physical ability either to accomplish their extreme stated objectives or to present a physical threat that rises to a level that threatens U.S. vital security interests. Of course, terrorist organizations can commit acts of war on a continuing basis, as reflected in their conduct in the war against al-Qaeda and its associates in which the United States has been engaged for more than two decades.

# North Korea

## Bruce Klingner

North Korea is a perennial problem in Asia because of the regime's consistently provocative behavior and enhanced missile, nuclear, and cyber capabilities, all of which pose a growing threat to the United States and its allies. These actions and capabilities, though not on the same existential scale as the threat posed by China or Russia, threaten to undermine not only regional stability and security, but the American homeland itself.

Pyongyang now has a spectrum of missile systems that threaten both the continental United States and U.S. forces and allies in Asia with nuclear weapons. On assuming power in 2011, Kim Jong-un accelerated nuclear and missile testing and oversaw an expansive diversification of North Korea's arsenal. He directed the North Korean military to develop a new strategy to invade and occupy Seoul within three days and all of South Korea within seven days. This would necessitate the early use of nuclear weapons and missiles against superior allied conventional forces. New weapons overcame the shortcomings of their predecessors and now pose a far greater threat to allied forces in spite of advancements in missile defense systems.

#### Threats to the Homeland

In 2017, North Korea conducted three successful launches of the Hwasong-14 and Hwasong-15 ICBMs, demonstrating the ability to target the entire continental United States with nuclear weapons. In January 2021, Kim Jong-un announced an ambitious plan to develop multiple-warhead ICBMs, hypersonic glide warheads, tactical nuclear weapons, nuclear-powered submarines, military reconnaissance satellites, and long-range submarine-launched ballistic missiles (SLBMs).<sup>2</sup>

In March 2022, the regime conducted the first test of the massive Hwasong-17, the world's largest

road-mobile ICBM, which exploded at an altitude of 20 kilometers. Eight days later, the regime successfully launched an ICBM, which it claimed was the Hwasong-17.<sup>3</sup> However, the U.S. and South Korea subsequently assessed that the second launch was actually a Hwasong-15, a model successfully tested in 2017. The missile flew considerably higher and farther than the 2017 Hwasong-15 launch.

The Hwasong-17 is assessed to carry three or four nuclear warheads and, combined with Pyongyang's recently confirmed ability to produce ICBM transporter-erector-launchers indigenously, conceivably could overwhelm the limited missile defenses protecting the American homeland. Currently, the U.S. is defended by only 44 Ground-Based Interceptors in Alaska and California and plans to add an additional 20 by the late 2020s.

To date, North Korea has launched all of its ICBMs on a highly lofted trajectory so that they would not fly over Japan. The regime could choose to be even more provocative by launching missiles in a normal trajectory over Japan; bracketing Guam with intermediate-range missiles (as it threatened to do in 2017); testing two long-range SLBM systems that have been paraded but not yet launched; or demonstrating the ability of an ICBM reentry vehicle to reenter the Earth's atmosphere successfully after a lengthy flight.

North Korea has conducted six nuclear tests, including a 2017 test of a powerful hydrogen bomb with an explosive yield approximately 10 times the yields of the Hiroshima and Nagasaki atomic bombs of World War II. In 2017, "the U.S. Defense Intelligence Agency (DIA), estimated [that North Korea had] a stockpile of up to 60 nuclear warheads." In addition, "[s]ome experts have estimated that North Korea could produce enough nuclear material for

an additional seven warheads per year,"<sup>5</sup> and others have estimated that the number could be as high as 12 per year.<sup>6</sup>

In August 2021, the International Atomic Energy Agency assessed that North Korea had resumed operations at its Yongbyon nuclear reactor, which produces plutonium for nuclear weapons. Pyongyang also may have reprocessed nuclear fuel from previous reactor operations. In recent years, North Korea has expanded and refined manufacturing facilities for fissile material, nuclear weapons, missiles, mobile missile launchers, and reentry vehicles. By 2027, according to a RAND analysis, "North Korea could have 200 nuclear weapons and several dozen intercontinental ballistic missiles (ICBMs) and hundreds of theater missiles for delivering the nuclear weapons."

Pyongyang has created a new generation of advanced mobile missiles that are more accurate, survivable, and capable of evading allied missile defenses. Its evolving nuclear and missile forces increasingly give the regime the ability to conduct surprise preemptive first-strike, retaliatory second-strike, and battlefield counterforce attacks.

The collapse of the February 2019 U.S.–North Korean summit in Hanoi led Pyongyang to initiate extensive missile testing from 2019–2022.

- In 2019, North Korea conducted 26 missile launches, its highest-ever number of violations of U.N. resolutions in a year. That year, the regime unveiled five new short-range missile systems threatening South Korea, including a 400mm multiple rocket launcher (MRL); the KN-23 maneuverable missile, which is similar to the Russian Iskander; the KN-24 missile, which is similar to the U.S. Army Tactical Missile System (ATACMS); the KN-25 600mm MRL; and the Pukguksong-3 SLBM. The enhanced accuracy of these systems enables North Korea to accomplish counterforce operations with fewer missiles.
- In 2021, Pyongyang conducted more missile launches, revealing an additional five new missile systems, including a long-range cruise missile, an SLBM, an improved short-range ballistic missile, the first North Korean missiles launched from a train, and the Hwasong-8 hypersonic glide missile.<sup>9</sup>

• In 2022, North Korea again increased its missile testing and even exceeded 2019 levels. On June 5, according to U.S. Special Representative to the Democratic People's Republic of Korea Sun Kim, "the DPRK launched eight ballistic missiles from various parts of the country, which would be the largest number of ballistic missiles ever launched in a single day by the DPRK." All told, "North Korea has now launched 31 ballistic missiles in 2022, the most ballistic missiles it has ever launched in a single year, surpassing its previous record of 25 in 2019." 10

Pyongyang has test-launched its second hypersonic missile capable of evasive flight maneuvers. North Korean–released photos show a warhead design that is different from the Hwasong-8 tested the previous year. Both hypersonic missiles have detachable, maneuverable warheads that can fly at lower altitudes than standard ballistic missiles, which follow a more predictable parabolic trajectory. These characteristics make radar tracking more difficult and enable the weapons to evade allied missile defense interceptors.

The KN-18 and KN-21 Scud variants also have maneuverable reentry vehicles, and the KN-23's flight profile showed evasive characteristics instead of a typical ballistic parabola. The KN-23 was flown at depressed trajectories, potentially between the upper reach of Patriot missiles and below the minimum intercept altitude for Terminal High Altitude Area Defense (THAAD), with a final pull-up maneuver that provides a steep terminal descent. The KN-23 could also be used in a first strike against leadership, hardened command and control, or high-value military targets.

North Korea has successfully tested the Pukguksong-1 (KN-11); Pukguksong-3 (KN-26); and an unidentified SLBM, which could target South Korea and Japan, potentially with a nuclear warhead. In its October 2020, January 2021, and April 2022 parades, North Korea revealed the Pukguksong-4, Pukguksong-5, and Pukguksong-6 SLBM missiles.<sup>12</sup>

South Korea does not currently have defenses against SLBMs. Because the THAAD ballistic missile defense (BMD) system radar is limited to a 120-degree view that is directed toward North Korea, it cannot protect against SLBMs arriving from either the East or West Seas. <sup>13</sup> The SM-2 missile currently

deployed on South Korean destroyers provides protection only against anti-ship missiles.

In 2022, the U.S. Intelligence Community assessed that Kim Jong-un will "continue efforts to steadily expand and enhance Pyongyang's nuclear and conventional capabilities targeting the United States and its allies" and that these efforts will include "periodically using aggressive and potentially destabilizing actions to reshape the regional security environment in his favor."14 In April 2022, Kim Jong-un vowed that he would augment his nuclear arsenal in "both quality and scale...at the fastest possible speed."15 Some experts interpreted Kim's speech as hinting at a new, more offensive nuclear doctrine, but Pyongyang has long declared that its nuclear arsenal was both a "trusted shield" and "treasured sword" for deterrence and preemptive attack against the United States and its allies.16

#### Threat of Regional War

In addition to its nuclear and missile forces, North Korea has approximately a million people in its military and several million more in its reserves. Pyongyang has forward-deployed 70 percent of its ground forces, 60 percent of its naval forces, and 40 percent of its naval forces south of the Pyongyang–Wonsan line. South Korea assesses that North Korean forces "maintain a readiness posture capable of carrying out a surprise attack on the South at any time."

North Korea has an extensive quantity of conventional forces, but the majority of their weapons are of low quality, having been manufactured from the 1950s to the 1970s. The ground forces have approximately 3,500 tanks, 2,500 armored personnel carriers, 8,600 towed and self-propelled artillery, and 5,500 multiple rocket launchers. North Korea's tank inventory consists predominantly of 1950s-era and 1960s-era T-55 and T-62 tanks. It also has indigenously produced updated tank variants, but they remain outdated compared to South Korean and U.S. tanks, as do North Korea's light armored vehicles, artillery, combat helicopters, and other ground force weapons.

North Korea has unveiled some new ground force weapons, including tanks and self-propelled artillery, at military parades in recent years, but it is unlikely that they have been deployed in more than limited numbers. Pyongyang has compensated for the large number of aging systems by prioritizing the

deployment of strong asymmetric capabilities that include special operations forces, long-range artillery, and a broad array of newly developed missiles, several of which are assessed to be nuclear-capable.

North Korea's naval and air forces are similarly obsolete and underequipped compared with South Korea's military. The North Korean navy has a limited number of aged surface vessels that have fared badly against South Korean naval forces in skirmishes along the maritime Northern Limit Line in the Yellow Sea. The navy has only two frigates and several hundred corvettes and other small coastal combatants.

Pyongyang has 71 submarines, but only one is a *Gorae*-class that is capable of firing ballistic missiles. The remaining force is composed of *Romeo*-class, *Sango-O*-class, and *Yugo*-class submarines.

The North Korean air force consists of 545 older combat aircraft that are no match for modern South Korean and U.S. aircraft. North Korean fighters include vintage Mig-15 *Fagot*, Mig-17 *Fresco*, Mig-19 *Farmer*, Mig-21 *Fishbed*, Mig-23 *Flogger*, and Mig-29 *Foxbat* aircraft. Even the relatively small number of third-generation fighter airplanes are of 1980s design.

In September 2018, the two Koreas signed a Comprehensive Military Agreement to ease military tension and build confidence. The agreement sought to reduce the danger that inadvertent tactical military clashes along the Demilitarized Zone (DMZ) might escalate to larger strategic conflicts. However, static defensive positions like fixed concrete bunkers and minefields are not threatening and have never been the source of military clashes on the peninsula. Rather, the greatest danger arises from the forward, offensively oriented disposition of North Korea's forces and the regime's history of making threats and initiating hostilities. The confidence-building measures implemented to date have not reduced North Korea's tactical or strategic conventional military threat to South Korea, nor do they represent progress in denuclearization.

Due to a predicted shortfall in 18-year-old conscripts, South Korea has initiated a comprehensive defense reform strategy to transform its military into a smaller but more capable force to deal with the North Korean threat. Overall, South Korean military manpower will be reduced approximately 25 percent, from 681,000 to a planned goal of 500,000. The South Korean military currently has a total

strength of 555,000: 420,000 in the army, 70,000 in the navy, and 65,000 in the air force. <sup>20</sup> Seoul is compensating for decreasing troop levels by procuring advanced fighter and surveillance aircraft, naval platforms, and ground combat vehicles. <sup>21</sup>

#### Threat to the Commons

Pyongyang has developed an advanced cyberwarfare prowess that is surpassed by that of few other nations. From initial rudimentary distributed denial-of-service (DDoS) attacks against South Korea, the regime has improved its cyber programs to create a robust and global array of disruptive military, financial, and espionage capabilities.

North Korean leader Kim Jong-un has declared that cyber warfare is a "magic weapon" and an "all-purpose sword that guarantees the North Korean People's Armed Forces ruthless striking capability, along with nuclear weapons and missiles."22 In the run-up to a crisis or as an alternative to kinetic strikes, the regime could conduct cyberattacks on government and civilian computer networks that control communications, finances, and infrastructure such as power plants and electrical grids. Perhaps the proof of this can be seen in the regime's use of such tools in peacetime. Pyongyang has conducted cyber guerrilla warfare to steal classified military secrets in addition to absconding with billions of dollars in money and cyber currency, holding computer systems hostage, and inflicting extensive damage on computer networks.

As its cyber proficiencies have evolved, Pyongyang has implemented ever more sophisticated techniques and prioritized financial targets to evade international sanctions and increase its ability to finance its nuclear and missile programs. In 2019, the U.N. Panel of Experts estimated that North Korea had gained a cumulative \$2 billion from cybercrime. In 2021, North Korean hackers stole at least \$400 million worth of cryptocurrency. In April 2022, the FBI announced North Korean hackers had stolen \$620 million of cryptocurrency from a video gaming company.

In 2017, it was reported that a "former British intelligence chief estimates the take from its cyberheists may bring the North as much as \$1 billion a year, or a third of the value of the nation's exports."<sup>26</sup> According to the U.N. Panel of Experts, the revenue generated from these hacks is used to evade sanctions and to support North Korea's weapons of mass destruction and ballistic missile programs.<sup>27</sup>

To the extent that the cyber domain is a "global commons" used by all people and countries, North Korea's investment in and exploitation of cyberwarfare capabilities presents a very real threat in this domain.

#### Conclusion

North Korea's nuclear and missile forces represent its greatest military threat. Its naval and air forces would not be expected to last long in a conflict with South Korea and the United States. Pyongyang's ground forces, though consisting mostly of older weapons, are extensive and forward-deployed. Thousands of artillery systems deployed near the demilitarized zone could inflict devastating damage to South Korea, including Seoul, before allied forces could attrite them.

Greater North Korean nuclear capabilities could undermine the effectiveness of existing allied military plans and exacerbate growing allied concerns about Washington's willingness to risk nuclear attack to defend its allies. Attaining an unambiguous nuclear ICBM capability could lead North Korea to perceive that it has immunity from any international response. Pyongyang could feel emboldened to act even more belligerently and seek to intimidate the U.S. and its allies into accepting North Korean diktats.

Pyongyang could use the fear of nuclear weapons to force South Korea to accommodate North Korean demands that it, for example, end bilateral military exercises and reduce U.S. force levels. The regime could use threats of nuclear attack to force Tokyo to deny U.S. forces access to Japanese bases, ports, and airfields during a Korean conflict.

Pyongyang is on the path to developing capabilities that go beyond deterrence to a viable true warfighting strategy. The regime might also assume that conditions for military action had become favorable if it believed the U.S. extended deterrence guarantee had been undermined. During a crisis, the threshold for use of nuclear weapons could be more easily breached.

This *Index* assesses the overall threat from North Korea, considering the range of contingencies, as "testing" for level of provocative behavior and "gathering" for level of capability.

## **Threats: North Korea**

	HOSTILE	AGGRESSIVE	TESTING	ASSERTIVE	BENIGN
Behavior			✓		
	FORMIDABLE	GATHERING	CAPABLE	ASPIRATIONAL	MARGINAL
Capability		✓			

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# Non-State Actors

## James Phillips and Jeff Smith

Terrorist groups come in many forms but have one thing in common: the use of violence to achieve their political objectives, whether those objectives are religious, ethnic, or ideological. In general, terrorist groups operate in a very local context, usually within a specific country or sub-region. Sometimes a terrorist group's objectives extend beyond the internationally recognized borders of a state because its members' identity as a group transcends such legal or geographic boundaries.

Terrorist groups rarely pose a threat to the United States that rises to the threshold used by this *Index*: a substantial threat to the U.S. homeland; the ability to precipitate a war in a region of critical interest to the U.S.; and/or the ability to threaten the free movement of people, goods, or services through the global commons. With the exception of Hezbollah and other Iran-backed groups, those that do meet these criteria are assessed in this section.

# Terrorist Threats to the Homeland from the Middle East and North Africa

Radical Islamist terrorism in its various forms remains a global threat to the safety of America's citizens. Many terrorist groups operate in the Middle East, but those that are inspired by Islamist ideology also operate in Europe, Asia, and Africa.

The primary terrorist groups of concern to the U.S. homeland and to Americans abroad are the Islamic State of Iraq and al-Sham (ISIS) and al-Qaeda. Their threat is amplified when they can exploit areas with weak or nonexistent governance that allows them to plan, train, equip, and launch attacks.

**Al-Qaeda and Its Affiliates.** Al-Qaeda was founded in 1988 by Arab foreign fighters who flocked to Afghanistan to join the war against Soviet occupation of the country in the 1980s. With Osama bin

Laden appointed emir, al-Qaeda was envisaged as a revolutionary vanguard that would radicalize and recruit Sunni Muslims across the world and lead a global Islamist revolution.<sup>2</sup>

After the September 11, 2001, terrorist attacks, al-Qaeda's leadership fled Afghanistan. Many members of the original cadre have been killed or captured, including Osama bin Laden, and other key al-Qaeda leaders have been killed by targeted strikes in Afghanistan, Iran, Iraq, Pakistan, Syria, Yemen, and Somalia. However, some key elements of al-Qaeda's leadership have survived or have been replaced, and al-Qaeda's central leadership remains a potential threat to the U.S. homeland.

Bin Laden's successor as emir, Ayman al-Zawahiri, was forced deeper into seclusion and was killed on July 31, 2022, by two Hellfire missiles launched in a CIA drone strike in Kabul, Afghanistan. At the time, Zawahiri was living in a guesthouse owned by acting Taliban Minister of Interior Sirajuddin Haqqani—a blatant violation of the withdrawal agreement that the Taliban negotiated with the United States.3 Zawahiri's death is not expected to affect al-Qaeda's daily operations, which have long been controlled by the leaders of the terrorist network's regional affiliates,4 but it could spark a leadership struggle that could weaken al-Qaeda's influence over its far-flung affilitates. Some al-Qaeda lieutenants are believed still to be in the Afghanistan-Pakistan region; others have taken refuge in Iran. Zawahiri's likely successor, Mohammed Salahuddin Zeidan, reportedly also is based in Iran, where he operates under the nom de guerre Saif al-Adel (Sword of Justice).6

Like scores of other al-Qaeda members in Iran, Zeidan has experienced imprisonment, some form of house arrest, and periods of relative freedom to operate inside Iran, depending on the state of relations between Iran and al-Qaeda. Although both share common enemies in the United States, Israel, and Sunni Arab regimes, they represent clashing Shia and Sunni Islamist ideologies and pursue conflicting long-term goals in Afghanistan, Iraq, Lebanon, Syria, and Yemen.

Iran's Islamic Revolutionary Guard Corps (IRGC) played an important role in establishing links with al-Qaeda in the early 1990s when Bin Laden was based in Sudan. According to the report of the 9/11 Commission, the IRGC trained al-Qaeda members in camps in Lebanon and in Iran, where they learned to build much bigger bombs. The commission assessed that al-Qaeda may have assisted Iran-backed Saudi Hezbollah terrorists who executed the June 1996 bombing that killed 19 U.S. Air Force personnel at the Khobar Towers residential complex in Saudi Arabia and recommended that further investigation was needed to examine Iran's ties to al-Qaeda.<sup>7</sup>

This long-neglected issue resurfaced in 2020 after The New York Times reported that al-Qaeda's second-highest leader was killed in the heart of Iran's capital city on August 7, 2020, by Israeli agents at the behest of the United States.8 The al-Qaeda leader, Abdullah Ahmed Abdullah, who went by the nom de guerre Abu Muhammad al-Masri, had been living in Iran at least since 2003 when he had fled from Afghanistan. Abdullah was long a fixture on the FBI's "most wanted" list for his role in planning the August 7, 1998, bombings of the U.S. embassies in Kenya and Tanzania, which killed 224 people including 12 Americans. He was gunned down on a street in Tehran by two assassins on a motorcycle on the anniversary of that attack, which was al-Qaeda's most lethal operation before 9/11.9

On January 12, 2021, then-Secretary of State Mike Pompeo confirmed the *New York Times* report about Abdullah's death and warned that Iran had become the "new Afghanistan." He also announced sanctions on two al-Qaeda leaders who continue to operate inside Iran.

Al-Qaeda also dispersed its fighters further afield, allowing for the development of regional affiliates that shared the long-term goals of al-Qaeda's general command and largely remained loyal to it. These affiliates have enjoyed some success in exploiting local conflicts. In particular, the Arab Spring uprisings that began in 2011 enabled al-Qaeda to take advantage of failed or failing states in Iraq, Libya, Mali, Syria, and Yemen to advance its revolutionary

agenda. It is through these affiliates that al-Qaeda is able to project regional strength most effectively.

Yemen. Yemen has long been a bastion of support for militant Islamism. Yemenis made up a disproportionate number of the estimated 25,000 foreign Muslims that fought in the Afghan jihad against the Soviet Union in the 1980s. After that conflict ended, Yemen also attracted Westerners into the country to carry out terrorist operations there. In 1998, several British citizens were jailed for planning to bomb Western targets, including hotels and a church.<sup>11</sup>

Al-Qaeda's first terrorist attack against Americans occurred in Yemen in December 1992 when a bomb was detonated in a hotel used by U.S. military personnel. In October 2000, in a much deadlier operation, al-Qaeda terrorists used a boat filled with explosives to attack the USS *Cole* in the port of Aden, killing 17 American sailors. The first U.S. drone strike outside Afghanistan after 9/11 also took place in Yemen and targeted those who were connected to the attack on the *Cole*.

After 9/11 and following crackdowns in other countries, Yemen became increasingly important as a base of operations for al-Qaeda. In September 2008, al-Qaeda launched an attack on the U.S. embassy in Yemen that killed 19 people, including an American woman. Yemen's importance to al-Qaeda increased further in January 2009 when al-Qaeda members who had been pushed out of Saudi Arabia merged with the Yemeni branch to form Al-Qaeda in the Arabian Peninsula (AQAP). This affiliate quickly emerged as one of the leading terrorist threats to the U.S. In 2010, CIA analysts assessed that AQAP posed a more urgent threat to U.S. security than the al-Qaeda general command based in Afghanistan/Pakistan.<sup>14</sup>

Much of this threat centered initially on AQAP's Anwar al-Awlaki, a charismatic American-born Yemeni cleric who directed several terrorist attacks on U.S. targets before being killed in a drone air strike in September 2011. Awlaki had an operational role in the plot executed by Umar Farouk Abdulmutallab, the failed suicide bomber who sought to destroy an airliner bound for Detroit on Christmas Day 2009. He was also tied to plots to poison food and water supplies, as well as to launch ricin and cyanide attacks, and is suspected of playing a role in the November 2010 plot to dispatch parcel bombs to the U.S. in cargo planes. Additionally, Awlaki reportedly was a key influence on Major Nidal Hassan, the U.S.

Army psychiatrist who perpetrated the 2009 Fort Hood shootings that killed 13 soldiers.<sup>17</sup>

Since Awlaki's death, the number of AQAP-sanctioned external operations in the West has diminished. However, his videos on the Internet have continued to radicalize and recruit young Muslims, including the perpetrators of the April 2013 bombing of the Boston Marathon that killed three people. 19

AQAP's threat to Western security, while seemingly reduced to some extent by Awlaki's death, remains persistent. Another attempt to carry out a bombing of Western aviation using explosives concealed in an operative's underwear was thwarted by a U.S.–Saudi intelligence operation in May 2012. <sup>20</sup> In August 2013, U.S. interception of al-Qaeda communications led to the closure of 19 U.S. embassies and consulates across the Middle East and Africa because of indications that AQAP was planning a massive attack. <sup>21</sup> In January 2015, two AQAP-trained terrorists murdered staff members and nearby police at *Charlie Hebdo* magazine in Paris. <sup>22</sup> In 2017, aviation was targeted once again by a plan to conceal bombs in laptop batteries. <sup>23</sup>

AQAP launched another successful attack inside the United States on December 6, 2019, when a radicalized Saudi Royal Air Force officer being trained at Naval Air Station Pensacola killed three U.S. Navy sailors and wounded eight other Americans in a shooting attack. The FBI later assessed that the shooter, Mohammed Saeed Al-Shamrani, had been radicalized by 2015 and was influenced by Awlaki's propaganda.<sup>24</sup>

Much of AQAP's activity has focused on exploiting the chaos of the Arab Spring in Yemen. AQAP acquired a significant amount of territory in 2011 and established governance in the country's South, finally relinquishing this territory only after a Yemeni military offensive in the summer of 2012.<sup>25</sup>

In 2015, after Iran-backed Houthi rebels overthrew Yemen's government, AQAP further intensified its domestic activities, seizing the city of al-Mukalla and expanding its control of rural areas in southern Yemen. AQAP withdrew from al-Mukalla and other parts of the South in the spring of 2016, reportedly after the U.S.-backed Saudi–United Arab Emirates coalition had cut deals with AQAP, paying it to leave certain territory and even integrating some of AQAP's fighters into its own forces that were targeting the Houthis.<sup>26</sup>

More substantive progress has been achieved in the targeting of AQAP's leadership. In 2013, Said al-Shehri, a top AQAP operative, was killed in a drone strike, and in June 2015, the group's leader at the time, Nasir al-Wuhayshi, was killed in another drone strike. Perhaps most significantly, Ibrahim al-Asiri, AQAP's most notorious bomb maker, was killed in a U.S. strike in 2017. The number of U.S. air and drone strikes targeting AQAP terrorists peaked at 131 in 2017 before declining steadily to 41 in 2018 and four in 2020. The Biden Administration launched two air or drone strikes in 2021 but had launched none as of the time this book was being prepared in 2022.<sup>27</sup>

In 2018, U.N. experts estimated that AQAP commanded between 6,000 and 7,000 fighters. AQAP has declined since its 2015–2016 peak, losing key leaders to drone strikes and other attacks and suffering manpower losses in factional clashes and defections. According to a February 2022 U.N. report, AQAP now has approximately 3,000 fighters. Nevertheless, it remains a resilient force that could capitalize on the anarchy of Yemen's multi-sided civil war to seize new territory and plan more attacks on the West.

Syria. Al-Qaeda's Syrian affiliate, initially named the al-Nusra Front (ANF), was established as an offshoot of the Islamic State of Iraq (ISI), al-Qaeda's Iraq affiliate, in late 2011 by Abu Muhammad al-Julani, a lieutenant of ISI leader Abu Bakr al-Baghdadi. By the end of 2016, ANF—now renamed Jabhat Fatah Al Sham (JFS)—"had up to 10,000 fighters" and was "one of the most active rebel groups [fighting the Assad dictatorship] in Syria." Most ANF cadres are concentrated in rebel strongholds in northwestern Syria, but the group also has small cells operating elsewhere in the country.

ANF had some success in attracting Americans to its cause. An American Muslim recruited by ANF, Moner Mohammad Abusalha, conducted a suicide truck bombing in northern Syria on May 25, 2014, in the first reported suicide attack by an American in that country. At least five men have been arrested inside the U.S. for providing material assistance to ANF, including Abdirahman Sheik Mohamud, a naturalized U.S. citizen who was arrested in April 2015 after returning from training in Syria and was planning to launch a terrorist attack on U.S. soldiers based in Texas. 4

In recent years, the al-Qaeda network in Syria has undergone several name changes, allying itself with various Islamist rebel groups. This has made it more difficult to assess the degree of direct threat that it poses outside of Syria.

In a May 2015 interview, al-Julani stated that al-Nusra's intentions were purely local and that, "so as not to muddy the current war" in Syria, ANF was not planning to target the West. <sup>35</sup> In July 2016, al-Nusra rebranded itself as Jabhat Fatah Al Sham (JFS), and al-Julani stated that it would have "no affiliation to any external entity," a move that some experts regarded as a break from al-Qaeda and others regarded as designed to obscure its ties to al-Qaeda and reduce U.S. military pressure on the group. <sup>36</sup>

In January 2017, ANF merged with other Islamist extremist movements to create a new anti-Assad coalition: Hayat Tahrir al-Sham (HTS, Organization for the Liberation of the Levant). In March 2017, it was estimated that HTS had 12,000 to 14,000 fighters. HTS suffered many casualties as Syria's Assad regime, backed by Iran and Russia, tightened the noose around its strongholds in northwest Syria. "Since 2017," according to the U.S. Department of State's 2020 *Country Reports on Terrorism*, "ANF has continued to operate through HTS in pursuit of its objectives." The report further estimates that ANF's strength has fallen to "between 5,000 to 10,000 fighters." 38

Further complicating matters surrounding al-Qaeda's presence, another group in Syria connected to al-Qaeda, Hurras al-Din (Guardians of the Religion), was formed in March 2018.<sup>39</sup> Among its ranks were those who defected from HTS, and its suspected emir is an Ayman al-Zawahiri acolyte.<sup>40</sup> Hurras al-Din leaders have criticized HTS for its close ties to Turkey and were among the rival Islamist extremists arrested by HTS in January and February 2022 in Idlib province, the last remaining stronghold of armed resistance in northwest Syria.<sup>41</sup>

HTS is more pragmatic than its ultra-extremist parent organization and has cooperated with moderate Syrian rebel groups against both the Assad regime and ISIS. However, the leadership of Abu Muhammad al-Julani and his tactical approach to the conflict, as well as the clear divisions within the Syrian jihad, have led to rebukes from Ayman al-Zawahiri and those who are loyal to him. <sup>42</sup> Zawahiri has stressed the need for unity while condemning the jihadist movement in Syria and its emphasis on holding territory in northwest Syria at the expense of intensifying the struggle against Assad. <sup>43</sup>

One entity that posed a more immediate threat to the West was the Khorasan group, which was thought to comprise dozens of veterans of al-Qaeda's operations in Afghanistan and Pakistan.<sup>44</sup> Al-Zawahiri had dispatched this cadre of operatives to Syria, where they were embedded with ANF and—despite al-Julani's statement that ANF was not targeting the West—charged with organizing terrorist attacks against Western targets. A series of U.S. air strikes in 2014 and 2015 degraded Khorasan's capacity to organize terrorist attacks, and the group's prominence faded after two of its top leaders were killed by U.S. air strikes in 2016.<sup>45</sup>

Al-Qaeda's presence and activities in Syria, as well as the intent of those who once were aligned with it, remain opaque. Even if offshoots of al-Qaeda are not currently emphasizing their hostility to the U.S., however, that will probably change if they succeed in further consolidating power in Syria.

The Sahel. Al-Qaeda in the Islamic Maghreb (AQIM) "has an estimated 1,000 fighters operating in the Sahel, including Algeria, northern Mali, southwest Libya, and Niger."<sup>46</sup> AQIM's roots lie in the Algerian civil war of the 1990s after the Algerian government cancelled the second round of elections in 1992 following the victory of the Islamic Salvation Front (FIS) in the first round. The FIS's armed wing, the Armed Islamic Group (GIA), responded by launching a series of attacks, executing those who were even suspected of working with the state. The group also attempted to implement sharia law in Algeria.

The GIA rapidly alienated Algerian civilians, and by the late 1990s, an offshoot, the Salafist Group for Preaching and Combat (GSPC), emerged. Its violence, somewhat less indiscriminate than the GIA's, was focused on security and military targets. Having failed to overthrow the Algerian state, the GSPC began to align itself with al-Qaeda, and Ayman al-Zawahiri announced its integration into the al-Qaeda network in a September 2006 video. The GSPC subsequently took the AQIM name.

AQIM has carried out a series of regional attacks and has focused on kidnapping Westerners. Some of these hostages have been killed, but more have been used to extort ransoms from Western governments. <sup>47</sup> Like other al-Qaeda affiliates, AQIM also took advantage of the power vacuums that emerged from the Arab Spring, particularly in Libya where Islamist militias flourished. The weak central government was unable to tame fractious militias, curb tribal and political clashes, or dampen rising tensions between

Arabs and Berbers in the West and Arabs and the Toubou tribe in the South.

The September 11, 2012, attack on the U.S. diplomatic mission in Benghazi underscored the extent to which Islamist extremism had flourished in the region. The radical Islamist group that launched the attack, Ansar al-Sharia, had links to AQIM and shared its violent ideology. AQIM and like-minded Islamist allies also grabbed significant amounts of territory in northern Mali late in 2012, implementing a brutal version of sharia law, until a French military intervention helped to push them back.

AQIM continues to support and work with various jihadist groups in the region. In March 2017, the Sahara branch of AQIM merged with three other al-Qaeda or al-Qaeda-linked organizations based in the Sahel to form the Group for Support of Islam and Muslims (JNIM), an organization that has pledged allegiance to al-Qaeda emir Ayman al-Zawahiri.48 AQIM remains an active threat in Algeria, Libya, Mali, Niger and Tunisia and has expanded its operations in Burkina Faso and Cote D'Ivoire in recent years. Although AQIM is not known to have targeted the U.S. homeland explicitly, it does threaten regional stability and U.S. allies in North Africa and Europe, where it has gained supporters and operates extensive networks for the smuggling of arms, drugs, and people.

Islamic State of Iraq and al-Sham and Its Affiliates. The Islamic State of Iraq and al-Sham (ISIS) is an al-Qaeda splinter group that has outstripped its parent organization in terms of its immediate threats to U.S. national interests. Some Western policymakers wrongly perceived the Islamic State of Iraq (ISI), the precursor to ISIS and an al-Qaeda offshoot, as having been strategically defeated following the U.S. "surge" of 2006–2007 in Iraq. However, although decimated by U.S.-led counterterrorism operations, it exploited the more permissive environment after the 2011 U.S. military withdrawal from Iraq as well as the mounting chaos in Syria after Arab Spring protests were brutally suppressed by the Assad regime.

In both Iraq and Syria, ISI had space in which to operate and a large pool of disaffected individuals from which to recruit. In April 2013, ISI emir Abu Bakr al-Baghdadi declared that the al-Nusra Front, the al-Qaeda affiliate operating in Syria, was merely a front for his operation and that a new organization was being formed: the Islamic State of Iraq

and al-Sham. ISIS sought to establish an Islamic state governed by its harsh interpretation of sharia law, thereby posing an existential threat to Christians, Shiite Muslims, Yazidis, and other religious minorities as well as to Sunni Muslims that rejected its leadership. Its long-term goals include leading a jihad to drive Western influence out of the Middle East; diminishing and discrediting Shia Islam, which it considers apostasy; and becoming the nucleus of a global Sunni Islamic empire.

With both al-Qaeda leader Ayman al-Zawahiri and ANF emir Abu Mohammed al-Julani unable to rein in al-Baghdadi, ISIS was expelled from the al-Qaeda network in February 2014. Despite this, ISIS swept through parts of northern and western Iraq and in June 2014 declared the return of the caliphate with its capital in the northern Syrian city of Raqqa. It subsequently kidnapped and then murdered Westerners working in Syria, including American citizens.

A U.S.-led international coalition was assembled to chip away at ISIS's control of territory. The Iraqi Army and Iranian-backed militias, supported by U.S. and coalition air strikes and special operations forces, liberated Mosul in July 2017. In Syria, the U.S.-backed Syrian Democratic Forces militia liberated Raqqa in October 2017, and ISIS's last stronghold in the town of Baghouz fell in March 2019.

ISIS fighters have dispersed, have adopted insurgent tactics, and will continue to pose a regional terrorist threat with direct implications for the U.S. In January 2019, for example, four American military and civilian personnel were killed in a suicide bombing at a market in Manbij in northern Syria.<sup>49</sup>

On October 26, 2019, U.S. special operations forces killed ISIS leader al-Baghdadi in a raid in northwestern Syria's Idlib province near the Turkish border. 50 ISIS soon named a successor, Abu Ibrahim al-Hashimi al-Qurayshi, the nom de guerre of Amir Muhammad Sa'id Abdal-Rahman al-Mawla. Qurayshi was killed in a February 3, 2022, U.S. special operations raid, also staged in Idlib province.<sup>51</sup> On March 10, 2022, in a recorded audio message that was distributed online, ISIS announced that it had a new leader, Abu al-Hassan al-Hashemi al-Quraishi. Iraqi and Western intelligence officials revealed that the new leader's real name was Juma Awad al-Badri and that he was an Iraqi whose brother was the slain former caliph Abu Bakr al-Baghdadi.52 Turkish officials claimed that the new ISIS leader was arrested

in Istanbul on May 26, 2022, but that arrest has not been officially confirmed.<sup>53</sup>

The number of ISIS attacks in Iraq and Syria declined from 2019 to 2020 and fell further in 2021, although its attacks increased in Afghanistan and West Africa. "In 2021," according to Israel's Meir Amit Intelligence and Terrorism Information Center, "a total of 8,147 people were killed or wounded in ISIS attacks, compared to 9,068 people in 2020."54 Nevertheless, ISIS remains a significant regional threat. U.S. officials estimate that ISIS retains 11,000 to 18,000 militants in Syria and Iraq, where it is rebuilding its strength in remote desert and mountain regions.<sup>55</sup> In January 2022, during an operation designed to free more than 3,500 members of ISIS who were being held at a prison maintained by the Syrian Democratic Forces militia in northeastern Syria, scores if not hundreds of ISIS terrorists escaped during almost two weeks of fighting.<sup>56</sup>

Although ISIS's territorial control has been broken in Iraq and Syria, its presence has spread far beyond that territory. Terrorist groups around the world have pledged allegiance to Abu Bakr al-Baghdadi and his successors, and ISIS now has affiliates in the Middle East, in South and Southeast Asia, and in Africa. ISIS poses a threat to stability in all of these regions as it seeks to seize territory, overthrow governments, and impose its harsh brand of Islamic law.

Although the regional ISIS groups may not pose as great a threat to the U.S. homeland as the original group in Iraq and Syria posed, they represent significant threats to U.S. allies and U.S. forces deployed overseas. An Islamic State in the Greater Sahara ambush in Niger in October 2017, for example, resulted in the death of four U.S. special operations troops. <sup>57</sup> ISIS-Greater Sahara also has staged attacks on French and Malian military forces in Mali. By 2022, ISIS affiliates in Africa had established a tempo of lethal attacks that surpassed that of its parent organization in Iraq and Syria. <sup>58</sup> In addition, ISIS has made threats against embassies, including those of the U.S., in its areas of influence. <sup>59</sup>

ISIS also poses an ongoing threat to life in the West. On May 3, 2015, for example, two American extremists in contact with an ISIS operative in Syria were fatally shot by police before they could commit mass murder in Garland, Texas. <sup>60</sup> An apparent ISIS plot to assassinate former President George W. Bush in Dallas, Texas, that was foiled in early 2022 resulted in the arrest of an Iraqi man living in the U.S.

who was linked to ISIS operatives. The man, Shihab Ahmed Shihab, visited Dallas in November 2021 to videotape the approaches to the former President's home and recruited a team that he hoped to smuggle into the country over the Mexican border. As of March 2022, the George Washington University Extremism Tracker reported that "238 individuals have been charged in the U.S. on offenses related to the Islamic State (also known as IS, ISIS, and ISIL) since March 2014, when the first arrests occurred."

More commonly, however, the ISIS ideology has inspired individuals and small groups to plan attacks in the U.S. that exhibit little or no apparent contact with the terrorist organization. Tashfeen Malik, one of the perpetrators of the December 2, 2015, shootings that killed 14 people in San Bernardino, California, pledged allegiance to al-Baghdadi. 63 ISIS claimed responsibility for the June 12, 2016, shootings that killed 49 people at a nightclub in Orlando, Florida. Omar Mateen, the perpetrator, had pledged allegiance to al-Baghdadi, but there is no evidence to show that the attacks were directed by ISIS.64 The group also claimed responsibility for the October 31, 2017, vehicular attack by Sayfullo Saipov in New York that killed eight. 65 Saipov also had pledged allegiance to ISIS's emir but did not appear to be operationally guided by ISIS.66 Such terrorist attacks, incited but not directed by ISIS, are likely to continue for the foreseeable future.

Although its appeal appears to have diminished since the fall of its caliphate in Iraq and Syria, ISIS continues to attract support from self-radicalized Americans. For example, in April 2021, two men were arrested for attempting to provide material support to ISIS. One received a prison term for providing material support, and one received a prison term for the December 2017 bombing of a New York City subway.<sup>67</sup>

ISIS has also attempted complex attacks on aviation. It claimed responsibility for the October 31, 2015, downing of a Russian passenger jet over Egypt's Sinai Peninsula, which killed 224 people, and also tried to bring down a flight heading from Sydney, Australia, to Abu Dhabi by concealing an explosive device inside a meat grinder.<sup>68</sup>

ISIS had well-publicized success in attracting the support of foreign fighters. Approximately 250 from the U.S. traveled or attempted to travel to Syria to join its ranks. <sup>69</sup> These individuals, who likely have received military training, could well pose an

ongoing threat upon their return to the U.S. by involving themselves in attack planning or by helping to recruit future generations of jihadists.

ISIS had greater success attracting recruits from Europe with approximately 6,000 departing from European countries. The return of foreign fighters to Europe has led to several attacks. Mehdi Nemmouche, a French citizen of Algerian origin who shot and killed four civilians at the Jewish Museum in Brussels in May 2014, for example, was an ISIS-aligned terrorist who had fought in Syria. In August 2015, Ayoub el-Khazzani, a Moroccan, attempted to gun down passengers in a train travelling between Amsterdam and Paris. Passengers, including two members of the U.S. Army, foiled the attack and restrained him.

Similarly, a group of ISIS foreign fighters teamed with local Islamist terrorists in France to launch a series of suicide and gun attacks on a music venue, restaurants, cafes, and a football stadium, killing 130 and injuring 368 people in Paris in November 2015.<sup>73</sup> Recruits from within the same network then killed 32 people and injured around 300 more in shootings and suicide bombings across Brussels, Belgium, in March 2016.<sup>74</sup>

ISIS ideology has also inspired a wave of vehicle and knife attacks in Europe, including one carried out by a Tunisian who used a truck to kill 86 people and injure 434 more at a Bastille Day celebration in Nice, France, in July 2016.<sup>75</sup> In June 2017, in another such attack, three men killed eight people and injured 47 on or near London Bridge in London, England, by running over them or stabbing them.<sup>76</sup> London Bridge also was the site of a November 29, 2019, knife attack by an ISIS supporter who killed two people and wounded three more before being killed by police.<sup>77</sup>

ISIS has demonstrated an interest in carrying out biological attacks. Sief Allah H., a Tunisian asylum seeker who was in contact with ISIS, and his German wife Yasmin H. were arrested in Cologne in June 2018 after they had produced ricin as part of a suspected attack. This was the first time that ricin had been successfully produced in the West as part of an alleged Islamist terrorist plot.

Overall, as of May 2019, ISIS was known to have had some involvement—ranging from merely inspirational to hands-on and operational—in more than 150 plots and attacks in Europe since January 2014 that had led to 371 deaths and more than 1,700

injuries.<sup>79</sup> This includes the loss of American lives abroad. An American college student was killed in Paris in November 2015, four Americans were killed in the March 2016 Brussels attack, and another three were killed in the July 2026 Nice attack.<sup>80</sup> Moreover, the threat is by no means confined to Europe: Americans were also killed in attacks for which ISIS claimed responsibility in Tajikistan in July 2018 and Sri Lanka in April 2019.

# Terrorist Groups Operating in Afghanistan and Pakistan (Af-Pak)

A wide variety of Islamist fundamentalist and terrorist groups operate in Afghanistan and Pakistan. The direct threat posed by al-Qaeda to the U.S. homeland has diminished since the 9/11 terrorist attacks, the U.S. invasion of Afghanistan in 2001, and the killing of Osama bin Laden at his Abbottabad, Pakistan, hideout in May 2011 and was further degraded by an intensive drone campaign in Pakistan's tribal areas and operations by Pakistani security forces. Nevertheless, the residual presence of al-Qaeda and the emergence of a regional offshoot of the Islamic State remain serious concerns.

The Taliban's takeover of Afghanistan in August 2021 amid a chaotic U.S. withdrawal from the country has altered the terrorist landscape, providing a more permissive environment to a wide variety of terrorist and extremist groups. Of particular concern is the prominent role the Haggani Network has assumed in the new Taliban government.81 The Haqqani Network, a loyal proxy of Pakistan's Inter-Services Intelligence (ISI) agency, allied itself with the Taliban during the Afghan War and became integrated with its leadership structure under the leadership of Sirajuddin Haqqani. Throughout the course of the war, the Haqqani Network was responsible for many of the deadliest attacks on U.S. and Afghan forces,82 including an attack on the U.S. embassy in Afghanistan and the single deadliest attack on the CIA in the agency's history. Today, Sirajuddin Haqqani serves as Afghanistan's interior minister, and other members of his network have assumed cabinet positions.

The Haqqanis maintain close links to al-Qaeda. According to a 2021 U.N. report, the Haqqani Network "remains a hub for outreach and cooperation with regional foreign terrorist groups and is the primary liaison between the Taliban and Al-Qaida."<sup>83</sup>

Reports of an ISIS presence in Afghanistan first began to surface in 2014, and the group slowly

gained a small foothold in the country in subsequent years. The lack of publicly available information and the willingness of local fighters in the region to change allegiances with little thought make it next to impossible to know the exact number of Islamic State fighters in Afghanistan at any given time. In September 2019, U.S. officials estimated that there were between 2,000 and 5,000 ISIS fighters in Afghanistan. <sup>84</sup> In arguably its highest-profile attack, the Islamic State in Afghanistan claimed responsibility for a deadly suicide bombing at the Kabul airport in August 2021 that "killed more than 170 civilians and 13 U.S. soldiers." <sup>85</sup>

Experts believe that there is little coordination between the Islamic State branch operating in Afghanistan and the central command structure located in the Middle East. Instead, the branch draws recruits from disaffected members of the Pakistani Taliban and other radicalized Afghans and has frequently found itself at odds with the Afghan Taliban, with which it competes for resources, territory, and recruits.

While the Islamic State and the Afghan Taliban have engaged in heavy fighting in recent years, the Haqqani Network has maintained links to the Islamic State, which may have itself splintered into different factions. In 2020, the group appointed a former midlevel Haqqani commander as its new leader, and Afghanistan's intelligence agency killed five members of a joint cell of Haqqani Network and Islamic State fighters and arrested eight others. Scholar Theo Farrell contends that "the Haqqanis have the deepest links with [the Islamic State] of any faction within the Taliban."

Ultimately, both the Islamic State in Afghanistan and al-Qaeda continue to pose the greatest threat to the U.S. homeland. In March 2019, General Joseph Votel, then Commander, U.S. Central Command, said that he believed the Islamic State in Afghanistan "does have ideations focused on external operations toward our homeland." In late 2021, a senior Biden Administration official warned that both al-Qaeda and the Islamic State in Afghanistan are intent on conducting terrorist attacks on the United States and that "[w]e could see ISIS-K generate that capability in somewhere between 6 or 12 months."

Pakistan remains both a victim of and a key benefactor of regional terrorist groups. Pakistan's ISI maintained links to terrorist groups operating in disputed Kashmir and in Afghanistan for decades, viewing them as an extension of Pakistani foreign policy. Most of the terrorist groups operating in the country maintain some ties with the Pakistani military–intelligence establishment. Several domestic terrorist groups focus their attacks on non-Muslims and Muslim minorities deemed un-Islamic inside Pakistan. A smaller number of terrorist groups, like the Pakistani Taliban, are hostile to the Pakistani state and have carried out countless attacks on civilian and military targets inside the country.

After a bloody wave of terrorism by the Pakistani Taliban between 2006 and 2016, a series of military operations in Pakistan's Federally Administered Tribal Areas and peace deals struck with local militant commanders caused terrorism inside Pakistan to subside in the late 2010s.90 However, since the takeover of Afghanistan by the Haggani Network and Afghan Taliban, Pakistan has again witnessed a spike in bombings and terrorist attacks by the Pakistani Taliban. Pakistan has sought to pressure the Afghan Taliban and the Haqqani Network to use their influence to persuade the Pakistani Taliban to end these attacks, but with only mixed success. Despite Pakistan's willingness to shelter the Afghan Taliban leadership throughout the course of the Afghan War, relations between the Afghan Taliban and the Pakistani government remain difficult.91

Nevertheless, Pakistan's continued support for terrorist groups that have links to others like al-Qaeda, the Afghan Taliban, and the Haqqani Network undermine U.S. counterterrorism goals in the region and pose an ongoing threat to the U.S. homeland and its interests and partners abroad. Pakistan's ongoing patronage of terrorist groups operating in Kashmir, like Lashkar e Taiba and Jaish e Mohammed (and their various offspring and splinter groups), has ensured continued volatility in the Kashmir dispute and prevented any breakthrough in India-Pakistan diplomatic relations. Pakistan's military and intelligence leaders maintain a short-term tactical approach of fighting some terrorist groups that are deemed a threat to the state while supporting others that are aligned with Pakistan's foreign policy goals.

#### Conclusion

ISIS has lost its so-called caliphate, but it remains a highly dangerous adversary that is capable of planning and executing attacks regionally and—at the very least—inspiring them in the West. It has

transitioned from a quasi-state to an insurgency, relying on its affiliates to project strength far beyond its former Syrian and Iraqi strongholds.

Meanwhile, despite sustained losses in leadership, al-Qaeda remains resilient. It has curried favor with other Sunnis in particular areas of strategic importance to it, has focused its resources on local conflicts, has occasionally controlled territory, and has deemphasized (but not eschewed) focus on the global jihad. This approach has been particularly noticeable since the Arab Spring.

Regardless of any short-term tactical considerations, both groups ultimately aspire to attack the U.S. homeland and U.S. interests abroad. While the U.S. has hardened its domestic defenses, both ISIS and al-Qaeda can rely on radicalized individuals living within the U.S. to answer their call for jihadist terrorism. Furthermore, as has been demonstrated time and again, there are ample opportunities to target Americans overseas in countries that are more vulnerable to terrorist attack. If it wishes to contain and ultimately end Islamist violence, the U.S. must continue to bring effective pressure to bear on these groups and those that support them.

The terrorist threat to the U.S. homeland from Afghanistan and Pakistan remains real and uncertain in a rapidly shifting landscape that is home to a wide variety of extremist and terrorist groups. On one hand, the capabilities of al-Qaeda, the terrorist group that is most directly focused on attacking the U.S. homeland, have been degraded in South Asia. On the other hand, the U.S. withdrawal from Afghanistan and the Taliban/Haqqani Network takeover of the country have generated a great deal of uncertainty about Afghanistan's future and the panoply of terrorist and extremist groups operating in that space, including the local branch of the Islamic State.

In its interim peace agreement with the U.S., the Taliban ostensibly committed to preventing Afghan soil from being used to launch attacks against the U.S. homeland. However, experts remain skeptical of these commitments. For its part, Pakistan continues to harbor and support a vibrant ecosystem of terrorist groups within its borders.

This *Index* assesses the threat from ISIS, al-Qaeda, and their affiliated organizations as "aggressive" for level of provocation of behavior and "capable" for level of capability.

## **Threats: Non-State Actors**

	HOSTILE	AGGRESSIVE	TESTING	ASSERTIVE	BENIGN
Behavior		✓			
	FORMIDABLE	GATHERING	CAPABLE	ASPIRATIONAL	MARGINAL
Capability			<b>✓</b>		

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# Conclusion: Global Threat Level

America faces challenges to its security at home and interests abroad from countries and organizations that have:

- Interests that conflict with those of the United States;
- Sometimes hostile intentions toward the U.S.; and
- In some cases, growing military capabilities that are leveraged to impose an adversary's will by coercing or intimidating neighboring countries, thereby creating regional instabilities.

The government of the United States constantly faces the challenge of employing—sometimes alone but more often in concert with allies—the right mix of diplomatic, economic, public information, intelligence, and military capabilities to protect and advance U.S. interests. Because this *Index* focuses on the military component of national power, its assessment of threats is correspondingly an assessment of the military or physical threat posed by each entity addressed in this section.

Russia remains the primary threat to American interests in Europe as well as the most pressing threat to the United States. Its invasion of Ukraine reintroduced conventional war to Europe. It also is the largest conflict on that continent since the end of the Second World War, and its many economic and security repercussions are felt across the globe. Moscow also remains committed to massive pro-Russia propaganda campaigns in other Eastern European countries, as well as disruptive activities around its periphery and across the Middle East.

The 2023 Index again assesses the threat emanating from Russia as "aggressive" for level of provocation of behavior and "formidable" (the highest

category on the scale) for level of capability. Though Russia is consuming its inventory of munitions, supplies, equipment, and even military personnel in its war against Ukraine, it is also replacing those items and people. Russia's industrial capacity, unlike Ukraine's, remains untouched by the war, and Russia's military is gaining combat experience. Consequently, the war may actually serve to increase the challenge posed by Russia to U.S. interests on the continent.

China, the most comprehensive threat the U.S. faces, remained "aggressive" in the scope of its provocative behavior and earns the score of "formidable" for its capability because of its continued investment in the modernization and expansion of its military and the particular attention it has paid to its space, cyber, and artificial intelligence capabilities. The People's Liberation Army continues to extend its reach and military activity beyond its immediate region and engages in larger and more comprehensive exercises, including live-fire exercises in the East China Sea near Taiwan and aggressive naval and air patrols in the South China Sea. It has continued to conduct probes of the South Korean and Japanese air defense identification zones, drawing rebukes from both Seoul and Tokyo, and its statements about Taiwan and exercise of military capabilities in the air and sea around the island have become increasingly belligerent. China is taking note of the war in Ukraine and U.S. military developments and has been adjusting its own posture, training, and investments accordingly.

Iran represents by far the most significant security challenge to the United States, its allies, and its interests in the greater Middle East. Its open hostility to the United States and Israel, sponsorship of terrorist groups like Hezbollah, and history of threatening the commons underscore the problem it could pose. Today, Iran's provocations are of primary

## **Behavior of Threats**

	HOSTILE	AGGRESSIVE	TESTING	ASSERTIVE	BENIGN
China		<b>✓</b>			
Russia		✓			
Iran		✓			
North Korea			✓		
Non-State Actors		✓			
OVERALL		<b>✓</b>			

# **Capability of Threats**

	FORMIDABLE	GATHERING	CAPABLE	ASPIRATIONAL	MARGINAL
China	<b>✓</b>				
Russia	✓				
Iran		✓			
North Korea		✓			
Non-State Actors			<b>~</b>		
OVERALL		<b>✓</b>			

## Threats to U.S. Vital Interests

	SEVERE	HIGH	ELEVATED	GUARDED	LOW
China		✓			
Russia		<b>✓</b>			
Iran		✓			
North Korea		✓			
Non-State Actors		✓			
OVERALL		<b>✓</b>			

concern to the region and America's allies, friends, and assets there. Iran relies heavily on irregular (to include political) warfare against others in the region and fields more ballistic missiles than any of its neighbors. Its development of ballistic missiles and its potential nuclear capability also make it a long-term threat to the security of the U.S. homeland. In addition, Iran has continued its aggressive efforts to shape the domestic political landscape in Iraq, adding to the region's general instability. The 2023 Index extends the 2022 Index's assessment of

Iran's behavior as "aggressive" and its capability as "gathering."

North Korea's military poses a security challenge for American allies South Korea and Japan, as well as for U.S. bases in those countries and on the island territory of Guam. North Korean officials are belligerent toward the United States, often issuing military and diplomatic threats. Pyongyang also has engaged in a range of provocative behavior that includes nuclear and missile tests and tactical-level attacks on South Korea.

North Korea has used its missile and nuclear tests to enhance its prestige and importance domestically, regionally, and globally and to extract various concessions from the United States in negotiations on its nuclear program and various aid packages. Such developments also improve North Korea's military posture. U.S. and allied intelligence agencies assess that Pyongyang has already achieved nuclear warhead miniaturization, the ability to place nuclear weapons on its medium-range missiles, and the ability to reach the continental United States with a missile. North Korea also uses cyber warfare as a means of guerilla warfare against its adversaries and international financial institutions. The 2023 Index therefore assesses the overall threat from North Korea, considering the range of contingencies, as "testing" for level of provocation of behavior and "gathering" for level of capability.

A broad array of terrorist groups remain the most hostile of any of the threats to America examined in the *Index*. The primary terrorist groups of concern to the U.S. homeland and to Americans abroad are the Islamic State of Iraq and al-Sham (ISIS) and al-Qaeda. Al-Qaeda and its branches remain active and effective in Syria, Yemen, Iraq, and the Sahel of

Northern Africa. Though no longer a territory-holding entity, ISIS also remains a serious presence in the Middle East, in South and Southeast Asia, and throughout Africa, threatening stability as it seeks to overthrow governments and impose an extreme form of Islamic law. Its ideology continues to inspire attacks against Americans and U.S. interests. Fortunately, Middle East terrorist groups remain the least capable threats facing the U.S., but they cannot be dismissed.

Just as there are American interests that are not covered by this *Index*, there may be additional threats to American interests that are not identified here. This *Index* focuses on the more apparent sources of risk and those that appear to pose the greatest threat.

Compiling the assessments of these threat sources, the *2023 Index* again rates the overall global threat environment as "aggressive" and "gathering" in the areas of threat actor behavior and material ability to harm U.S. security interests, respectively, leading to an aggregated threat score of "high."

Our combined score for threats to U.S. vital interests can be summarized as:

# Threats to U.S. Vital Interests: Summary



U.S. Military Power

# An Assessment of U.S. Military Power

merica is a global power with global interests. Consequently, its military is tasked with defending the country from attack and protecting its national interests on a corresponding global scale. The United States does not have the luxury of focusing only on one geographic area or narrow challenge to its interests. Its economy depends on global trade; it has obligations with many allies; and it must account for several major competitors that routinely, consistently, and aggressively challenge its interests and seek to displace its influence in key regions. It follows that its military should be commensurately sized for the task and possess the necessary tools, skills, and readiness for action. Beyond that, the U.S. military must be capable of protecting the freedom to use the global commons—the sea, air, space, and cyberspace domains on which American prosperity and political influence depend.

As noted in all preceding editions of the *Index*, however, the U.S. does not have the necessary force to address more than one major regional contingency (MRC) and is not ready to carry out its duties effectively. Consequently, as we have seen during the past few years, the U.S. finds itself increasingly challenged both by major competitors such as China and Russia and by the destabilizing effects of terrorist and insurgent elements operating in regions that are of substantial interest to the U.S. Russia's large-scale, conventional invasion of Ukraine in February 2022 is proof that war in regions of interest to the U.S. remains a feature of modern times—something that is not lost on China as it expands its military power and threatens Japan and other U.S. allies and partners in the Indo-Pacific region more aggressively. Poland, Germany, Lithuania, Japan, and several other countries have taken note of this and are committed to substantially improving the capacity, capability, and readiness of their military forces. The United States, however, has not made a similar commitment.

The SARS-CoV-2 virus that causes the COVID-19 disease affected the ability of U.S. forces to train, exercise, and deploy for much of 2020 and 2021. It also caused disruptions in supply and maintenance activities similar to those experienced in the civilian community. In 2022, its impact was less troublesome as measures to reduce risk and mitigate challenges took effect. Some of the readiness that was lost has been regained, but other factors, like inadequate funding for parts and flight hours, have slowed the pace of progress.

### **How to Think About Sizing Military Power**

Military power consists of many things and is the result of how all of its constituent pieces are brought together to create an effective warfighting force, but it begins with the people and equipment used to conduct war: the weapons, tanks, ships, airplanes, and supporting tools that make it possible for a force to impose its will on another or to prevent such an outcome from happening, which is the point of deterrence.

However, simply counting the number of people, tanks, or combat aircraft that the U.S. possesses would be insufficient 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 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 those of the enemy. 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 not well 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 battle. Get these wrong—tools, objective, competence, or context—and you lose.

Another key element is the military's capacity to conduct 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. Because 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 that requires informed but not certain judgment. The war in Ukraine is a powerful illustration of this. By the numbers, Russia should have achieved a quick victory over the smaller, less modern Ukrainian military. For various reasons that include leadership, tactics, training, and resupply, the Ukrainians have performed much better than the Russians, who have performed poorly overall.

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. A thinking adversary will analyze his opponent for weaknesses or patterns of behavior and seek to develop techniques, approaches, and tools that exploit such shortfalls or predictable patterns—the asymmetries of war. One need not try to match an enemy tank for tank: In many cases, not trying is more effective.

This appears to be what China is doing. Having analyzed U.S. forces, performance characteristics of U.S. platforms and weapons, and the geography and basing options affecting U.S. defense posture in the Indo-Pacific, China has invested heavily in shore-based long-range missiles, an extensive fleet of ships optimized for the local maritime environment, and a deepening inventory of guided munitions. China does not need a force that mirrors that of the U.S.: It is building a force that leverages the asymmetries between China's situation and that of the United States.

All of these factors and a multitude of others affect 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 advising the President in his role as Commander in Chief of U.S. military forces.

Measuring hard combat power in terms of its capability, capacity, and readiness to defend U.S. vital interests is difficult, especially in such a limited space as this *Index*, but it is not impossible. However difficult the task, the Secretary of Defense and the military services have to make such 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 apply. Although that 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 exactly what is needed in terms of hard power and the status of such power from year to year.

Administrations take various approaches in determining the type and amount of military power needed and, by extension, the amount of money and other resources that will be necessary to support that power. After defining the national interests to be protected, the DOD 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 whether major actors pose a meaningful threat and of the extent to which friends and allies have the ability to assist the U.S. in meeting security objectives, one can arrive at different conclusions about the necessary level of military strength.

For example, one Administration might view China as a rising belligerent power bent on dominating the Asia–Pacific region. Another Administration might view China as an inherently peaceful rising economic power and the expansion of its military capabilities as a natural occurrence commensurate with its strengthening status. There can be dramatically different perspectives with respect to how China might use its military power and what would constitute an effective U.S. response, and the difference between these perspectives 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 also can 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 and 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 in addition to or a subset of a military force that is sized to handle two major regional conflicts?
- How much value should be assigned to advanced technologies as they are incorporated into the force, especially if they have not been proven in combat settings?
- What is the likelihood of conventional war, and (if one thinks it is minimal) what level of risk is one willing to accept that sufficient warning will allow for rearming?

#### Where to Start

There are two major 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 that are 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 example that is frequently cited by analysts. Secretary Aspin recognized that "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" had "fundamentally altered America's security needs" and were 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 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.

Since that study, the government has undertaken others as Administrations, national conditions, and world events have changed the context of national security. Quadrennial Defense Reviews (QDRs) were conducted in 1997, 2010, and 2014 and were accompanied by independent National Defense Panel (NDP) reports that reviewed and commented on them. Both sets of documents purported to serve as key assessments, but analysts came 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.

The QDR was replaced by the National Defense Strategy (NDS), released in 2018,3 and the independent perspectives of the formal DOD review by the National Defense Strategy Commission, which released its view of the NDS in November 2018.4 Departing from their predecessors, neither document proposed specific force structures or end strength goals for the services, but both were very clear in arguing that America's military should be able to address more than one major security challenge at a time. The commission's report went so far as to criticize the NDS for not making a stronger case for a larger military that would be capable of meeting the challenges posed by four named competitors—China, Russia, Iran, and North Korea-while also possessing the capacity to address lesser, though still important, military tasks that included presence, crisis response, and assistance missions.

The Biden Administration has not yet produced a national defense strategy to replace the one issued by the Trump Administration in 2018, although it has released an Interim National Security Strategic Guidance (INSSG) that echoes the general goal for the U.S. military to "deter and prevent adversaries from directly threatening the United States and our allies, inhibiting access to the global commons, or dominating key regions," all of which are themes that have remained remarkably consistent from

one Administration to the next for several decades. Taken at face value and considering the challenges posed simultaneously by a multitude of competitors in several regions, the INSSG seems to imply that the military should have the capability and capacity to meet this objective.

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

During the Cold War, the U.S. used the Soviet threat as its primary reference in determining its hard-power needs. 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 comparative 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 since the late 1980s have made comparing combat power more difficult. What was largely a platform-versus-platform model has shifted somewhat to a munitions-versus-target model. Evidence of this has been seen on recent battlefields in Nagorno-Karabakh and Ukraine.

The proliferation of precise weaponry means increasingly that each round, bomb, rocket, missile, and even (in some instances) individual bullet can hit its intended target, thus decreasing the number of munitions needed to prosecute an operation. It also means that an operating environment's lethality increases significantly for the people and platforms involved. We have reached the point at which, instead of focusing primarily on how many ships or airplanes the enemy can bring to bear against one's own force, 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.6 The increasing presence of unmanned systems that can deliver precision-guided munitions against targets adds complexity and danger to the modern battlefield. There is also the higher cost of fielding precision weapons rather than less expensive but less accurate conventional (unguided) munitions.

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 than ever before with fewer assets.

- Platform signature reduction (stealth) makes it harder for the enemy to find and target them, and the increased precision of weapons makes it possible for fewer platforms to hit many more targets.
- The U.S. military's ability to harness computers, modern telecommunications, space-based platforms—such as for surveillance, communications, and positioning-navigation-timing (PNT) support from GPS satellites—and networked operations potentially means that in certain situations, smaller forces can have far greater effect in battle than was possible at any other time in history (although these same advances also enable enemy forces).
- Some 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. For example, the number of infantry squads needed to secure an urban area where line of sight is constrained and precision weapons have limited utility is the same as the number needed in World War II. Again, current operations in Ukraine are illustrative as Russian forces find that seizing, occupying, and holding ground is a manpower-intensive effort.

Regardless of the improved capability of smaller forces, there is a downside to fewer numbers. With smaller forces, each element of the force represents a greater percentage of its combat power. Each casualty or equipment loss therefore 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 multiple theaters of operation.

As advanced technology has become more affordable, it has become more accessible for nearly any actor, whether state or non-state. Consequently, it may well be that the outcomes of future wars will depend far more 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 become more important 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 remains are the defense strategy 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, which often simply align with executive branch policy priorities.

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

This section of the *Index* assesses the adequacy of America's defense posture as it pertains to a conventional understanding of hard power, defined as the ability of U.S. military forces to engage and defeat an enemy's forces in battle at a scale commensurate with America's vital national interests. While some hard truths in military affairs are appropriately addressed by mathematics 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 competence 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. The authors of these military sections bring a combined total of more than a hundred years of uniformed military experience to their analysis.

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, but practitioners of war 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 that is 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 used is very much an art-of-war matter that is learned through experience over time.

#### What Is Not Being Assessed

In assessing the current status of the military forces, this *Index* uses the primary measures 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);
- The Marine Corps structures itself by battalions;
- For the Navy, it is the number of ships in its combat fleet; and
- The most consistent measure for the Air Force is the total number of aircraft, sometimes broken down into the two primary subtypes of fighters and bombers.

Obviously, this is not the totality of service capabilities, and it certainly is not everything needed for war. Nevertheless, these measures can be viewed as surrogates that subsume or represent the vast number of other things that make these units of measure possible and effective in battle. For example, combat forces depend on a vast logistics system that supplies everything from food and water to fuel, ammunition, and repair parts. Military operations require engineer support, and the force needs medical, dental, and administrative capabilities. The military also fields units that transport combat power and its sustainment to wherever they may be needed around the world.

The point 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 tip. Thus, in assessing the basic units of measure for combat power, one can get a sense of what is probably 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. It also does not assess the services' Reserve and

National Guard components, although they account for roughly one-third of the U.S. military force and have been essential to the conduct of operations since September 2001.8 Consistent assessment of their capability, readiness, and operational role is challenging because each service determines the balance among its Active, Reserve, and National Guard elements differently: Only the Army and Air Force have Guard elements; the Navy and Marine Corps do not. This balance can change from year to year and is based on factors that include cost of the respective elements, availability for operational employment, time needed to respond to an emergent crisis, allocation of roles among the elements, and political considerations.9

As with other elements that are essential to the effective employment of combat power-logistics, medical support, strategic lift, training, etc.—the U.S. military could not handle a major conflict without the Reserve and Guard forces. Nevertheless, to make the challenge of annually assessing the status of U.S. military strength using consistent metrics over time more manageable, this Index looks at something that is usually associated with the Active component of each service: the baseline requirement for a given amount of combat power that is readily available for use in a major combat operation. There are exceptions, however. For example, in the 2020 Index, four Army National Guard BCTs were counted as "available" for use because of the significant amounts of additional resources that had been dedicated specifically to these formations to raise their readiness levels. 10

## The Defense Budget and Strategic Guidance

When it comes to the defense budget, how much we spend does not automatically determine the U.S. military's posture or capacity. As a matter of fact, simply looking at how much is allocated to defense does not tell us much about the capacity, modernity, or readiness of the forces. Proper funding is a necessary condition for a capable, modern, and ready force, but it is not sufficient by itself. A larger defense budget, for example, could be associated with less military capability if the money were allocated inappropriately or spent wastefully. Nevertheless, the budget does reflect the importance assigned to defending the nation and its interests in prioritizing federal spending.

Absent a significant threat to the country's survival, the U.S. government will always balance spending on defense against spending in all of the other areas of government activity that are deemed necessary or desirable. 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, what would be needed to defeat those threats, and the costs associated with that capability; 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 a risk to U.S. security interests.

This *Index* enthusiastically adopts this 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 about where to accept risk: force modernization, the capacity to conduct large-scale or multiple simultaneous operations, or force readiness. The composition of the force and the understanding of military risk have become more salient issues with the shift toward competition with China and Russia. Both the 2017 National Security Strategy<sup>11</sup> and the 2021 Interim National Security Strategic Guidance<sup>12</sup> recognize that meeting the challenges posed by these two large, well-equipped, and well-resourced countries requires a U.S. force that is modern, ready, and effective in all domains of warfare. During their deliberations on the fiscal year (FY) 2022 defense budget, Members of Congress had no updated National Defense Strategy or National Security Strategy to use as a guide.

FY 2022 was the first of the Biden Administration, and the President's party also controlled both chambers of Congress. The Administration initially requested \$715 billion for the base discretionary budget of the Department of Defense, which is a 1.6 percent increase over the previous fiscal year's budget. This relative frugality stood in stark contrast to the massive increases requested for other federal departments: increases of more than 40 percent for the Department of Education, more than 14 percent for the Department of Transportation, and more than 29 percent for the Department of Commerce.

Congressional leaders saw Biden's proposal as inadequate, and both chambers acted through the appropriations and authorization bills to increase the defense budget by \$27.3 billion over the requested amount. The argument that carried the day was based on the need to stop the divestment of combat-relevant assets, marginally increase the

procurement of hardware, and further invest in research and development of emerging technologies. This increase represented both a rejection of platform retirements proposed by the Biden Administration and Congress's assessment of what is needed to tackle the challenges and threats faced by our armed forces.

The FY 2022 base discretionary budget for the Department of Defense was \$742.3 billion. This represents the resources allocated to pay for America's military forces (manpower, equipment, and training); their enabling capabilities (things like transportation, satellites, defense intelligence, and research and development); and their institutional support (bases and stations, facilities, recruiting, and the like).

With the congressional increase, the FY 2022 defense budget was 7.3 percent higher in nominal terms than the FY 2021 budget. Unfortunately, FY 2022 was also marked by the return of inflationary levels that the nation had not experienced for 40 years: By the end of 2021, inflation had reached 7 percent.<sup>17</sup> By increasing fuel, food, raw materials, and labor costs, inflation affects the defense budget as much as it does any household budget. Therefore, the price of merely maintaining our current force structure has risen considerably in the past year and is likely to rise further in the coming years as inflation continues to raise costs.

FY 2022 was also affected by Russia's war of aggression against Ukraine. The war started on February 24, 2022, but the FY 2022 budget was signed into law on March 15, 2022.18 Though FY 2022 started 5.5 months before passage of the full-year appropriations bill, the delayed start of the actual budget allowed it to be adjusted to account for the war in Ukraine. The appropriations law for FY 2022 included \$13.6 billion in assistance to Ukraine, \$3.5 billion of which was for defense assistance and \$3 billion of which was for operations support for U.S. European Command.<sup>19</sup> Because of the need to replenish the stocks of weapons being shipped to Ukraine and to pay for the redeployment of American troops to Europe, the war's budgetary impacts on America's armed forces will continue.

Adding to these challenges, part of the federal government's response to the coronavirus pandemic was a very substantial increase in government spending. Federal outlays jumped from \$4.4 trillion in 2019 to \$6.8 trillion in 2021, and the result was a \$3.1 trillion budgetary deficit in FY 2020 and a \$2.7 trillion deficit

in FY 2021.<sup>20</sup> This extremely high level of budgetary deficit should shape how the country assesses the federal government's budgetary priorities, especially when added to a national debt that had reached \$28.43 trillion by the end of FY 2021.<sup>21</sup> The public debt, which has been building for years, will continue to consume federal taxpayers' dollars and will have to be balanced against all other federal priorities.

The decision to fund national defense at a level that is commensurate with interests and prevailing threats reflects our national priorities and risk tolerance. 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 about the level of funding for hard power is better informed.

### 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 relatively rare, although they have occurred every 15 years on average. <sup>22</sup> In between (and even during) such occurrences, the military is used to support regional engagement, crisis response, strategic deterrence, and humanitarian assistance as well as to support civil authorities and U.S. diplomacy.

All of the U.S. Unified Geographic Combatant Commands, or COCOMS<sup>23</sup>-Northern Command (NORTHCOM); European Command (EUCOM); Central Command (CENTCOM); Indo-Pacific Command (INDOPACOM); Southern Command (SOUTHCOM); and Africa Command (AFRICOM) have annual and long-term plans through which they engage with countries in their assigned regions. Engagements range from very small unit training events with the forces of a single partner country to larger bilateral and sometimes multilateral military exercises. Such events help to foster 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 their respective regions or that operate in them temporarily on a rotational basis. To make these regional rotations possible, the services must maintain base forces that are large enough to train, deploy,

support, receive back, and again make ready a stream of units that ideally is 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 (three periods of time at home for every period deployed) is sustainable. If a unit is to be out for six months, for example, it will be home for 18 months before deploying again. Obviously, a service needs enough 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 CO-COM requirements for presence and engagement and the amount of military power (typically measured in terms of combat units and major combat platforms, which inform total end strength) that is 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 because 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; and
- 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. A commander who wants one U.S. warship stationed off the coast of a hostile country, for example, 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 is otherwise unavailable because of major maintenance or modernization work.

This *Index* focuses on the forces required to win two major wars as the baseline force-sizing metric for the Army, Navy, and Air Force and the one-war-pluscrisis-response paradigm for the Marine Corps. The three large services are sized for global action in more than one theater at a time; the Marines, by virtue of overall size and most recently by direction of the Commandant, focus on one major conflict while ensuring that all Fleet Marine Forces are globally deployable for short-notice, smaller-scale actions.<sup>24</sup> The military's effectiveness, both as a deterrent against opportunistic competitor states and as 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 America's military 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)
  with the design, performance characteristics,
  technological advancement, and suitability that
  the force needs to perform its function against
  an enemy 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; and
- 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 in Iraq to depose Saddam Hussein 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 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 the armed forces of few if any other countries can do.

The most recent evidence of this was seen in the hasty evacuation of civilians from Afghanistan in August 2021 once the Biden Administration ordered the end of U.S. operations in that country. Though subject to severe criticism both during and after its execution, almost all of which had to do with the politics surrounding the decision to withdraw and the context that framed the nature of the operation, the operation itself was an extraordinary feat of military effectiveness within tight time constraints and tremendous pressure. Approximately 124,000 civilians were evacuated

via the Hamid Karzai International Airport, situated on the outskirts of Kabul, during the latter two weeks of August. The effort involved 6,000 troops on the ground and approximately 800 aircraft from 30 countries (250 of which were U.S. Air Force transports), all coordinated and controlled by U.S. military personnel.<sup>25</sup> No other country could have executed such a mission under such conditions.

A modern "major combat operation" 26 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 undersea); 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.

Since 2018, given its focus on counterinsurgency, stability, and advise-and-assist operations since 2004 and the 2018 NDS directive to prepare for conflict in an era of great-power competition, the military community has focused on its suitability and readiness for major conventional warfare.<sup>27</sup>

- 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;
- The Marine Corps has undertaken a dramatic restructuring to posture itself more effectively for high-end warfare against a major opponent, focusing specifically on China and the littorals of the Indo-Pacific but also appreciating that its new capabilities will be broadly applicable elsewhere; and
- Both the Navy and the Air Force have acknowledged the evolved threat environment that will demand more of them in the coming decade than they have had to deal with during the past 20 years.

This *Index* ascertains the relevance and health of military service capabilities by looking at such factors as the average age of equipment, the generation of equipment relative to the current state of competitor efforts as reported by the services, and the status of replacement programs that are 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 addressed by senior service officials when providing testimony to Congress or examining 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. When speaking of platforms such as planes and ships, a troubling and fairly consistent trend within U.S. military acquisition characterizes the path from requirement to fielded capability. Along the way to acquiring the capability, several linked things happen that result in far less of a presumed "critical capability" than was supposedly required.

- The military articulates a requirement that the manufacturing sector attempts to satisfy.
- "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 altogether, and the military finally fields fewer platforms at a higher cost per unit 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 it currently fields only 22 and has stated that it plans to drop to 21 in order to make resources available for experimentation and modernization.<sup>28</sup>
- In 2012, the Army was building toward 48
  brigade combat teams, but incremental budget
  cuts reduced that number over time to 31—less
  than two-thirds the number that the Army originally thought was necessary.
- The Navy has produced various assessments
  of fleet size since the end of the Cold War, from
  313 ships to 372 ships with some working estimates as high as 500 manned ships.

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 going to be needed to win in battle against a credible opponent when the crisis is profound enough to threaten a vital national 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 the two-MRC metric as a benchmark for most of the force.

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 any given time. Some percentage of the force will always be unavailable because of long-term maintenance overhaul, especially for Navy ships; unit training cycles; employment in myriad

# **U.S. Military Power: Summary**

 VERY WEAK
 WEAK
 MARGINAL
 STRONG
 VERY STRONG

engagement and small-crisis response tasks that continue even during major conflicts; a standing commitment with allies to maintain U.S. forces in a given country or region; and the need to keep some portion of the force uncommitted to serve as a strategic reserve.

The historical record shows that, on average, the U.S. Army commits 21 BCTs to a major conflict; thus, a two-MRC standard would require that 42 BCTs be 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. Although new technologies and additional capabilities have made current BCTs more capable than those they replaced, one thing remains the same: Today's BCT, like its predecessors, can be committed to only one place at a time and must be able to account for combat losses, especially if it engages a similarly modernized enemy force. Thus, regardless of modernity, numbers still matter.

Again, this *Index* assesses only the Active component of the service, albeit 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 long-running debate within the total Army about the roles and contributions of its various components. A similar situation exists with the Air Force and Marine Corps.

The balance among Active, Reserve, and Guard elements is beyond the scope of this study. Our focus 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, <sup>29</sup> 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.<sup>30</sup> To this force allocation we added 20 percent, both to account for forces and platforms that are likely to be unavailable and to provide a strategic reserve to guard against unforeseen demands.

Summarizing the totals, this *Index* concluded that a Joint Force capable of dealing with two MRCs simultaneously or nearly simultaneously would consist of:

- Army: 50 BCTs.
- **Navy:** at least 400 ships and 624 strike aircraft.
- **Air Force:** 1,200 fighter/attack aircraft.
- Marine Corps: 30 battalions.

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

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

Supplemental funding in FY 2017, a higher topline in FY 2018, and sustained increases in FY 2019 and FY 2020 have helped to stop the bleeding and have enabled the services to plan and implement readiness recovery efforts. Massive federal spending in response to the COVID-19 pandemic in calendar year 2020 led to fiscal pressure on defense accounts in future years, but gains in readiness were preserved during FY 2020. Ensuring adequate readiness in FY 2021 was difficult given the challenges created by COVID-19 during the preceding year. In FY 2022, the services continued their effort to find

an appropriate balance among capability, capacity, and readiness, at first benefiting from a reduction in combat operations and the easing of COVID-related restrictions and disruptions but then forced to contend with a loss in spending power caused by rising inflation.

It is one thing to have the right capabilities to defeat the enemy in battle. It is another thing to have enough of those capabilities to sustain operations and many battles against an enemy over time, especially when attrition or dispersed operations are significant factors. But sufficient numbers of the right capabilities are rather meaningless if the force is not ready 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, opensource, 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. Simple numbers, while important, do not tell the whole story.

We believe that 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. It then considered several questions, including:

- How does one place a value on the combat effectiveness of such concepts as Air-Sea Battle, Multi-Domain Operations, Littoral Operations in a Contested Environment, Distributed Maritime Operations, Network-centric Operations, or Joint Operational Access when they have not been tested in battle?
- 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. is pursuing so 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 erosion of experience as combat operation events recede in time and those who participated in them leave the force, the health of a supporting workforce, the value of "presence and engagement operations," and the related force structures and patterns of deployment and employment that presumably deter war or mitigate its effects if it does occur?

New capabilities such as unmanned systems, cyber tools, hypervelocity platforms and weapons, and the use of artificial intelligence to achieve a better understanding of operations and orchestrate them more effectively have the potential to change military force posture calculations in the future. At the present time, however, they are not realized in any practical sense.

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, both in and out of government, who have covered these issues for many years.

Taking everything 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.

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- 6. 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. Naval planners are much more concerned about ship-based, air-based, and shore-based anti-ship cruise missiles than they are about the number of conventional surface combatants armed with large-caliber guns that an enemy navy has, and 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 typically 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. Adding this to the rise of unmanned platforms capable of carrying anti-platform weapons makes the threat environment even more complicated. Some examples: Harpoon ASCM (\$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 (\$70 million) or F-35A Lightning II (\$78 million).
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- 23. U.S. Space Command (USSPACECOM) is also considered a geographic command, but within the context of this discussion, SPACECOM's interactions with other countries and the extent to which it must deal with units and peoples operating on its terrain are much different from those of terrestrial commands.
- 24. In previous editions of the *Index*, the capacity of the Marine Corps was assessed against a two-war requirement of 36 battalions: a historical average of 15 battalions for a major conflict (twice that for two) and a 20 percent buffer, bringing the total to 36. The Corps has consistently maintained that it is a one-war force and has no intention of growing to the size needed to fight two wars. Its annual budget requests and top-level planning documents reflect this position. Having assessed that the Indo-Pacific region will continue to be of central importance to the U.S., noting that China is a more worrisome "pacing threat" than any other competitor, and that the Joint Force lacks the ability to operate within the range of intensely weaponized, layered defenses featuring large numbers of precision-guided munitions, the Corps is reshaping itself to optimize its capabilities and organizational structures for this challenge. This *Index* concurs with this effort but assesses that the Corps will still need greater capacity to succeed in war in the very circumstances for which the Marines believe they must prepare. For a detailed examination of the current state of the Corps, see Dakota Wood, "The U.S. Marine Corps: A Service in Transition," Heritage Foundation *Backgrounder* No. 3501, June 16, 2020, https://www.heritage.org/sites/default/files/2020-06/BG3501\_0.pdf.
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# U.S. Army

# Thomas W. Spoehr

The U.S. Army is America's primary agent for the conduct of land warfare. Although it is capable of all types of operations across the range of military operations and support to civil authorities, its chief value to the nation is its ability to defeat and destroy enemy land forces in battle.

The Army is engaged throughout the world in protecting and advancing U.S. interests. From May 2021 to April 2022, the Army provided 120,000 soldiers to the Joint Force in 140 different countries. Most notably it has deployed significant forces to NATO countries as a deterrent to further aggression by Russia. Since Vladimir Putin began his invasion of Ukraine on February 24, 2022, the Army has deployed two Corps, two Division Headquarters, six Brigade Combat Teams, and two Combat Aviation Brigades to Europe.

On May 12, 2022, speaking of the deployments to Europe, Secretary of the Army Christine Wormuth and Army Chief of Staff General James C. McConville testified that:

Never before has the U.S. Army moved so many forces so quickly. It took less than one week after receiving deployment orders for an armored brigade to deploy from Savannah, Georgia and be on the ground in Germany starting live-fire exercises with tanks drawn from [Army Prepositioned Stock] in Europe. That is a testament to years spent investing in our alliances and partnerships, and to maintaining strong relationships that enabled the Army [to enjoy] the access and presence needed to bolster NATO deterrence.<sup>2</sup>

The Army, like the other military services, finds itself under extraordinary operational and financial

pressure. In some cases, advances in firepower like ballistic missiles, electronic warfare, and loitering munitions delivered by drones fielded by adversaries like China have outpaced the U.S. Army's capabilities. Information-age warfare requires new levels of speed and precision in Army sensor-to-shooter chains. Autonomy is changing the character of warfare, and the Army has developed some bold ideas about how to take advantage of this technology.

In her initial message to the Army, Secretary Wormuth set out six objectives. The first, and arguably most important is to "put the Army on a sustainable strategic path amidst this uncertainty." Wormuth acknowledged that the Army is "facing increased fiscal pressures" And while the objective of "a sustainable strategic path" is noble and well-founded, it is not at all clear how the Army will be able to find such a path given its significant year-over-year losses in buving power.<sup>3</sup>

When inflation is factored in, the Army has lost \$46 billion in buying power since fiscal year (FY) 2019, and if we assume an inflation factor of 5 percent from 2022 to 2023 (which is likely conservative), the Administration's \$177.5 billion FY 2023 budget request for the Army represents a loss of more than \$6 billion just from its FY 2022 enacted budget. Signs of budget strain are clearly visible in the Army's proposal to cut its end strength; in modernization accounts slashed (with procurement cut by 7 percent and research and development down by 6 percent); and in military construction accounts that are now below historic levels.

**Enduring Relevance of Land Power.** Arguments that America no longer needs a strong modern Army because, for example, China is largely a maritime threat ignore history. We need to look no further than today's newspaper headlines about war

in Europe between Russia and Ukraine to remember that capable land power is an enduring need for the United States.

America has a horrible record of predicting where it will fight its next war. As former Secretary of Defense Robert Gates famously said:

When it comes to predicting the nature and location of our next military engagements, since Vietnam, our record has been perfect. We have never once gotten it right, from the Mayaguez to Grenada, Panama, Somalia, the Balkans, Haiti, Kuwait, Iraq, and more—we had no idea a year before any of these missions that we would be so engaged.<sup>6</sup>

America should not be willing to gamble that the next conflict will be in the Indo-Pacific and put all our eggs in one basket and ignore the need for land power.

Many also overlook the fact that great-power competition with China and Russia is a global contest, which means that we face the enduring need to counter aggression wherever it may occur, not just within the territory or waters of China or Russia. All of this reinforces the reality that America has a long-term need for modernized, sufficiently sized land power.

Lingering Effects of the Pandemic. The Army has largely surmounted the direct challenges posed by the COVID-19 pandemic, but some others have been more persistent. Major collective training events had to be cancelled, and the virus upended Army recruiting efforts in FY 2021, but the Army eventually achieved its desired overall end strength, albeit by relying more on reenlistments than on recruiting. In 2022, combined with other structural factors, the reordering of the U.S. economy that was caused by the pandemic continues to frustrate recruiting efforts.

An Army Recruiting Crisis. The Army's FY 2023 budget request reflects a reduction of 12,000 in end strength. The Army has endeavored to portray this cut as both temporary and driven by a desire to maintain a quality force. In reality, the Army and, to a degree, the other military services are facing a recruiting crisis the likes of which they have not experienced since the transition to the All-Volunteer Force in 1973. Since 2018, the Army has been missing its recruiting goals and making up the difference with strong numbers of reenlistments. Now

facing extraordinary financial pressure and in order to save money, it has been forced to face reality and cut spaces for servicemembers that it does not anticipate being able to recruit.

The reasons for the recruiting crisis are many.

- The percentage of Americans that qualify for military service without a waiver has dropped from 29 percent in 2016 to 23 percent in 2022.
- The predominant factor in disqualification is obesity.
- Low unemployment makes recruiting difficult, and as this book was being prepared, the U.S. unemployment rate "was 3.6 percent for the third month in a row."
- A requirement for volunteers to be vaccinated against COVID-19 is disqualifying some applicants.
- Finally, for a variety of reasons that are beyond the scope of this study, fewer Americans express a desire to serve in the armed forces.<sup>11</sup>

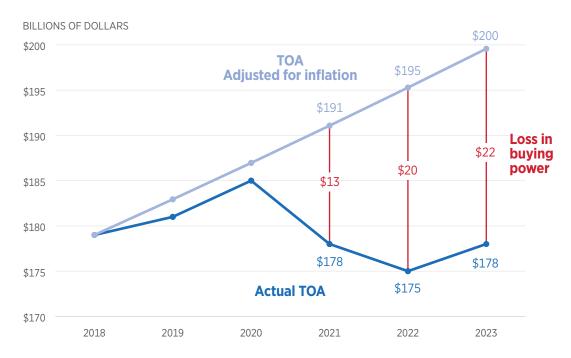
The results of this recruiting crisis include lower manning in Army formations, critical shortages in certain career fields, and lower overall readiness. If the crisis is not ameliorated, its longer-term implications are even more consequential.

A Capable Force Showing Strain of Chronic Underfunding. The U.S. Army is currently the world's most powerful army, but it is also too small and insufficiently modern to meet even the modest requirements of the 2018 National Defense Strategy (NDS),<sup>12</sup> much less to handle two major regional contingencies simultaneously, which many experts believe is essential.<sup>13</sup>

Even though the conflict in Iraq has largely ended and the military has withdrawn from Afghanistan, the Army's single-minded focus on counterinsurgency during the period from 2001 to 2016 precluded the service from modernizing the key combat capabilities that it needs now for near-peer competition. In 2011, for example, the Army cancelled its only mid-tier air defense program, the Surface Launched Advanced Medium-Range Air-to-Air Missile (SLAMRAAM), based on its assessment that it would not face a threat from the air in the

## **Army Budget Hit by Both Cuts and Inflation**

Not only is the Army's total obligation authority (TOA) declining in real terms, but due to inflation, those declines have resulted in an additional loss of buying power since 2018. Combined losses from 2018 to 2023 total \$59 billion.



**SOURCES:** Honorable Gabe Camarillo, Under Secretary of the Army, "Army Fiscal Year 2023 Budget Overview," March 28, 2022, p. 5, https://www.asafm.army.mil/Portals/72/Documents/BudgetMaterial/2023/pbr/Army%20FY%202023%20Budget%20Overview.pdf (accessed August 17, 2022), and Executive Office of the President, Office of Management and Budget, *Budget of the U.S. Government, Fiscal Year 2023*, https://www.whitehouse.gov/wp-content/uploads/2022/03/budget\_fy2023.pdf (accessed August 17, 2022).

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foreseeable future. <sup>14</sup> The Army's last major modernization efforts occurred in the 1980s with the fielding of the M-1 Abrams Tank, the M-2 Bradley Fighting Vehicle, and the Blackhawk and Apache helicopters. As General McConville has cogently argued, "we must modernize the Army. Every 40 years the Army needs to transform. It did in 1940, it did in 1980 and we're in 2020 right now." <sup>15</sup>

The Army's ability to transition from counterinsurgency operations was further constrained by a period of fiscal austerity that began with the Budget Control Act (BCA) of 2011. The inability to fund what was needed led to difficult across-the-board tradeoffs in equipment, manpower, and operations accounts. Budget pressure drove the Department

of Defense (DOD) in 2014 to consider cutting the Army's Active component end strength from more than 500,000 to 420,000. If implemented, this would have resulted in "the smallest number of troops since before the Second World War." Multiple equipment programs were cancelled.

The change in Administrations in 2017 fore-stalled those cuts in end strength. However, the addition of billions of dollars by Congress and the Trump Administration, while it served to arrest the decline of the Army and significantly improved unit readiness, was not sufficient to modernize or significantly increase the size of the force. <sup>18</sup>

A Change in Strategic Direction? As of May 2022, the Biden Administration had been in office for 16 months, yet it remains unclear what direction its National Security or National Defense strategies will take. The Administration's Interim National Security Guidance provided little insight into its thinking with respect to national defense and does not mention the Army or any other military service. <sup>19</sup> The Administration has released a one-and-a-halfpage fact sheet on its National Defense Strategy, but it provides no useful details. <sup>20</sup>

Consequences of the Loss in Buying Power. Despite relatively broad agreement that the DOD budget needed real growth of 3 percent to 5 percent to avoid a strategy–budget mismatch,<sup>21</sup> the defense budget topline did not meet that target in FY 2019 and has not done so since.

Of all the services, the Army has fared the worst in terms of resources. Its funding levels plateaued with the FY 2020 budget and since then have declined. The Army received \$181 billion in FY 2019, \$185 billion in FY 2020, \$178 billion in FY 2021, and \$175 billion in FY 2022 and has requested \$178 billion for FY 2023. <sup>22</sup> Because of the inexorable annual bite of inflation and the decline in budget authority, the Army budget for FY 2023 represents a net loss of about 11 percent in buying power, or \$46 billion, since FY 2019.

Summarizing the Army budget at a recent hearing, General McConville candidly reported: "You know Congressman, we're trying to give you the best army we can with the resources we get." General McConville's more than \$5 billion Unfunded Priority List containing hundreds of critical items is a testament to what the Army was not able to include in its FY 2023 budget request: family housing, cold weather clothing, Stinger missiles, counter unmanned aerial vehicle systems, and air defense systems—among many other categories of funding.<sup>24</sup>

### Capacity

Capacity refers to the sufficiency of forces and equipment needed to execute the National Defense Strategy. One of the ways the Army quantifies its warfighting capacity is by numbers of Brigade Combat Teams (BCTs).

**Brigade Combat Teams.** BCTs are the Army's primary combined arms, close combat force. They often operate as part of a division or joint task force, both of which are the basic building blocks for employment of Army combat forces. BCTs are usually employed within a larger framework of U.S. land

operations but are equipped and organized so that they can conduct limited independent operations as circumstances demand.<sup>25</sup>

BCTs range between 4,000 and 4,700 soldiers in size. There are three types of BCTs: Infantry, Armored, and Stryker. At its core, each of these formations has three maneuver battalions enabled by multiple other units such as artillery, engineers, reconnaissance, logistics, and signal units.<sup>26</sup>

The simplest way to understand the status of hard Army combat power is to know the readiness, quantity, and modernization level of BCTs. This section deals with the number of BCTs in the force.

Since 2012, the number of active BCTs has been in decline. In January 2012, "DOD announced [that] the Army would reduce the size of the Active Army starting in 2012 from a post-9/11 peak in 2010 of about 570,000 soldiers to 490,000 soldiers by the end of 2017." Later guidance revised that figure downward "to a range of 440–450,000 soldiers." In 2013, the Army announced that because of those end strength reductions and the priorities of the prior Administration, the number of Regular Army BCTs would be reduced from 45 to 33.28 Subsequent reductions reduced the number of Regular Army BCTs from 33 to 31, where they remain today.<sup>29</sup>

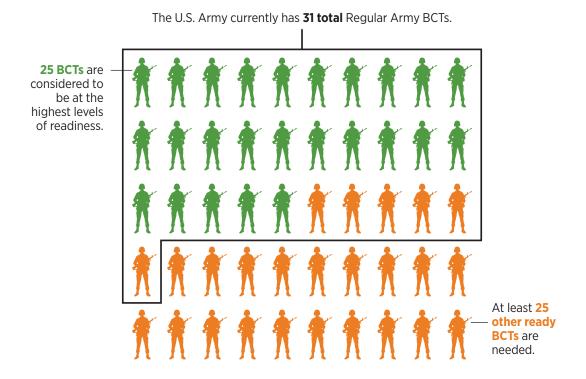
When President Donald Trump and Congress reversed the planned drawdown in Army end strength and authorized growth beginning in 2017, instead of "re-growing" the numbers of BCTs, the Army chose to "thicken" the force and raise the manning levels within the individual BCTs to increase unit readiness. The Army's goal was to fill operational units to 105 percent of their authorized manning,<sup>30</sup> but the decision announced in the FY 2023 budget to cut end strength by 12,000 soldiers will reverse those trends.

**Combat Aviation Brigades.** The Regular Army also has a separate air component that is organized into Combat Aviation Brigades (CABs). CABs are made up of Army rotorcraft, such as the AH-64 Apache, and perform various roles including attack, reconnaissance, and assault. The number of Army aviation units also has been reduced. In May 2015, the Army deactivated one of its 12 CABs, leaving only 11 in the Regular Army.<sup>31</sup>

**Generating Force.** CABs and Stryker, Infantry, and Armored BCTs make up the Army's main combat fighting forces, but they obviously do not make up the entirety of the Army. In the Active

## **Army Capacity: Brigade Combat Teams**

Based on historical force requirements, The Heritage Foundation assesses that the Army needs a total of 50 Brigade Combat Teams (BCTs).



<sup>\*</sup> Includes four Army National Guard BCTs.

**SOURCE:** Email to the author from Headquarters, Department of the Army, Public Affairs office, July 6, 2022.

▲ heritage.org

component, there are 194,000 soldiers in combat units, 119,000 in support units, and 138,000 in overhead units. Overhead is composed of administrative units and units providing such types of support as preparing and training troops for deployments, carrying out key logistics tasks, staffing headquarters, and overseeing military schools and Army educational institutions.

**Functional or Multifunctional Support Brigades.** In addition to the institutional Army, a great number of functional or multifunctional support brigades, amounting to approximately 46 percent of the force,<sup>32</sup> provide air defense; engineering; explosive ordnance disposal; chemical, biological, radiological, and nuclear protection; military police; military intelligence; and medical support among

other types of battlefield support. Special operations forces such as the 75th Ranger Regiment, six Special Forces Groups, and the 160th Special Operations Aviation Regiment are also included in these numbers.

New Concepts and Supporting Force Structure. The Army is trying to adapt its force structure to meet the anticipated new demands of near-peer competition. The foundations for these changes are contained in the Army's Multi-Domain Operations (MDO) concept, published in December 2018, which describes how the Army views the future.<sup>33</sup>

In January 2022, the Army announced that it planned to modify its force structure for MDO under the designation "Army 2030." As part of this initiative, the Army plans to reorganize divisions

TABLE 4

## **Major Army Combat Formations**

	Army National				
Brigade Combat Teams	Regular Army	Guard	Total		
Infantry Brigade Combat Teams	13	20	33		
Stryker Brigade Combat Teams	7	2	9		
Armored Brigade Combat Teams	11	5	16		
Total	31	27	58		

	Army National			
Aviation Brigades	Regular Army	Guard	Total	
Combat Aviation Brigades	11	-	11	
Expeditionary Combat Aviation Brigades	-	8	8	
Theater Aviation Brigades	-	2	2	
Total	11	10	21	

#### SOURCES:

- U.S. Department of the Army, Department of the Army Fiscal Year (FY) 2023 Budget Estimates, Volume 1, Operation and Maintenance, Army, Justification of Estimates, April 2022, pp. 57 and 121, https://www.asafm.army.mil/Portals/72/Documents/BudgetMaterial/2023/Base%20Budget/Operation%20and%20Maintenance/OMA Volume 1,pdf (accessed August 17, 2022).
- U.S. Department of the Army, Department of the Army Fiscal Year (FY) 2023 Budget Estimates, Volume 1, Operation and Maintenance, Army National Guard, Justification Book, April 2022, pp. 38 and 94, https://www.asafm.army.mil/Portals/72/Documents/ BudgetMaterial/2023/Base%20Budget/Operation%20and%20Maintenance/OMNG\_Vol\_1.pdf (accessed August 17, 2022).

into five different types: Standard Light, Standard Heavy, Penetration, Joint Force Entry Air Assault, and Joint Force Entry Airborne.<sup>34</sup> Very little information has been made public regarding the missions, the organization of these divisions, and the timeline for conversions. As part of its adaptation to MDO, the Army reactivated V Corps Headquarters on October 16, 2020, to provide operational planning, mission command, and oversight of rotational forces in Europe.<sup>35</sup>

The Army also has announced plans to create five Multi-Domain Task Forces (MDTFs). One MDTF is currently stationed at Joint Base Lewis–McChord in Washington State. Another is in Wiesbaden Germany, aligned to Europe. These task forces contain rockets, missiles, military intelligence, and other capabilities that will allow Army forces to operate seamlessly with joint partners and conduct

multi-domain operations.<sup>36</sup> A third MDTF included in the Army's FY 2023 budget will be "tied" to the Indo-Pacific with exact stationing still to be determined.<sup>37</sup>

To relieve the stress on the use of BCTs for advisory missions, the Army has activated six Security Force Assistance Brigades (SFABs). These units, each one of which is composed of about 800 soldiers, are designed specifically to train, advise, and mentor other partner-nation military units. The Army had been using BCTs for this mission, but because train-and-assist missions typically require senior officers and noncommissioned officers, a BCT comprised predominantly of junior soldiers was a poor fit. The SFABs will be regionally aligned to combatant commands. Of the six SFABs, one is in the National Guard, and the other five are in the Regular Army.<sup>38</sup>

Force Too Small to Execute the NDS. Army leaders have consistently stated that the Army is too small to execute the National Defense Strategy at less than significant risk. For FY 2022, the Army had an authorized total end strength of 1,010,500 soldiers:

- 485,000 in the Regular Army,
- · 189,500 in the Army Reserve, and
- 336,000 in the Army National Guard (ARNG).<sup>39</sup>

In May 2021, Army Chief of Staff McConville testified that "[w]hen we take a look at end-strength, I would like to grow the Army. We've done analysis like the previous chief [General Mark Milley] talked about. 540 to 550 [thousand] is about the right size of the Army."<sup>40</sup> In an earlier discussion with reporters, McConville stated, "I would have a bigger...sized Army if I thought we could afford it, I think we need it, I really do.... I think the regular Army should be somewhere around 540–550 [thousand].... [W]e're sitting right now at 485,000."<sup>41</sup>

The Army's plan to increase the size of the Regular Army force has recently been slammed into reverse because of budget cuts and recruiting challenges. The Army had planned to raise the Regular Army incrementally to above 500,000 by adding approximately 2,000 soldiers per year.<sup>42</sup> At that rate, it would have reached 500,000 by around 2028. Now even that modest plan is off the table. As a result of bleak defense budget forecasts and recruiting difficulties, the Army has proposed to cut its active end strength by 12,000 in FY 2023.<sup>43</sup>

Overall end strength dictates how many BCTs the Army can form, and by cutting end strength, not only will the service not be able to add more combat units, but it will likely have to reduce the manning levels in the units it possesses. This will drive a higher operational tempo (OPTEMPO) for Army units and increase risk both for the force and for the ability of the Army to carry out its mission.

Many outside experts agree that the U.S. Army is too small. In 2017, Congress established the National Defense Strategy Commission to provide an "independent, non-partisan review of the 2018 National Defense Strategy." Two of the commissioners, Dr. Kathleen Hicks and Mr. Michael McCord, are now top DOD leaders. Among its findings, the

commission unanimously reported that the NDS now charges the military with facing "five credible challengers, including two major-power competitors, and three distinctly different geographic and operational environments." The commission assessed that "[t]his being the case, a two-war force sizing construct makes more strategic sense today than at any previous point in the post-Cold War era." In other words, "[s]imply put, the United States needs a larger force than it has today if it is to meet the objectives of the strategy."<sup>44</sup>

In addition to the increased strategic risk of not being able to execute the NDS within the desired time frame, the combination of an insufficient number of BCTs and a lower-than-required Army end strength has resulted in a higher-than-desired level of OPTEMPO. Assistant Deputy Chief of Staff, G-3/5/7, Major General Sean Swindell recently stated that the Army had tried to reduce the demands on the force, but that "effort has been going in the opposite direction."<sup>45</sup>

**Army Force Posture.** The Army also has transitioned from a force with a third of its strength typically stationed overseas, as it was during the Cold War, to a force that is mostly based in the continental United States. In 1985, 31 percent of the active-duty Army was stationed overseas; by 2015, that figure had declined to 9 percent.46 The desire to find a peace dividend following the dissolution of the Soviet Union, combined with a reluctance to close bases in the United States, led to large-scale base closures and force reductions overseas. Even though the 2018 NDS (the most recently publicly available defense strategy) placed a high premium on how the Joint Force is postured, achieving that goal will be very difficult with the vast bulk of the Army now in the United States.

Among Army units that deploy periodically are Armored Brigade Combat Teams (ABCTs) and Patriot Battalions that rotate to and from Europe, Kuwait, and Korea. Rather than relying on forward-stationed BCTs, the Army rotates ABCTs to these regions on a "heel-to-toe" basis so that there is never a gap.

The Russia–Ukraine War has brought the issue of stationing more Army forces in Europe back to the forefront. Joint Chiefs of Staff Chairman General Mark Milley has suggested that the U.S. should establish more permanent European bases and rotate more forces to the continent.<sup>47</sup> There is disagreement as to which represents the better

option: rotated forces or forward-stationed forces. Proponents of rotational BCTs argue that they arrive fully trained, that they remain at a high state of readiness throughout their typically nine-month overseas rotation, and that the cost of providing for accompanying military families is avoided. Those who favor forward-stationed forces point to a lower overall cost, forces that typically are more familiar with the operating environment, and a more reassuring presence for our allies. In reality, both types of force postures are needed, not only for the reasons mentioned, but also because the mechanisms by which a unit is deployed, received into theater, and integrated with the force stationed abroad must be practiced on a regular basis.

## Capability

Capability in this context refers to the quality, performance, suitability, and age of the Army's various types of combat equipment. In general, the Army is using equipment developed in the 1970s, fielded in the 1980s, and incrementally upgraded since then. This "modernization gap" was caused by several factors: the predominant focus on the wars in Iraq and Afghanistan since 9/11; pressures caused by budget cuts, especially those associated with the BCA; and failures in major modernization programs like the Future Combat System, Ground Combat Vehicle, and Crusader artillery system.

Army leaders today clearly view this situation as a serious challenge. General McConville believes that modernization cannot be deferred any longer:

[E]veryone believes, and I believe strongly—that we must transform and modernize the Army now. So we've got to do that. We're three years into it, I think we've got some really good programs going. We probably need about two or three more years of good solid budgets. And I think that's something we have to do.<sup>49</sup>

Emphasizing the point, McConville also said recently that "we must transform the Army, now. Every 40 years, I would argue or suggest the Army transforms. It did it in 1940, it did it when I came in, in the Army in 1980. Now, we're in 2020, and we must transform the Army." <sup>50</sup>

**Equipment Losing Its Competitive Advantage.** As an example of how Army equipment is falling behind that of our competitors, the Army Tactical Missile System (ATACMS), first introduced in 1991, is the Army's only ground-launched precision missile. Because of the Intermediate Range Nuclear Forces Treaty's restrictions and other factors, it had a maximum range of 300 kilometers. China and Russia have much more substantial inventories of conventional, precision, ground-launched missiles and rockets. China has nine major groundlaunched missile systems and more than 425 launchers. These capable systems can range from 600 kilometers (DF-11A and DF-15) to 4,000 kilometers (DF-26).51 Russia, on the other hand, has the widest inventory of missiles in the world: at least four conventional ground-launched missile systems that can range from 120 kilometers (SS-21) to 2,500 kilometers (SSC-8).<sup>52</sup> The Army plans to field a new precision strike missile by 2023, but for now, that system remains a plan rather than a capability.<sup>53</sup>

Another example is the main battle tank. When the M-1 Abrams was introduced in 1980, it was indisputably the world's best tank. Now, in 2022, before the war with Ukraine, Russia was reportedly going to export versions of its T-14 Armata tank, which has an unmanned turret, reinforced frontal armor, an information management system that controls all elements of the tank, a circular Doppler radar, an option for a 155 mm gun, and 360-degree ultraviolet high-definition cameras.<sup>54</sup> Other assessments rate two other tanks—the German Leopard 2A7 and the South Korean K2 Black Panther—as superior to the M-1A2 SEP v3.55 The M-1A2 SEP v3 (the latest version) is a very good tank, but the decisive advantage the U.S. once enjoyed in tank warfare has now disappeared.

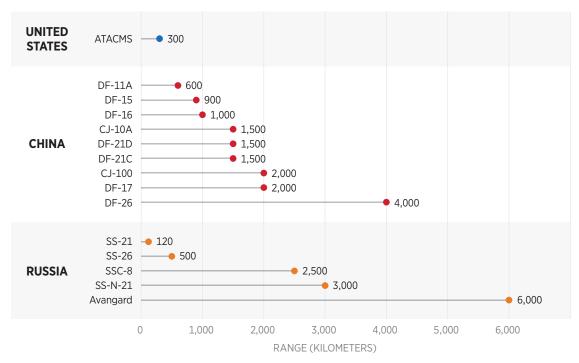
Similarly, the U.S. Army's Patriot Missile System is an excellent system, but countries such as Saudi Arabia, Turkey, and India have either purchased or recently expressed interest in buying the Russian competitor system, the S-400. The question has to be asked: Why?

Within the Army's inventory of equipment are thousands of combat systems, including small arms, trucks, aircraft, soldier-carried weapons, radios, tracked vehicles, artillery systems, missiles, and drones. The following updates with respect to some of the major systems as they pertain to Armored, Stryker, and Infantry BCTs and Combat Aviation Brigades are by no means exhaustive.

**Armored Brigade Combat Team (ABCT).** The Armored BCT's role is to "close with the enemy by

## U.S. Lags Behind China, Russia in Land-Based Missiles

GROUND-LAUNCHED CONVENTIONAL-CAPABLE PRECISION MISSILE SYSTEMS



#### SOURCES:

- China Power Team, "How Are China's Land-based Conventional Missile Forces Evolving?" Center for Strategic and International Studies, China Power Project, updated May 12, 2021, https://chinapower.csis.org/conventional-missiles/ (accessed August 17, 2022).
- Center for Strategic and International Studies, Missile Defense Project, "Missiles of Russia," *Missile Threat*, last updated August 10, 2021, https://missilethreat.csis.org/country/russia/ (accessed August 17, 2022).
- U.S. Army, Acquisition Support Center, "Army Tactical Missile System (ATACMS)," https://asc.army.mil/web/portfolio-item/atacms/ (accessed August 17, 2022).

means of fire and movement to destroy or capture enemy forces, or to repel enemy attacks by fire, close combat, and counterattack to control land areas, including populations and resources."<sup>57</sup> The Abrams Main Battle Tank (most recent version in production: M1A2 SEPv3, "scheduled for First Unit Equipped in FY 2020"<sup>58</sup>) and Bradley Fighting Vehicle (most recent version: M2A4, first unit equipped in April 2022<sup>59</sup>) are the primary Armored BCT combat platforms.

The M-1 tank and Bradley Fighting Vehicle first entered service in 1980 and 1981, respectively. There are 87 M-1 Abrams tanks and 152 Bradley Fighting Vehicle variants in an ABCT.<sup>60</sup> Despite upgrades, the M-1 tank and the Bradley are now at least 40 years old, and their replacements will likely not arrive until the platforms are at least 50 years old.

Optionally Manned Fighting Vehicle (OMFV). The Army's replacement program for the Bradley, the Optionally Manned Fighting Vehicle, was on an aggressive timeline, but the Army cancelled the request for proposals in January 2020 and rereleased an RFP for what it called a "concept design" in December 2020. Five teams were selected to come up with designs for the OMFV. The next milestone was in July 2022 when the government released a final

RFP. An award for three contractors to produce detailed designs is expected in the second quarter of FY 2023,<sup>61</sup> and "[t]he Army now plans for the first unit to be equipped [with the OMFV] in the fourth quarter of FY2028."<sup>62</sup> Flat or declining funding such as the Army is currently experiencing may impact those plans.

**New Tank?** A potential clean-sheet replacement for the M-1 tank is even further down the road. The Army does not intend to decide "what direction we want to go for decisive lethality and survivability on the battlefield" until at least 2023.<sup>63</sup> Meanwhile, the Army has another upgrade in development for the Abrams platform: the M1A2 SEPv4, which would incorporate a third-generation Forward-Looking Infrared (FLIR) sensor.<sup>64</sup>

Armored Multi-Purpose Vehicle (AMPV). The venerable M113 multi-purpose personnel carrier is also part of an ABCT and fills multiple roles such as mortar carrier and ambulance. It entered service in 1960 and is scheduled to be replaced by the new Armored Multi-Purpose Vehicle (AMPV), which after numerous delays "entered the low-rate initial production phase (LRIP)" on January 25, 2019.<sup>65</sup> The system's first fieldings are now expected during the second quarter of FY 2023.<sup>66</sup> The Army's FY 2023 budget requested to procure 72 AMPVs. At that rate, it will take the Army 40 years to meet its objective of 2.897 AMPVs.<sup>67</sup>

Stryker Brigade Combat Team (SBCT). The Stryker BCT "is an expeditionary combined arms force organized around mounted infantry" and is able to "operate effectively in most terrain and weather conditions" because of its rapid strategic deployment and mobility. 68 Stryker BCTs are equipped with approximately 321 eight-wheeled Stryker vehicles. 69 Relatively speaking, these vehicles are among the Army's newest combat platforms, having entered service in 2001. In response to an Operational Needs Statement, the Stryker BCT in Europe received Strykers fitted with a 30 mm cannon to provide an improved anti-armor capability.70 Based on the success of that effort, the Army decided to outfit at least three of its SBCTs equipped with the Double V-hull, which affords better underbody protection against such threats as improvised explosive devices (IEDs), with the 30 mm autocannon.71 The next SBCT to receive the cannons (after the 2nd Cavalry Regiment) will be the 1-2 SBCT at Joint Base Lewis-McChord in Washington State.<sup>72</sup> The Army is also integrating

Javelin anti-tank missiles on the Stryker platform and test-fired this capability in April 2022.<sup>73</sup>

Infantry Brigade Combat Team (IBCT). The Infantry BCT "is an expeditionary, combined arms formation optimized for dismounted operations in *complex terrain*—a geographical area consisting of an urban center larger than a village and/or of two or more types of restrictive terrain or environmental conditions occupying the same space."<sup>74</sup> Infantry BCTs have fewer vehicles and rely on lighter platforms such as trucks, High Mobility Multipurpose Wheeled Vehicles (HMMWVs), and Joint Light Tactical Vehicles (JLTVs) for mobility.

Joint Light Tactical Vehicle (JLTV). The JLTV combines the protection offered by Mine Resistant Ambush Protected Vehicles (MRAPs) with the mobility of the original unarmored HMMWV. The vehicle features design improvements that increase its survivability against anti-armor weapons and IEDs. The Army Procurement Objective is 49,099, replacing about 50 percent of the current HMMWV fleet.

Requested FY 2023 funding of \$703.1 million would support procurement of 1,528 JLTVs and 1,381 trailers. This reflects an increase in funding for this program (\$574.6 million was enacted for FY 2022), suggesting that the Army is committed to this program, at least in the short term. Considering the 5,426 JLTVs the Army has already procured,<sup>75</sup> as well as procurement at a rate of 1,528 vehicles (the FY 2023 rate), the Army will not reach its procurement objective for the JLTV until 2050, thereby forcing continued reliance on aging HMMWVs, which began fielding in 1983.<sup>76</sup>

**Mobile Protected Firepower (MPF).** The Army is developing an armored gun system called Mobile Protected Firepower to provide IBCTs with the firepower to engage enemy armored vehicles and fortifications. In 2020, the Army received 24 prototypes (12 each from General Dynamics Land Systems and BAE) for testing and evaluation. The Army announced in June 2022 that the winner of the competition was General Dynamics Land Systems. The first units are expected to receive MPF in FY 2025.

**Ground Mobility Vehicle (GMV).** Airborne BCTs are the first IBCTs to receive a new platform to increase their speed and mobility. The GMV (also referred to as the Infantry Squad Vehicle) provides enhanced tactical mobility for an IBCT nine-soldier infantry squad with their associated equipment. GM Defense was selected for the production contract in

TABLE 5

## **Procurement of Select Army Systems Will Take Decades to Complete**

System	Army Acquisition Objective	Funded Through FY 2023	Years Needed to Complete Army Fielding at FY 2023 Procurement Rate
Armored Multi-Purpose Vehicle (AMPV)	2,897	519	33
Joint Assault Bridge (JAB)	297	126	28
Armored Breacher Vehicle (ABV)	201	48	13
Mobile Protected Firepower (MPF)	504	51	16
Paladin Integrated Management (PIM) Howitzer	689	378	12
Joint Lightweight Tactical Vehicle (JLTV)	49,099	4,757	29

**SOURCES:** U.S. Department of the Army, *Department of Defense Fiscal Year (FY) 2023 Budget Estimates, Army, Justification Book of Procurement of W&TCV, Army,* April 2022, pp. 1 and 81, https://www.asafm.army.mil/Portals/72/Documents/BudgetMaterial/2023/Base%20 Budget/Procurement/WTCV\_ARMY\_II.pdf (accessed August 17, 2022), and U.S. Department of the Army, *Department of Defense Fiscal Year (FY) 2023 Budget Estimates, Army, Justification Book Volume 1 of 3, Other Procurement, Army, Tactical and Support Vehicles, Budget Activity 1,* April 2022, p. 49, https://www.asafm.army.mil/Portals/72/Documents/BudgetMaterial/2023/Base%20Budget/Procurement/OPA\_BA1\_Tactical\_Support\_Vehicles.pdf (accessed August 17, 2022).

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June 2020. The Army has approved a procurement objective of 11 IBCT sets at 59 vehicles per IBCT for a total of 649 vehicles. The approved Army acquisition objective is 2,406, but for some unspecified reason, funding for the program is projected to stop in FY 2024 with 848 systems procured.<sup>78</sup>

Combat Aviation Brigade. CABs are composed of AH-64 Apache attack, UH-60 Black Hawk medium-lift, and CH-47 heavy-lift Chinook helicopters. The Army has been methodically upgrading these fleets for decades, but the FY 2023 budget request continues the reduction in aircraft procurement that began in FY 2022. This continued cutback in helicopter modernization, if enacted, would extend the amount of time necessary to put aircraft crews in the latest version of these critical platforms. This is a continued reflection of downward budget pressure and incurs additional risk for the Army.

**UH/HH-60.** The acquisition objective for the H-60 medium-lift helicopter is 1,375 H-60Ms and 760 recapitalized 60-A/L/Vs for a total of 2,135 aircraft. The FY 2023 procurement request for the UH-60M is \$718.5 million, which would support the

procurement of 25 aircraft (one more than the 24 requested in FY 2021 before congressional adds). $^{79}$ 

**CH-47.** The CH-47F Chinook, a rebuilt variant of the Army's CH-47D heavy-lift helicopter, has an acquisition objective of 535 aircraft (a reduction of 15 from last year) and, with no replacement on the horizon, is expected to remain the Army's heavy-lift helicopter for the foreseeable future. The FY 2023 budget request of \$187.9 million would support the service life extension of six aircraft, all of which would be the MH-47G special operations model. <sup>80</sup>

**AH-64.** The AH-64E heavy attack helicopter has an acquisition objective of 812 aircraft (a combination of remanufactured and new build), which is being met by the building of new aircraft and remanufacturing of older AH-64 models. The \$693.9 FY 2023 procurement request would support the purchase of 35 AH-64E aircraft<sup>81</sup> (five more than the 30 requested in the FY 2022 budget before congressional adds).

Overall, the Army's equipment inventory, while increasingly dated, is maintained well. Despite high usage in Afghanistan and Iraq, most Army platforms

are relatively "young" because the Army deliberately undertook and Congress funded a "reset" plan that includes "[r]epairing and reconditioning systems to bring them back to a satisfactory operating condition." Under its current modernization plans, "the Army envisions [the M-1 Abrams Tank, the M-2/M-3 Bradley Fighting Vehicle (BFV), and the M-1126 Stryker Combat Vehicle] to be in service with Active and National Guard forces beyond FY 2028."82

In addition to seeing to the viability of today's equipment, the military must look to the health of future equipment programs. Although future modernization programs are not current hard-power capabilities that can be applied against an enemy force today, they are a leading indicator of a service's overall fitness for future sustained combat operations. In future years, the service could be forced to engage an enemy 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 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.

After years of a singular focus on counterinsurgency followed by concentration on the current readiness of the force, the Army is now playing catch-up in equipment modernization. General Milley, for example, has said that China is "on a path...to be on par with the U.S. at some point in the future." While his statement is intentionally ambiguous, General Milley was clearly conveying his concern about the pace of China's modernization and the very real danger that the U.S. military could lose its current advantages.

New Organizations and Emphasis on Modernization. In 2017, the Army established eight cross-functional teams (CFTs) to improve the management of its top modernization priorities, and in 2018, it established a new four-star headquarters, Army Futures Command, to lead modernization efforts. <sup>84</sup> Time will tell whether the new structures, commands, and emphasis result in long-term improvement in modernization posture. The Army aspires to develop and procure an entire new generation of equipment based on its six modernization

priorities: "long range precision fires, next generation combat vehicles, future vertical lift, network, air and missile defense, and Soldier lethality."<sup>85</sup>

Although the Army has put in place new organizations, plans, and strategies to manage modernization, the future is uncertain, and Army programs are in a fragile state with only a few in an active procurement status. The Army has shown great willingness to make tough choices and reallocate funding toward its modernization programs, but this has usually been at the expense of end strength or reduction in the total quantity of new items purchased. "There has been real progress in [modernization] over the last three or four years, but that progress is fragile," Lieutenant General James Pasquarette, a former senior Army budget official, has warned. "We continue to fund [the top] priority programs at the cost of the other programs in the equipping portfolio." 86

As budget challenges such as nuclear deterrence programs, inflation, rising personnel costs, health care, and the need to invest in programs to respond to China's increasingly aggressive activities continue to present themselves, the Army desperately needs time and funding to modernize its inventory of equipment. Recent modernization programs seem to be on track except for the OMFV program and the Integrated Visual Augmentation System, 87 both of which needed a reboot. Limited numbers of Stryker vehicle-mounted Maneuver Short Range Air Defense (M-SHORAD) systems have been delivered to Europe.88 Army officials are currently optimistic about future fielding dates for equipment like the Extended Range Cannon Artillery, a hypersonic weapon firing battery, and the Precision Strike Missile, all of which are scheduled to begin delivery in FY 2023, but their success will depend on sustained funding.

#### Readiness

**BCT Readiness.** Over the past four years, the Army has made significant progress in increasing the readiness of its forces. Its goal is to have 66 percent of the Regular Army and 33 percent of National Guard BCTs at the highest levels of readiness.<sup>89</sup>

As of July 6, 2022, the Army reported that "81 percent of Active Component Brigade Combat Teams are at the highest levels of tactical readiness," <sup>90</sup> 15 percentage points above its goal and 23 percentage points above last year's reported level. This means that 25 of the Army's 31 active BCTs were at either C1 or C2, the two highest levels of tactical readiness,

and ready to perform all or most of their wartime missions immediately. The *2022 Index* reported that 21 Regular Army BCTs were at the highest levels of readiness.

There also are 27 BCTs in the Army National Guard: five Armor, 20 Infantry, and two Stryker. The Army has allocated two Combat Training Center (CTC) rotations for two National Guard BCTs. The two BCTs conducting CTC rotations "are resourced to achieve company-level proficiency," and the remaining 25 "are on a path to platoon minus-level proficiency." These training levels dictate that additional training time would be required before the unit could be deployed.

**Training Resources Slashed.** In the FY 2023 budget request, funding for training activities is maintained at the low level first established in FY 2022. When measuring training resourcing for Brigade Combat Teams, the Army uses full-spectrum training miles (FSTMs), which represents the number of miles that formations are resourced to drive their primary vehicles on an annual basis. For Combat Aviation Brigades, the Army uses hours per crew per month (H/C/M), which reflects the number of hours that aviation crews can fly their helicopters per month.

According to the Army's budget justification exhibits, "[t]he FY 2023 budget funds unit Operating Tempo (OPTEMPO) at 1,235 Full Spectrum Training Miles for non-deployed units" and "358,000 Flying Hours (11.1 hours per crew per month), an increase from FY 2022 (10.3 H/C/M)" to meet "required training readiness levels." The FY 2023 proposed active FSTM is slightly higher (7 percent) than resourced levels of 1,150 miles and higher (11 percent) than the 10.0 active flying hours per crew per month enacted in the FY 2022 budget.<sup>92</sup>

**Training Level Goals Reduced.** The Army is coping with reduced training resources by shifting

training to lower echelons, where it is less expensive. Its strategy, begun in FY 2022, "focuses resources on squad, platoon and company level training to achieve highly trained companies." Starting with the FY 2022 budget justification books, the Army began to omit the Unit Proficiency Level Goal, which for years has been BCT; it is likely now battalion or company.

**CTC Rotations.** The Army uses Combat Training Centers to train its forces to desired levels of proficiency. Specifically, this important program "provide[s] realistic joint and combined arms training...approximating actual combat" and increases "unit readiness for deployment and warfighting." For FY 2023, "the Army is resourcing 22 Brigade Combat Team (BCT)-level CTC rotations...(17 Active BCT-level rotations, 2 BCT- level for the Army National Guard, and 3 for units on rotation in Europe)."

New Readiness Model. The Army has transitioned from one readiness model to another. Its Sustainable Readiness Model, implementation of which began in 2017, was intended to give units more predictability. Its new Regionally Aligned Readiness and Modernization Model (ReARMM) is designed to "better balance operational tempo (OPTEMPO) with dedicated periods for conducting missions, training, and modernization." ReARMM features units that spend eight months in a modernization-training-mission cycle while preparing to deploy to a specific part of the world. The Army shifted to this new model on October 1, 2021.

In general, the Army continues to be challenged by structural readiness problems as evidenced by too small a force attempting to satisfy too many global presence requirements and Operations Plan (OPLAN) warfighting requirements. If demand is not reduced, the funding cuts and end strength reduction featured in the FY 2023 budget can be expected to result in a continued decline in readiness.

# 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 (MRC). 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 approximately four in

Operation Iraqi Freedom—an average of 16 BCTs (or 21 if the much smaller Operation Iraqi Freedom initial invasion operation 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 and 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, our assessment is that 42 BCTs would be needed to fight two MRCs. 98 Taking into account the need for a strategic reserve, the Army force should also include an additional 20 percent of the 42 BCTs, resulting in an overall requirement of 50 BCTs.

Previous editions of the *Index* had counted a small number of Army National Guard BCTs in the overall count of available BCTs. Because the Army no longer makes mention of Army National Guard BCTs at the highest state of readiness, they are no longer counted in this edition of the *Index*. The Army has 31 Regular Army BCTs compared to a two-MRC construct requirement of 50. The Army's overall capacity score therefore remains unchanged from 2022.

- Two-MRC Benchmark: 50 Brigade Combat Teams.
- Actual FY 2022 Level: 31 Regular Army Brigade Combat Teams.

The Army's current BCT capacity equals 62 percent of the two-MRC benchmark and is therefore scored as "weak."

#### **Capability Score: Marginal**

The Army's aggregate capability score remains "marginal." This aggregate score is a result of "marginal" scores for "Age of Equipment," "Size of Modernization Programs," and "Health of Modernization Programs." More detail on these programs can be found in the equipment appendix following this section. The Army is scored "weak" for "Capability of Equipment."

Despite modest progress with the JLTV, Mobile Protected Firepower, Ground Mobility Vehicle, and AMPV programs, and in spite of such promising developments as creation of Army Futures Command, CFTs, and the initiation of new Research, Development, Testing and Evaluation (RDTE) funded programs, nearly all new Army equipment programs remain in the development phase and in most cases are one to two years from entering procurement. FY 2023 requested funding levels for procurement and research and development are down 7 percent compared to the FY 2022 enacted levels, which slows the pace of Army equipping and reduces the speed of procurement to below industry's minimum sustainment rates in some cases. The result of the FY 2023 budget request would be an Army aging faster than it is modernizing.

#### Readiness Score: Very Strong

The Army reports that 81 percent of its 31 Regular Army BCTs are at the highest state of readiness. <sup>99</sup> No National Guard BCTs were at those levels of readiness. The Army's internal requirement is for "66 percent...of the active component BCTs [to be] at the highest readiness levels." <sup>100</sup> Using the assessment methods of this *Index*, this results in a percentage of service requirement of 100 percent, or "very strong."

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

The Army's overall score is calculated based on an unweighted average of its capacity, capability, and readiness scores. The unweighted average is 3.33; thus, the overall Army score is "marginal." This was derived from the aggregate score for capacity ("weak"); capability ("marginal"); and readiness ("very strong"). This score is the same as the assessment of the 2022 Index, which also rated the Army as "marginal" overall.

# **U.S. Military Power: Army**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		✓			
Capability			✓		
Readiness					<b>✓</b>
OVERALL			<b>✓</b>		



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Main Battle Tank**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
M1A1/2 Abrams			Decisive Lethality Platform (DLP)		
Inventory: <b>344/1,635</b> Fleet age: <b>31.5/14.5</b> Date: <b>1980/1993</b> The Abrams is the Army's primary ground combat system and main battle tank in its Armored Brigade Combat Teams (ABCTs). It is a tracked, low-profile, land combat assault weapon that provides mobility, lethal firepower, and protection. The Abrams went through a remanufacture program to extend its life expectancy to 2045.	3	4	The DLP program, in its earliest stages of cois a notional manned or unmanned vehicle replace some or all of the Abrams tanks. This part of the Next Generation Combat Veh program, which is number two among the modernization priorities. The soonest a rep Abrams tank could conceivably be introduced.	that could his program icle (NGC\ Army's "B lacement	n /) ig Six" for the

# **Infantry Fighting Vehicle**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
M2 Bradley			Optionally Manned Fighting Vehicle (OMFV)		
Inventory: <b>3,310</b> Fleet age: <b>23</b> Date: <b>1981</b> The Bradley is a fully tracked, lightly armored vehicle meant to transport infantry by providing protection from artillery and employing mounted firepower. The Bradley complements the Abrams tank in Armored Brigade Combat Teams (ABCTs). The Bradley underwent a remanufacture program to extend its life expectancy to 2045.	3	3	The OMFV is intended to replace the M2-Br Fighting Vehicle (IFV) and in its objective stability to conduct remotely controlled oper the Army awarded five firm-fixed-price cor of the OMFV Concept Design Phase in whic firms were asked to develop digital designs to choose three teams in the third quarter ob build up to 11 prototype vehicles. This progr Next Generation Combat Vehicle (NGCV) p is number two among the Army's "Big Six" priorities. The Army plans for the first unit t by FY 2029.	tate will ha ations. In 2 atracts as p th compet . The Arm of FY 2023 am is part rogram, w moderniz	ave the 2021, part ing y plans to of the hich ation

# **Armored Fighting Vehicle**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Stryker Inventory: 4,115 Fleet age: 10.5 Date: 2001			None		
The Stryker is a wheeled vehicle that is the main platform in Stryker BCTs. The program was considered an interim vehicle to serve until the arrival of the Future Combat System (FCS), but that program was cancelled because of technology and cost problems. The original Stryker is being replaced with Double-V-Hull variants. The Double V Hull provides increased under-vehicle blast protection. The Stryker is expected to remain in service for 30-plus years.	4	4			

NOTE: See page 353 for details on fleet ages, dates, and procurement spending.



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# **Armored Personnel Carrier**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRA	Size Score	Health Score	
M113 Armored Personnel Carrier Inventory: 3,954 Fleet age: 39 Date: 1960			Armored Multi-Purpose Timeline: 2018-TBD	2	4	
The fully tracked M113 personnel carrier serves in a supporting role for Armored Brigade Combat Teams (ABCTs) and in units above brigade level. As the first mass-produced aluminum combat vehicle, the M113 was made to protect against small arms fire while being light enough to be transportable. The army planned to replace the M113 with the Armored Multi-Purpose Vehicle, but due to reduced production rates and higher commodity prices, the cost per vehicle has increased, and the replacement	0	2	The AMPV has been adapt Vehicle, which largely allow extensive technology devices to five variants. Alternains behind schedule AMPV production rates reconstruction rates reconstruction and the second production rates reconstruction rates reconstruction and the second production rates reconstruction rates and reconstruction rates reconstruction rates reconstruction rates and reconstruction rates are reconstructed by the reconstruction rates and reconstruction rates are reconstructed by the	owed the program velopment phase. Ithough total AMP due to early manu eportedly are plan	to bypass The fleet of Y product ufacturing ned to income at that	s an will tion troubles, crease to trate at
program will take an extended period of time. Plans are to use the current platform until 2045.						

# **Light Wheeled Vehicle**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM			Size Score	Health Score
HMMWV Inventory: 108,467 Fleet age: 19.5 Date: 1985			Joint Light Tactical Vehicle (JLTV) Timeline: 2015–2036		3	3	
The High Mobility Multipurpose Wheeled Vehicle (HMMWV) is a lightweight, highly mobile, highperformance wheeled vehicle used for a variety of purposes in combat or combat support services units. The expected life span of the HMMWV is 15 years. A portion of the HMMWV fleet is slowly being replaced by the Joint Light Tactical Vehicle (JLTV).	0	1	program tha HMMWVs w provides imp and survival approved th is underway	at is replacing a ith light tactica proved protect polity of vehicle e JLTV for full- , although curn rmy to reduce	is an Army-led, jo portion of the A jordin of	army's les. The JL aneuveral he Army Productio tfalls have lantities.	TV bility, on

**NOTE:** See page 353 for details on fleet ages, dates, timelines, and procurement spending.



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Attack Helicopter**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
AH-64 D Apache Inventory: 295 Fleet age: 17.5 Date: 1997			AH-64E Reman Timeline: 2010-TBD	3	5
The Apache attack helicopter is designed to support Brigade Combat Teams (BCTs) in the full spectrum of modern warfare including destroying armor, personnel, and material targets. The Apache has a modular open systems architecture that allows it to incorporate the latest communications, navigation, sensor, and weapon systems. The expected life cycle is about 20 years.	2	3	The AH-64E Reman (short for remanufact to remanufacture older Apache helicopter advanced AH-64E version which is fully dithe Army's joint interoperability goals for AH-64E has a new airframe and can carry including the JAGM missile, giving it signif capability as the Army's only heavy attack  PROCUREMENT*  SPENDING* (512 110 \$8,53	s into the gital and the future modern r icant com helicopte \$ millions)	more meets e. The munitions, nbat er.
AH-64E Inventory: 458 Fleet age: 5 Date: 2012  The AH-64E variant is a remanufactured or newly built version of the AH-64D Apache attack helicopter with substantial upgrades in powerplant, avionics, communications, and weapons capabilities making it the Army's most advanced attack helicopter. The expected life cycle is about 20 years.	6	6	AH-64E New Build  Timeline: 2010-2027  The AH-64E New Build program produces no rebuilt, Apaches. The program is meant to most sustain the current Apache inventory. The Amodern and interoperable systems and is altered modern munitions, including the JAGM miss in the 2022 request will likely close the AH-6 line as the cost of procurement is significant the need for all-new components for the new PROCUREMENT*  SPENDING*	nodernize H-64E has ole to carry ile. Budge 64E new b ly higher o w build pro	and s more y et cuts uild due to ogram.

\* Additional procurement expected. **NOTE:** See page 353 for details on fleet ages, dates, timelines, and procurement spending.



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Medium Lift**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
UH-60A Black Hawk Inventory: 48 Fleet age: 39.5 Date: 1978			UH-60M Black Hawk Timeline: 2004-TBD	3	4
The UH-60A is the Army's primary medium-lift utility transport helicopter that provides air assault, aeromedical evacuation, and support for special operations. The expected life span is about 25 years. This variant of the Black Hawk is now being replaced by the newer UH-60M variant.	0	2	The UH-60M, which began full production serves to modernize and replace current E inventories in line with the Army's Modern National Military Strategy, and National De The newer M-variant is a digital networked that will improve the Black Hawk's range a upgrading the rotor blades, engine, and co	Black Haw ization St efense Stra d platform and lift by omputers.	rategy, ategy. I
UH-60M Black Hawk			PROCUREMENT* SPENDING* (	, 	2.867
Inventory: 1,185 Fleet age: 8.5 Date: 2005  The UH-60M is the modernized version of the original UH-60A Black Hawk helicopter. It has multiple upgrades including multimission capabilities, a new airframe, advanced digital avionics, and a powerful propulsion system. As the UH-60A is retired, the M-variant will be the main medium-lift rotorcraft used by the Army. They are expected to remain in service until at least 2030.	6	4	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<i>y</i> .	_,,007

# **Heavy Lift**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
CH-47F Chinook Inventory: 451			CH-47F Timeline: 2001-TBD	3	4
Fleet age: 10 Date: 2002  The F-variant of the CH-47 Chinook heavy-lift helicopter includes a new digital cockpit and monolithic airframe to reduce vibrations. It transports forces and equipment while providing other functions such as parachute drops and aircraft recovery. The expected life span is 35 years. The Army plans to use the CH-47F until the late 2030s.	6	6	Currently in production, the CH-47F prograte keep the fleet of heavy-lift rotorcraft viable combat as older variants of the CH-47, not are retired. The program includes both rennew builds of CH-47s. The F-variant has erupgrades to lower the maintenance requir procurement numbers include the MH-47C that is used by U.S. Special Operations Conproducement and Special Operations Conproducement Spending*	e for use i ably the C nanufactu ngine and ements. T G configur mmand.	n modern CH-47D, ired and airframe otal ration

\* Additional procurement expected. **NOTE:** See page 353 for details on fleet ages, dates, timelines, and procurement spending.



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# Intelligence, Surveillance, and Reconnaissance (ISR)

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
MQ-1C Gray Eagle			MQ-1C Gray Eagle		
Inventory: 175 Fleet age: 4.75 Date: 2011			Timeline: <b>2010–2022</b>	4	5
The Gray Eagle is a medium-altitude long-endurance (MALE) unmanned aerial vehicle (UAV) used to conduct intelligence, surveillance, and reconnaissance (ISR) missions. It offers better range, altitude, and payload flexibility than was offered by earlier	4	3	The MQ-1C UAV is an unmanned aircraft the Army with reconnaissance, surveillar acquisition capabilities. The Army did no new MQ-1Cs for FY2O23. Four Gray Eagle to go to the Army may be sold to Ukrain  PROCUREMENT SPENDIN	ce, and targ t plan to pro es originally	et ocure slotted 2022.
systems. The Army does not plan to procure new Gray Eagles.			0	\$432	\$25

**NOTES:** See Methodology for descriptions of scores. Fleet age is the average between the first and last years of delivery. The date is the year of first delivery. The timeline is from the first year of procurement to the last year of delivery/procurement. Spending does not include advanced procurement or research, development, test, and evaluation (RDT&E).

<sup>\*</sup> Additional procurement expected.

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- 98. 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.
- 99. Email to the author from Headquarters, Department of the Army, Public Affairs Office, July 6, 2022.
- 100. See note 89, supra.

# U.S. Navy

# Brent D. Sadler

The U.S. Navy, Marine Corps, and Coast Guard (known collectively as the sea services) have enabled America to project power across the oceans, controlling activities on the seas when and where needed. In testimony before the Senate Armed Services Committee, the Secretary of the Navy has stated that:

[The Navy] will invest [its] resources through a concise, clear, and transparent strategy centered on three primary lines of effort:

- 1. Strengthen Maritime Dominance.
- 2. Empower Our People.
- 3. Expand Strategic Partnerships.1

To these ends, President Joseph Biden's proposed \$180.5 billion Navy budget for FY 2023 "represents a \$9.1 billion increase over our FY 2022 enacted President's Budget (including supplementals for disaster relief funding, Red Hill, and Operation Allies Welcome funding)" and an overall increase of 4.8 percent. While this increase is much needed, it is doubtful that this level of investment can deliver on the Secretary's goals given a rapidly modernizing and expanding Chinese fleet and inflation that is well above 7 percent.

The Navy remains under immense strain to maintain readiness for combat while also conducting the daily peacetime operations that are necessary to compete with the activities of China and Russia. In the year since publication of the 2022 Index of U.S. Military Strength, there have been several significant developments that are important to the Navy:

• As of June 22, 2022, "3,371 active component and 3,448 Ready Reserve service members

remain[ed] unvaccinated," and there "[had] been 1,229 separations for refusing the COVID-19 vaccine."<sup>3</sup>

- Russia invaded Ukraine on February 24, 2022, and since then has lost several warships to anti-ship missiles launched from shore.<sup>4</sup>
- Submarine *Connecticut* ran into an uncharted seamount on October 2, 2021, in the South China Sea, sustaining significant damage that led to its eventual stateside dry-docking where it remained as of May 24, 2022.<sup>5</sup>
- President Biden announced the Australia– U.K.–U.S. (AUKUS) partnership on September 15, 2021, with the goal of developing an Australian nuclear submarine program.<sup>6</sup> While important if successful, it will also place an added burden on the Navy's limited nuclear shipbuilding intellectual and industrial capacity.
- On September 9, 2021, the Navy's Fifth Fleet, based in Bahrain, established Task Force 59 to integrate and accelerate operational employment of naval unmanned systems.<sup>7</sup>

**Strategic Framework.** To address today's maritime competition more effectively, the sea services have released a new naval strategy, *Advantage at Sea*. If the new strategy is fully executed, the Navy will be conducting more assertive forward presence operations to challenge Chinese and Russian maritime coercion.<sup>8</sup> To this end, the Navy appears to be adjusting its deployment patterns to meet new demands caused by the war in Ukraine and increasing tensions in Asia: Two carrier strike groups have been

sustained in the western Pacific and eastern Mediterranean since December 2021.9

As the U.S. military's primary maritime arm, the Navy is charged to provide the enduring forward global presence required of this strategy while retaining war-winning forces. The Navy therefore continues to focus its investments in several functional areas: power projection, control of the seas, maritime security, strategic deterrence, and domain access. This approach is informed by several key documents:

- The 2021 Interim National Security Strategic Guidance;<sup>10</sup>
- The December 2020 Advantage at Sea naval strategy;<sup>11</sup>
- The 2022 National Defense Strategy (NDS) (as this edition of the Index was being prepared, only an unclassified fact sheet had been released to the public);<sup>12</sup> and
- The Global Force Management Allocation Plan (GFMAP).<sup>13</sup>

U.S. official strategic guidance requires the Navy to act beyond the demands of conventional warfighting. China and Russia use their fleets to establish a physical presence in regions that are important to their economic and security interests in order to influence the policies of other countries. To counter their influence, the U.S. Navy similarly sails ships in these waters to reassure allies of U.S. commitments and signal to competitors that they do not have a free hand to impose their will. This means that the Navy must balance two key missions: ensuring that it has a fleet that is ready for war while also using that fleet for peacetime "presence" operations. Both missions require crews and ships that are materially ready for action and a fleet that is large enough to maintain presence and marshal enough combat power to win in battle.

On July 26, 2022, the Chief of Naval Operations (CNO) released a new Navigation Plan 2022 (NAVPLAN 2022) to provide guidance for the Navy's contribution to the execution of the National Defense Strategy. In this latest edition, the CNO continues his emphasis on forward presence in the United States' daily competition with rivals like China and prioritizes investments in key capabilities like defense against anti-ship missiles and other forms

of attack, logistical support capabilities that remain viable in combat, and the ability to share information even when the enemy is targeting. NAVPLAN 2022 also emphasizes weapons with increased range, new deception capabilities, and improved abilities to make time-critical decisions.<sup>14</sup>

All of this reflects a continuation of demands stemming from the Distributed Maritime Operations concept that has been deemed critical to defeating Chinese anti-access and area denial capabilities. However, NAVPLAN 2022 lacks a clear timeline either for delivering these capabilities or for ensuring that the fleet is able to employ them in what the CNO acknowledges is a dangerous decade. NAVPLAN 2022 also adds to the several fleet-sizing plans offered by the Navy in recent years, calling for a fleet of 350 manned and 150 unmanned warships along with 3,000 naval aircraft—but without clearly explaining how it will achieve results in a way that the other plans could not. Whether this plan will deliver a fleet with new capabilities in time to deter an increasingly aggressive China remains highly questionable just as it was with its predecessors.

This *Index* focuses on the following elements as the primary criteria by which to measure U.S. naval strength:

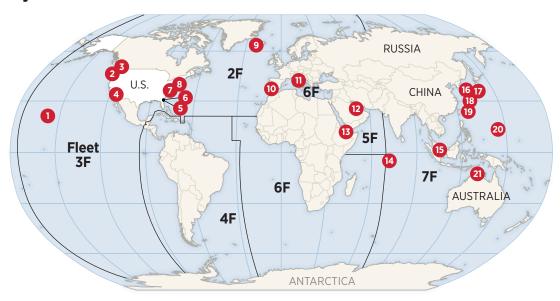
- Sufficient capacity to defeat enemies in major combat operations and provide a credible peacetime forward presence to maintain freedom of shipping lanes and deter aggression;
- Sufficient technical capability to ensure that the Navy is able to defeat potential adversaries; and
- Sufficient readiness to ensure that the fleet can "fight tonight" given proper material maintenance, personnel training, and physical well-being.

#### Capacity

**Force Structure.** The Navy is unique relative to the other services in that its capacity requirements must meet two separate objectives:

 During peacetime, the Navy must maintain a global presence in distant regions both to deter potential aggressors and to assure allies and security partners.

# **Key U.S. Naval Installations**



- Joint Base Pearl Harbor-Hickham, HI
  U.S. Pacific Fleet headquarters
- Naval Base Kitsap
- Naval Station Everett, WA
- 4 Naval Base San Diego and Naval Base Coronado, CA
  U.S. Third Fleet headquarters
- 5 Naval Station Mayport, FL U.S. Fourth Fleet headquarters
- 6 Naval Submarine Base King's Bay, GA
- 7 Naval Base Norfolk and Joint Expeditionary Base Little Creek, VA U.S. Fleet Forces Command and U.S. Second Fleet headquarters
- 8 Naval Submarine Base New London, CT
- Keflavik, Iceland—Expeditionary Maritime
   Operations Center
- 10 Naval Station Rota, Spain
- 11 Naval Support Activity Gaeta, Italy
  U.S. Sixth Fleet headquarters

- Naval Support Activity, Bahrain U.S. Fifth Fleet headquarters
- 13 Lemonnier, Djibouti—Camp Lemonnier
- Diego Garcia—Navy Support Facility Diego
  Garcia
- Singapore—Commander Logistics Group
  Western Pacific
- Buson, South Korea—Fleet Activities
  Chinhae Navy Base
- U.S. Fleet Activity Yokosuka, Japan U.S. Seventh Fleet headquarters
- 18 U.S. Fleet Activity Sasebo, Japan
- 19 Okinawa, Japan—Naval Base White Beach
- Naval Base Guam—Navy Expeditionary
  Force Command Pacific headquarters
- 21 Darwin, Australia—Marine Rotational Force Darwin

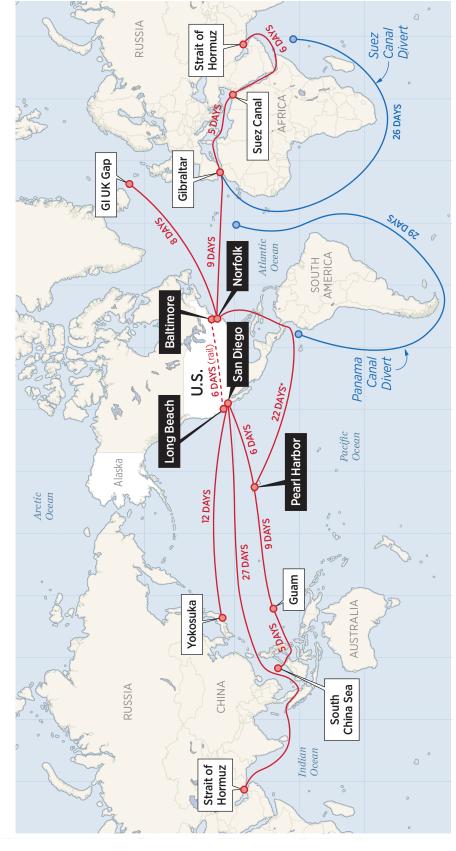
**NOTE:** Fleet boundaries are approximate. **SOURCE:** Heritage Foundation research.

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**MAP 16** 

# Steaming Times to Areas of Vital U.S. National Interest

Steam times are approximate based on an average speed of 15 knots.



\* Assumes no delay in passage through the Panama Canal. **SOURCE:** Heritage Foundation research.

2. The Navy must be able to win wars. To this end, the Navy measures capacity by the size of its battle force, which is composed of ships it considers directly connected to combat missions.<sup>15</sup>

This *Index* continues the benchmark set in the *2019 Index*: 400 ships to ensure the capability to fight two major regional contingencies (MRCs) simultaneously or nearly simultaneously, plus a 20 percent strategic reserve, and historical levels of 100 ships forward deployed in peacetime. <sup>16</sup> This 400-ship fleet is centered on providing:

- 13 Carrier Strike Groups (CSGs);
- 13 carrier air wings with a minimum of 624 strike fighter aircraft;<sup>17</sup> and
- 15 Expeditionary Strike Groups (ESGs). 18

Unmanned platforms are not included because they have not matured as a practical asset. They hold great potential and will likely be a significant capability, but until they are developed and fielded in larger numbers, their impact on the Navy's warfighting potential remains speculative. The same holds true across the fleet when it comes to new classes of ships. The Navy is investing in research, modeling, war gaming, and intellectual exercises to improve its understanding of the potential utility of new ship and fleet designs, but until new ships are added to the fleet, it is hard to know how they will affect the Navy's ability to perform its missions. Consequently, this Index measures what is known and can be known in naval affairs, assessing the current Navy's size, modernity, and readiness to perform its most important missions today.

Relative to the above metric, the Navy's fleet of 298 warships as of June 27, 2022, is inadequate and places greater strain on the ability of ships and crews to meet existing operational requirements. To alleviate the operational stress on an undersized fleet, the Navy has attempted since 2016 to build a larger fleet. However, for myriad reasons, it has been unable to achieve sustained growth and in fact has underdelivered by approximately 10 ships each year since 2016. In the past, the Navy has had some success in meeting operational requirements with fewer ships by posturing ships forward as it has done in Rota, Spain, and Guam.

At a February 2022 naval conference, the Chief of Naval Operations (CNO) stated, "I've concluded—consistent with the analysis—that we need a naval force of over 500 ships." He went on to specify that this fleet would include 12 carriers, 19 to 20 large amphibious warships, more than 30 smaller amphibious ships, 60 destroyers, 50 frigates, 70 attack submarines, and a dozen ballistic missile submarines, all backed by 100 support ships and 150 unmanned vessels. Based on the CNO's military advice and Heritage Foundation analysis, today's fleet remains too small to meet today's threats with maximum effectiveness.

**Posture/Presence.** Although the Navy remains committed to sustaining forward presence, it has struggled to meet the requests of regional Combatant Commanders. The result has been longer and more frequent deployments to meet a historical steady-state forward presence of 100 warships.<sup>21</sup> In 1985, at the height of the Cold War, the percentage of the 571-ship fleet deployed was less than 15 percent, and throughout the 1990s, deployments seldom exceeded the six-month norm: Only 4 percent to 7 percent of the fleet exceeded six-month deployments on an annual basis.22 Using the Navy's aircraft carrier fleet—the most taxed platform—as a sample set, for 20 years, approximately 25 percent of the aircraft carrier fleet has been deployed. Following the 2017 deadly collisions involving USS McCain and USS *Fitzgerald*, the overall fleet deployment percentage dropped temporarily to less than 20 percent, but it surged again to almost 30 percent in 2020.<sup>23</sup>

The numbers as of June 27, 2022, are fairly typical for a total battle force of 298 deployable ships with 102 warships at sea: 67 deployed and underway and 35 underway on local operations for an operational tempo (OPTEMPO) of 34 percent, double the OPTEMPO that characterized the Cold War. <sup>24</sup> Given Combatant Commanders' requirements for naval presence, there is impetus to have as many ships forward deployed as possible by:

- Homeporting. The ships, crew, and their families are stationed at the port or based abroad (for example, a CSG in Yokosuka, Japan).
- Forward Stationing. Only the ships are based abroad, and crews are rotated out to the ship.<sup>25</sup> This deployment model is currently used for Littoral Combat Ships (LCS) and *Ohio*-class

guided missile submarines (SSGNs) manned with rotating blue and gold crews, effectively doubling the normal forward deployment time (for example, LCS in Singapore).

These options allow one forward-based ship to provide a greater level of presence than four ships based in the continental United States (CONUS) can provide by offsetting the time needed to transit ships to and familiarize their crews with distant theaters. <sup>26</sup> This is captured in the Navy's GFM planning assumptions: a forward-deployed presence rate of 19 percent for a CONUS-based ship compared to a 67 percent presence rate for an overseas-homeported ship. <sup>27</sup> To date, the Navy's use of homeporting and forward stationing has not mitigated the effect of the reduction in overall fleet size on forward presence.

**Shipbuilding Capacity.** To meet stated fleet-size goals, the Navy must build faster and maintain more ships than its current capacity. However, significant shortfalls in shipyards, both government and commercial, make it hard to accomplish either task, and underfunded defense budgets make it even more difficult. Given the limited ability to build ships, the Navy will struggle to meet the congressionally mandated 355-ship goal,<sup>28</sup> much less the 400-ship goal advocated in this *Index*.

A bright spot in FY 2020 was the Navy's procurement of 12 ships, which marked a high point in shipbuilding over the past 20 years.29 However, subsequent procurement has not kept pace. The Navy purchased 10 new warships in FY 2021. Congress overruled the President's purchase of eight, raising him to 13 new buys in FY 2022,30 but this still misses congressional mandates for a fleet of 12 aircraft carriers.<sup>31</sup> Instead, the aircraft carrier fleet could shrink to nine (possibly augmented by a light carrier yet to be defined).32 The current long-range shipbuilding plan does not indicate a desire to reverse the downward trends; instead, the "PB2023 shipbuilding plan includes procurement of 9 manned ships in FY2023 and 51 manned battle force ships within the [Future years Defense Program]. Based on the corresponding projected funding levels in the FYDP, the battle force inventory will be 280 manned ships by FY2027."33

Meanwhile, diminished demand for ships has led shipbuilders to divest workforce and delay capital investments. From 2005 to 2020, the Navy's procurement of new warships increased the size of the fleet from 291 to 296 warships; at the same time, China's navy grew from 216 to 360 warships. <sup>34</sup> If the Navy is to build a larger fleet, more shipbuilders will have to be hired and trained—a lengthy process that precedes any expansion of the fleet. However, recent labor statistics comparing 2017 to 2021 show some positive trends, with total shipbuilding labor involved in production, like welders and pipefitters, adding 3,134 workers. <sup>35</sup>

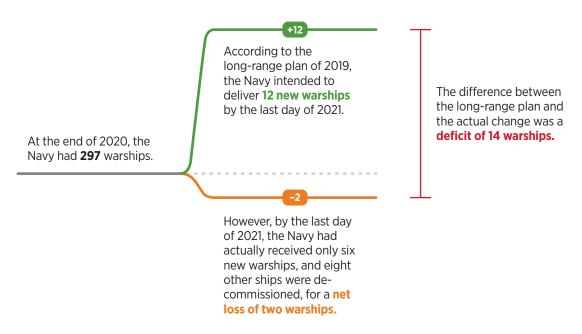
Of particular concern is the increased production of nuclear-powered warships, most notably nuclear-powered submarines that would be vital in any conflict with China. Limited nuclear shipbuilding capacity<sup>36</sup> may constrain the Navy's plans to increase the build rate from two attack submarines per year to three while concurrently building one ballistic missile submarine.37 To support a larger nuclear-powered fleet, the relevant public shipyards have increased their workforce by 16 percent since 2013, but this still falls short of the workforce needed to achieve the Navy's objectives.38 As demand increases for nuclear-powered warships to pace the threat from China and Russia into the foreseeable future, it remains to be seen whether the public shipyards will be able to sustain the recruitment of skilled labor in the numbers needed.

As it stands today, the most senior naval officer, the Chief of Naval Operations, has admitted that current funding will not build or maintain the larger fleet that both the Navy and this *Index* say is needed and Congress has mandated. Nothing has changed to alter his 2021 assessment that current budgets can only "sustain a Navy of about 300 to 305 ships." <sup>39</sup>

**Manpower.** In 2018, the Navy assessed that its manpower would need to grow by approximately 35,000 to achieve an end strength of 360,395 sailors to support a 355-ship Navy.<sup>40</sup> For comparison, the last time the Navy had a similar number of ships was in 1997, when it had 359 ships and also had a total of 398,847 personnel.<sup>41</sup> As of June 15, 2022, the Navy consisted of 344,827 officers and sailors, up 1,916 from June 2021 but 15,568 short of the number needed by 2034.<sup>42</sup> To improve personnel readiness and meet the demands of a growing fleet, the Navy added 5,100 sailors in FY 2020.<sup>43</sup> The FY 2021 budget continued these increases in active-duty manning end strength by an additional 7,300 sailors.<sup>44</sup>

Regrettably, trends for the Navy's personnel budget and for its recruiting and retention efforts have begun to point in the wrong direction. Despite the

## Change in Navy Battle Fleet Size, 2020-2021



**SOURCES:** U.S. Naval Institute News, "UNSI News Fleet and Marine Tracker: Jan. 4, 2021," January 4, 2021, https://news.usni.org/2021/01/04/usni-news-fleet-and-marine-tracker-jan-4-2021 (accessed August 3, 2022); Office of the Chief of Naval Operations, Deputy Chief of Naval Operations (Warfare System Requirements–OPNAV N9), *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for Fiscal Year 2020*, March 2019, https://media.defense.gov/2020/May/18/2002302045/-1/-1/1/PB20\_SHIPBUILDING\_PLAN.PDF (accessed August 3, 2022); and Naval Sea Systems Command, Naval Vessel Register, "Fleet Size," http://www.nvr.navy.mil/NVRSHIPS/FLEETSIZE.HTML (accessed August 3, 2022).

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need for more sailors and officers, total end strength has fallen from 347,677 in FY 2021 to 346,300 in FY 2023 and is trending toward 336,600 in FY 2027. It remains to be seen whether retention rates can be sustained to meet long-range manning needs in the face of a tightening labor market and dismissals for non-compliance with COVID vaccine mandates.

Despite the acknowledged need to increase the Navy's cadre of officers and enlisted sailors, the President's FY 2023 budget continues the recent trend toward reduced end strength. This proposed budget, combined with last year's, decreases the Navy's end strength by a total of 2,120 officers and sailors in the Active component and 900 in the reserves while increasing the civilian workforce by 269 full-time employees. Such sustained reductions are surprising in view of the Government Accountability Office's findings that persistent crew manning shortfalls on

ships are as high as 15 percent and compound crew fatigue, which was a contributing factor in several fatal collisions in 2017.<sup>47</sup>

Finally, the effort to attract people to join the Navy is made more difficult by wages that are not keeping up with inflated costs of living. In the battle for people, last year's 2.7 percent pay raise and the proposed 4.6 percent raise planned for FY 2023<sup>48</sup> are not helping the Navy to make a compelling case for young people to join and stay in the service. Using the Consumer Price Index, pay is trailing the rate of inflation, which in April 2022 had reached 8.5 percent.<sup>49</sup>

#### Capability

A complete measure of naval capabilities requires an assessment of U.S. platforms against enemy weapons in plausible scenarios. The Navy routinely conducts war games, exercises, and simulations to

## **Navy Fleet Design**

		BY 20	BY 2045		
Platform Class	Navy Plan, May 2022	Recommendation	Navy Plan, Dec. 2020	Navy Plan, April 2022	Range per Future Naval Force Study, 2020
Unmanned (LUSV, MUSV, XLUUV)	0*	36	21**	n/a**	143 to 242
Aircraft Carriers (CVN, CVNE, CVS)	11	12	10	10	8 to 17
Large Surface Combatant	93	110	97	86	73 to 88
Small Surface Combatant	32	37	34	23	60 to 67
Logistics and Support Vessels	62	90	82	74	96 to 117
Submarines (SSBN, SSGN, SSN)	68	77	67	62	84 to 90
Amphibious Warships	32	41	32	25	61 to 67
Total Without Unmanned	298	367	322	280	382 to 446
Total	298	403	343	280	525 to 688

<sup>\*</sup> As of May 2022, the U.S. Navy had only prototypes in operation for XLUUV, LUSV, and MUSV.

#### **SOURCES:**

- Navy plan, May 2022: Naval Sea Systems Command, Naval Vessel Register, "Ship Battle Forces," https://www.nvr.navy.mil/ NVR-SHIPS/SHIPBATTLEFORCE.HTML (accessed August 3, 2022), and Ronald O'Rourke, "Navy Large Unmanned Surface and Undersea Vehicles: Background and Issues for Congress," Congressional Research Service Report for Members and Committees of Congress No. R45757, updated May 11, 2022, pp. 5, 11, and 14-15, https://sgp.fas.org/crs/weapons/R45757.pdf (accessed August 3, 2022).
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- Navy plan, April 2022: U.S. Navy, Office of the Chief of Naval Operations, Deputy Chief of Naval Operations for Warfighting
  Requirements and Capabilities—OPNAV N9, Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for
  Fiscal Year 2023, April 2022, https://media.defense.gov/2022/Apr/20/2002980535/-1/-1/0/PB23%20 SHIPBUILDING%20PLAN%20
  18%20APR%202022%20FINAL.PDF (accessed August 3, 2022).

assess this, but insight into its assessments is limited by their classified nature. This *Index* therefore assesses capability based on remaining hull life, mission effectiveness, payloads, and the feasibility of maintaining the platform's technological edge.

Most of the Navy's fleet consists of older platforms: Of the Navy's 20 classes of ships, only eight are in production. However, at \$230.8 billion, the Department of the Navy's proposed budget for FY 2023 represents a real dollar increase of \$1.9 billion,

<sup>\*\* 21</sup> unmanned vessels were planned for procurement by fiscal year 2026; the long-range plan included no procurement data for unmanned platforms in 2022.

which is a relative increase of 8.7 percent from the previous year; procurement is increased by only 4 percent.<sup>50</sup> The following are highlights by platform.

**Ballistic Missile Submarines (SSBN).** The *Columbia*-class will relieve the aging *Ohio*-class SSBN fleet. Because of the implications of this change for the nation's strategic nuclear deterrence, the *Columbia*-class SSBN remains the Navy's top acquisition priority. To ensure the continuity of this leg of the U.S. nuclear triad, the first *Columbia*-class SSBN must be delivered on time for its first deterrent patrol in 2031. To achieve this goal, the Navy signed a \$9.47 billion contract in November 2020 with General Dynamics Electric Boat for the first in-class boat and advanced procurement for long-lead-time components of the second hull. And May 18, 2022, hearing, it was noted that the lead ship's keel-laying ceremony was to be on June 6, 2022.

However, there are concerns in Congress that the Department of Defense (DOD) may not be fully utilizing special authorities granted the Navy to ensure that this critical program is adequately resourced. Specifically, in 2014, the Congress established the National Sea-Based Deterrence Fund, which has saved more than \$1.4 billion using flexible funding but "has yet to utilize the core function of the NSBDF—namely, to provide increased flexibility to repurpose funds into it to buy down the fiscal impact of the program on our other shipbuilding priorities." <sup>553</sup>

Nuclear Attack Submarines (SSN). SSNs are multi-mission platforms whose stealth enables clandestine intelligence collection; surveillance; anti-submarine warfare (ASW); anti-surface warfare (ASuW); special operations forces insertion and extraction; land attack strikes; and offensive mine warfare. The newest class of SSN, the Block V *Virginia* with the Virginia Payload Module (VPM) enhancement, is important to the Navy's overall strike capacity, enabling the employment of an additional 28 Tomahawk cruise missiles over earlier SSN variants. Construction of Block V submarines began in September 2019 with the *Oklahoma* (SSN 802) to be delivered May 2027 and three more boats to be delivered before the end of the decade. 55

The FY 2021 National Defense Authorization Act included additional funds for advanced procurement that preserves a future option to buy as many as 10 *Virginia*-class submarines through FY 2023. As indicated previously, increasing *Virginia*-class

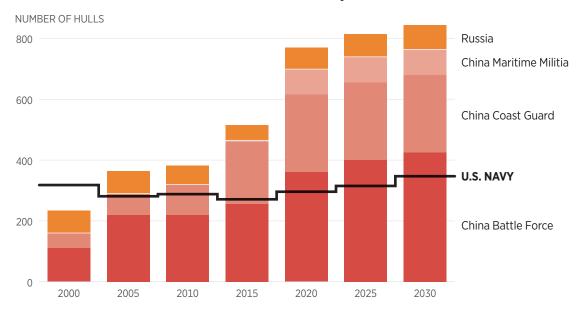
production has raised concerns regarding strain on the industrial base, and the FY 2023 budget would put \$1.6 billion toward expansion of the submarine industrial base "to support the Navy plan of serial production of 1 COLUMBIA plus 2 VIRGINIAs starting in FY25/26." Quality control of the supply chain is a key factor in submarine construction, and if it is not done well, the consequences can be catastrophic. That is why the premature replacement of critical submarine parts in 2021—parts that are intended to last the life of the boat—remains a concern. Added vigilance will be required as the Navy finds new suppliers to meet future increased submarine production as well as the potential need to provide support to AUKUS.

**Aircraft Carriers (CVN).** The Navy has 11 nuclear-powered aircraft carriers: 10 *Nimitz*-class and one *Ford*-class. The Navy has been making progress in overcoming nagging issues with several advanced systems, notably advanced weapons elevators, and the *Ford*'s first operational deployment is on track for the fall of 2022.<sup>58</sup> The second ship in the class, *Kennedy* (CVN 79), was christened on December 7, 2019, and remains on schedule for delivery in 2024, followed by *Enterprise* (CVN 80), which is in early construction.

The U.S. lead in this category of naval power may be waning as China completes construction of its first super carrier. As the U.S. Navy struggles to build, maintain, and crew a fleet of 11 aircraft carriers, China is rapidly catching up both in numbers and platform capability. Its newest carrier, the Type-003, like the Ford-class, will utilize electromagnetic catapults that will give its air wing greater range and sortie rates, thus greatly narrowing the capability gap.59 The Type-003 is China's second indigenously built carrier, marking a significant engineering milestone, and there has been renewed emphasis on having the ship delivered before the next Chinese Communist Party congress, which is scheduled for the fall of 2022.60 China's growing naval aviation and aircraft carrier capabilities place added stress on U.S. naval aviation and air defenses.

**Large Surface Combatants.** The Navy's large surface combatants consist of the *Ticonderoga*-class cruiser, the *Zumwalt*-class destroyer, and the *Arleigh Burke*-class destroyer. If the President's FY 2023 budget is executed, the Navy will decommission five aged cruisers. This will decrement the Navy's sea-launched firepower by 316 vertical launch tubes

# U.S. vs. China and Russia Navies: Fleet Expansion Trends



**NOTE:** U.S. figures are actual through 2020. Figures for 2025 and 2030 are from the Navy's December 2020 30-year shipbuilding plan. See U.S. Navy, Office of the Chief of Naval Operations, Deputy Chief of Naval Operations (Warfighting Requirements and Capabilities-OPNAV N9), *Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels*, December 9, 2020, https://media.defense.gov/2020/Dec/10/2002549918/-1/-1/1/SHIPBUILDING%20PLAN%20DEC%2020\_NAVY\_OSD\_OMB\_FINAL.PDF (accessed September 3, 2021).

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when measured against FY 2023 delivery of new strike-capable ships and submarines. Attempts to extend the life of the aging *Ticonderoga*-class cruisers have yielded mixed results as deferred upgrades and past incomplete maintenance are now driving up operating costs.<sup>61</sup>

In FY 2022, the Navy procured two *Arleigh Burke*–class DDG 51 destroyers, bringing the total

on active duty in the fleet to 70. Fourteen more have been ordered. The *Zumwalt* class was envisioned as bringing advanced capabilities to the fleet, but the program has suffered technological problems and cost overruns, and the Navy has not indicated that it intends to acquire more than the three that have already been purchased and are being built out: the USS *Zumwalt* (DDG-1000), which was delivered on

April 24, 2020; USS *Michael Monsoor* (DDG-1001), which was commissioned on January 26, 2019; and USS *Lyndon B. Johnson* (DDG-1002), which is completing checks before delivery to the Navy in 2024. <sup>62</sup> The *Zumwalt* was to achieve initial operational capability (IOC) by September 2021, which the Navy pushed back to December 2021. <sup>63</sup> As of May 2022, a revised timeline for achieving IOC had not been made public.

To reach 355 ships by 2034, the Navy plans several class-wide service life extensions, notably extension of the DDG-51-class service life from 35 to 40 years and modernization of older hulls. The FY 2020 budget included \$4 billion for modernization of 19 destroyers from FY 2021 through FY 2024.<sup>64</sup> The previously noted planned decommissioning of five cruisers in FY 2023 makes this more critical.

Small Surface Combatants. The Navy's small surface combatants consist principally of the Avenger-class mine countermeasures (MCM) ship; the Littoral Combat Ship (LCS); and the Constellation-class frigate (FFG), which began production in 2021. In January 2021, the Navy halted production of the mono-hull LCS Freedom-variant until issues involving the design of its propulsion system are resolved. In the meantime, the top speed of affected ships (currently 40-plus knots) is reportedly limited to 34 knots.65 Last year, the fleet of 23 LCS (10 Freedom-variant and 13 Independence-variant) was expected to grow to 34 and be joined by 18 frigates by FY 2034.66 Since then, the Navy has reversed course and terminated the LCS anti-submarine mission module program (10 units originally planned) and plans to decommission the remaining nine Freedom monohull variant.67

On August 20, 2020, the Navy decommissioned three of its aging *Avenger*-class MCM ships, leaving eight in service overseas in Sasebo, Japan, and Manama, Bahrain. These represent the only ship class dedicated to countering the mine threat.<sup>68</sup> The current long-range shipbuilding plan confirms that the Navy intends to operate these aged MCMs through FY 2027.<sup>69</sup>

As these ships reach the end of their service life, the Navy is relying on the development of mine countermeasure mission packages for the LCS to provide this capability. At an April 2022 webinar, the CNO indicated that these mission modules are on track to reach IOC by the end of 2022.<sup>70</sup> In an unanticipated move, the Navy began to arm LCS with the

naval strike missile, giving these ships a long-range anti-ship capability that they had lacked despite notable operations by the class in the South China Sea.<sup>71</sup> On December 9, 2021, the San Diego-based *Independence*-variant *Oakland* received this new capability.<sup>72</sup>

Instead of requesting additional LCS, the Navy has focused on a new frigate. On April 30, 2020, the Navy awarded Fincantieri \$795 million to build the lead ship at its Marinette Marine shipyard in Wisconsin based on a proven design currently in service with the French and Italian navies. While the design for the U.S. ship has not been finalized, the frigate is intended to be a multi-mission warship with 32 VLS cells, up to 16 containerized naval strike missiles (NSM), and one helicopter. May 2021, the Navy contracted for the second ship in the class, the USS *Congress* (FFG-63). In FY 2022 a third ship was purchased with two more planned for purchase in FY 2024.

The Navy continues to explore options to expand production eventually to as many as four ships a year. To do this, the Navy intends to begin production at a second yard by FY 2025; a decision on this "follow yard" is expected by FY 2023. In 2021, Austal USA broke new ground on a steel production facility that could position it to bid as the second yard, <sup>76</sup> but the FY 2022 appropriations bill contains language that may defer identification of this second yard until after delivery of the first frigate during FY 2026. To replicate Fincantieri Marine's Wisconsin shipyard would likely cost over \$700 million.

Amphibious Ships. Commandant of the Marine Corps General David Berger issued the 38th Commandant's Planning Guidance in July 2019 and Force Design 2030 in March 2020. Both documents signaled a break with past Marine Corps requests for amphibious lift, specifically moving away from the requirement for 38 amphibious ships to support an amphibious force of two Marine Expeditionary Brigades (MEB).<sup>77</sup> The Commandant envisions a larger yet affordable fleet of smaller, low-signature amphibious ships—the Light Amphibious Warship (LAW)—that enable littoral maneuver and associated logistics support in a contested theater.<sup>78</sup> However, the amphibious fleet remains centered on fewer large ships.

The Navy's Future Naval Force Study (FNFS)<sup>79</sup> and December 2020 30-year shipbuilding plan acknowledged the growing importance of the LAW, which will have to be produced rapidly and in

sufficient numbers in order to actualize the naval forces' distributed concepts of operations (e.g., Marine Littoral Regiments and Distributed Maritime Operations). According to the April 2022 long-range shipbuilding plan, the Navy intends to purchase the first LAW in FY 2025. The Marine Corps had intended to have the ship under contract by the summer of 2022, but because of delays, it has begun to use alternative platforms to train and work out operational concepts so that it will be ready when the ship eventually is delivered.<sup>80</sup>

As of July 1, 2022, the Navy had nine amphibious assault ships in the fleet (seven *Wasp*-class LHD and two *America*-class LHA); 12 amphibious transport docks (LPD); and 11 dock landing ships (LSD).<sup>81</sup> The FY 2021 budget included \$250 million in additional funds to accelerate construction of LHA-9 following the July 2020 catastrophic fire on *Bonhomme Richard* (LHD-6).<sup>82</sup> The decision to decommission the damaged ship further exposed limitations in shipyard capacity, as repairs would have had a negative effect on other planned shipbuilding and maintenance.<sup>83</sup>

The Navy's LSDs, the Whidbey Island-class and Harpers Ferry-class amphibious vessels, are scheduled to reach the end of their 40-year service lives beginning in 2025. LPD-30 began construction in April 2020 and when delivered will be the first of 13 San Antonio-class Flight II ships to replace the legacy LSD ships. The 12th first flight San Antonio-class ship (LPD 28) was delivered six months later than reported in the 2022 Index.84 The FY 2021 budget included \$500 million "to maximize the benefit of the amphibious ship procurement authorities provided elsewhere in this Act through the procurement of long lead material for LPD-32 and LPD-33."85 In the Navy's FY 2023 proposed budget, LPD-32 would be the last Flight II purchased of the originally envisioned 13; the Marine Corps is seeking procurement of the fourth LPD-33 Flight II as its top unfunded request.86

**Unmanned Systems.** The Navy does not include unmanned ships in counting its battle force size. Previous long-range shipbuilding plans envisioned the purchase of 13 Large Unmanned Surface Vessels (LUSV); one Medium Unmanned Surface Vessel (MUSV); and eight Extra Large Undersea Unmanned Vessels (XLUUV) by FY 2026.<sup>87</sup> On May 18, 2021, one of these experimental LUSV vessels, the *Nomad*, was seen transiting the Panama Canal on

its way to Surface Development Squadron (SURF-DESRON) 1.88 In April 2020, the Navy took delivery of its second MUSV *Sea Hunter* prototype, joining two LUSV, and the *Zumwalt* destroyer under SURF-DEVRON 1.89 Since the *2022 Index*, there has been significant progress in learning what it will take to operate a fleet of unmanned naval warships and their limitations.

The Navy reached a significant milestone in September 2021 when its small fleet of unmanned surface ships launched and hit a target with an SM-6 interceptor missile.90 After spending years in a laboratory and controlled at-sea navigational tests, unmanned ships are now deploying. That same month, Task Force 59, based in the Persian Gulf and comprised of smaller unmanned drones and vessels, conducted International Maritime Exercise 2022 (IMX22) with 10 nations and more than 80 unmanned platforms in the Red Sea. 91 Despite these advances, the FY 2023 budget will slow the pace of procurement with the next LUSV procured in FY 2025 and the next XLUUV in FY 2024 for a combined total of 12 of these craft by FY 2027.92 Overall, the Navy is making progress in maturing its unmanned fleet.

Logistics, Auxiliary, and Expeditionary Ships. Expeditionary support vessels are highly flexible platforms of two types: those used for prepositioning and sustaining forward operations and others used for high-speed lift in uncontested environments. The Navy has five of the former (two Expeditionary Transfer Dock [ESD] and three Expeditionary Sea Base [ESB] vessels) and 12 of the latter (shallow-draft Expeditionary Fast Transport [EPF] vessels). In March and April 2022, ESB Hershel Williams (ESB 4) demonstrated the versatility of these ships during maritime security missions with African coast guards and navies. In August 2021, it conducted a counter-piracy exercise with the Brazilian navy. At the same time, China was attempting to secure a base in Equatorial Guinea.93 The Navy christened ESB 6, USNS John L. Canley, on June 25, 2022, and ESB 7, USNS Robert E. Simanek, "is currently under construction."94

With their shallow draft and versatile cargo capacity, EPFs offer unique capabilities that are well suited to austere but uncontested waters. Specifically, these ships can transport 600 short tons of military cargo (for example, main battle tanks) 1,200 nautical miles at 35 knots. The Navy christened its

13th EPF, the *Apalachicola*, on November 13, 2021, and construction is progressing. <sup>95</sup> In March 2021, the Navy revised its contract with Austal USA for \$235 million to modify EPF 14 and the future EPF 15 to be high-speed hospital ships with the capability of embarking a V-22 tilt-rotor aircraft. <sup>96</sup> The keel for EPF 14 configured as a hospital ship was laid on January 26, 2022, and construction of EPF 15 in the same configuration commenced the same month. <sup>97</sup>

The Navy's Combat Logistics Force (CLF) includes dry-cargo and ammunition ships (T-AKE); fast combat support ships (T-AOE); and oilers (AO). The CLF provides critical support, including at-sea replenishment, that enables the Navy to sustain the fleet at sea for prolonged periods. The Navy's future oiler *John Lewis* (T-AO 205) was procured in 2016 and launched five years later on January 12, 2021; 20 ships of this class are planned. However, because of a flooding incident at the graving dock, delivery of *John Lewis* has been delayed, and this in turn has caused cascading delays of 12 to 15 months in construction of the second through sixth ships. Po

To sustain the number of oilers needed by the fleet, the Navy will have to receive the first two of this class by FY 2023. 100 Secretary of Defense Lloyd Austin's March 7, 2022, decision to dismantle Red Hill fuel storage facilities in Hawaii will generate additional pressure to increase the Navy's at-sea oiler fleet to meet operational needs in the Pacific. A plan specifying how the Navy will mitigate the loss of these massive Pacific fuel storage facilities was due by May 31, 2022. 101

Strike Platforms and Key Munitions. The FY 2023 budget continues the Navy's focus on long-range offensive strikes launched from ships, submarines, and aircraft. Notable capability enhancements funded in the FY 2023 budget include Conventional Prompt Strike (CPS), a maneuverable hypersonic non-nuclear weapon for long-range strikes that receives support for initial deployment on the *Zumwalt*-class destroyer in FY 2025, and the upgraded Block V Maritime Strike Tomahawk (MST) with improved targeting. 102

To counter the threat posed by the Chinese PL-15 long-range air-to-air missile, which has an operational range of 186 miles, the Navy is working with the Air Force to develop the AIM-120 Advanced Medium-Range missile, the operational range of which has not been made public. <sup>103</sup> In March 2021, the Air Force reported a record long-range kill of a drone

target by this developmental missile from one of its F-15C fighters.<sup>104</sup> If this report is accurate, it indicates that development of this needed capability is proceeding apace.

**Shore-Based Anti-Ship Capabilities.** Following the August 2019 U.S. withdrawal from the Intermediate-Range Nuclear Forces (INF) Treaty, new intermediate-range (500–1,000 miles) conventional ground-launched strike options became politically viable. This is especially important in Asia where such capable missiles deployed to the first island chain would have great relevance in any conflict with China. <sup>105</sup>

The FY 2020 budget included \$76 million to develop ground-launched cruise missiles.<sup>106</sup> The FY 2021 budget included \$59.6 million in additional funds to procure 36 ground-based anti-ship missiles.107 The FY 2023 budget, building on recent successes, continues this upward investment in development and increased production of these weapon systems. A photo of the launch of a U.S. Marine Corps truck-mounted Naval Strike Missile—ostensibly part of the Navy-Marine Expeditionary Ship Interdiction System (NMESIS)—was released in April 2021.108 The FY 2023 budget will fund low-rate initial production of 115 Naval Strike Missiles and associated development of Marine Corps platoon-level targeting systems. 109 Ukraine's use of shore-based anti-ship missiles to sink Russia's Black Sea flag ship, the Moskva, in April 2022 has renewed interest in such systems.

**Electronic Warfare (EW).** The purpose of electronic warfare is to control the electromagnetic spectrum (EMS) by exploiting, deceiving, or denying its use by an enemy while ensuring its use by friendly forces. It is therefore a critical element of successful modern warfare. The final dedicated EW aircraft, the EA-18G Growler, was delivered in July 2019, meeting the Navy's requirement to provide this capability to nine carrier air wings (CVW), five expeditionary squadrons, and one reserve squadron. <sup>110</sup> Anticipating the EA-18G's retirement in the 2030s, the Navy has been exploring follow-on manned and unmanned systems, but no new developments have been reported in 2022.

The Navy's proposal to retire all of its expeditionary electronic attack squadrons by FY 2025 has come as a surprise. Unless there is a replacement capability, retirement of these aircraft removes the EW coverage provided by these units from forward

airfields, shifting the support burden to nearby naval platforms and the other services.

**Air Early Warning.** The E-2D forms the hub of the Naval Integrated Control Counter Air (NF-IC-CA) system and provides critical theater air and missile defense capabilities. The Navy's FY 2021 budget supported the procurement of four aircraft with an additional 10 to be procured over the next two years. The FY 2023 budget completes this plan by including procurement of the final five new E-2D aircraft, which are important air control platforms.

High Energy Laser (HEL). HEL systems provide the potential to engage targets or shoot down missiles without being limited by how much ammunition can be carried onboard ship. A significant milestone was achieved when USS *Portland* (LPD-27) used its HEL Weapon System Demonstrator to shoot down an unmanned aerial vehicle (UAV) over the Pacific on May 16, 2020. This was followed by the Navy's decision to begin installation of a HEL system—the HELIOS (60 kw) laser—on destroyers in 2021 beginning with USS *Preble*. HELIOS is a scalable laser system that is integrated into the ship's weapons control and radar systems and can dazzle and confuse threats, disable small boats, or shoot down smaller air threats.

In April 2022, the Navy demonstrated the ability of its Layered Laser Defense HEL system to shoot down a drone simulating a cruise missile. 115 Successful tests like this and the ongoing deployment of the HELIOS on destroyer *Preble* will be followed by installation of a much stronger 100 kw laser on *Portland* (LPD-27) that approaches the powers needed for missile defense. 116 However, until field testing against meaningful threat platforms is conducted across a range of weather conditions, the effectiveness of such systems will remain unproven.

**Command and Control.** Networked communications are essential to successful military operations. The information passed over these networks includes sensitive data on such subjects as targeting and logistics, and this makes cyber security, communications, and the information systems that generate and relay this information critical elements of the DOD information enterprise.

On October 1, 2020, Chief of Naval Operations Admiral Michael Gilday signed two memos establishing Project Overmatch. The goal was to achieve situational awareness and effective command and control of a geographically dispersed naval force. In his two memos, the CNO directed that investments be made to deliver network architectures, unmanned capabilities, and data analytics to ensure that the Navy can operate and dominate in a contested environment.117 The CNO also directed the Navy to leverage related Air Force efforts on JADC2, now a Joint Force effort involving all of the military branches. Remarkably, despite the significance of the effort, little has been publicly released on Project Overmatch; what is known is that it involves three classified funding lines with initial deployment slated for 2023.118 In unofficial venues, it has been hinted that the first platform to employ JADC2 capabilities will be an aircraft carrier, but public statements indicate that the objective is to connect all platform data flows, analyze them for classification, and make predictive targeting recommendations. If successful, artificial intelligence paired with resilient communications and big data analytics can enable a key element of Distributed Maritime Operations (DMO).

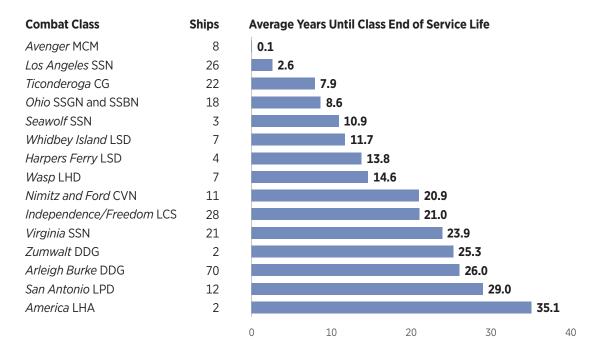
#### Readiness

In the 1980s, the Navy had nearly 600 ships in the fleet and kept roughly 100 (17 percent) deployed at any one time. As of June 22, 2022, the fleet numbered 298 ships, of which 94 (31.5 percent) were at sea or deployed. With fewer ships carrying an unchanging operational workload, training schedules become shorter and deployments become longer. The commanding officer's discretionary time for training and crew familiarization is a precious commodity that is made ever scarcer by the increasing operational demands on fewer ships.

FY 2019 marked the first time in more than a decade that DOD and the Navy did not have to operate under a continuing resolution for at least part of the fiscal year. Having a full fiscal year to plan and execute maintenance and operations helped the Navy to continue on its path to restoring fleet readiness. However, as CNO Admiral John Richardson explained to the Senate Armed Services Committee in April 2018, it will take until late 2021 or 2022 to restore fleet readiness to an "acceptable" level if adequate funding is maintained; without "stable and adequate funding," it will take longer. "Infortunately, the Navy began FY 2020 under a continuing resolution that delayed planned maintenance for USS *Bainbridge* (DDG 96) and USS *Gonzalez* (DDG 66)."

Given this recent history, as well as the effects of COVID, and the demands of unplanned urgent

## **Navy Combat Ships Nearing End of Service Life**



**NOTE:** Figures are based on calculations for August 2022.

**SOURCE:** U.S. Navy, Naval Sea Systems Command, Naval Vessel Register, "Fleet Size," http://www.nvr.navy.mil/NVRSHIPS/FLEETSIZE. HTML (accessed August 17, 2022).

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ship repairs brought about by such incidents as the grounding of the submarine *Connecticut*, the Navy still has much to do.

**Impact of COVID-19.** The eruption of the COVID-19 pandemic in 2020 caused many problems for the U.S. Navy. USS *Theodore Roosevelt* (CVN 71), for example, was forced to quarantine for 55 days in Guam; the major biannual international Rim of the Pacific Exercise (RIMPAC) was scaled down; 1,629 reservists were called to active duty to backfill high-risk shipyard workers conducting critical maintenance; and the Navy was restricted to using "safe haven" COVID-free ports. In May 2021, the CNO assessed that the Navy managed the pandemic with minimal operational impact but with added time at sea and delays for family reunions pending quarantines.<sup>121</sup>

In fact, as the pandemic recedes, the Navy's response has been a success overall. As of June 22,

2022, total cumulative COVID cases among the Navy's active-duty uniformed personnel numbered 97,880 with 17 deaths, and only 3,371 remained unvaccinated, of which 214 had approved exemptions to the mandated vaccination. Given vaccination rates and ebbing danger, the Navy appears to be past the COVID epidemic. It is therefore expected that the Navy will implement lessons learned from this experience to prepare for future pandemics and biological attacks.

Maintenance and Repairs. Naval Sea Systems Command completed its Shipyard Optimization and Recapitalization Plan in September 2018. 123 Three years later, the improvement of public shipyard capacities is just beginning. The initial step of building digital models to inform future upgrades to the Navy's four public shipyards was expected to be complete by the end of 2021, but remained

incomplete as of June 2022. Attempts by Congress to accelerate the effort have not been effective. <sup>124</sup> At a May 10, 2022, Senate hearing, it became apparent both that the original costs were significantly underestimated and that timelines are slipping. During that hearing, the Government Accountability Office reported that:

- "[F]rom 2017 to 2020, the backlog of restoration and modernization projects at the Navy shipyards has grown by over \$1.6 billion, an increase of 31 percent."
- "In 2018, the Navy estimated that it would need to invest about \$4 billion in its dry docks to obtain the capacity to perform the 67 availabilities it cannot currently support. This estimate included 14 dry dock projects planned over [a] 20-year span. However...the Navy's first three dry dock projects have grown in cost from an estimated \$970 million in 2018 to over \$5.1 billion in 2022, an increase of more than 400 percent." 126
- "In a 2021 report to Congress, the Navy stated it would complete the ADPs by fiscal year 2021. However, in a September 2021 update of that report, the Navy stated the [Area Development Plans] would be complete four years later, in fiscal year 2025."<sup>127</sup>

#### Training, Ranges, and Live-Fire Exercises.

Ship and aircraft operations and training are critical to fleet readiness. The Navy seeks to meet fleet readiness requirements by funding 58 underway days for each deployed warship and 24 underway days for each non-deployed warship per quarter. Less clear is how much of this time is spent on crew training and whether the Navy assesses this as effective in meeting needed operational proficiencies.

To improve warfighting proficiency, the Navy is seeking to expand and update instrumentation of the training range at Naval Air Station Fallon, Nevada, to enable practice with the most advanced weapon systems. <sup>128</sup> This training range fits into the larger five-year \$27.3 billion Pacific Deterrence Initiative (PDI), led by Indo Pacific Command, that is intended partly to transform the way the Navy trains for highend conflict and improve training with U.S. allies in the Pacific. <sup>129</sup> Of particular importance to the Navy

are PDI investments to modernize the Pacific Missile Range Facility (PMRF); the Joint Pacific Alaska Range Complex (JPARC); and the Combined/Joint Military Training (CJMT) Commonwealth Northern Mariana Islands in order to improve training for operations across all domains: air, land, sea, space, and cyber. <sup>130</sup>

The FY 2023 budget earmarks \$6.1 billion of DOD's topline budget for PDI. Especially important are long lead time infrastructure projects in Guam and Tinian in the northern Marianas. This year's PDI budget includes the largest amount allocated so far for exercises, training, experimentation, and innovation: approximately \$2.3 billion. To measure the effectiveness of these investments, the Navy will need to demonstrate increased frequency of exercises that practice high-end warfighting independently, jointly, and with key allies such as Australia, Japan, and South Korea. This should include increased numbers of realistic free-play events and increased by-hull frequency of live-fire drills.

Finally, not forgotten are the 2017 collisions of USS *John S. McCain* (DDG 56) and USS *Fitzgerald* (DDG 62) in which 17 sailors were lost. Findings of the subsequent investigations, which highlighted the importance of operational risk management and unit readiness, remain relevant. <sup>132</sup> To ensure that these tragic events are not repeated, the following broad institutional recommendations in the Secretary of the Navy's *Strategic Readiness Review* should be implemented:

- "The creation of combat ready forces must take equal footing with meeting the immediate demands of Combatant Commanders."
- "The Navy must establish realistic limits regarding the number of ready ships and sailors and, short of combat, not acquiesce to emergent requirements with assets that are not fully ready."
- "The Navy must realign and streamline its command and control structures to tightly align responsibility, authority, and accountability."
- "Navy leadership at all levels must foster a culture of learning and create the structures and processes that fully embrace this commitment."

A reminder that the above recommendations remain relevant was the October 2021 grounding of submarine *Connecticut* in the South China Sea. The subsequent investigation found the event

avoidable while operating in poorly surveyed waters—a reminder of the risk as well as vigilance required at sea. $^{134}$ 

# Scoring the U.S. Navy

#### **Capacity Score: Very Weak**

This *Index* assesses that a battle force consisting of 400 manned ships is required for the U.S. Navy to do what is expected of it today. The Navy's current battle force fleet of 298 ships and intensified operational tempo combine to reveal a service that is much too small relative to its tasks. Contributing to a lower assessment is the Navy's persistent inability to arrest and reverse the continued diminution of its fleet while adversary forces grow in number and capability. On its current trajectory, the Navy will shrink further to 280 ships by 2037. The result is a score of "very weak," which is down from the 2022 *Index*. Depending on the Navy's ability to realize aggressive growth, reverse early decommissioning plans, increase its end strength, and develop creative service life extensions, its capacity score will probably remain "very weak" for the foreseeable future.

## Capability Score: Marginal Trending Toward Weak

The overall capability score for the Navy remains "marginal" with downward pressure as the Navy's technological edge narrows against peer competitors China and Russia. The combination of a fleet that is aging faster than old ships are being replaced and the rapid growth of competitor navies with modern technologies has only intensified the danger for U.S. naval power. Without meaningful progress in

fielding systems that are able to defend against an array of threats, greater integration of unmanned systems into the fleet, and development of a family of new long-range weapons, especially in air-to-air combat, next year's capability score could well decline to "weak."

#### Readiness Score: Weak

The Navy's readiness is rated lower this year as "weak." This is due primarily to the Navy's persistent struggle to recapitalize antiquated, inadequate maintenance infrastructure and workforce to meet current needs. The effectiveness of training and exercises measured against China will be an increasingly critical metric in this score.

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

The Navy's overall score for the 2023 Index is "weak" driven by lower scores in capacity and readiness. To correct this trend, the Navy will have to eliminate several readiness and capacity bottlenecks while seeing to it that America has an operational fleet with the numbers and capabilities postured to counter Russian and Chinese naval advances. There is added urgency given that China is aggressively posturing itself to obtain maximum advantage over Taiwan and many of the U.S. Navy's efforts to improve itself will take several years to realize.

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

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity	✓				
Capability			✓		
Readiness		✓			
OVERALL		<b>✓</b>			

# **NAVY SCORES**



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Aircraft Carrier**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score		
Nimitz-Class Aircraft Carrier (CVN-68) Inventory: 10 Fleet age: 30 Date: 1975			Ford-Class Aircraft Carrier (CVN-78) Timeline: 2017-TBD	2	2		
The Nimitz-class is a nuclear-powered multipurpose carrier. The aircraft carrier and its embarked carrier air wing can perform a variety of missions including maritime security operations and power projection. Its planned service life is 50 years. The class will start retiring in FY 2025, starting with CVN-68 USS Nimitz and CVN-69 USS Eisenhower, and will be replaced by the Ford-class carriers.	3	3	Currently in production, the Ford-class will replace the Nimitz-class aircraft carriers. The Ford-class design uses the basic Nimitz-class hull form but incorporates several improvements to achieve a 33 percent higher sortie rate, a smaller crew with approximately 600 fewer sailors, two and a half times more electrical power, and over \$4 billion in life-cycle cost savings over the Nimitz-class. The ship completed Planned Incremental Availability on March 1 after six months of modernization and maintenance work. The crew is currently undergoing training to prepare for the				
Ford-Class Aircraft Carrier (CVN-78) Inventory: 1 Fleet age: 5 Date: 2017  The Ford-class incorporates new technologies that will increase aircraft sortie rates, reduce manning, provide greater electrical power for future weapons systems, and decrease operating costs. Its planned service life is 50 years. CVN-78 is expected to deploy in the fall of 2022 after five years of delays. CVN-79 is awaiting testing while CVN-80 and CVN-81 are under construction.	6	4	crew is currently undergoing training to p first deployment of the ship in the fall of 2 intended life expectancy is 50 years.  PROCUREMENT  SPENDING  3 1		ship's		

**NOTE:** See page 386 for details on fleet ages, dates, timelines, and procurement spending.

# **NAVY SCORES**



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Large Surface Combatant**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score		
Ticonderoga-Class Cruiser (CG-47) Inventory: 22 Fleet age: 33.5 Date: 1981			Zumwalt-Class Destroyer (DDG-1000) Timeline: 2016–2024	0	0		
The <i>Ticonderoga</i> -class is a multimission battle force ship equipped with the Aegis Weapons System. While it can perform strike, anti-surface warfare and anti-submarine warfare, its primary focus is air and missile defense. The cruisers have a life expectancy of 40 years. The Navy plans to retire the entire cruiser fleet by FY 2027.	2	3	The DDG-1000 was designed to be a new-generation destroyer capable of handling more advanced weapon systems for long-range strike with a hull design aimed to reduce radar detectability for its original primary mission of naval surface fire support (NSFS). The DDG-1000 program was intended to produce a total of 32 ships, but this number has been reduced to three. The first DDG-1000 was commissioned in October 2016. DDG-1002, the last ship of the class, is expected to be delivered in 2024.				
Zumwalt-Class Destroyer (DDG-1000)			PROCUREMENT SPENDING	<b>3</b> (\$ million	ıs)		
Inventory: 1 Fleet age: 4.5 Date: 2016			3	\$4,092			
The Zumwalt-class is multi-mission destroyer that incorporates several technological improvements such as a stealthy hull design and integrated electric-drive propulsion system. Although it has passed sea trials, it continues to experience problems with its combat systems. The third and final ship of the class was commissioned in FY 2020, with DDG 1002 currently awaiting Combat Systems testing before entering the service.	6	2					
Arleigh Burke-Class Destroyer (DDG-51) Inventory: 70			Arleigh Burke-Class Destroyer (DDG-51) Timeline: 1991–2029	3	4		
Fleet age: <b>15.5</b> Date: <b>1991</b> The <i>Arleigh Burke</i> -class is a multimission guided missile destroyer featuring the Aegis Weapons System with a primary mission of air defense. The Navy procured two in FY 2022 and will continue to procure two more each fiscal year. The destroyers will begin to decommission starting in FY 2027 with DDG-51.	3	4	the reduction in DDG-1000 acquisitions. E 2017, all DDG-51s procured will be the Flig which includes the Advanced Missile Defe a more capable missile defense radar. The two destroyers in FY 2022 and plans to pleach fiscal year. The destroyers are believ an extended life span of 45 years of operating the procurement SPENDING				

**NOTE:** See page 386 for details on fleet ages, dates, timelines, and procurement spending.

# **NAVY SCORES**



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Small Surface Combatant**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROG	ΡΔΜ	Size Score	Health Score
Littoral Combat Ship (LCS)	30016	Score	Littoral Combat Ship		30016	30016
Inventory: 22 Fleet age: 7 Date: 2008			Timeline: 1991–2024	(LCS)	2	2
The Littoral Combat Ship includes two classes: the <i>Independence</i> -class and the <i>Freedom</i> -class. The modular LCS design <i>depends</i> on mission packages (MP) to provide warfighting capabilities in the SUW, ASW and MCM mission areas. The ship has an expected service life of 25 years. However, the Navy is planning to decommission nine <i>Freedom</i> -class LCS under its FY 2023 budget proposal as well as two <i>Independence</i> -class LCS in FY 2024, despite resistance from Congress.	6		The LCS is intended to fulfill the mine countermeasure, antisubmarine warfare, and surface warfare roles for the Navy. It is designed to operate in near-shore environment but is also capable of open-ocean operation. It works better with smaller ships than the DDG-51. In the FY 2023 budget proposal, the Navy has marked all nine Freedom-class ships currently in service for early disposal. The Independence-class LCS would remain as the sole small surface combatant after the retirement of the MCM ships and until the new FFG-62 frigates are delivered. The decision to scrap the Freedom-class LCS does not affect the ships currently under construction.			
			PROCUREMENT SPENDING (\$ millions) 33 \$16,182			
Avenger-Class Mine Counter Measure (MCM-1)		2	FFG Frigate			
Inventory: 8 Fleet age: 31.5 Date: 1983			Timeline: <b>1991–2030</b>		N/A	N/A
Avenger-class ships are designed as mine sweepers/hunter-killers capable of finding, classifying and destroying moored and bottom mines. The class has an expected 30-year service life. The remaining MCMs are expected to be decommissioned throughout the 2020s. While there is no direct replacement single-mission MCM ship in production, the Navy plans to fill its mine countermeasure role with the LCS and its MCM MP.	0		A new program called the FFG-62 will augment the LCS program to fill out the remaining 20-ship small surface combatant requirement for a total of 52 small surface combatants. The ships will be 496 feet with a top speed 29 miles per hour and a range of 6,000 nautical miles. Its purpose is to escort carrier battle groups and high-value convoys. It will accommodate 32 VLS cells to handle high powered missiles and machine guns. The first ship should be delivered by 2026 and be operational by 2030. The current contract would provide 10 hulls by 203, with a tol of 20 FFG-62 frigates in the fleet. Procurement has been frigate per fiscal year with the Navy requesting to procur one more in FY 2023.			
			PROCUREMENT SPENDING		<b>G</b> (\$ millions)	
			3 17	\$3,425	\$17,636	

**NOTE:** See page 386 for details on fleet ages, dates, timelines, and procurement spending.



Procurement ■ Through FY 2022 and Spending ■ Pending

# **SSGN Cruise Missile Submarine**

Ohio-Class (SSGN-726) Inventory: 4 Fleet age: 39.5 Date: 1981		None	
The SSGNs provide the Navy with a large stealthy strike and special operations mission capabilities. From 2002-2007, the four oldest <i>Ohio</i> -class ballistic missile submarines were converted to guided missile submarines. Each SSGN is capable of carrying up to 154 Tomahawk landattack cruise missiles and up to 66 special operations forces for clandestine insertion and retrieval. All four SSGNs will retire between FY 2026 and FY 2028. The Navy tentatively plans to replace the SSGNs with a new Large Payload Submarine beginning in FY 2036, but loss of the SSGN undersea strike capability will be mitigated by the	4		



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Attack Submarines**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Seawolf-Class (SSN-21) Inventory: 3 Fleet age: 21 Date: 1997  The Seawolf-class is exceptionally quiet, fast, well-armed, and equipped with advanced sensors. Though lacking a vertical launch system, the Seawolf-class has eight torpedo tubes and can hold up to 50 weapons in its torpedo room. Although the Navy planned to build 29 submarines, the program was cut to three submarines. The Seawolf-class has a 33-year expected service life. They have been succeeded by the	3	4	Virginia-Class (SSN-774)  Timeline: 2004-2036  The Virginia-class is in production and will Angeles-class and Seawolf-class attack suare decommissioned. The Virginia-class Pa (VPM) will be incorporated into eight of the V submarines beginning in FY 2019. VPM is large-diameter, vertical launch tubes that additional Tomahawk missiles or other payservice life of the Virginia-class is 33 years been procured so far at a rate of two per years procured so far at a rate of two per years.	replace the abmarines ayload More 11 planner includes for carry to all planners in the can carry to a carry to	as they dule ed Block our up to 28 e planned ur have
Virginia-class attack submarine.  Los Angeles-Class (SSN-688)			36 12 \$65,4	06 \$3	2,882
Inventory: <b>28</b> Fleet age: <b>36</b> Date: <b>1976</b> The <i>Los Angeles</i> -class comprises the largest portion of the Navy's attack submarine fleet. They are multi-mission submarines that can perform covert intelligence collection, surveillance, ASW, ASuW, and land attack strike. The <i>Los Angeles</i> -class has a 33-year expected service life. Between 2022 and 2028, 14 <i>Los Angeles</i> -class submarines will be retired and replaced by the <i>Virginia</i> -class.	0	3			
Virginia-Class (SSN-774) Inventory: 19 Fleet age: 9 Date: 2004  The Virginia-class is the U.S. Navy's next-generation attack submarine. The Virginia-class includes several improvements over previous attack submarine classes that provide increased acoustic stealth, improved SOF support, greater strike payload capacity and reduced operating costs. The planned service life of the Virginia-class is 33 years. The Virginia-class is in production and will replace the Los Angeles-class and Seawolf-class attack submarines as they are decommissioned. Thirty-six have been procured so far, at a rate of two per year.	4	4			



Procurement ■ Through FY 2022 and Spending ■ Pending

# **SSBN Ballistic Missile Submarine**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Ohio-Class (SSBN)			Columbia-Class (SSBN-826)		
Inventory: <b>14</b> Fleet age: <b>33</b> Date: <b>1981</b>			Timeline: 2021-TBD		
The <i>Ohio</i> -class SSBN is most survivable leg of the U.S. military's strategic nuclear triad. The <i>Ohio</i> -class SSBN's sole mission is strategic nuclear deterrence, for which it carries longrange submarine-launched ballistic missiles. The <i>Ohio</i> -class's expected service life is 42 years. The <i>Ohio</i> -class fleet will begin retiring in 2027 at an estimated rate of one submarine per year until 2039. The <i>Ohio</i> -class fleet	2	4	The 12-boat <i>Columbia</i> -class will replace class nuclear ballistic submarine force, credible and survivable sea-based strat. The Navy's FY 2023 budget submission total procurement cost of the 12 boats at The lead boat, SSBN-826, is expected FY 2027 with its first patrol scheduled fromplications from the pandemic and the program could be delayed. Despite construction continues to be underway will have a 42-year life expectancy.	which provide egic deterrent estimates the t \$112.7 billion be delivered or FY 2031. Du echnical chall- such issues,	s a t. e h. I in ue to enges,
will be replaced by 12 <i>Columbia</i> -class SSBNs.			PROCUREMENT SPENDI	<b>IG</b> (\$ millions)	)
			1 11	\$50,787	

# **Amphibious Warfare Ship**

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PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Wasp-Class Amphibious Assault Ship (LHD-1) Inventory: 7 Fleet age: 23 Date: 1989 The Wasp-class can support amphibious landing operations with Marine Corps landing craft via its well deck. It can also support Marine Air Combat Element operations with helicopters, tilt-rotor aircraft and Vertical/Short Take-Off and Landing (V/STOL). This ship has a planned 40-year service life.	2	3	America-Class (LHA-6)  Timeline: 2014-2028  LHA Flight 0 (LHA-6 and 7) were built with provide more space for Marine Corp aviation and storage as well as increased JP-5 fuel of Flight 1 (LHA-8 and beyond) will reincorporincreased mission flexibility. The America-c with three LHA 6s already procured. In the estimate, the Navy has requested procurent procurement Spending (Spending Course)	on mainter capacity. L rate a well lass is in p FY 2023 k nent for Li	nance HA deck for production oudget
America-Class Amphibious Assault Ship (LHA-6) Inventory: 2 Fleet age: 5 Date: 2014  This new class of large-deck amphibious assault ships is meant to replace the retiring Wasp-class LHD. LHAs are the largest of all amphibious warfare ships, resembling a small aircraft carrier. The America-class is designed to accommodate the Marine Corps' F-35Bs. In the FY 2023 budget estimates, the Navy plans to procure one LHA.	6	4	3 1 \$3,66	57 \$	1,085



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Amphibious Warfare Ship (Cont.)**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
San Antonio-Class Amphibious Transport Dock (LPD-17) Inventory: 11 Fleet age: 10.5 Date: 2006			San Antonio-Class Amphibious Transport Dock (LPD-17) Timeline: 2006-2017	5	4
The LPDs have well decks that allow the USMC to conduct amphibious operations with its landing craft. The LPD can also carry four CH-46s or two MV-22s. Eleven of the planned 13 Flight I LPD-17-class ships are operational with the remaining two under construction. The class has a 40-year planned service	4		The 13 LPD-17s are replacements for the S class LPDs. Both Flight I and Flight II LPDs mission ships designed to embark, transp elements of a Marine landing force by heli rotor aircraft, landing craft, and amphibio  PROCUREMENT SPENDING	s are multi ort and lar icopters, ti	nd ilt s.
life. As of FY 2022, two of the LPD Flight II-class have been procured.			13	\$13,836	
Whidbey Island-Class Dock Landing Ship (LSD-41) Inventory: 7 Fleet age: 33.5 Date: 1985			LPD-17 Flight II Timeline: 2025–2029	5	4
LSD 41 Whidbey Island-class ships were designed specifically to transport and launch four Marine Corps Landing Craft Air Cushion vehicles. They have an expected service life of 40 years. All eight ships in the class will retire between FY 2026 and FY 2033. LSD-41-class will be replaced by LPD-17 Flight II program, which began procurement in FY 2018. Before 2026. the Navy plans	2	3	Previously known as LX(R), the LPD-17 FI will procure 13 ships to replace the Navy's The Navy originally planned to procure th in FY 2020, but accelerated procurement procurement of the first LPD-17 Flight II in Navy delayed the second ship planned for 2021. In the FY 2023 budget request, the procurement for one Flight II.	LSD-type e first Flig funding e FY 2018. r FY 2020,	ships. ht II ship nabled The , until FY
to retire six of the <i>Whidbey Island</i> -class ships.				<b>G</b> (\$ millio ,926	ns) \$1,673
Harpers Ferry-Class Dock Landing Ships (LSD-49) Inventory: 4 Fleet age: 25.5 Date: 1995  The Harpers Ferry-class reduced LCAC capacity to two while increasing cargo capacity. They have an expected service life of 40 years and all ships will be retired by FY 2038. The LSD-49 will be replaced by the LPD-17 Flight II, which began procurement in FY 2018. Before 2026, the Navy plans to retire four of the Harpers Ferry-class ships.	3			- <del>-</del>	,,,,,



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Airborne Early Warning**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	He Sc
r-2C Hawkeye nventory: 26 rleet age: 39 Date: 1973			E-2D Advanced Hawkeye Timeline: 2014–2023	4	(
the E-2C Hawkeye is a battle hanagement and airborne early warning ircraft. The aircraft uses computerized adar and electronic surveillance sensors or threat analysis and early warning. The -2C fleet received a series of upgrades or mechanical and computer systems round the year 2000. While still perational, the E-2C is nearing the end fits service life and is being replaced by the E-2D Advanced Hawkeye.	0	3	The E-2D Advanced Hawkeye replaces the and is in production. The Navy received apfive year multi-year procurement plan beg 2019 for 24 aircraft to complete the progradditional five aircraft were requested for in FY 2023 after five were procured in FY 2024  PROCUREMENT  SPENDING (3)	oproval fo Jinning in am of reco procurem 2022. Simillions	r a FY ord. <i>A</i>
repart of the E-2D Advanced Hawkeye are the set age: 4.5 Date: 2014  The E-2D program is the next-generation, arrier-based early warning, command, and control aircraft that provides approved battle space detection, apports theater air missile defense, and ffers improved operational availability. The E-2D AHE is replacement for the 1-2C platform. As of FY 2022, 112 E-2D HE were procured, and an additional we aircraft are requested for FY 2023.	6	4			

# **Electronic Attack Aircraft**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
EA-18G Growler Inventory: 158 Fleet age: 9 Date: 2009			None		
The EA-18G Growler is the U.S. Navy's electronic attack aircraft, providing tactical jamming and suppression of enemy air defenses. The final EA-18G aircraft was delivered in FY 2018, bringing the total to 16O aircraft and fulfilling the Navy's requirement. It replaced the legacy EA-6B Prowlers. The Navy proposed to retire 25 EA-18Gs across five land-based expeditionary electronic attack squadrons in its FY 2023 budget request. However, the Senate Armed Services Committee, in its markup of the FY 2023 National Defense Authorization Act (NDAA), prevented the retirement of the aircraft. The final decision to retire the 25 EA-18Gs waits to be confirmed.	6	4			



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Fighter/Attack Aircraft**

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PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
F/A-18E/F Super Hornet Inventory: 598 Fleet age: 18 Date: 2001			F-35C Joint Strike Fighter Timeline: 2019–TBD	2	3
The F/A-18 E/F Super Hornet has longer range, greater weapons payload, and increased survivability than the F/A-18A-D Legacy Hornet. The Navy plans to achieve a 50/50 mix of two F-35C squadrons and two F/A-18E/F Block III squadrons per carrier air wing by the mid-2030s. The ongoing service life extension program will extend the life of all Super Hornets to 9,000 flight hours. As of FY 2022, 690 F/A-18 E/F Super Hornets were procured.	3	3	The F-35C is the Navy's variant of the Join The Joint Strike Fighter faced many issues developmental stages, including engine p software development delays, cost overru a Nunn-McCurdy breach, and structural property of the	during its roblems, ns incurrir roblems. T y (IOC) of urement cornets. As cured with ment in FY	ng The the of of n an ' 2023.
F-35C Joint Strike Fighter Inventory: 35 Fleet age: 2 Date: 2019  The C-variant is the Navy's fifth- generation aircraft, brining radar- evading technology to the carrier deck for the first time. The F-35C performs a variety of missions to include air-to-air combat, air-to-ground strikes, and ISR missions. As of FY 2022, 164 of the F-35C variant were procured, with 205 expected to be procured beginning in FY 2023.	6	4	F/A-18 Super Hornet  The Navy plans to buy 108 Block III Super and modernize most of its existing Super II standards. All Block III Super Hornets wi of 10,000 flight hours, which is 50 percent of earlier F/A-18E/F aircraft. As of FY 2022 Super Hornets were procured.	Hornets to Il have a li greater t	Block fe span han that

**NOTES:** See Methodology for descriptions of scores. Fleet age is the average of platform since commissioning. The date for ships is the year of commissioning. Inventory for aircraft is estimated based on the number of squadrons. The date for aircraft is the year of initial operational capability. The timeline for ships is from the year of first commissioning to the year of last delivery. The timeline for aircraft is from the first year of delivery to the last year of delivery. Spending does not include advanced procurement or research, development, test, and evaluation (RDT&E). The total program dollar value reflects the full F–35 joint program including engine procurement. The Navy is also procuring 67 F-35Cs for the Marine Corps. Age of fleet is calculated from date of commissioning to January 2016.

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# U.S. Air Force

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The mission of the U.S. Air Force has expanded ▲ significantly since 1947 when the USAF became a separate service. Initially, operations were divided among four major components-Strategic Air Command, Tactical Air Command, Air Defense Command, and Military Air Transport Service—that collectively reflected the Air Force's "fly, fight, and win" nature. Space's rise to prominence in the early 1950s brought a host of capabilities that would expand the service's portfolio and increase its capabilities in the mission areas of intelligence, surveillance, and reconnaissance (ISR) and command and control (C2). With the birth of the Space Force in December 2019,1 the Air Force began to move its space and space-related personnel assets to the new service. The impact of that change, coupled with the lingering effects of the global COVID-19 pandemic that were highlighted in the 2022 Index of Military Strength, continue to hamper the trajectory of the Air Force.

The creation of the Space Force affected three Air Force mission areas: air and space superiority, ISR, and C2. Each of these mission areas was born from air-breathing assets, and while the loss of the space portfolio has reduced the service's inherent capabilities, they remain within the Department of the Air Force (DAF) and should allow the Air Force to focus the weight of its efforts on core missions in the air and cyber domains.

Today's Air Force has five principal missions:

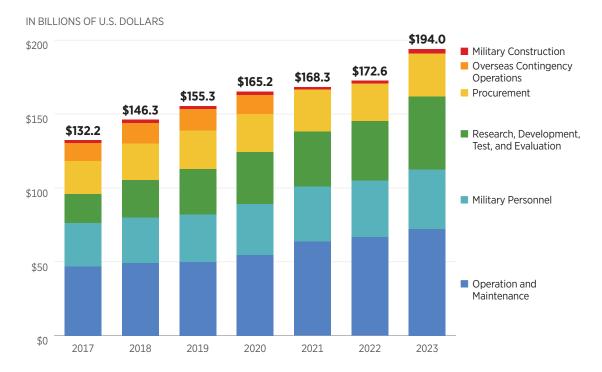
- Air superiority (space superiority is now the responsibility of the Space Force);
- Intelligence, surveillance, and reconnaissance;
- · Mobility and lift;

- Global strike; and
- · Command and control.

The summer of 2022 should have found the Air Force all but fully recovered from the effects of COVID-19. Readiness levels as measured by operational sortie rates and flying hours should have been well above the historic lows reached during the pandemic; instead, they have grown only marginally. The service's ability (or willingness) to fund and then generate sorties and flying hours for training has now spiraled well below the hollow-force days of the Carter Administration with equally dismal readiness levels. Training pipeline capacity for basic military training, officer accessions, and pilot training are back up to pre-pandemic levels, but a vibrant job market and steadily increasing civilian wages have stymied recruiting, and while the Air Force met its recruiting goals in 2021, it will struggle to meet accession requirements for fiscal year (FY) 2022.2 Moreover, in spite of more than 30 years of reductions in force size that left the Air Force 25 percent below the capacity level required for a fight with a peer competitor,3 the service has conveyed its intentions to reduce the fighter force by almost 20 percent over the next five years.4

On its face, that might not seem to be particularly worrisome, but the force structure required for a fight with China would significantly exceed the demands of a single major regional contingency (MRC). It would also require capability and readiness levels that significantly exceed what the Air Force possesses as it enters FY 2023. The Air Force did not have the funding required to increase capacity or develop any one of those critical areas, and it continues to defer their development under the overused mantra

# Air Force Budgets, 2017-2023



NOTE: FY 2023 figures are proposed.

**SOURCES:** Extracted from U.S. Air Force budget summaries for FY 2017 through FY 2023. For example: Table 1, "Air Force Budget Highlights Summary," in U.S. Department of the Air Force, *United States Air Force Fiscal Year 2017 Budget Overview*, February 2016, p. 15, https://www.saffm.hq.af.mil/Portals/84/documents/FY17/AFD-160209-036.pdf?ver=2016-08-24-102126-717 (accessed September 8, 2022), and Table 1, "Department of the Air Force Budget Summary," in U.S. Department of the Air Force, *Department of the Air Force FY 2023 Budget Overview*, p. 2, https://www.safm.hq.af.mil/Portals/84/documents/FY23/SUPPORT\_/BOB\_28Mar\_1125\_LoRes.pdf? ver=5nrA8bBfhWoUSrvZ09CeHA%3d%3d (accessed September 8, 2022).

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of "taking more risk." Understanding the depth of the hole this service is in begins with a bit of history.

Unlike some of the other services, the Air Force did not grow larger during the post-9/11 buildup. Instead, it grew smaller as acquisitions of new aircraft failed to offset programmed retirements of older aircraft. Following the sequestration debacle in 2012, the Air Force began to trade size for quality.<sup>5</sup> Presidential defense budgets from 2012 through 2017 during the Obama Administration proved merely aspirational, and as the service sustained the war on terrorism, it struggled also to sustain the type of readiness required to prevail in a major regional contingency (MRC) against a near-peer threat.

The Air Force was forced to make strategic trades in capacity, capability, and readiness to meet the operational demands of the war on terrorism and develop the force it needed for the future. The collective effects left the Air Force of 2016 with just 55 total force fighter squadrons, and the readiness levels within those organizations were very low. Just four of the Air Force's 32 active-duty fighter squadrons were ready for conflict with a near-peer competitor, and just 14 others were considered ready even for low-threat combat operations.<sup>6</sup>

Recognizing the threat from a rising China and resurgent Russia, the 2018 National Defense Strategy (NDS) directed the services to prepare for a

large-scale, high-intensity conventional conflict with a peer adversary.7 Later that same year, the Air Force released "The Air Force We Need" (TAFWN), a study of the capacity it would need to fight and help the U.S. win such a war. Based on thousands of war-game simulations, the study found that the service needed to grow by 25 percent, from 312 to 386 squadrons, to execute that strategy. That growth included one additional airlift squadron and seven additional fighter, five additional bomber, and 14 additional tanker squadrons,8 which equates to an additional 182 fighter, 50 bomber, 210 air refueling, and 15 airlift platforms.9 During the same period, the service's most senior leaders emphasized the need for more time in the air for aircrews. Secretary of the Air Force Heather Wilson, for example, "noted that even when air crews go abroad and fly combat missions, such as those against violent extremists such as the Islamic State, they're not practicing skills that would be required for a high-end fight against an advanced adversary such as Russia."10 Taken together, all of these demands required a bigger budget.

In a series of speeches in 2018, Secretary Wilson and Air Force Chief of Staff General David Goldfein highlighted the shortfall and the need for more funding to increase the service's capacity with next-generation platforms: in other words, to buy all-new-design aircraft rather than continuing to purchase aircraft that have been in production since the 1980s and 1990s. To meet that requirement, the Trump Administration increased DAF funding by 31 percent from 2017 to 2021.

Considering the shortfall in aircraft, one might assume that the Air Force increased its procurement budget and accelerated acquisition of fifth-generation offensive platforms (F-35A) and next-generation tanker aircraft (KC-46A) during that period by a substantial margin. However, funding for aircraft procurement remained relatively flat, growing from \$22.4 billion in FY 2017 to just \$25.6 billion in FY 2022-a rate of growth that did not keep up with inflation. The budget for procurement fell from \$28.4 billion in FY 2021 to \$25.6 billion in FY 2022. While the President's budget for FY 2023 increased procurement to \$29.3 billion,13 it had not been approved as this edition of the *Index* was being prepared. If it is not approved, the service will be forced to operate on continuing resolutions. Moreover, even if the budget is fully funded, the impact of inflation has meant that procurement has been flat from FY 2017 to FY

2023, even as the service's budget has grown by 21 percent over the same period.

The budget for research, development, test and evaluation (RDT&E), on the other hand, has more than doubled since FY 2017, growing from \$20.5 billion in FY 2017 to \$49.2 billion in FY 2023. It now exceeds procurement by almost 70 percent.<sup>14</sup> In spite of TAFWN's finding that the Air Force was 25 percent too small for its mission sets, the Air Force announced last year that it would retire 421 F-22, F-15C, F-16C, and A-10 fighters by the end of FY 2026 while acquiring just 304.15 However, earlier this year, it was revealed that the Air Force plans to cut 1,468 aircraft from its fleet over the Future Years Defense Program (FYDP) and that this will include the accelerated retirement of 646 fighters and procurement of just 246 over that period. 16 If enacted, this would equate to a net reduction of 19 percent of the total fighter fleet.

### Capacity

At the height of the Cold War buildup in 1987, the active-duty Air Force had an inventory of 3,082 fighter, 331 bomber, 576 air refueling, and 331 strategic airlift platforms. When the strategic reserve assets within the Air National Guard and Air Force Reserve are added, the 1987 totals were 4,468 fighter, 331 bomber, 704 air refueling, and 362 strategic airlift platforms. After the fall of the Iron Curtain, the United States shifted from a force-sizing construct centered on great-power competition to one capable of winning two simultaneous or nearly simultaneous MRCs. Those numbers for capacity have been reduced significantly over the years.

It is projected that at the end of FY 2022, the Air Force will have a total aircraft inventory (TAI) of 2,099 fighters, 140 bombers, 483 tankers, and 274 strategic airlift platforms. With the rollout of the President's budget for FY 2023, the service announced its plan to reduce 167 total fighters from its inventory, reducing its TAI to 1,932 fighters, 140 bombers, 483 tankers, and 274 strategic airlift aircraft by the end of FY 2023. At that point, the Air Force will have a total force that equates to 43 percent of the fighter, 42 percent of the bomber, and 69 percent of the tanker and airlift assets that it possessed the last time the United States was prepared to fight a peer competitor.

The idea that aircraft production lines will somehow surge to come to the rescue in a peer-level crisis

may seem plausible to some, <sup>18</sup> but even if Congress were to throw an unlimited amount of funding at production lines, it would take from two to three years for those additional assets to arrive. <sup>19</sup>

The *Index of U.S. Military Strength* uses "combat-coded" fighter aircraft within the Active Component of the U.S. Air Force to assess capacity. Combat-coded aircraft and related squadrons are aircraft and units with an assigned wartime mission, which means that those numbers exclude units and aircraft assigned to training, operational test and evaluation (OT&E), and other missions.

The software and munitions carriage and delivery capability of aircraft in non-combat-coded units renders them incompatible with and/or less survivable than combat-coded versions of the same aircraft. For example, all F-35As may appear to be ready for combat, but training wings and test and evaluation jets have hardware and software limitations that would severely curtail their utility and effectiveness in combat. Even if those jets were slated for upgrades, hardware updates sideline jets for several months, and training wings and certain test organizations are generally the last to receive those upgrades.

Of the 5,564 manned and unmanned aircraft projected to be in the USAF's inventory at the end of FY 2022, 1,487 are active-duty fighters, and 940 of those are combat-coded aircraft.<sup>20</sup> It is important to separate the active-duty fighters and units from the strategic reserve because it would take several months to get elements of the latter up to manning and readiness levels that allowed their first elements to deploy. Unfortunately, other factors also affect the number of fighters the service could actually employ in combat.

Most squadrons will have to pack up and deploy several thousand miles to be able to fight. Because of the additional wartime manning requirements and the fact that most squadrons have several jets that are in disrepair at any given time, it takes the resources of approximately three active-duty squadrons to deploy two combat-capable fighter units forward.<sup>21</sup> That effectively reduces the total number of active-duty, combat-coded fighters to 626 jets.

The strategic reserve has 661 fighters, 519 of which are combat coded. Because of the additional manning requirements and the fact that Guard and Reserve units generally have just one squadron at each location, it takes two squadrons to deploy one

combat-capable unit forward.22 In terms of capacity, this means that 626 active-duty and 259 strategic reserve fighters, for a total of 885 combat-coded fighters, could be deployed into combat, leaving virtually nothing in reserve. However, recent squadron deployments in response to a request from the Commander of U.S. European Command following Russia's invasion of Ukraine were fulfilled with 12 jets—packages that were referred to as "squadrons." This may have reflected the "lead force package" (LFP) concept within the 2020 Air Force posture statement: "More than 90% of our pacing squadrons are ready to 'fight tonight' with their lead force packages—the first Airmen to deploy at the beginning of a conflict."23 However, it is more likely a combination of LFPs and severe readiness challenges within the fighter force.

Capacity also relies on the stockpile of available munitions and the production capacity of the munitions industry. The actual number of munitions within the U.S. stockpile is classified, but there are indicators that make it possible to assess the overall health of this vital area. The inventory for precision-guided munitions (PGM) was severely stressed by nearly 18 years of sustained combat operations and budget actions that limited the service's ability to procure replacements and increase stockpiles. From 2017 through 2021, funding for munitions was significant, and the service, believing the inventory is now sufficiently restocked, has reduced the number of PGMs it will acquire to a total of 6,473 munitions in FY 2023.

However, even though the munitions stockpile may have returned to a level that is capable of supporting a surge in expenditures associated with a conflict similar to the global war on terrorism—loosely encompassing operations in Afghanistan and Iraq—it probably would not support a peer-level fight that lasted more than a few weeks. Typically, there is a delay of 24–36 months between funding and delivery of additional munitions, and while the potential exists for a rapid expansion of production, it is hard to envision how such an expansion could be rapid enough to exceed demand before the stockpile is depleted. (See Table 7.)

Advances in the jamming of global navigation satellite systems (GNSS) like GPS have been significant over the past 20 years, and the number, types, and effectiveness of jammers are growing.<sup>24</sup> In the days leading up to its invasion of Ukraine and throughout

TABLE 7

# **Precision-Guided Munitions Expenditures and Programmed Acquisitions**

TOTAL MUNITIONS EXPENDED

	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022*
JDAM	30,664	5,462	7,354	4,004	4,242	4,032
HELLFIRE	1,536	2,110	2,449	1,019	1,023	180
SDB-I/II	4,507	749	1,289	397	98	84
APKWS	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
JASSM-ER	360	19	16	10	8	0
LGB	276	373	106	6,078	5,625	4,356
ARRW**	0	0	0	0	0	2
LRASM	0	0	0	0	0	0
Total	38,092	9,462	11,963	11,508	10,996	8,654
TOTAL MUNITIC	NS ACQUIRED					
	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023*
JDAM	35,106	36,000	25,000	16,800	1,919	1,241
HELLFIRE	3,629	3,734	3,859	4,517	1,176	5,151
SDB-I/II	7,312	6,254	8,253	3,205	1,983	5,837
APKWS	10,621	6879	15,642	1,323	12,801	11,199
JASSM-ER	360	360	390	400	525	390
LGB	0	0	0	0	0	0
ARRW**	0	0	0	0	12	0
LRASM	0	0	0	0	0	28

57,777

**Total** 

53,893

26,994

53,976

**SOURCES:** Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation request for information, May 11, 2022; Table 2, "U.S. Air Force Budget Summary," in U.S. Department of the Air Force, *Department of the Air Force FY 2023 Budget Overview*, p. 4, https://www.saffm.hq.af.mil/Portals/84/documents/FY23/SUPPORT\_/BOB\_28Mar\_1125\_LoRes. pdf?ver=5nrA8bBfhWoUSrvZ09CeHA%3d%3d (accessed September 8, 2022); U.S. Department of the Air Force, *Department of Defense Fiscal Year (FY) 2022 Budget Estimates, Air Force Justification Book Volume 1 of 1, Procurement of Ammunition, Air Force*, May 2021, p. Volume 1-7, https://www.saffm.hq.af.mil/Portals/84/documents/FY22/PROCUREMENT\_/FY22%20DAF%20J-Book%20-%203011%20-%20 Ammunition%20Proc.pdf?ver=PaFt7rWf7aiKYJhl-cpv9w%3d%3d (accessed September 8, 2022); and Dario Leone, "Second Successful Test of AGM-183A ARRW Hypersonic Weapon, Booster Tests Complete," The Aviation Geek Club, July 14, 2022, https://theaviationgeekclub.com/second-successful-test-of-agm-183a-arrw-hypersonic-weapon-booster-tests-complete/ (accessed September 8, 2022).

23,818

18,416

<sup>\*</sup> Estimate based on data from President's Budget.

<sup>\*\*</sup> Air-launched Rapid Response Weapon (ARRW) is a hypersonic, long-range, conventional air-to-surface missile with precision-guided, prompt-strike capability from stand-off ranges.

its combat operations, Russia has used its systems to jam signals in the region to hamper the employment of Ukrainian and Allied GNSS guided weapons systems against its troops and equipment, and the areas covered by the effects of those systems can be considerable. The employment of such systems in a war with a peer adversary could significantly diminish the accuracy of weapons like JDAMs and SDBs that rely on reliable GPS guidance to hit their targets.

Although there has been significant research toward making munitions less susceptible to the effects of GPS jammers, there is little evidence that such munitions would retain their accuracy during a full-up conflict with a peer adversary. Attacking targets in that environment using GPS guidance alone might require many more munitions and sorties than would otherwise be necessary, and this probably would deplete the inventory of GPS guided munitions much faster and with markedly less effect than is likely accounted for in current war plans.

The only weapons in the U.S. inventory that can fully counter GPS/electronic jammers and reliably hit their targets are those that can track physical targets with laser, optical, or infrared seeker heads. The Air Force has not acquired PaveWay or Maverick missiles for several years, and most GPS guided munitions do not have seeker heads or a secondary capability to track and guide on a target in a degraded GPS environment.

To cover this gap, the Air Force has added a laser guidance capability to its already effective GBU-53 smaller diameter bomb (SDB I). Known as the SDB II, the weapon "uses Link 16 and ultra-high frequency datalinks, along with infrared guidance, to provide course corrections" and hit "both fixed and moving targets." Funding in the FY 2023 budget will also support the acquisition of 4,200 JDAM guidance kits with laser sensors that will give this munition a seeker to acquire/track targets. Unfortunately, the service has not yet acquired the SDB II or the advanced JDAM guidance kits in numbers required for conflict with a peer competitor.

### Capability

The risk assumed in capacity has placed an ever-growing burden on the capability of Air Force assets. The ensuing capability-over-capacity strategy centers on the idea of developing and maintaining a *more*-capable force that can win against the advanced fighters and surface-to-air missile systems

now being developed by top-tier potential adversaries like China and Russia, which are also increasing their capacity.

Any assessment of capability includes both the incorporation of advanced technologies and the overall health of the inventory. Most aircraft have programmed life spans of 20 to 30 years based on a programmed level of annual flying hours. The bending and flexing of airframes over time in the air generates predictable levels of stress and fatigue on everything from metal airframe structures to electrical wiring harnesses.

The average age of Air Force aircraft is 29.4 years, and in some fleets, such as the B-52 bomber, the average is more than 60 years. In addition, KC-135s comprise 75 percent of the Air Force's 483 tankers and are more than 61 years old on average. By the end of FY 2023, 95 brand-new KC-46s will make up 20 percent of the tanker inventory, but they will not be capable of refueling aircraft during combat operations—the jet's primary mission—until FY 2024.28 By that time, the Air Force will have taken possession of some 103 KC-46s. The Air Force estimates that the fix for problems in the KC-46's refueling boom and remote vision system (RVS) should be ready by the spring of 2024. Assuming the boom and RVS redesign goes as planned, retrofitting jets that the service has already accepted will take several years, and the operational impact of that process will be significant: 103 strategic air refueling assets will be unusable in real-world operations in 2024. That number will grow to 110 jets in 2025, equating to 23 percent of the fleet that will be unable to fulfill operational taskings reliably.29

The average age of the F-15C fleet is 37.8 years,<sup>30</sup> significantly exceeding the programmed service life of a fleet that comprises more than half of USAF air superiority platforms.<sup>31</sup> The planes in the F-16C and F-16D fleets are 31 and 31.9 years old, respectively, on average.32 In 2018, the Air Force announced its intent to extend the service lives of 300 F-16s through a major service life extension program (SLEP) that will allow those jets to fly through 2050.33 SLEPs lengthen the useful life of airframes, and these F-16 modifications also include funding for the modernization of avionics within those airframes. These modifications are costly, and the added expense reduces the amount of funding the service has to invest in modernization, which is critical to ensuring future capability. Even with a SLEP, there is a direct

TABLE 8

Air Force Total Aircraft Inventory (Page 1 of 3)

			FY 2022				MISSION-CAPABLE (MC)	ABLE (MC)			FY 2023	
Type	Active Duty	Air National Guard	Air Force Reserve	Total	Average Age in Years	MC Rate FY 2020	MC Rate FY 2021	Change	Average Daily MC Aircraft, FY 2023	Programmed Retirements	Programmed Acquisitions	Total
A010C	141	85	55	281	41	72%	73%	1%	189	-21	0	260
AC130J	30	0	0	30	4	82%	84%	2%	25	0	0	30
B-1B	45	0	0	45	35	23%	41%	-12%	18	0	0	45
B-2A	20	0	0	20	27	82%	29%	-3%	12	0	0	20
В-52Н	28	0	18	9/	61	61%	29%	-2%	45	0	0	92
C-130H	0	98	42	128	30	%02	%69	-1%	82	-10	0	118
C-130J	114	27	10	151	13	%62	%92	-3%	116	0	2	153
C-5M	36	0	16	52	35	61%	27%	-3%	30	0	0	52
C-17A	146	20	26	222	20	82%	%08	-2%	178	0	0	222
CV022B	52	0	0	52	6	54%	51%	-3%	26	0	0	52
E003B	2	0	0	2	43	%99	26%	-10%	0	-2	0	0
E003C	2	0	0	2	38	77%	%0	%	0	-2	0	0
E003G	27	0	0	27	42	71%	61%	-10%	10	-11	0	16
E008C	0	12	0	12	22	%29	62%	-5%	2	8-	0	4
E11	4	0	0	4	11	n/a	n/a	n/a	n/a	0	2	9
EC130H	7	0	0	7	48	%29	%29	%0	23	-3	0	4
EC130J	0	7	0	7	22	23%	64%	12%	4	-1	0	9
F015C	46	122	0	168	38	72%	%69	-2%	74	-61	0	107
F015D	4	14	0	18	38	71%	%69	-2%	80	9-	0	12
F015E	218	0	0	218	30	%69	%99	-3%	144	0	0	218

TABLE 8

Air Force Total Aircraft Inventory (Page 2 of 3)

			FY 2022			~	MISSION-CAPABLE (MC)	ABLE (MC)			FY 2023	
Type	Active Duty	Air National Guard	Air Force Reserve	Total	Average Age in Years	MC Rate FY 2020	MC Rate FY 2021	Change	Average Daily MC Aircraft, FY 2023	Programmed Retirements	Programmed Acquisitions	Total
F015EX	2	0	0	2	1.5	n/a	%0	n/a	0	0	9	∞
F016C	421	277	52	750	32	74%	72%	-2%	521	-22	0	728
F016D	86	39	2	139	33	72%	%69	-2%	94	-4	0	135
F022A	166	20	0	186	16	52%	51%	-1%	92	0	0	186
F035A	356	20	0	376	2	%92	%69	%/_	297	0	56	432
HC130J	21	12	9	39	9	%08	%92	-4%	30	0	0	39
D090HH	38	18	16	72	29	%69	71%	2%	43	-12	0	09
M090HH	25	0	0	25	0.5	%0	%0	%0	0	0	14	39
KC010A	36	0	0	36	38	81%	%62	-1%	21	-10	0	26
KC046A	52	12	7	71	2	%29	71%	2%	89	0	24	95
KC135R	119	140	62	321	09	73%	71%	-2%	219	-13	0	308
KC135T	30	24	0	54	63	73%	%02	-3%	38	0	0	54
LC130H	0	10	0	10	36	44%	43%	-1%	4	0	0	10
MC130H	11	0	0	11	33	74%	75%	1%	0	-11	0	0
MC130J	22	0	0	22	7	%92	%62	3%	47	0	4	29
MQ009A	340	24	0	364	7	91%	%06	-1%	248	-100	12	276
RC135S	3	0	0	3	09	%88	%98	-2%	3	0	0	2
RC135U	2	0	0	2	28	81%	82%	~5~	2	0	0	2
RC135V	80	0	0	80	28	78%	73%	~2%	9	0	0	∞
RC135W	12	0	0	12	09	81%	%99	-15%	8	0	0	12

TABLE 8

# Air Force Total Aircraft Inventory (Page 3 of 3)

FY 2023	Programmed Acquisitions Total	6 0	0 127	0 442	0 5	0 53	0 439	0 31
Œ	Programmed F Retirements	1-1	-50	0	0	0	0	0
	Average Daily MC Aircraft, FY 2023	7	94	314	4	38	276	23
ABLE (MC)	Change	%0	%9	-3%	%0	1%	-2%	2%
MISSION-CAPABLE (MC)	MC Rate FY 2021	74%	74%	71%	71%	72%	%29	%9/
Σ	MC Rate FY 2020	74%	%89	74%	%0	71%	%59	73%
	Average Age in Years	12	28	17	Н	26	26	40
	Total	10	177	442	2	53	439	31
FY 2022	Air Force Reserve	0	0	0	0	0	0	0
	Air National Guard	0	0	0	0	0	0	0
	Active Duty	10	177	442	0	53	439	31
	Туре	RQ-4	T001A	T006A	T007A	T038A	T038C	U2

BOB\_28Mar\_1125\_LoRes.pdf?ver=5nrA8bBfhWoUSrvZ09CeHA%3d%3d (accessed August 29, 2022); and International Institute for Strategic Studies, The Military Balance 2022: The Annual Assessment Force Budget Summary," in U.S. Department of the Air Force, Department of the Air Force FY 2023 Budget Overview, p. 4, https://www.saffm.hq.af.mil/Portals/84/documents/FY23/SUPPORT\_ SOURCES: Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation request for information, May 11, 2022; Table 2, "Department of the Air of Global Military Capabilities and Defence Economics (London: Routledge, 2022), pp. 56–59 (accessed August 14, 2022). correlation between aircraft age and the maintainability of those platforms. (See Table 8.)

The Air Force's ISR and lift capabilities face similar problems in specific areas that affect both capability and capacity. The majority of the Air Force's ISR aircraft are now unmanned aerial vehicles (UAVs). The Air Force will divest 100 MQ-9 Block-1 aircraft and accept delivery of 12 MQ-9 Block-5s in FY 2023 for a total of 276 Reapers.<sup>34</sup> The service divested the last of its fleet of EQ-4s and Block 30 RQ-4s in FY 2021 and FY 2022, respectively. The RQ-4 Block 40 fleet remains in service, and the RQ-4 Block 30 mission will be carried on by the 40-year-old U-2,<sup>35</sup> which is scheduled to be divested by the end of the current FYDP.<sup>36</sup>

The E-8 Joint Surveillance Target Attack Radar System (J-STARS) and RC-135 Rivet Joint are critical ISR platforms. Each was built on the Boeing 707 platform, and the last one came off the production line 43 years ago. The Air Force will divest eight of its remaining E-8s in FY 2023, leaving it with just three operational platforms.<sup>37</sup>

The Air Force is working on an incremental approach for a J-STARS replacement that focuses on advanced and disaggregated sensors (a system of systems) that would require enhanced and hardened communications links. Known as the Advanced Battle Management System (ABMS), it is envisioned as an all-encompassing approach to both airborne and ground Battle Management Command and Control (BMC2) that would allow the Air Force both to fight and to support joint and coalition partners in highend engagements.<sup>38</sup>

With respect to air combat, the Air Force will retire 67 more F-15C/Ds in FY 2023, leaving just 119 in its inventory. Oncerns about what platform will fill this role when the F-15C is retired are fully justified. Just 186 of 750 planned F-22A stealth air superiority fighters were acquired to replace the F-15C, and the service has announced its intent to retire 33 Block 20 F-22s in FY 2023. If those jets are retired, the fleet will be reduced to just 153 jets.

The service's already low ability to fulfill operational requirements for air superiority fighters will be further strained by a 10-year program, intended to refurbish the low-observable coatings on the F-22's engine inlets and inspect and overhaul the aircraft's flight control system, that will run through 2031.<sup>43</sup> That program, coupled with the F-22's low mission capability rate, will significantly

hobble the availability of this system in a fight with a peer competitor.

The Air Force's number-one acquisition priority remains the F-35A, the next-generation fighter that is scheduled to replace all legacy multirole and close air support aircraft. The jet's full operating capability (FOC) was delivered in early 2018.<sup>44</sup> The F-35A's multirole design favors the air-to-ground mission, but its fifth-generation faculties will also be dominant in an air-to-air role, allowing it to augment the F-22A in many scenarios.<sup>45</sup> In spite of the jet's dominant performance in the air, relatively high mission-capable rates, and acquisition and sustainment costs that are at or below those for the F-15EX,<sup>46</sup> the Air Force has reduced the number of F-35As that it will acquire to just 33 jets in FY 2023 and 29 in FY 2024.<sup>47</sup>

In terms of funding, the second major USAF acquisition priority is the B-21 Raider, formerly called the Long-Range Strike Bomber (LRSB). The USAF awarded Northrop Grumman the B-21 contract to build the Engineering and Manufacturing Development (EMD) phase, which includes associated training and support systems and initial production lots. The program has completed an Integrated Baseline Review for the overall B-21 development effort as well as the jet's Preliminary Design Review. The Air Force is committed to a minimum of 100 B-21s at an average cost of \$639 million per plane in FY 2019 dollars. 48

With the budget agreement that was reached for FY 2018 and FY 2019, the Secretary of the Air Force announced the service's intent to retire all B-1s and B-2s and sustain a fleet comprised of 100 B-21s and 71 B-52s.49 The B-21 Raider and B-52s "will form a two-bomber fleet that will incrementally replace the aging fleet of B-1 Lancer and the B-2 Spirit bombers," and the B-21 is "slated to hit full operations in the mid-2020s."50 The Air Force retired 17 B-1s in 2021 and continues to execute a SLEP on the remaining fleet of 44 to restore the bomber's engines to their original specifications. The Air Force had planned to modernize the B-2's Defense Management System but cancelled the plan in 2021 because of a software coding mismatch with its legacy computer system.<sup>51</sup> Stores Management Operational Flight Program and Common Very-Low-Frequency/Low Frequency Receiver Program elements will be fielded to ensure that this penetrating bomber remains viable in highly contested environments, keeping it fully mission capable until it is replaced by the B-21.52

Modernization efforts for the B-52 are also underway. The jet was designed in the 1950s, and the current fleet entered service in the 1960s. The FY 2018 budget funded the re-engineering of this fleet with upgrades that will include a new Long-Range Standoff (LRSO) cruise missile, improved radar, new computers, new communication links, and a new suite of electronic warfare countermeasures. The aircraft will remain in the inventory through 2050.<sup>53</sup>

Acquisition of the KC-46A air refueling tanker is another critical enabler for the service. As previously noted, the KC-46 has experienced a series of problems and delays, the most recent of which involves the air refueling system that currently cannot refuel fighters in an operational environment. The Air Force will have 95 KC-46s by the end of FY 2023<sup>54</sup> and will acquire another 84 tankers for a total of 179 by the end of FY 2029. The KC-46 will replace less than half of the current tanker fleet and will leave the Air Force with more than 200 aging KC-135s (already averaging 61 years old) that still need to be recapitalized.<sup>55</sup>

When the Secretary of the Air Force (SECAF) and the Chief of Staff of the Air Force (CSAF) rolled out "The Air Force We Need" in 2018 to expand the number of squadrons from 312 to 386, one of their goals was to fill the ranks of those new squadrons with only the newest generation of aircraft-F-35s, B-21s, and KC-46s-because of the capabilities that those platforms bring to bear. <sup>56</sup> Curiously, the Air Force is now acquiring the fourth-generation F-15EX, based primarily on the ill-conceived notion that it will be cheaper to acquire and operate than the F-35A.57 The FY 2023 budget funds 24 F-15EXs and signals an intent to cap the purchase at just 80 jets. With the latest cuts in the fighter force, the service has reversed course on its stated intent to use them to replace Air National Guard F-15Cs; instead, approximately half of the F-15EX fleet will be fielded in active-duty units. Although the service will offset some of its fighter fleet retirements with this new hardware, the F-15EX is a step backwards and will not be survivable in anything more than low-threat environments by the time this weapons system reaches initial operating capability (IOC).

### Readiness

The 2018 National Defense Strategy's focus on peer-level war was designed to facilitate a clear and rapid paradigm shift away from the tiered levels of readiness the Air Force had adopted because of years of relentless deployments and funding shortfalls. In a move that would refine the service's focus on great-power competition as spelled out by the new NDS, Secretary of Defense James Mattis directed the Air Force to increase the mission-capable rates of the F-16, F-22, and F-35 aircraft to 80 percent by the end of September 2019.<sup>58</sup> The move was designed to make more of an all-too-small fleet of combat aircraft available to deploy in the numbers required to deter or defeat a peer adversary.

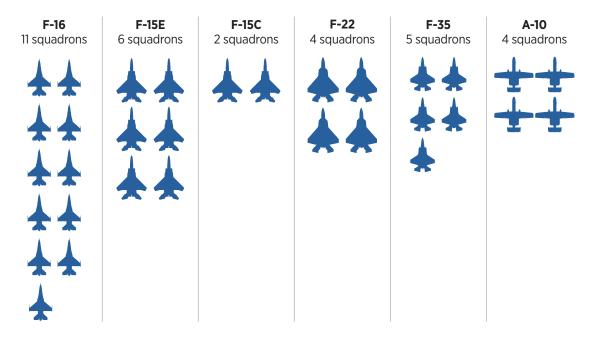
Early in 2019, General Goldfein stated that the service would likely not meet the 80 percent mission-capable (MC) threshold directive until 2020, and in the spring of 2020, he made it clear that the threshold was no longer a focus for the Air Force. MC rates are a measure of how much of a certain fleet is "ready to go" at a given time, and the general stated in clear terms that he regarded the statistic as an inaccurate portrayal of the service's overall health.

Instead of using that historic marker for readiness, the service moved to highlight how deployable a portion of any fleet was within a short period of time<sup>59</sup> and shifted its focus to the number of "force elements"—fighters, bombers, and tankers—that it has across the Air Force and how quickly those forces need to be ready. One of the examples that Goldfein used was the rapid deployment of a "task force" of four B-52s to the Middle East in May 2019.<sup>60</sup> The bombers, from Barksdale Air Force Base, Louisiana, had two days from notification to deployment, and while the ability to deploy four of 58 operational bombers rapidly is a capability, it is more in line with responding to a regional contingency than it is with taking on a peer adversary.

In the USAF's FY 2020 posture statement, Secretary Wilson and Chief of Staff Goldfein said that more than 90 percent of the "lead force packages" within the service's 204 "pacing squadrons" are "ready to 'fight tonight." They went on to say that "pacing squadrons are on track to reach 80% readiness before the end of Fiscal Year 2020." A short time later, however, the service abandoned even the illusion that it was working to achieve that goal.

The FY 2022 Air Force posture statement offered no more clarity or assurances of readiness; instead, it moved to change the paradigm of readiness into a three-phase force-generation model designed to "articulate readiness impacts and capacity limits." In FY 2023, it morphed again into what is now known as the Air Force Generation (AFFORGEN), dividing

# Air Force Active-Duty Combat-Coded Fighter Squadrons (32 Total)



**SOURCES:** Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation request for information, May 11, 2022, and International Institute for Strategic Studies, *The Military Balance 2022: The Annual Assessment of Global Military Capabilities and Defence Economics* (London: Routledge, 2022), pp. 56–59 (accessed August 15, 2022).

the deployable combat Air Force into four six-month phases of readiness known as "Ready, Available to Commit, Reset, and Prepare." In theory, the model "builds high-end and sustainable readiness toward future missions by balancing elements of current availability, modernization and risk," but from the outset, it represents little more than an attempt to change the dialog surrounding what are perhaps the lowest levels of readiness in Air Force history.

In 2017, the Secretary of the Air Force and the Chief of Staff informed Congress that "[w]e are at our lowest state of full spectrum readiness in our history." In the four years since their testimony, DOD has stifled open conversation or testimony about readiness, limiting the Air Force's ability to be forthcoming with open-source readiness indicators. While this makes any assessment of readiness difficult, there are three areas that can support an assessment:

- MC rates,
- · Aircrew training, and
- Deployability.

MC rates are defined as the percentage of a unit's aircraft that are capable of executing its mission set. Multiplying MC rates by the actual number of aircraft within a particular fleet yields the physical operational capacity of a weapons system. Several factors drive MC rates. The two most common to mature systems are operations and maintenance (O&M) funding and qualified manning to generate, fix, and fly those jets. Collectively, they dictate the number of sorties and flight hours that units have available for aircrew training.

The last time the United States was prepared to fight a peer competitor, the Air Force had more

TABLE 9

# Air Force Flying Hours and Weapons System Sustainment (WSS) Funding

Dollar figures are in millions.

Fiscal Year	Flying Hours	Flying Hours Budget (Nominal Dollars)	WSS Budget (Nominal Dollars)	Flying Hours Budget (2023 Dollars)	WSS Budget (2023 Dollars)
2012	1,189,723	\$6,900	\$11,900	\$8,901	\$15,351
2013*	1,165,592	\$7,100	\$11,600	\$9,017	\$14,732
2014	1,203,877	\$7,800	\$10,500	\$9,762	\$13,141
2015	1,202,971	\$7,600	\$10,700	\$9,500	\$13,375
2016	1,219,557	\$7,800	\$11,500	\$9,625	\$14,191
2017	1,165,203	\$6,700	\$12,000	\$8,100	\$14,508
2018	1,423,000	\$6,200	\$11,900	\$7,316	\$14,042
2019	1,454,283	\$5,813	\$13,161	\$6,737	\$15,254
2020	1,325,156	\$6,063	\$14,847	\$6,942	\$17,000
2021	1,238,206	\$6,575	\$13,552	\$7,186	\$14,812
2022	1,150,715	\$5,647	\$12,299	\$5,647	\$12,299
2023	1,126,000	\$5,872	\$13,288	\$5,872	\$13,288

<sup>\*</sup> Budget Control Act, also known as sequestration, implemented.

**NOTES:** Weapons System Sustainment supports aircraft sustainment through an enterprise-level concept for managing Depot Maintenance, Contractor Logistic Support (spare parts), Sustaining Engineering, and Technical Orders.

**SOURCES:** Extracted from U.S. Air Force budget summaries for FY 2013 through FY 2023. For example: U.S. Department of the Air Force, *United States Air Force FY 2013 Budget Overview*, February 2012, p. 12, https://www.saffm.hq.af.mil/Portals/84/ documents/FY13/AFD-120209-052.pdf?ver=2016-08-24-090344-023 (accessed September 8, 2022), and "U.S. Air Force Budget Highlights," in U.S. Department of the Air Force, *Department of the Air Force FY 2023 Budget Overview*, p. 3, https://www.saffm.hq.af. mil/Portals/84/documents/FY23/SUPPORT\_/BOB\_28Mar\_1125\_LoRes.pdf?ver=5nrA8bBfhWoUSrvZ09CeHA%3d%3d (accessed September 8, 2022).

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than 700 F-15C air superiority fighters with an MC rate of more than 80 percent for that fleet. If just 500 of them were combat coded, more than 400 mission-capable jets were ready to fight the Soviet Union. Conversely, there are 186 F-22As in the total aircraft inventory, but 28 are dedicated trainers, and 16 are primary development aircraft inventory used for testing new equipment, which leaves just 142 operational jets. In 2021, the F-22A had an MC rate of 51 percent, which means that just 72 F-22As could be committed to combat at any given time. 65 Although the F-22A is an incredibly capable fighter and 72 F-22s would be a formidable capability

against a regional threat, that number would be grossly insufficient for a peer fight.

Similarly, there are 33 operational B-1s in the Lancer fleet. <sup>66</sup> With an MC rate of 41 percent in FY 2021 (down from 52 percent in FY 2020), 13 are available for combat at any given time during the year. The B-2 fleet's small size and 59 percent MC rate mean that, on average, just 12 are combat capable. If the B-52's 58-plane operational fleet and 59 percent mission-capable rate are added, a total of 63 Air Force bombers were capable of executing combat missions on any given day in 2021. <sup>67</sup> For a summary of the mission-capable rates for combat-coded

TABLE 10

# Mission-Capable Combat-Coded Fighters in the Active-Duty Air Force

	Combat-Coded Fighters	Average Age in Years	Mission- Capable Rate	Mission-Capable Combat-Coded Fighters
A-10C	115	41	73%	83
F-15C	55	38	69%	38
F-15E	164	30	66%	109
F-16C	336	32	72%	240
F-22A	133	16	51%	68
F-35A	139	5	69%	96
Total	942			634

**NOTE:** Thirteen months were added to the age of aircraft because of differences between aircraft data capture dates from the 2022 USAF Almanac and the publication date of this edition of the *Index*.

**SOURCES:** Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation request for information on Air Force mission-capable rates, May 11, 2022; Table, "Equipment: Aircraft Total Active Inventory (TAI) (As of Sept. 30, 2021)," in "Air Force & Space Force Almanac 2022," *Air Force Magazine*, Vol. 105, No. 6 and 7 (June/July 2022), p. 70, https://www.airforcemag.com/app/uploads/2022/07/Almanac2022 Fullissue-1.pdf (accessed September 8, 2022); and endnote 20.

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(operational) aircraft of the five fighter weapons systems, see Table 10.

Maintenance manning remains healthy across the board. (See Table 11.) If funding for flying hours and spare parts were robust, MC rates would rise, giving pilots more sorties and the capability to sharpen their combat mission-capable skills. Unfortunately, funding for flying hours has increased marginally in the years immediately following sequestration, and the number of available sorties falls well short of the minimum number required for pilots to be considered combat mission capable.

Unlike maintenance manning, the pilot shortage continues to plague the service. In March 2017, Lieutenant General Gina M. Grosso, Air Force Deputy Chief of Staff for Manpower, Personnel, and Services, testified that at the end of FY 2016, the Air Force had a shortfall of 1,555 pilots. Of that total, the Air Force was short 1,211 fighter pilots: 873 Active and 338 from the Active Reserve Component (ARC). Even with the temporary surge in retention caused by COVID-19, the Total Force shortfall is 1,650: 650 Active and 1,000 ARC. 69

The Air Force graduated 1,200 pilots in FY 2018, added 1,279 in FY 2019, and projected that 1,480 would graduate in 2020, but the impact of COVID-19 was such that only 1,263 received their wings. Another 1,381 graduated in FY 2021, and the Air Force estimated that the number would be similar for FY 2022.

Those projected numbers rely on a very high annual graduation rate of approximately 94 percent of the candidates that enter flight school during any given year. According to the Air Force, the graduation rates for the past four years were 98 percent in 2018, 94 percent in 2019, 85 percent in 2020 (COVID-19), and 95.5 percent in 2021. The vast majority of those who washed out from flight school in 2021 were eliminated for health, discipline, or other reasons not specifically related to performance; only 0.27 percent were eliminated based on performance.<sup>70</sup>

Throughout the pilot shortage, the Air Force has done an excellent job of emphasizing operational manning instead of placing experienced fighter pilots at staffs and schools, but the currency and qualifications of the pilots in operational units are at least as important as manning levels. Although the quality

TABLE 11

# **Air Force Maintenance Manning**

Skill Level	Authorized	Assigned	<b>Manning Percentage</b>
3-level (Apprentice)	15,078	15,994	106%
5-level (Journeyman)	36,704	36,151	98%
7-level (Craftsman)	18,443	18,390	100%

**NOTE:** Headquarters U.S. Air Force, Deputy Chief of Staff for Operations refused to provide manning data for calendar year 2021. Data shown are for calendar year 2020 and are assumed to be correct for 2021.

**SOURCE:** Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation request for information on Air Force mission-capable rates, May 17, 2021.

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of sorties is admittedly subjective, a healthy rate of three sorties a week and flying hours averaging more than 200 hours a year have been established as "sufficient" over more than six decades of fighter pilot training. In the words of General Bill Creech, "Higher sortie rates mean increased proficiency for our combat aircrews," and given the right number of sorties and quality flight time, it takes seven years beyond mission qualification in a fighter for an individual to maximize his potential as a fighter pilot. The sorties are desirable to the sorties and quality flight time, it takes seven years beyond mission qualification in a fighter for an individual to maximize his potential as a fighter pilot.

COVID-19's impact on flying hours hit the Air Force as it was beginning to recover from an 18-year drought in training for combat with a near-peer competitor. Flying hours and sortie rates across all fighter platforms fell to historic lows as the average line combat mission-ready fighter pilot received less than 1.4 sorties a week and 131 hours of flying time per year. Those numbers increased only marginally in 2021 to 1.5 sorties a week and 133.3 hours of flight time per year, not much above the all-time lows experienced the preceding year. That equates to roughly two-thirds the number of sorties required to meet the minimum sortie threshold to qualify pilots as combat mission capable throughout the Combat Air Force (CAF).

Those numbers are so low in a high-performance fighter that pilot competence levels drop to the point where even excellent pilots begin to question their execution of very basic tasks and where the execution of complex mission tasks can become overwhelming.<sup>75</sup> In a speech delivered on September 21,

2022, General Mark Kelly stated that the average fighter pilot received just 6.8 hours of flying time per month for a total of 81.6 hours of flying time in 2021.<sup>76</sup> No matter which data point is selected, the numbers reflect an Air Force that would struggle in a fight with a regional competitor and founder in a war with a peer adversary.

The last time that fighter pilots received an average of 150 hours of flying time and more than 2 sorties a week for an entire year was when the service was beginning to recover from sequestration in 2015. In spite of a budget that has increased by more than 75 percent in the years since, the number of flying hours the Air Force funds has remained abysmal. The number of funded flying hours dropped from 1.33 million in FY 2020 to 1.24 million in FY 2021 to 1.15 million in FY 2022,77 and they will fall again in FY 2023 to 1.13 million hours<sup>78</sup>—a level below which the Air Force was flying the year sequestration took effect.<sup>79</sup> Every reduction in funding for hours has been accompanied by a note stating that the hours were budgeted to "the maximum executable level," but that is, at best, misleading as the only constraint beyond funding is maintenance manning, which has been healthy since 2019. (See Table 9.)

The current generation of fighter pilots, those who have been actively flying for the last seven years, has never experienced a healthy rate of operational flying. It will take several years of flying three or more sorties a week to regain the level of competence required to dominate a peer competitor,

TABLE 12

# **Average Hours All Fighter Pilots Received per Month**

	2017	2018	2019	2020	2021	Percentage Change, 2020 to 2021
F-22	10.8	10.8	10.5	6.9	7.6	11%
F-35A	10.4	10.4	14.4	10.2	8.8	-13%
F-15C	10.5	10.5	11.8	4.8	9.0	88%
F-16C	12.2	12.2	12.1	6.7	10.4	54%
F-15E	18.3	18.3	20.3	13.0	12.8	-2%
A-10	15.1	15.1	16.5	12.2	10.7	-13%
All Jets	13.0	12.9	14.1	8.7	10.0	16%
Average Hours per Year	155.4	154.6	168.7	104.3	120.6	16%

**SOURCE:** Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation reguest for information on Air Force fighter pilot flight hours, August 24, 2022.

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but the Air Force is not moving to make that happen. Readiness, as measured by any acceptable means, is incredibly low and it is no surprise that Air Force Chief of Staff, General C. Q. Brown is trying to shift the focus away from readiness or even redefine it using criteria that has yet to released, or perhaps even formulated. Either way, the effort will undoubtedly further erode the combat capability of the Air Force, pilot competency, and flying safety.

**Deployability.** Because long-term inspections and depot-level work affect the availability of support equipment and aircraft, it takes three active-duty squadrons to deploy two squadrons forward. For that reason, up until the end of the Cold War, the Air Force organizational structure was based on a three-squadron wing. On any given day, units have several aircraft that are not flyable because of longterm inspections, deep maintenance, or the need for spare parts. By using aircraft from one of the three squadrons to "plus up" the others, the wing could immediately deploy two full-strength units into combat. The handful of fully flyable jets and pilots left at the home station could then be used to train new and inbound pilots up to mission-ready status so that, among other things, they could replace pilots that were lost during combat.81

Normal, active duty fighter squadron manning levels are based on a ratio of 1.25 aircrew members

for every aircraft, 82 which means that a unit with 24 assigned aircraft should have 30 line pilots and five supervisor pilots who are combat mission ready. 83 Flight times, sortie rates, mission planning teams, and flight supervision requirements are significantly higher in combat, and to cover those requirements, the manning ratio normally increases to 1.50 pilots per aircraft, or 36 line pilots per squadron. In other words, every squadron deployed to fight requires six more pilots than it has on its roster. 84 Pilots from "donor" squadrons can fill those slots for the deploying units.

With the downsizing that has taken place since the end of the Cold War and the reduction in the number of fighter squadrons, the Active Air Force has reduced the number of fighter squadrons to two or even one in many wings. All operational Guard and Reserve wings are comprised of a single squadron, which complicates the math behind the total number of deployable fighter squadrons.

Of the 55 operational fighter squadrons on the Air Force roster, 32 are Active and 23 are Guard or Reserve Units. (See Figure 3.) Using the notion that it takes three squadrons to get two active-duty squadrons forward, the airframe disposition of each active-duty wing would allow just 21 active-duty fighter squadron equivalents (24 fighter aircraft each) to deploy to a fight. That equates to 480 active-duty

fighters that could deploy to meet a crisis situation, which is well short of the 600 it takes to win a single MRC and means that a war with a peer competitor would draw heavily on our strategic reserve.

Guard and Reserve units face the same manning and deployment challenges that the active-duty service faces, except that the vast majority of those units have just one fighter squadron per wing, further straining their ability to muster the airframes and manning needed to meet an emergency deployment.85 Planning for low-threat, low-intensity deployments to Operation Iraqi Freedom and Operation Enduring Freedom took this into consideration by mapping deployments out months (often years) in advance of the required movement, allowing pilots to deconflict their civilian work schedules not just for the deployment, but also to get the training and time in the air that they needed to employ successfully in those low-threat combat operations.86 Nevertheless, it was common for Guard units to pull pilots from other units to fulfill manning requirements for "rainbow" fighter squadrons,87 and in a conflict where there is little time from warning order to deployment, it would likely take two Guard and Reserve squadrons to enable one to deploy forward.88

The average Guard and Reserve fighter squadron has one-third fewer jets than similar active-duty units have. By rainbowing units with similar aircraft, the Guard and Reserve could muster 12 squadrons as a strategic reserve of 288 fighters that could deploy sometime after the active-duty units deploy. In other words, the service could muster just 768 fighters (480 Active and 288 Guard and Reserve) for a peer-level fight. However, the gravity of that mix is

not fully understood. The Guard and Reserve numbers are based on airframes alone, but other factors such as manning levels would also limit the number of sorties and the amount of combat power that those fighters could generate continually in a highend confrontation with a peer competitor.

The declaration in Air Force posture statements for FY 2020 and FY 2021 that lead force packages within the service's 204 pacing squadrons are ready to fight also conveys the fact that only portions of its most capable squadrons have enough mission-capable aircraft and aircrews that are "closer" to the minimum Combat Mission Capable sortie requirements to respond somewhat readily to a crisis. Because of the pilot shortage, actual unit manning levels in fighter squadrons are below peacetime requirements (if only slightly), which obviously is not enough to meet the significantly increased demands and the tempo required for combat operations.

The service has already moved the majority of pilots who were in staff or other non-flying billets back to the cockpit in an effort to relieve the manning shortfall. Thus, the only way units can meet wartime manning requirements is by pulling pilots from other "donor" squadrons. The complications that this involves are significant and call into question the idea that the portions of the 55 fighter squadrons that are unable to deploy immediately in a crisis could be combined to create more combat power. The vast majority of aircraft and aircrew that are left would be used for homeland defense and to train replacement pilots or to replace aircraft that are lost through combat attrition.

# Scoring the U.S. Air Force

### **Capacity Score: Marginal**

One of the key elements of combat power in the U.S. Air Force is its fleet of fighter aircraft. In responding to major combat engagements since World War II, the Air Force has deployed an average of 28 fighter squadrons. Based on an average of 18 aircraft per squadron, that equates to a requirement of 500 Active Component fighter aircraft to execute one MRC. Adding a planning factor of 20 percent for spares and attrition reserves brings the number to 600 aircraft.

As part of its overall assessment of capacity, the 2023 Index looks for 1,200 active-duty, combat-coded fighter aircraft to meet the baseline requirement for two MRCs. That number of fighters lines up well with the fighter requirement from the 2018 TAFWN, which the Commander of Air Combat Command recently reaffirmed is the actual capacity requirement for today's Air Force. The bomber, tanker, and strategic air requirements from that study are also used in this assessment.

- Two-MRC Fighter—Threshold: 1,200 combat-coded active-duty fighters / 62 squadrons.
- Two-MRC Fighter—Actual 2022 Level: 940 active-duty combat-coded fighters (78 percent) / 55 total force squadrons (88 percent).
- TAFWN Bomber Squadron—Threshold: 14 combat-coded bomber squadrons / 140 bombers.
- TAFWN Bomber Squadron—Actual 2022 Level: nine combat-coded bomber squadrons (64 percent) / 111 combat-coded bombers (79 percent).
- TAFWN Tanker Squadron—Threshold: 54 tanker squadrons / 540 combat-coded tankers.
- TAFWN Tanker Squadron—Actual 2022 Level: 43 combat-coded tanker squadrons (80 percent) / 454 combat-coded tankers (84 percent).
- TAFWN Airlift Squadron—Threshold: 54 airlift squadrons / 540 combat-coded airlifters.
- TAFWN Airlift Squadron—Actual 2022 Level: 48 combat-coded airlift squadrons (89 percent) / 532 combat-coded airlifters (99 percent).

Based on a pure count of combat-coded squadrons and platforms that have achieved IOC, the USAF currently is at 86 percent of the capacity required to meet a two-MRC/TAFWN benchmark. However, the disposition of those assets limits the ability of the service to deploy them rapidly to a crisis region. While the active fighter and bomber assets that are available would likely prove adequate to fight and win a single regional conflict, when they are coupled with the low mission capability rates of those aircraft (see Table 10), the global sourcing needed to field the required combat fighter force assets would leave the rest of the world uncovered.

Nevertheless, the capacity level is well within the methodology's range of "marginal." However, with programmed retirements that will exceed acquisitions, capacity is now trending downward.

### **Capability Score: Marginal**

The Air Force's capability score is "marginal," based on scores of "strong" for "Size of Modernization Program," "marginal" for "Age of Equipment" and "Health of Modernization Programs," but "weak" for "Capability of Equipment." These assessments are the same as those in the *2022 Index*. New F-35 and KC-46 aircraft continue to roll off their respective production lines, but these additions are more than offset by aircraft retirements. As a consequence, this score will probably not improve over the next three to five years.

### Readiness Score: Very Weak

The Air Force scores "very weak" for readiness in the 2023 Index, a grade lower than it received in the 2022 Index and the lowest of the five-grade scale. The USAF's sustained pilot deficit certainly contributes to this assessment, but the incredibly low sortie rates and flying hours would prevent any Air Force combat-coded fighter squadron from being able to execute all or even most of its wartime mission. At best, half of the cadre of pilots within the most capable units will be able to execute some of the unit's wartime missions. The Air Force's mission-capable rates have increased only slightly from 2021, and the intent of the current CSAF to sustain or further reduce operational training sorties reflects a service that would struggle to respond to a regional contingency much less hold the readiness levels, competence, and confidence levels required to square off against a peer competitor. 91 Readiness continues to trend downward.

The FY 2023 Air Force statement mentions the word "ready" just four times, and never in the context of current readiness levels. <sup>92</sup> The Air Force should be prepared to respond quickly to an emergent crisis not with a "task force" of four bombers, but with the speed and capacity required to stop a peer competitor in its tracks. With the significant curtailment of deployments in support of the global war on terrorism, the Air Force should be much farther along in its full-spectrum readiness than we have witnessed to date.

### Overall U.S. Air Force Score: Very Weak

This is a result of the lowest of the USAF's three scores: a capacity score of "marginal," capability score of "marginal," and readiness score of "very weak." Like a three legged stool, success or failure

is determined by the weakest leg. The shortage of pilots and flying time for those pilots degrades the ability of the Air Force to generate the quality of combat air power that would be needed to meet wartime requirements. Fighter pilots should receive an average of three or more sorties a week and 200 hours per year to develop the skill sets needed to survive in combat, and while some readiness issues can be written off to the effects of COVID-19, the service is making a calculated decision not to acquire more aircraft or fund the accounts required

for any significant increase in training and numbers of sorties.

Although there is a chance that it might win a single MRC in any theater, there is little doubt that the Air Force would struggle in war with a peer competitor. Both the time required to win such a conflict and the attendant rates of attrition would be much higher than they would be if the service had moved aggressively to increase high-end training and acquire the fifth-generation weapon systems required to dominate such a fight.

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

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity			✓		
Capability			✓		
Readiness	✓				
OVERALL	<b>✓</b>				

# **AIR FORCE SCORES**



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Strategic Bomber**

PLATFORM	Age Score	Capability Score	Size Health REPLACEMENT PROGRAM Score Score
B-52 Stratofortress Inventory: 76 Fleet age: 61 Date: 1961  The B-52, the oldest of the bombers, provides global strike capabilities with conventional or nuclear payloads. Programmed upgrades for B-52 include a new communications, avionics, and Multi-Functional Color Displays. The Air Force plans to use this aircraft through the 2050s as a compliment to the B-21 Raider.	1		The B-21 is an advanced stealth bomber that is currently programmed to begin replacing all B-1s and B-2s within the A Force bomber fleet in the late 2020s and expand to a fleet of at least 100 aircraft. Flight testing, originally scheduled for late 2022, has been pushed back to 2023 because of unspecified delays. However, the Raider is still projected to enter service in the mid-2020s.
B-1B Lancer Inventory: 45 Fleet age: 35 Date: 1986		2	
Nicknamed "The Bone," the B-1B Lancer is a long-range, multi-mission, supersonic conventional bomber that has served the United States Air Force since 1985. Originally designed for nuclear capabilities, the B-1 switched to an exclusively conventional combat role in the mid-1990s. In September 2020, the entire Air Force B-1B Lancer fleet completed the Integrated Battle Station upgrade to modernize the jet's datalinks, cockpit displays, and test system. The B-1B is scheduled to be phased out in 2032.	2		
B-2 Spirit Inventory: 20			
Fleet age: <b>27</b> Date: <b>1997</b> The B-2 bomber provides the USAF with global strike capabilities for both nuclear and conventional payloads. The stealth bomber's communication suite is currently being upgraded, and efforts are being made to increase its loadout and the ability of its payload to strike hardened and buried targets. The current plan is to begin phasing out the B-2 in 2032.	3	4	



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Ground Attack/Multi-Role Aircraft**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Healtl Score
A-10 Thunderbolt II Inventory: 260 Fleet age: 41 Date: 1977 The A-10 is the only USAF platform designed specifically for close air support mission using both self-designated precision-guided munitions and an internal 30mm cannon. While the retirement of the A-10 has been in discussion for years, Congress's denial of both the Air Force's request to retire the A-10 in 2021 and a subsequent request to cut 42 A-10s in FY 2022 indicates that the aircraft may fly for years to come.  F-16C Falcon Inventory: 863 Fleet age: 32 Date: 1980 The F-16 is a multi-role aircraft capable of tactical nuclear delivery, all-weather strike, and Suppression of Enemy Air Defenses (SEAD). Improvements to the F-16's radar, mission computer, and cockpit displays and an ongoing Service Life Extension Program (SLEP) will keep this jet flying through the late 2040s.	2	Score	F-35A  Timeline: 2016–2035  The F-35A is a multi-role stealth fighter that on August 2, 2016. The Block 4 version of the to significantly increase combat capability development, leading to concerns about rifor existing F-35 aircraft, which in recent yeareduced procurement of the aircraft. The Edit modification will be retrofitted into all Block PROCUREMENT  SPENDING \$555,618	at achieved he jet, med remains u sing retrof ears have l lock ock 3 F-35	I IOC ant nder it costs ed to s.
F-35A Lightning Inventory: 432 Fleet age: 5 Date: 2016 See Ground Attack Replacement Program entry. The F-35 is a multi-role stealth fighter that became operational in 2016. By the end of FY 2022, the Air Force will have received 326 of a planned purchase of 1,763 aircraft.	6	6			
F-15E Strike Eagle  Inventory: 218 Fleet age: 30 Date: 1989  The F-15E is a multi-role aircraft capable of all-weather, deep interdiction/attack, and tactical nuclear weapons delivery. Upgrades include an AESA radar, EPAWSS self-defense suite, a new central computer, and cockpit displays.	2	2			



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Fighter Aircraft**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
F-15C/D Eagle Inventory: 119 Fleet age: 38 Date: 1975			F-15 EX Timeline: TBD-2024	0	0
The F-15C is an air superiority fighter that has been in service since the late 1970s. The jet is receiving upgrades that include a new AESA radar and self- defenses needed to survive and fight in contested airspace. The F-15C inventory is currently being reduced by the Air Force after determinations that a Service Life Extension Program (SLEP) would not be cost-effective with	0	2	The F-15EX, the most advanced Eagle varia on the F-15QA as a replacement for the leg The USAF awarded Boeing a \$1.2 billion co first eight of up to 144 new-build F-15EX jet 2020. FY 2021 funds procure an additional 12 more in FY 2022. The Air Force accepted F-15EXs in FY 2021 and expects the next six PROCUREMENT  SPENDING (	acy F-15C, ntract for its on July 12 aircraft d the first t x fighters i	/D. the 13, and two n 2023.
48 aircraft being divested in FY 2022 ahead of fleetwide recapitalization by the F-15Ex.			24 48 \$2,338	\$5,120	
F-22A Raptor Inventory: 186 Fleet age: 16 Date: 2005			None		
The F-22 is the preeminent air superiority stealth fighter aircraft, modified to enable precision-guided weapons delivery. The jet is currently undergoing a modification called RAAMP that will improve reliability, maintainability, and performance. In FY 2022, the jet will also begin fielding the Link-16, which will allow it to transmit data with legacy aircraft via Multifunctional Information Distribution System/Joint Tactical Radio System (MIDS/JTRS). The Air Force could begin to replace the F-22 as early as the 2030s as it seeks to leverage new technologies developed from its NGAD program.	4	6			



Procurement ■ Through FY 2022 and Spending ■ Pending

### **Tanker**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
KC-10 Extender			KC-46		
Inventory: <b>26</b> Fleet age: <b>38</b> Date: <b>1981</b>			Timeline: TBD-2027	3	0
The KC-10 is multi-role tanker and airlift platform that can refuel both boomand drogue-compatible fighters on the same mission. Recent modifications have enabled a service life extension through 2045. While Congress blocked efforts by the Air Force to begin retiring the aircraft in 2021, the Air Force retired eight KC-10s in FY 2022 and plans to retire 14 in FY 2023 to make way for the KC-10's replacement, the KC-46.	2		This aircraft is a multi-role tanker/airlift p refuel both boom- and drogue-compatib same mission. The Air Force accepted the programmed aircraft in 2019. The program problems with the remote vision system currently limit it to refueling fourth-gener combat operations. The Air Force will recipets in FY 2023 with this same limitation, number of KC-46s in the inventory to 95.	le fighters e first of 17 m has sign and boom ration jets eive anoth bringing th	on the 9 ificant that in non- er 24 ne total
. ,			PROCUREMENT SPENDING	(\$ millions)	
KC-135 Stratotanker Inventory: 362		5	109 66 \$17,807	\$13,	110
Fleet age: <b>62</b> Date: <b>1957</b>					
The KC-135 is a multi-role tanker/airlift platform capable of simultaneous cargo and AE missions. The aircraft has undergone several modifications, mainly engine upgrades to improve performance and reliability. Air Force plans to further modify the aircraft with Block 45 upgrades: additional glass cockpit display for engine instrumentation, a radar altimeter, advanced autopilot, and modern flight director at a rate of 38 aircraft per year through 2026. Part of the fleet will be replaced with the KC-46 with the remainder scheduled to be in service through 2050.	0				
KC-46 Pegasus					
Inventory: 95 Fleet age: 2 Date: 2020					
This Pegasus is a multi-role tanker/airlift platform that can refuel both boomand drogue-compatible fighters on the same mission. The Air Force accepted the first of 179 programmed aircraft in 2019. The program has significant problems with the remote vision system and boom that currently limit it to refueling fourth-generation jets in non-combat operations. The Air Force will receive another 24 jets in FY 2023 with this same limitation, bringing the total number of KC-46s in the inventory to 95.	6	0			



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Heavy Lift**

None  None	PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	
Aircraft IR Countermeasures (LAIRCM).  5-17 Globemaster III  nventory: 222	riventory: <b>52</b> Fleet age: <b>35</b> Date: <b>1970</b> The C-5 is the USAF's largest mobility ircraft. It can transport 270,000 rounds of cargo over intercontinental anges and is air refuellable. The Models are heavily modified C-5A/Bs hat have new engines, avionics, and tructural/reliability fixes. Ongoing rods include a new weather radar and	2		None		
	Aircraft IR Countermeasures (LAIRCM).  2-17 Globemaster III  nventory: 222		6			

# **Medium Lift**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
C-130J Super Hercules Inventory: 153			C-130J Timeline: 2006–2022	5	6
Fleet age: 13 Date: 2006  The C-130J is an upgraded tactical airlift platform with a medium-lift capability and multiple variants including the C-130J-30, AC-130J gunship, and HC-130 rescue/air refueling platform. The C-130J-30 can carry 92 airborne troops and lift over 40,000 pounds of cargo. The Air Force Active Component completed its transition to the C-130J in October 2017, but it will continue to procure C-130Js for the Guard and Reserve at least through FY 2023.	6	6	The C-130J is an upgraded tactical airlift pla medium-lift capability and multiple variant C-130J-30, AC-130J gunship, and HC-130 re platform. The C-130J-30 can carry 92 airbo troops and lift over 40,000 pounds of carg Active Component completed its transitior in October 2017, but it will continue to proc for the Guard and Reserve at least through	s including escue/air r rne o. The Air to the C- ure C-130. FY 2023.	g the efueling Force 130J



Procurement ■ Through FY 2022 and Spending ■ Pending

# Intelligence, Surveillance, and Reconnaissance (ISR)

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
RQ-4 Global Hawk Inventory: 9 Fleet age: 12 Date: 2011 The Global Hawk is a strategic, highaltitude, long-endurance (HALE), "deep look" ISR platform complementing satellite and manned ISR. Unlike the MQ-9, which is a medium-altitude, longendurance UAV, the RQ-4 has a higher altitude and longer range.	4	3	None		
MQ-9 A/B Reaper			MQ-9		
Inventory: <b>276</b> Fleet age: <b>7</b> Date: <b>2007</b>			Timeline: <b>2007–2022</b>	5	5
The MQ-9B is a medium-altitude to highaltitude, long-endurance hunter-killer RPA (remotely piloted aircraft) tasked primarily with eliminating time-critical and high-value targets in permissive environments. Additional roles include CAS, CSAR, precision strike, armed overwatch, target development/designation, and terminal weapon guidance. The MQ-9 fulfills a secondary tactical ISR role utilizing its Multispectral Targeting System-B (MTS-B), Lynx SAR, and/or Gorgon Stare wide-area surveillance. The USAF is attempting to end MQ-9 procurement and seeks to replace the Reaper with a more survivable, flexible, and advanced platform as early as 2031.	5	•	The MQ-9 is a hunter/killer unmanned Aeri (UAV). The Air Force planned to end procuse a procure an additional 16 Reapers. With the counterinsurgency efforts, the Air Force haplans to transition the MQ-9 away from cost to operating in near contested airspace. The planning to replace the Reaper with a mort flexible, and advanced platform as early as PROCUREMENT  SPENDING (STATE OF THE PROCUREMENT SPE	rement fo s decided decline of as annound unterinsur ee Air Force survivab 2031.	to f U.S. ced gency e is
RC-135 Rivet Joint			None		
Inventory: 25 Fleet age: 60 Date: 1972  The RC-135V/W is tasked with real-time electronic and signals intelligence-gathering, analysis, and dissemination in support of theater and strategic-level commanders. The extensively modified C-135s detect, identify, and geolocate signals throughout the electromagnetic spectrum. Rivet Joint is used mostly to exploit electronic battlefield intelligence and deliver near-real-time ISR information to tactical forces, combatant commanders, and National Command Authorities. Ongoing upgrades include new direction-finding COMINT, precision ELINT/SIGINT system integration, wideband SATCOMS, enhanced near real- time data dissemination, and new steerable beam antenna. The Air Force's most recent utility assessment projected that the RC-135 would fly through 2050.	1	4			



Procurement ■ Through FY 2022 and Spending ■ Pending

# Intelligence, Surveillance, and Reconnaissance (ISR) (Cont.)

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
U-2 Dragon Lady Inventory: 31 Fleet age: 40 Date: 1956			None		
The U-2S is the Air Force's only manned, strategic, high-altitude, long-endurance ISR platform and is capable of SIGINT, IMINT, and MASINT collection. The aircraft's modular payload systems allow it to carry a wide variety of advanced optical, multispectral, EO/IR, SAR, SIGINT, and other payloads simultaneously. Its open system architecture also permits rapid fielding of new sensors to counter emerging threats and requirements. The Air Force is currently upgrading the U-2 with ASARS-2B/C, which will improve the U-2's high-altitude, deep-look radar ground mapping, moving target, and maritime capabilities.	0	4			



Procurement ■ Through FY 2022 and Spending ■ Pending

### **Command and Control**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Hea Sco
E-3 Sentry Inventory: 16 Fleet age: 42 Date: 1977			None		
The E-3 Airborne Warning and Control System (AWACS) is tasked with all-weather, air and maritime surveillance, command and control, battle management, target, threat, and emitter detection, classification, and tracking. Ongoing upgrades include an urgent operational requirement to shorten kill chains on time-sensitive targets, modernizing airborne moving target indication, and adding high-speed jam-resistant Link 16. Due to difficulties sustaining the E-3, the Air Force has looked into potentially procuring Boeing's E-7A Wedgetail as a compliment to the E-3.	0	•			
E-8 JSTARS					
Inventory: 4 Fleet age: 22 Date: 2001					
E-8C is a ground moving target indication (GMTI), airborne battlefield management/command and control platform. Its primary mission is providing theater commanders with ground surveillance data to support tactical operations. Congress approved divestiture of the E-8 in 2022 with four aircraft being retired.					

**NOTES:** See Methodology for descriptions of scores. The date is the year the platform achieved initial operational capability. The timeline is from the year the platform achieved initial operational capability to its final procurement. Spending does not include advanced procurement or research, development, test, and evaluation (RDT&E).

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- 80. General Charles Q. Brown, Jr., and General David H. Berger, "Redefine Readiness or Lose," War on the Rocks, March 15, 2021, https://warontherocks.com/2021/03/redefine-readiness-or-lose/ (accessed August 29, 2022).
- 81. Author's experience through 26 years of Air Force operations coupled with senior leader engagements from 2018–2019.
- 82. Albert A. Robbert, Anthony D. Rosello, Clarence R. Anderegg, John A. Ausink, James H. Bigelow, William W. Taylor, and James Pita, *Reducing Air Force Fighter Pilot Shortages* (Santa Monica, CA: RAND Corporation, 2015), p. 33, https://www.rand.org/content/dam/rand/pubs/research\_reports/RR1100/RR1113/RAND\_RR1113.pdf (accessed July 4, 2022).
- 83. Even though active-duty fighter squadrons have an average of 30 aircraft per squadron, that number includes maintenance spare and attrition reserve platforms. Manning is based on Primary Assigned Aircraft (PAA), which is 24 aircraft for active-duty fighter squadrons.
- 84. Based on a squadron with 24 Primary Assigned Aircraft. Units with 18 PAA require four additional pilots.
- 85. The very premise of these units is that they are manned with citizen soldiers whose main source of income is full-time civilian jobs and who are committed to travel and temporary duty locations that make them unavailable for days or weeks at a time. Those units would likely require several days to assemble the manpower needed to deploy, and once an assessment of their real mission currency was made, they would need some period of intense training before a responsible senior leader could employ them in a fight with a peer competitor.
- 86. "Deployments most suited to the ARC are those in which there is long lead time (six months or more), and in which the operation is of short duration (six days or less), requiring a small force package (12 aircraft or less), and in which the scheduling is flexible." John T. Correll, "Future Total Force," *Air Force Magazine*, Vol. 82, No. 7 (July 1999), p. 32, https://www.airforcemag.com/PDF/MagazineArchive/Documents/1999/July%20 1999/0799total.pdf (accessed July 4, 2022).
- 87. The author commanded the 349th Expeditionary Combat Group at Al Udeid, Qatar, from 2004–2005. During that time, he flew with seven different Air National Guard F-16 squadrons. Every one of those units had some level of rainbow manning, and each performed admirably.
- 88. Interview with senior Air National Guard leader, November 20, 2019.
- 89. The number of fighters needed for a two-MRC strategy is based on a Heritage Foundation study of airpower requirements and actual fighter deployments for all major combat operations and conflicts from 1950 through 2021.
- 90. Kelly, "Air Force Fighter Enterprise."
- 91. See Venable, "Independent Capability Assessment of U.S. Air Force Reveals Readiness Level Below Carter Administration Hollow Force."
- 92. The FY 2023 Air Force Posture Statement does not discuss current posture; it makes declarative allusions as to what it should or must be ready to do. For example: "[T]o provide effective integrated deterrence, the Department of the Air Force must be fully ready to expeditiously transition to a wartime posture. We must be ready to mobilize against a peer competitor who has spent decades researching and developing the means to attack the systems and infrastructure we depend on to go to war through cyber and non-cyber means." The Honorable Frank Kendall, Secretary of the Air Force; General John W. Raymond, Chief of Space Operations, United States Space Force; and General Charles Q. Brown, Jr., Chief of Staff, United States Air Force, "Department of the Air Force Posture Statement, Fiscal Year 2023," Department of the Air Force Presentation to the Committees and Subcommittees of the United States Senate and the House of Representatives, 117th Cong., 2nd Sess., p. 5, https://www.af.mil/Portals/1/documents/2022SAF/FY23\_DAF\_Posture\_Statement.pdf (accessed July 4, 2022). "These investments ensure today's space capabilities are ready to support day-to-day campaigning in the near-term as the Space Force's modernization efforts pave the way to deliver new architectures that are resilient by design." Ibid., p. 9. "To ensure this capability remains ready, the Air Force is modernizing with the Sentinel system, our Ground Based Strategic Deterrent (GBSD)." Ibid., p. 12.

# U.S. Marine Corps

# Dakota L. Wood

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 under attack abroad to operating the President's helicopter fleet. But while Marines have a wide variety of individual assignments, the focus of every Marine is and always has been on combat: Every Marine is first a rifleman.

Over the past several decades, the Marine Corps has positioned itself for crisis response, but while the Corps has maintained its historical, institutional, and much of its doctrinal focus on operations in maritime environments, the majority of its operational experience over the past 20 years has been in sustained land operations. This has led to a dramatic decline in the familiarity of most Marines with conventional amphibious operations and other types of employment within a distinctly maritime setting.<sup>1</sup> Even with the conclusion of military operations in Afghanistan in 2021, by which time the U.S. military presence had been reduced to just 2,500 military personnel, the general shortage of amphibious ships and the absence of any necessity to deploy large numbers of Marines on amphibious shipping still resulted in few opportunities for Marines to gain such experience. Consequently, the Corps' connection to the sea has continued to fade.<sup>2</sup>

Recognizing this shortfall, the Corps' leadership initiated efforts to reorient the service toward enabling and supporting the projection of naval power in heavily contested littoral environments with a particular focus on the Indo-Pacific region and China as the "pacing threat" against which Marine

Corps capabilities are being assessed and modified. This reorientation was much more than a simple refocusing on amphibious operations. Following a comprehensive assessment of the operational challenges that the service's operating forces are most likely to face 10 to 15 years in the future, General David H. Berger, Commandant of the Marine Corps, issued Force Design 2030 (FD 2030), his directive to the service to reorganize, re-equip, and retrain Marines in ways that will make them relevant and effective in the presumed operating environment of the next several years and into the 2030s.<sup>3</sup>

As necessary an effort as FD 2030 is, however, the force envisioned by the project has yet to be built (though meaningful progress is being made<sup>4</sup>) and certainly has not yet been proven in battle. Consequently, this *Index* can only assess the Corps that exists today, and our assessments of capacity, capability (modernity), and readiness therefore pertain to the Marine Corps' current status, not to what it might be in the future.

As of May 2022, "approximately 30,000 Marines [were] forward-deployed or forward-stationed, with hundreds more on watch at our embassies across the globe." During the year preceding its fiscal year (FY) 2023 budget request:

[T]he Marine Corps conducted activities in support of 18 named operations, participated in 11 amphibious operations, engaged in nine theater security cooperation events / programs, participated in 89 named exercises, supported three response efforts associated with Defense Security Cooperation Agency (DSCA) requests, and executed seven response efforts associated with the Coronavirus 2019 (COVID-19) pandemic. Amphibious Ready Groups / Marine

Expeditionary Units (ARG/MEU) conducted operations in support of combatant commands (COCOMs) along-side regional partners providing a range of deliberate and crisis response options. Joint Task Force - Crisis Response, led by Task Force 51 / 5th Marine Expeditionary Brigade, deployed over 2,000 Marines from the 24th Marine Expeditionary Unit and the Special Purpose Marine Air Ground Task Force - Crisis Response - Central Command (SPMAGTF-CR-CC) to Kabul, Afghanistan in support of non-combatant evacuation operations. The Marine Corps provided crisis response and contingency operations for AFRICOM, EUCOM, and INDOPACOM. In an effort to deepen partner alliance with the United Kingdom (UK), Marine Fighter Attack Squadron (VMFA) 211 deployed ten F-35B Lightning II Joint Strike Fighters onboard Her Majesty's Ship Queen Elizabeth in support of the first operational deployment of the UK Carrier Strike Group since 2011....6

The Marine Corps has always prized its crisis-response contributions to national security, and senior service leaders have emphasized this point consistently over the years. Maintaining this emphasis, General Berger has made it central to the Corps' efforts to remain combat credible as adversary capabilities evolve, even at the expense of force capacity (the size of the service) and existing capabilities that, while still of value, are perceived as less relevant to the maritime environment of the Indo-Pacific. Marine Corps leadership has emphasized that China serves as the pacing challenge for the Corps, which means that the military capabilities that China has and is developing, as well as the severity of the challenge presented by China, are a benchmark against which to measure "the level of capabilities that we will need in order to have a relative advantage now and into the future."7 These capabilities will be applicable not only in a fight with China, but also in other scenarios and regions involving other enemies of lesser magnitude.

Service leadership is assuming that defense budgets will not see any appreciable growth in the next several years, so the Commandant has ordered the Corps to retire or reduce assets and capabilities such as tanks, conventional tube artillery, heavy bridging, and some aircraft and continue to reduce manpower end strength in order to make related funding available for other purposes.

In general for the Joint Force, this Index focuses on the forces required to win two major wars as the baseline force-sizing metric for the Army, Navy, and Air Force, but it adopts a different paradigm one war plus crisis response—for the Marine Corps. The three large services are sized for global action in more than one theater at a time; the Marines, by virtue of overall size and most recently by direction of the Commandant, focus on one major conflict while ensuring that all Fleet Marine Forces are globally deployable for short-notice, smaller-scale actions. Marine Corps officials have emphasized that the results of the FD 2030 redesign will ensure that USMC forces are more capable and relevant in any fight, in any region, but the pacing challenge for Corps planners is China.8

In previous editions of the *Index*, the capacity of the Marine Corps was assessed against a two-war requirement of 36 battalions: a historical average of 15 battalions for a major conflict (30 for two major conflicts) and a 20 percent buffer, bringing the total to 36. The Corps has consistently maintained that it is a one-war force and has no intention of growing to the size needed to fight two wars, and both its annual budget requests and its top-level planning documents reflect this position.

However, with China as the primary threat driving Marine Corps force planning and given China's extraordinary investment in modernizing its forces across all capabilities—to include the expansion of various sensors, weapons, and platforms that are essential to the creation of an intensely weaponized, layered defense architecture—this *Index* cannot help but note that the Corps will need greater capacity if it is to succeed in war in the very circumstances for which the Marines believe they must prepare and with which this *Index* concurs.

### Capacity

The measures of Marine Corps capacity in this *Index* are similar to those used to assess the Army's: end strength and units (battalions for the Marines and brigades for the Army). The Marine Corps' basic combat unit is the infantry battalion, which is composed of approximately 900 Marines and includes three rifle companies, a weapons company, and a headquarters and service company.

The service has redesignated 3rd Marines, one of its infantry regiments, as 3rd Marine Littoral Regiment (MLR), a new organizational construct it is using to test ideas put forward in FD 2030.10 Unlike a conventional Marine regiment, the MLR will have a single Littoral Combat Team (LCT) based on an infantry battalion but also possessing an anti-ship missile battery, a Littoral Anti-Air Battalion, and a Combat Logistics Battalion. The LCT will focus on employment of platoons, which is radically different from a standard battalion's use of companies. 11 While a bold move, 3rd MLR will serve as an operational test bed, deriving experience and insights that feed back into the FD 2030 effort. It is not a standard experimental organization in that it is operationally employed as a full component of the Corps' operating forces, but because it has not yet been standardized across the Corps, it cannot yet serve reliably as a reference by which to assess the Corps.

Infantry. In 2011, the Marine Corps maintained 27 infantry battalions in its Active Component at an authorized end strength of 202,100.12 As budgets declined, the Corps prioritized readiness through managed reductions in capacity, including a drawdown of forces, and delays or reductions in planned procurement levels. After the Marine Corps fell to a low of 23 Active Component infantry battalions in FY 2015,13 Congress began to fund gradual increases in end strength, returning the Corps to 24 infantry battalions. The deactivation of 3rd Battalion 8th Marines on May 18, 2021, and 2nd Battalion 3rd Marines on January 21, 2022,14 left the Corps with 22 infantry battalions. Marine Corps leadership plans to stand down one more battalion, which will bring the Corps to 21 battalions supported by an end strength of 177,000,15 which is where the Commandant believes it will be stable.16 The Corps operated with 177,249 Marines in FY 2022.17

New requirements have also sapped the Corps' conventional deployable strength. In 2005, the Marines were directed to establish a special operations component to which they ultimately committed 2,700 Marines comprising a regimental-like head-quarters, three battalions, a school/training organization, and various supporting elements. In 2010, the Corps established a cyberspace element, Predirecting more manpower to new capabilities. The point here is that new requirements arise over time. Unless the Marine Corps' end strength is increased accordingly, establishing new units and capabilities means losing capacity in other areas.

Infantry battalions serve as a surrogate measure for the Corps' total force. As the first to respond to many contingencies, the Marine Corps requires a large degree of flexibility and self-sufficiency, and this drives its approach to the organization and deployment of operational formations that, although typically centered on infantry units, are composed of ground, air, and logistics elements. Each of these assets and capabilities is critical to effective deployment of the force, and any one of them can be a limiting factor in the conduct of training and operations.

Aviation. On May 3, 2022, the Corps published an update to its Aviation Plan (AVPLAN),<sup>20</sup> something it had not done since 2019. The current AVPLAN notes that several initiatives undertaken in 2014 have led to marked improvements in readiness with the Corps setting an objective of 75 percent aviation readiness for FY 2021. To this end, the service has increased funding for aviation-related operations and maintenance by 84 percent since FY 2016. Manning of its aviation units appears to remain a problem in some specialties: The Corps has only 66 percent of the pilots it needs for its fixedwing aircraft and only one-half of its requirement for its two front-line fighters, the F-35 (40 percent) and F/A-18 (72 percent). However, it has reported strong numbers for its rotary-wing pilots (95 percent) and its enlisted community of maintainers (also 95 percent).21

The Corps maintains 18 squadrons of fixed-wing fighter/attack aircraft in its Active Component, one-third of which are equipped with the F-35.<sup>22</sup> Eighteen is a substantial reduction from the approximately 28 it had during Desert Storm.<sup>23</sup> The reduction corresponds with the general shrinking of the U.S. military since the end of the Cold War but is also a consequence of budget restrictions caused by the Budget Control Act of 2011,24 the costs of operations over the past 20 years without a corresponding increase in funding, and the current budget ceilings imposed by the White House and Congress. The reorientation of Marine Aviation in its capacity, type of aircraft, and balance among the various platforms is dictated by FD 2030, which itself is informed by both budget and operational threat realities.

Although the Corps is introducing the F-35 platform into the fleet, F/A-18 Hornets remain "the primary bridging platform to F-35B/C" and will remain in the force until 2030.<sup>25</sup> This primary tactical aviation capability has to be managed carefully as it is no longer in production. Through various programs, the Marines have extended the service life of their

F/A-18 fleet to 10,000 flight hours, making it possible to keep them in service until FY 2030. <sup>26</sup> A similar effort will keep the venerable AV-8B Harrier in use until FY 2027. <sup>27</sup> At present, the Marines have acquired 142 F-35B—the STOVL (Short Take-Off and Vertical Landing) variant of the Joint Strike Fighter (JSF)—and 22 F-35C (carrier capable) aircraft of a planned 353 F-35B and 67 F-35C models. <sup>28</sup> This has enabled the service to stand up 10 JSF squadrons: six operational, two fleet replacement (used to train new pilots), and one test for F-35Bs, and one operational squadron of F-35C aircraft. <sup>29</sup>

In its heavy-lift rotary-wing fleet, the Corps began a reset of the CH-53E in 2016 to bridge the procurement gap between the CH-53E and the CH-53K King Stallion and aimed to "reset...the entire 143-aircraft fleet by FY20,"30 but reporting in 2020 indicated that the Corps was moving rather slowly in this effort, and it was only one-third of the way through the process toward the close of the fiscal year. 31 Even when the reset is complete, the service will still be 57 aircraft short of the stated heavy-lift requirement of 200 airframes and will not have enough helicopters to meet its heavy-lift requirement without the transition to the CH-53K. 32

As for the CH-53K heavy-lift helicopter, the service has reported that the aircraft has achieved initial operational capability (IOC),  $^{\rm 33}$  opening the door for full production of operational units. The service procured nine aircraft in FY 2021 and 11 in FY 2022 and will purchase an additional 10 in FY 2023.  $^{\rm 34}$  Ultimately, the Corps plans to acquire 88 aircraft that will equip five squadrons by FY 2027.  $^{\rm 35}$ 

The Corps continues to search for improvements in its MV-22B Osprey, to include testing a version of an electronic warfare radar jamming pod that it uses on other aircraft.<sup>36</sup> In the absence of conventional pylons on which weapons and sensors can be mounted, new capabilities have to be reconfigured to fit inside the aircraft or mounted on the aircraft fuselage.

Notably, the Corps has moved aggressively to implement aviation-related actions specified or implied by FD 2030. In May 2021, it disestablished HMLA-367, a light-attack helicopter squadron in Hawaii, sending its still relatively new attack and utility helicopters to Davis–Monthan Airbase in Arizona where they will be placed in the "boneyard" for possible use in the future. The 27 AH-1Z Viper attack helicopters and 26 UH-1Y Venom utility helicopters that were decommissioned represented

approximately one-fifth of the Marine Corps' inventory of such aircraft.<sup>37</sup>

The Marines have also divested two MV-22 squadrons, standing down VMM-264 in FY 2020 and VMM-166 in FY 2021. Though FD 2030 originally proposed reducing MV-22 squadrons to 14, subsequent experimentation led the Commandant to revise his direction to specify retaining 16 squadrons in the Active force while changing the number of aircraft per squadron from 12 to 10.38 Continuing with its plan to restructure its helicopter fleet, the Corps shuttered a light-attack helicopter squadron in April 202239 and will deactivate two more by the end of FY 2023.40 The Corps is also reducing the number of its heavy-lift squadrons of CH-53s; it deactivated HMH-463 in April 202241 and plans to deactivate two more by FY 2024.42

**Amphibious Ships.** Amphibious ships, although driven by the Corps' articulation of what it needs to execute its operational concepts, remain a Navy responsibility. A trio of documents describe the rationale for and nature of the Marine Corps' thinking about how it plans to contribute to the projection of naval power in highly contested environments such as that found in the Indo-Pacific region should the U.S. find itself at war with China.

- In 2017, the Corps and the U.S. Navy jointly released Littoral Operations in a Contested Environment (LOCE), in which the services presented general ideas about how to conduct naval operations against a very capable enemy.<sup>43</sup>
- Several months after taking office, General Berger published FD 2030, which set objectives for redesigning the force so that it could do the things implied by LOCE.<sup>44</sup>
- In February 2021, the Corps released an unclassified version of its *Tentative Manual* for Expeditionary Advanced Base Operations, which provided substantial details about the service's evolved thinking about the tactical and organizational challenges posed by high-threat maritime environments.<sup>45</sup>

These documents informed and reinforced Marine Corps and Navy plans to develop and acquire upwards of 35 light amphibious warships (LAWs), new amphibious vessels that would be smaller than

those constituting the current fleet and optimized to support naval operations in the contested environments envisioned by LOCE and Expeditionary Advance Base Operations (EABO).<sup>46</sup> The Marine Corps held 38 amphibious ships as the minimum requirement for many years but stepped away from that as a prelude to redefining its amphibious operations capabilities.<sup>47</sup>

With the evolution of FD 2030 and refinement of related supporting concepts and material requirements, the Corps is now making the case for 31 traditional amphibious ships as the bare minimum needed to execute operations as envisioned in FD 2030, augmented by LAWs. Five companies have been awarded contracts for further concept development of LAWs, but procurement of the first ship has been delayed. According to the Congressional Research Service:

[T]he Navy had previously envisioned procuring the first LAW in FY2023, but the Navy's FY2023 budget submission defers the procurement of the first LAW to FY2025. The Navy's FY2023 five-year (FY2023-FY2027) shipbuilding plan calls for procuring the first LAW in FY2025, the second in FY2026, and the third and fourth in FY2027. The Navy's FY2023 budget submission states that the contract for the construction of the first LAW would be awarded in December 2024, and that the ship would be delivered in July 2028.<sup>50</sup>

Meanwhile, the number of traditional amphibious ships stood at 32 as of August 2022.<sup>51</sup>

The USMC continues to invest in the recapitalization of legacy platforms in order to extend platform service life and keep aircraft and amphibious vehicles in the fleet, but as these platforms age, they also become less relevant to the evolving modern operating environment. Thus, although they do help to maintain capacity, programs to extend service life do not provide the capability enhancements that modernization programs provide. The result is an older, less capable fleet of equipment that costs more to maintain.

#### 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, as indicated in the preceding section on capacity, and is covered in the Navy's section of the *Index*. The Marine Corps is engaged in a force-wide redesign per FD 2030 with modernization and divestiture programs shaped accordingly. General Berger has emphasized that his force redesign initiatives are being self-funded, which means that the service has been getting rid of some capabilities that are less relevant to expected operational demands and reducing manpower to redirect that funding to other priorities of greater relevance.

Nevertheless, defense funding has not kept pace with inflation, and there are some things for which the Corps needs additional money. On June 15, 2021, for example:

Making his case before the House Armed Services Committee...for the Marine Corps' \$47.86 billion [FY 2022] budget request, Berger said he has reduced headquarters staffing by 15%, cut legacy systems and end strength, and has nothing left to draw from to fund programs and projects.

"We have wrung just about everything we can out of the Marine Corps internally," Berger said. "We're at the limits of what I can do."

The Marine Corps' budget request represents a 6.2% increase from fiscal 2021, even as the service plans to reduce the size of the active-duty force by 2,700, to 178,500 Marines. The service ultimately wants to reach 174,000 by 2030—roughly the size it was in fiscal 2002.

Berger is using the money he has saved by reorganizing the Marine Corps and shedding capabilities such as tanks and artillery to invest in new technologies and platforms.<sup>52</sup>

On May 11, 2022, in an earlier appearance before the House Armed Services Committee, General Berger similarly emphasized the efforts of the Corps to use existing funds, taken from divestment of various capabilities and realignment of spending, to support changed priorities and new initiatives, noting that the service had self-funded \$17 billion of its modernization.<sup>53</sup>

Programs such as the Amphibious Combat Vehicle (ACV), F-35, CH-53K, Naval Strike Missile, and

Light Amphibious Warship continue to be at the top of the list of major items of equipment and weapons, but the Corps is also pursuing a variety of unmanned systems (air, ground, and sea) and has placed great emphasis on smaller pieces of gear and individual-level weapons that will enable tactical units to be more effective.<sup>54</sup> These latter items are typically small in cost when compared with aircraft and armored vehicles, but they can have a decisive effect in small-unit actions in the field.<sup>55</sup>

**Vehicles.** 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 with the AAV-7A1 averaging more than 50 years old and the LAV averaging 40 years old. <sup>56</sup> The Corps had moved to extend the service life of the AAV but abandoned that program as progress with the ACV accelerated. <sup>57</sup> The Corps has stated that:

[W]e continue to make strategic choices in the divestiture of certain programs to reallocate funds toward building a more lethal, modern, multi-domain, expeditionary force. This has included accepting near-term capacity risk by reducing depot level maintenance for the legacy Amphibious Assault Vehicle (AAV) as we transition to the Amphibious Combat Vehicle (ACV).<sup>58</sup>

The Marine Corps has also been exploring the possibility of replacing its aged Light Armored Vehicle with a collection of vehicles under the Advanced Reconnaissance Vehicle (ARV) program. <sup>59</sup> It requested \$48.6 million in its FY 2022 budget submission for research and design work and \$70.6 million in its FY 2023 budget request "to provide an initial operational capability of an advanced reconnaissance vehicle and to expand the ARV capability to other mission roles and integrate capabilities that emerge from other programs to further develop and enhance LAR [Light Armored Reconnaissance] operations."

The AAV program hit rough waters on July 30, 2020, with the sinking of an AAV off the California coast near San Clemente Island. In addition to halting all AAV operations until various investigations were completed, the Corps installed supplementary emergency breathing devices in the vehicle and took other steps to improve its safety and survivability.<sup>61</sup>

AAV operations were resumed in April 2021 following inspection and modification of vehicles and related training and certification of AAV crews on the improvements. <sup>62</sup> Nine months later, however, the Corps permanently restricted water operations for the AAV, relegating it to a land-only armored vehicle.

"[G]iven] the current state of the amphibious vehicle program," according to a statement issued by the Corps:

[T]he Commandant of the Marine Corps has decided the AAV will no longer serve as part of regularly scheduled deployments or train in the water during military exercises; AAVs will only return to operating in the water if needed for crisis response. This decision was made in the interest of the long-term health of the amphibious vehicle programs and future capabilities. The AAV will continue to operate on land; 76 percent of its tasks are land-based. In doing so, we reserve the capability to reverse this decision should the need arise.<sup>63</sup>

The Corps, recognizing the problems of its AAV fleet and the urgent need to update for capabilities in line with FD 2030, has accelerated procurement of the ACV. It procured 72 ACVs in FY 2021, purchased another 88 in FY 2022, and has requested funding for 74 in FY 2023. 64 Combined with the 112 vehicles acquired in previous years, the additions bring the number of ACVs in the Corps' inventory to 346 out of a total program objective of 632. 65

Acquisition of the Joint Light Tactical Vehicle (JLTV) is steady. Since 2017, when fielding of the HMMWV replacement began, the Marines have acquired 5,167 vehicles and have placed another 413 on order with its FY 2023 budget request. 66 Budget documents show plans for the Corps to purchase an additional 2,676 vehicles from FY 2024 through FY 2027. 67 The acquisition objective for JLTV has varied over the years from 5,500 to just over 9,000. 68 Representatives from Marine Corps Systems Command have reported that the objective has been revised again to have the JLTV be a one-for-one replacement for all of the almost 11,000 HMMWVs currently in the inventory. 69

**Aircraft.** Fixed-wing fighter-attack aircraft—specifically the AV-8B Harrier and F/A-18 Hornet—continue to age while the Corps pursues delivery of replacement aircraft: the F-35B STOVL variant

to replace the AV-8B, in service since 1985, and the F-35C to replace its carrier-capable F/A-18s. To account for a lengthy transition period, the Corps has undertaken various efforts to extend the service life of its Hornets and Harriers to keep them in service until the end of the decade and, to meet the need to train new pilots even as the service retires the aircraft the pilots will fly, has taken such steps as folding the responsibilities of a formal training squadron into an operational unit.<sup>70</sup>

The Corps has acquired 142 of the 353 F-35B aircraft that it plans to purchase and 48 of the 67 F-35Cs, the version designed for use aboard aircraft carriers.<sup>71</sup> Though the F-35 program has been the subject of vigorous criticism ever since it began, much of this criticism is misplaced today given the superior capabilities the aircraft brings to air operations in heavily contested environments featuring peer-level enemies and the steady decrease in per-unit cost.<sup>72</sup> "As the Commander of United States Indo-Pacific Command (USINDOPACOM) recently noted during testimony," according to General Berger, "The importance of the F-35 cannot be overstated."73 Additionally, not only is the F-35 "the most advanced fighter, strike, and sensor platform in the world," but "aircraft like the F-35B provide combatant commanders a competitive warfighting advantage," and the Corps "remains focused on accelerated transition to an all F-35 tactical aviation (TACAIR) fleet in order to stay in front of our pacing challenge."74 The Corps' current concerns about the aircraft have less to do with its capabilities than they do with the overall cost of modern aircraft in general in the constrained budget environment within which the service is working to redesign its force.

Today, the USMC MV-22 Osprey program is operating with few problems and has completed the MV-22's full acquisition objective. The MV-22's capabilities are in high demand from the Combatant Commanders (COCOMS), and the Corps is adding such capabilities as fuel delivery and use of precision-guided munitions to the MV-22 to enhance its value to the COCOMS.

The Corps has struggled with sustainment challenges in the Osprey fleet. In the years since procurement of the first MV-22 in 1999, the fleet has developed more than 70 different configurations. This has led to increased logistical requirements as maintainers have had to be trained to each configuration and not all spare parts are shared. The Marine

Corps developed its Common Configuration–Reliability and Modernization program to consolidate the inventory to a common configuration at a rate of "2–3 aircraft installs per year." The program was initiated in FY 2018 and continues as a component of the Corps' V-22 Readiness Program.<sup>77</sup>

The USMC's heavy-lift replacement program, the CH-53K, conducted its first flight on October 27, 2015. The CH-53K will replace the Corps' CH-53E, which is now over 30 years old. Although "unexpected redesigns to critical components" delayed a low-rate initial production decision, the program achieved Milestone C in April 2017. The Corps received \$1 billion in FY 2019 to purchase seven aircraft, \$60 \$848 million for another six in FY 2020, \$1.1 billion for an additional nine in FY 2021, and \$1.5 billion for 11 more in FY 2022. \$12 Its FY 2023 budget request includes \$1.67 billion for another 10 aircraft. \$13 Its FY 2023 budget request includes \$1.67 billion for another 10 aircraft.

#### Readiness

Riding alongside the Corps' principal Title 10 responsibility to provide "fleet marine forces...for service with the fleet in the seizure or defense of advanced naval bases and for the conduct of such land operations as may be essential to the prosecution of a naval campaign"84 is its contribution as the military's crisis-response force. This aspect of USMC contributions to national defense has been reinforced by service leaders who take pains to allay concerns that their focus on China and the Indo-Pacific will distract them from this important role.85 The Corps' readiness must therefore account for both high-end conflict against a major opponent in the most complex operational settings and pop-up crises against lesser opponents that cannot be predicted, all of which implies a force that is ready to go at a moment's notice.

Marine Corps guidance identifies multiple levels of readiness that can affect the ability to conduct operations:

Readiness is the synthesis of two distinct but interrelated levels. a. unit readiness—The ability to provide capabilities required by the combatant commanders to execute their assigned missions. This is derived from the ability of each unit to deliver the outputs for which it was designed. b. joint readiness—The combatant commander's ability to integrate and synchronize ready combat and support forces to execute his or her assigned missions.<sup>86</sup>

To this the Commandant has added an expanded perspective that includes force modernization as an essential element to ensure that combat forces remain relevant and therefore ready. As General Berger and Air Force Chief of Staff General Charles Q. Brown, Jr., have argued, only by divesting old capabilities that would not be useful in changed circumstances and investing in new capabilities that account for more capable enemies and the characteristics of key operational theaters can U.S. forces be ready. "To do this," however, "we cannot let our focus on near-term availability consume the resources necessary to generate truly relevant future readiness through adaptive modernization." <sup>87</sup>

Divestiture carries with it some risk unless replacement capabilities are brought into the force as old or legacy capabilities are retired. For example, the Marine Corps' decision to get rid of tanks and a large percentage of its tube artillery means that the service will not have these capabilities should it be called into battle before new items can be fielded. Early reports of promising replacement capabilities to compensate for the loss of the Abrams main battle tank, for example, are encouraging, but the Corps now no longer has tanks while the improved replacement remains to be fielded. 88 This has a bearing on readiness to the extent that the force has a current ability to win in combat. The force might be ready but in a different posture. For a few years, the Marines could be more light-infantry than the middle-weight "two-fisted fighter" proudly described by a former Commandant a decade ago.89

Unfortunately for this *Index*, the Corps reports its current readiness in vague, generalized terms instead of providing data by which external audiences can independently assess the status of the service. It should be noted, however, that this approach is generally used by all of the services: Detailed readiness reports are classified to prevent potential enemies from obtaining sensitive information.

In the past, the services' leaders would report to Congress in formal testimony the various percentages of key equipment that were or were not available, share the status of primary units or types of force capabilities, and perhaps provide insight into maintenance or supply backlogs. The absence of such details from Marine Corps statements during the past year or two reveals that the Corps prefers not to share such information, at least currently. Corps officials have shared very encouraging anecdotal

reports of lessons being learned in force-on-force exercises and the testing of new equipment and weapons that appear to validate the direction and objectives of FD 2030, but our assessment of the Corps' readiness must rely on the tone of statements and discussions, inferences derived from the totality of efforts and programs, and the sense one gets from anecdotal evidence of the seriousness with which the service is preparing for current and future employment.

As mentioned, the Marine Corps has undertaken a great reorientation to ready itself for war not just against China, but against any adversary that has the ability to field modern weapons and sensors in a heavily contested maritime environment. The service believes that the changes it is pursuing to this end will be relevant and necessary for combat environments outside of the Indo-Pacific as well, because many countries are acquiring capabilities that are now possible and affordable with modern technologies. With this as the driver, combined with the reiteration of the Corps' role as a force in readiness, the service's words, actions, and policies strongly imply a focused commitment to combat readiness and rapid progress in realizing the goals of its great reorientation.90

To improve force capabilities from the level of the individual to the most senior operational commands, the service is pushing several initiatives. Among them:

- The Marine Corps School of Infantry has revamped its training for entry-level infantry Marines, lengthening its course by nearly half (extending the eight-week course to 14 weeks) and including new coursework and field training intended to sharpen the thinking skills of Marines who will likely find themselves operating more independently than has been the case in the past.<sup>91</sup>
- "In May [2021], the Marine Corps broke ground on a new, state-of-the-art wargaming facility intended to house various capabilities to enhance warfighter preparedness." The Corps intends that the center, planned for use as early as 2024, will "help Marines better visualize the threat environment" and participate in war games of various sizes with a focus on realism and that it will also "provide data to inform decisions

affecting force development [and] support existing and developing weapons platforms and capabilities in all regions of the globe."<sup>92</sup>

- Taking this emphasis on thinking, training, and war-gaming scenarios to the field, the Corps and the Navy teamed to execute a two-week Large Scale Exercise 2021, billed as the largest the services have conducted in many years, that involved 25,000 personnel, 36 live units, 50 virtual units, and a half-dozen major commands spread across 17 time zones.<sup>93</sup>
- On the landward side of testing new capabilities, over the past 18 months, the Marines have conducted a series of force-on-force exercises (free-play exercises employing units with the ability to respond creatively to events rather than being limited to scripted or controlled play), have deployed new force designs in novel ways, and have operationally proved the utility of new force packages in real-world settings, all of which has validated the initial arguments framing FD 2030 and driven adjustments to the effort.<sup>94</sup>
- The Corps has transitioned its 3rd Marine
   Regiment, based in Hawaii, to a new organizational construct reflecting FD 2030 initiatives.

The 3rd Marine Littoral Regiment is serving as the tactical and operational test bed for the service's many initiatives.<sup>95</sup>

Such efforts, from improvements to infantry training to war gaming to large exercises, are steps that appear to be having a positive effect on currently fielded forces. Although proof at scale has yet to be seen, they do reveal attitudes, priorities, and perspectives that reflect a level of seriousness about warfighting.

Within the Marine Corps, perhaps because it is a smaller service, changes in direction and attitude are more easily conveyed to the force by senior leaders and adopted force-wide than is the case in the larger services. While this does not directly replace hard data on mission-capable rates for equipment used by the Marines or cleanly substitute for unclassified reports about the readiness of units composing the Fleet Marine Force, it can be seen as a surrogate for the Corps' attention to its level of readiness. The extended operational demands of Iraq and Afghanistan having concluded, the force is reconstituting its readiness as it reorients toward the requirements of FD 2030, LOCE, and EABO.

Lacking any other direct reporting, this *Index*'s assessment of the Corps' readiness for current operations is therefore an optimistic one.

# 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 major regional contingency (MRC). <sup>96</sup> This requirement is based on the presumption of a rather conventional force using known (current) equipment and capabilities against a similar opponent.

This *Index* acknowledges the service's work to develop new capabilities and approaches to fighting and is certainly aware of the trends in new technologies and associated thinking about how warfare *might* change in the future, but until this happens, one can assess only what can be known at present. Consequently, the Corps' historical need for 15 battalions (and associated enabling elements) for one major conflict translates to a force of approximately

30 battalions to fight two MRCs simultaneously if we were to retain the metric used in previous editions of the *Index*. The government force-sizing documents that discuss Marine Corps composition support the larger measure. Though the documents that make such a recommendation count the Marines by divisions rather than 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. However, the Corps has repeatedly made the case that it is a one-war force that must also have the ability to serve as the nation's crisis-response force.<sup>97</sup> It has just as consistently resisted growing in end strength even during the years of high operational demand associated with

peak activities in Operation Iraqi Freedom (Iraq) and Operation Enduring Freedom (Afghanistan). Most recently, General Berger has stated flatly that the Corps will trade manpower for modernization and that he intends to shrink the Corps from its current 22 infantry battalions to 21 battalions both to free resources so that they can be applied to new formations and to maintain capability investments in other areas such as Marine Special Operations Command.<sup>98</sup>

Manpower is by far the biggest expense for the Marines. In the Corps' FY 2022 budget, the military personnel account was approximately \$14.6 billion (an increase of \$200 million over FY 2021), 99 dwarfing both the approximately \$9.2 billion allocated for operations and maintenance<sup>100</sup> and the \$3.1 billion allocated for the procurement of new equipment.<sup>101</sup> Nevertheless, the historical record of the use of Marine Corps forces in a major contingency argues for the larger number. More than 33,000 Marines, for example, were deployed in Korea, and more than 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 approximately 66,000 were deployed for Operation Iraqi Freedom.

One could reasonably presume that in a war with China, in which the Marines would employ many small, highly distributed units, the demand for forces would be similar to the demand during these historical instances of Marine Corps employment. The pacing threat for the Corps is China, the archetype for countries developing new tools and operational concepts that will likely require the distribution of the Marine Corps across a large, contested littoral battlespace. Though the Corps has been refining its sense of what these formations will require, they have yet to be proven in operational employment at significant scale. Consequently, we can only assess the service's current status against historical demand. Even a one-major-war Marine Corps should possess a larger end strength and more tactical units (infantry battalions as the surrogate measure for the total Corps) than it currently has, especially with the trend bending downward to even fewer.

As a one-war force that also needs the ability to provide crisis-response forces, sustain operations in the face of combat losses, and sustain its support for efforts that are not USMC-specific such as its service component contribution to U.S. Special Operations Command, the Corps should have a minimum of 30 battalions.

- One-MRC-Plus Level: 30 battalions.
- Actual 2022 Level: 22 battalions.

The Corps is operating with 73 percent of the number of battalions it should have relative to the revised benchmark set by this *Index* and has stated its intent to shrink from its current 22 battalions to 21 battalions. Marine Corps capacity is therefore scored as "weak," a drop in score from the *2022 Index*. Reducing operational strength by another battalion would bring it to just 70 percent of the strength it should have.

### Capability Score: Strong

The Corps receives scores of "marginal" for "Capability of Equipment," "marginal" for "Age of Equipment," "strong" for "Health of Modernization Programs," and "strong" for "Size of Modernization Program." This Index recognizes that within the Capability and Age portfolios, the old equipment exists mostly in ground combat vehicles. The Marines have modernized their aviation assets almost completely and are moving aggressively to introduce new ground platforms like the ACV and JLTV to offset the deteriorating condition of the AAV and HMMWV fleets, respectively. In the aggregate, the service's aviation arm and its rapid introduction of new munitions, weapons, and a host of communications equipment, sensors, and unmanned platforms likely compensate for the aged AAV, HMMWV, and AV-8B Harriers, resulting in a score of "strong" for Marine Corps capability.

### **Readiness Score: Strong**

The Corps has exhibited an especially focused and aggressive commitment to ensuring that Marine Corps forces are ready for action. This is the point of FD 2030. However, the history of military services is littered with the debris of grand vision statements and futuristic concepts that were unrealized in practical implementation.

The Marine Corps' effort appears to be substantially different, as evidenced by nearly irrevocable decisions to cashier old equipment and implement significant changes in education and training

programs, dramatic investments in experimentation and war gaming, rapid acquisition of new capabilities, and profound redesign of operational units. The real changes in programs and organizations that reflect its published rhetoric are compelling evidence that the Corps means what it has been saying about maintaining readiness. The authors of the 2023 Index believe it to be a low-risk proposition to apply the evidence of preparing for the future to current forces in terms of their focus on readiness for combat. The force remains encumbered by old primary equipment, but the service's effort to spend the money needed to keep it serviceable mitigates this problem to a reasonable extent.

The Corps is still too small, but the force it has is fully focused on warfighting. Consequently, the *2023 Index* assesses Marine Corps readiness as "strong," a continuation of the assessment made in the *2022 Index*.

### **Overall U.S. Marine Corps Score: Strong**

The score for the Marine Corps was raised to "strong" from "marginal" in the 2022 Index, and it remains "strong" in this edition for two reasons: (1) because the 2021 Index lowered the threshold for capacity from 36 infantry battalions to 30 battalions

in acknowledgment of the Corps' argument that it is a one-war force that also stands ready for a broad range of smaller crisis-response tasks and (2) because of the Corps' extraordinary, sustained efforts to modernize (which improves capability) and enhance its readiness during the assessed year.

Of the five services, the Marine Corps is the only one that has a compelling story for change, has a credible and practical plan for change, and is effectively implementing its plan to change. However, in the absence of additional funding in FY 2023, the Corps intends to reduce the number of its battalions even further from 22 to 21, and this reduction, if implemented, will limit the extent to which it can conduct distributed operations as it envisions and to replace combat losses (thus limiting its ability to sustain operations).

Though the service remains hampered by old equipment in some areas, it has nearly completed modernization of its entire aviation component, is making good progress in fielding a new amphibious combat vehicle, and is fast-tracking the acquisition of new anti-ship and anti-air weapons. Full realization of its redesign plan will require the acquisition of a new class of amphibious ships, for which the Corps needs support from the Navy.

# **U.S. Military Power: Marine Corps**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		✓			
Capability				<b>~</b>	
Readiness				<b>~</b>	
OVERALL				<b>~</b>	



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Light Wheeled Vehicle**

			_				
PLATFORM	Age Score	Capability Score		REPLACEMENT	REPLACEMENT PROGRAM	REPLACEMENT PROGRAM	REPLACEMENT PROGRAM Size Score
HMMWV Inventory: 10,859 Fleet age: 24 Date: 1983					Joint Light Tactical Vehicle (JL Timeline: 2017–2023	Joint Light Tactical Vehicle (JLTV) Timeline: 2017–2023	3
The HMMWV, better known as the Humvee, is a light wheeled vehicle used to transport troops and various weapons systems with limited protection against small arms, fragmentation, and blast damage. Initially introduced in the 1980s, HMMWVs are being replaced by the Joint Light Tactical Vehicle (JLTV).	2	2		eventually to rep achieved in FY 2 March 2019; IOC fourth quarter o	eventually to replace all HMMV achieved in FY 2019. The first s March 2019; IOC was achieved fourth quarter of FY 2022, a necontinue production of JTLVs.	eventually to replace all HMMWVs. Full-rat achieved in FY 2019. The first set of JLTVs March 2019; IOC was achieved in mid-sum fourth quarter of FY 2022, a new contract continue production of JTLVs.	
				PROCUREMENT 5,167			
Inventory: 5,167 Fleet age: 3 Date: 2019							
The Joint Light Tactical Vehicle (JLTV) is taking the place of the HMMWV as a light wheeled vehicle for troop							
transport. The vehicle provides stronger protection from IEDs and threats with which the Humvee struggled during the	5	5					
conflicts in Iraq and Afghanistan. The JLTV improves reliability, survivability, and transportability while retaining the capability to be outfitted for specific							
missions.							

**NOTE:** See page 448 for details on fleet ages, dates, timelines, and procurement spending. JLTV spending figures reflect the full joint program spending



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Amphibious Assault Vehicle**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
AAV Inventory: 1,200 Fleet age: 50 Date: 1972		Amphibious Combat Vehicle (ACV) Timeline: 2018–2026		3	4
The Amphibious Assault Vehicle (AAV) is an amphibious landing vehicle designed to transport Marines from vessels at sea to shore. Though old, the AAV has received numerous upgrades over the years to keep it viable for land combat operations. In 2021, the decision was made to permanently restrict AAVs from amphibious operations due to their age and threat to safety. The AAV will be replaced by the ACV.	0	0		e that will supplement and eventu- is designed for increased survival rence being the increased protect he ACV features a new remote we situational awareness and ability ets. The ACV achieved Initial Oper	
LAV-25 Inventory: 488 Fleet age: 40 Date: 1983 The Light Armored Vehicle (LAV) is an eight-wheeled, armored reconnaissance vehicle. It is designed for off-road and moderate amphibious capabilities. This allows for highly mobile fire support in most terrains. It will be in service until 2035.			167 363 \$1,597	\$2,904	



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Attack Helicopters**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	
AH-1Z Viper Inventory: 159 Fleet age: 8 Date: 2010			None		
The AH-1Z Viper replaced the AH-1W Super Cobra as the much improved attack helicopter for the Marine Corps. The Viper has greater speed, payload, and range, as well as upgraded landing gear, advanced weapons systems, and a fully integrated glass cockpit. The Viper provides Marines with close air support, armed escort/reconnaissance, and anti-armor capabilities. The expected operational life span of the Viper is 30 years.	4	<b>5</b>			

# **Tactical Aircraft**

Turonoui / III orun							
PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score		
AV-8B Inventory: 53 Fleet age: 30 Date: 1985			F-35B/C Timeline: 2007-2031	4	4		
The Harrier is the Marine Corps ground attack aircraft. It is a subsonic jet capable of hovering similar to a helicopter. The Harrier has a vertical/short takeoff and landing (V/STOL) system, designed to fly from amphibious assault ships and unconventional runways. These unique capabilities allow it to operate in a variety of environments that other jets find inaccessible. The aircraft is being replaced by the F-35B and will be fully retired around 2024.	0	0	The F-35B (STOVL Variant) is replacing the AV-8B Harrier providing the Corps a 5th Generation stealth STOVL aircra Specifically designed for the Marine Corps, the B-model achieved IOC in 2015. It is being procured at a much high quantity than the C-model, and full operational capability is expected in the late 2020s. The F-35C (Carrier Variant) also being procured by the Marine Corps, taking over the of the F/A-18. Designed for operations by aircraft carrier, F-35C is being procured to give Marines the ability to laur from carrier while the F-35B launches from amphibious assault ships. The Marines activated their first F-35C squadron in December of 2020. Full operational capabilit expected in the late 2020s.				
F/A-18 C-D Inventory: 41 Fleet age: 31 Date: 1978  The F/A-18 Hornet is a fighter and attack jet, primarily used by the Marine Corps for traditional strike missions, fleet air defense, and air support. The F/A/18 will no longer fly on carriers and will be replaced by the F-35C. The F/A-18 fleet life has been extended until 2030 in order to bridge the gap between the two aircraft platforms.	2	0	PROCUREMENT SPENDING (  164 205 \$24,414	\$ millions)			



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Tactical Aircraft (Cont.)**

PLATFORM	Age Score	Capability Score
F-35B Lightning II (STOVL)		
Inventory: 116 Fleet age: 6 Date: 2015		
The F-35B is the Marine Corps variant of the Joint Strike Fighter (JSF) Program. It is a fifth-generation, stealth multi-role fighter. The next-generation technology allows it to dominate combat missions without being detected by the enemy. Unique to the other variants, the B-Model is designed with a Short Take-Off Vertical Landing (STOVL) system, allowing for operation from flight decks and unconventional runways. This combines the unique operational capabilities of the AV-8B Harrier with the new technology offered by the JSF program.	6	5
F-35C Lightning II (CV) Inventory: 10 Fleet age: 1 Date: 2020  The F-35C is the aircraft carrier variant of the Joint Strike Fighter (JSF) Program, used by both the Navy and the Marine Corps. It is a fifth-generation, stealth multi-role fighter. The next-generation technology allows		
it to dominate multiple types of combat missions without being detected by the enemy. The C-Model, also known as the carrier variant (CV), is specially designed for operation on aircraft carriers. Although the C-Model is used primarily by the Navy, the Marine Corps implemented its first C-Model squadron in December 2020 to complement its pre-existing F-35B fleet. The F-35C will replace the F/A-18 in the Marine Corps inventory.	•	6



Procurement ■ Through FY 2022 and Spending ■ Pending

### **Medium Lift**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	1	Size Score	Health Score	
MV-22B Osprey		MV-22B			6	5	
Inventory: <b>296</b> Fleet age: <b>15</b> Date: <b>2007</b>			Timeline: 2007-TBD	îmeline: <b>2007-TBD</b>			
The Osprey is a vertical takeoff, tilt-rotor aircraft, combining the vertical capabilities of a helicopter and a traditional fixedwing aircraft. Similar to the AV-8B, this allows the aircraft to take off and land in environments where normal aircraft cannot go. The Osprey provides transport for personnel, cargo lift, and support for expeditionary assaults. The life expectancy of the MV-22B is 23 years.	3	6	Fielding of the Osprey was completed in 2019 with the MV-22B replacing the CH-46E helicopter. The modernization program is not facing any serious issues.				
			PROCUREMENT	SPENDING (\$ millions		s)	
			359	5 \$30,502	2 \$23	5,095	

# **Heavy Lift**

PLATFORM	Age Score	Capability Score	REPLACEM	1ENT PROGRAM		Size Score	Health Score
CH-53E Super Stallion Inventory: 136 Fleet age: 33 Date: 1981			CH-53K Timeline: 2	017-2030		5	3
The CH-53E is a heavy-lift rotary-wing aircraft. The Super Stallion transports heavy equipment and supplies for amphibious assault operations. The aircraft will operate through 2027, to be replaced by the more advanced CH-53K. The program life of the CH-53E is	2	0	The CH-53K King Stallion program is currently in development. It will replace the aging CH-53E and provide increased range, survivability, and payload. The King Stallion achieved IOC in April of 2022 and is scheduled to deploy in 2022		H- illity, OC in 1 2024.		
41 years.			40	156	\$6,397	\$18.428	

### **Tanker**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGR	Size SAM Score	Health Score		
KC-130J			KC-130J				
Inventory: 63 Fleet age: 12 Date: 2005			Timeline: <b>2005–2031</b>	4	4		
The KC-130J is a large multi-role aircraft, used primarily as a tanker and cargo transport and can be equipped for various missions to include air-to-air refueling, reconnaissance, and medevac	4	6	The KC-130J is both a tanker and transport aircraft. The procurement program for the KC-130J is not facing acquisition problems. Procurement planned to be complete by 2024.				
operations. The airframe is expected to			PROCUREMENT SPENDING (\$ m		ns)		
last 38 years.			79 32	2 \$6,098 \$	4,616		

**NOTE:** See Methodology for descriptions of scores. Fleet age is the average between the last year of procurement and the first year of initial operational capability. The date is when the platform achieved initial operational capability. The timeline is from the start of the platform's program to its budgetary conclusion. Spending does not include advanced procurement or research, development, test, and evaluation (RDT&E). Total program dollar value reflects the full F-35 joint program, including engine procurement. As part of the F-35 program, the Navy is purchasing 67 F-35Cs for the U.S. Marine Corps that are included here. The MV-22B program also includes some costs from U.S. Air Force procurement. AH-1Z costs include costs of UH-1 procurement.

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- 8. Testimony of General David H. Berger, Commandant of the Marine Corps, in hearing, *Fiscal Year 2023 Defense Budget from the Department of the Navy*, Committee on Armed Services, U.S. House of Representatives, May 11, 2022, 22:48 to 23:08, https://armedservices.house.gov/hearings?ID=0CE42E6D-9589-41CB-AC90-FF8CE0E827FF (accessed August 4, 2022). Cited hereafter as Berger testimony, May 11, 2022.
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  ¶ 'The experimentation that we've done now to date successfully using lightweight mounted fires—think the back of a Joint Light Tactical Vehicle—is killing armor at ranges, rough calculation, about 15, 20 times the range that a main battle tank can kill another main battle tank,' Smith said. He added the Marine Corps didn't get rid of its tanks because they weren't good at taking out adversary tanks, but rather 'we can kill armor formations at longer ranges using additional and other resources without incurring a 74-ton challenge trying to get that to a shore, or to get it from the United States into the fight. You simply can't be there in time." Megan Eckstein, "Early Experiments Are Proving out Tank-Free Marine Corps Concept," U.S. Naval Institute News, February 10, 2021, https://news.usni.org/2021/02/10/early-experiments-are-proving-out-tank-free-marine-corps-concept (accessed August 5, 2022). General Berger has built on this point with his annual updates that report progress with FD 2030. For his latest discussion of divestiture, replacement capabilities, and readiness, see Berger, "Force Design 2030 Annual Update," May 2022, p. 16.
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# U.S. Space Force

### John Venable

The U.S. Space Force (USSF) was created with enactment of the fiscal year (FY) 2020 National Defense Authorization Act (NDAA) on December 20, 2019. Established as the fifth uniformed service within the Department of Defense (DOD) and the second service within the Department of the Air Force (DAF), the USSF functions under the direction and leadership of the Secretary of the Air Force. The FY 2020 NDAA specifies that a four-star general will serve as Chief of Space Operations (CSO) and as a full member of the Joint Chiefs of Staff.<sup>2</sup>

The Space Force's mission is to organize, train, and equip forces "to protect U.S. and allied interests in space and to provide space capabilities to the joint force." Its responsibilities include "developing Guardians [military space professionals], acquiring military space systems, maturing the military doctrine for space power, and organizing space forces to present to our Combatant Commands."<sup>3</sup>

A 2001 RAND study estimated that 95 percent of all civilian and commercial space technologies have direct applicability to military systems or are of dual use. That fact and the capabilities that those two sectors bring to the Space Force are critical to an assessment of this new service. The domination of great-power competition in space relies increasingly on the interwoven efforts of all three U.S. sectors—military, civil, and commercial space.

### **Background**

More than any other nation, America has enjoyed the technological advantages of space, and we now rely on it for nearly every aspect of our lives. Banking, commerce, travel, entertainment, the functions of government, and our military all depend on our assets in space.<sup>5</sup>

Though our reliance on our spaceborne systems has been recognized by every President since Dwight Eisenhower in the mid-1950s, various issues kept the United States from developing a single service charged with managing space assets and capabilities. In 1961, the Air Force was named executive agent for space research and development, but at that point, the Army and Navy already had well-established programs. Every Administration sustained this splintered approach for the next six decades, but U.S. space capabilities still advanced at a stunning pace.

The effectiveness of the DOD's space support missions was put on full display during Operation Desert Storm,<sup>7</sup> and adversary nations did much more than take note. They recognized the growing U.S. dependence on space and began to position themselves to move against it.

As early as 2001, a congressionally mandated report warned of our growing dependence on space and the vulnerability of U.S. assets in that domain and ultimately recommended establishing a Space Corps within the DAF.<sup>8</sup> Those recommendations were set aside following the terrorist attacks of September 11, 2001, and by the mid-2010s, the command and control of space had fragmented across at least 60 different DOD offices.<sup>9</sup> All the while, U.S. reliance on the Global Positioning System (GPS) for air, land, and sea maneuver, targeting, and engagement has grown to the point of being nearly universal, exposing a critical vulnerability that our adversaries have moved to exploit.

Both China and Russia have developed doctrine, organizations, and capabilities to challenge U.S. access to and operations in the space domain. Concurrently, their own use of space is expanding significantly. These nations have demonstrated the capability to put American space assets at risk, and until very recently, the United States had not taken

overt steps to protect those systems, much less to develop its own warfighting capability in that domain.

The FY 2017 NDAA mandated that DOD conduct a review of the organization and command and control of space assets within the department. <sup>10</sup> Shortly after the FY 2017 NDAA was enacted, President Donald Trump directed that a Space Force be established within the DAF. <sup>11</sup> Congress concurred and authorized the creation of the USSF with enactment of the FY 2020 NDAA.

An important addition to the U.S. warfighting command structure was the reestablishment of U.S. Space Command as the 11th Combatant Command within the Department of Defense. The mission of Space Command is to conduct "operations in, from, and to space to deter conflict, and if necessary, defeat aggression, deliver space combat power for the joint/combined force, and defend U.S. vital interests with allies and partners." <sup>12</sup>

### **U.S. Space Force Organization**

The USSF Headquarters and Office of the Chief of Space Operations are located in the Pentagon. When Congress authorized the Space Force, it limited its scope to Air Force organizations and personnel located at five major installations:

- The 21st Space Wing at Peterson Air Force Base, Colorado;
- The 30th Space Wing at Vandenberg Air Force Base, California;
- The 45th Space Wing at Patrick Air Force Base, Florida;
- The 50th Space Wing at Schriever Air Force Base, Colorado; and
- The 460th Space Wing at Buckley Air Force Base, Colorado.<sup>13</sup>

Those personnel, organizations, and structures have been or will be restructured and rolled into three major field commands that fall directly under the CSO:

- Space Operations Command (SpOC);
- Space Systems Command (SSC); and

 Space Training and Readiness Command (STARCOM).<sup>14</sup>

These three commands lead the next tier of organizations, called Deltas and Garrisons. Deltas are equivalent to Air Force Groups, are led by a colonel, and are tasked with and responsible for specific missions and operations. Garrisons are also the equivalent of Air Force Groups and support Deltas with functions similar to those of Air Force base-level command. Squadrons are the final level of command and will fall under Deltas and Garrisons.<sup>15</sup>

**Space Operations Command.** SpOC was established on October 22, 2020, as the first major USSF field command. Currently located at Peterson Air Force Base, Colorado, SpOC is led by a three-star general and is responsible for organizing, training, and equipping space forces assigned to Combatant Commands. The SpOC at Vandenberg Air Force Base, California, was redesignated as SpOC West and continues to conduct operations in support of Combatant Commanders.

Space Systems Command. This command stood up on August 13, 2021, at Los Angeles Air Force Base<sup>17</sup> to oversee the development, acquisition, and maintenance of satellites and ground systems, the procurement of SATCOM and launch services, and investments in next-generation technologies. SSC is led by a three-star general who oversees the Space Force's approximately \$15.8 billion annual budget for research, development, test, and evaluation (RDT&E) and the acquisition of new systems. 18 SSC absorbed the Space and Missile Systems Center (SMC), located at Los Angeles Air Force Base, California; the Commercial Satellite Communications Office based in Washington, D.C.;19 and the Space Vehicles Directorate at Kirkland Air Force Base, New Mexico.20

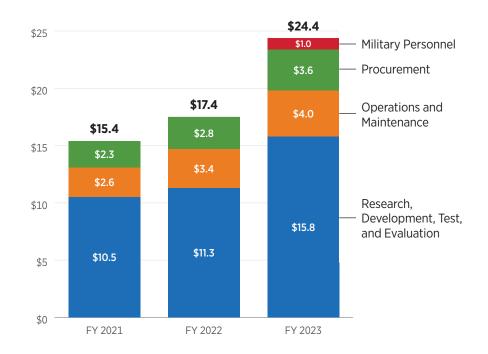
**Space Training and Readiness Command.** STARCOM is the third USSF field organization and stood up on August 23, 2021, at Peterson Air Force Base in Colorado. It is led by a two-star general and is responsible for the education and training of space professionals.<sup>21</sup>

**Personnel.** The FY 2023 Air Force budget request supports 8,600 military and 4,927 civilian Space Force personnel, respectively, up from 8,400 military and 4,364 civilian, respectively, in FY 2022, and a total end strength of 13,527, up from 12,764 in FY 2002.<sup>22</sup> The 2020 NDAA specified that only

CHART 10

## U.S. Space Force Budget

IN BILLIONS OF DOLLARS



**NOTE:** U.S. Space Force personnel costs for fiscal years 2021 (\$800.3 million) and 2022 (\$929.8 million) were funded by the U.S. Air Force budget.

**SOURCES:** U.S. Air Force budget summaries for fiscal years 2021, 2022, and 2023. For example: Table 3, "U.S. Space Force Budget Summary," in U.S. Department of the Air Force, *Department of the Air Force Fiscal Year 2023 Budget Overview*, p. 6, https://www.safm.hq.af.mil/Portals/84/documents/FY23/SUPPORT\_/BOB\_28Mar\_1125\_LoRes.pdf?ver=5nrA8bBfhWoUSrvZ09CeHA %3d%3d (accessed August 18, 2022).

the Air Force was required to provide personnel for the Space Force, and with the redesignation of Air Force Space Command (AFSPC) as Space Operations Command, approximately 16,000 Air Force active-duty and civilian personnel were assigned to support the USSF.<sup>23</sup>

The Space Force began to accept interservice transfer applications for the first time on June 15, 2022. <sup>24</sup> In June, the Naval Satellite Operations Center (NAVSOC) based at Naval Base Ventura County in Mugu, California, was transferred to the USSF and redesignated as the 10th Space Operations Squadron (SOC). On August 15, 2022, the Army announced the transfer of its satellite communications functions, conducted by the 53rd Signal Battalion, along with approximately 300 uniformed and 200 civilian Army personnel who work those systems. Those personnel are based in Maryland, Hawaii, Germany, and Japan and will remain at those duty locations as the USSF's

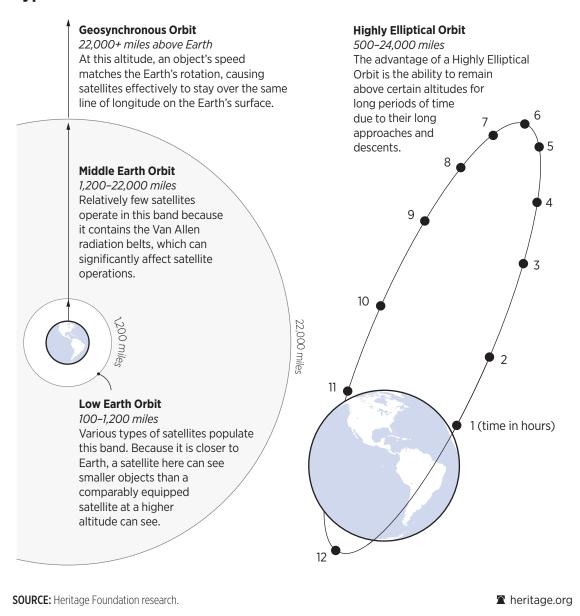
53rd Space Operations Squadron. Many of the Army and Navy transfers were supposed to happen at the beginning of FY 2022 but were delayed because of the congressional delay in passing the FY 2022 budget. With the Army's SATCOM mission transfer, the Space Force is now the only DOD organization that conducts satellite and transmission control for the Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) Satellite constellations.<sup>25</sup>

"To officially transfer from one military service to another," according to the USSF, "a military member separates from the current service and commissions or enlists into the new service in their current rank." <sup>26</sup>

### **Funding**

The President's budget request for FY 2023 lays out a relatively robust level of funding for every

### **Types of Earth Orbits**



aspect of the new service's mission set. The budget for Operations and Maintenance (O&M) is \$4.0 billion; the budget for RDT&E is \$15.8 billion; and procurement adds another \$3.6 billion for a total of \$24.5 billion, a 41 percent increase from FY 2022.<sup>27</sup>

Assuming that the President's budget is fully funded, the Space Force, as noted, will have an authorized end strength of 13,527 military and civilian personnel, an increase of 763 from FY 2022.<sup>28</sup> The

combination of robust funding and manpower levels will allow the CSO to continue to focus on building a strong organizational foundation and filling critical billets with the right people.

### Capacity

The classified nature of deployed space assets makes listing specific capacity levels within the Space Force portfolio, much less attempting to assess the service's capability to execute its mission, a challenging exercise. The USSF's position, navigation, and timing (PNT); command and control (C2); communications (Comm); weather; and intelligence, surveillance, and reconnaissance (ISR) satellites are unrivaled and provide extraordinary capabilities. Its space situational awareness (SSA) satellites and terrestrial-based capabilities are also unrivaled, but they are limited and require additional resourcing. Each satellite, satellite constellation, and terrestrial space surveillance site has unique characteristics and an expected life span.

### **Satellite Constellations**

The Space Force's mission is conducted through a network of satellites, ground-based radar, ground stations, and situational awareness nodes. In 2018, the Secretary of the Air Force stated that the service operates 77 satellites that provide information on position, navigation, and timing (PNT), weather, communications, command and control, missile warning, and nuclear detonation that is "vital to national security." An estimated 114 satellites now reside within the Space Force portfolio. (See Table 14).

Global Positioning System (37 Satellites). Perhaps the best-known constellation of satellites under Space Force control is the Global Positioning System, which provides PNT for millions of simultaneous users around the world. It takes 24 of these satellites to provide seamless global coverage, and 31 are operational.<sup>30</sup> Currently, six additional satellites that have been decommissioned serve as on-orbit spares, bringing the total to 37.

GPS III is the latest upgrade to the platform and incorporates a more robust anti-jamming capability. The fifth GPS III satellite was launched into orbit in June 2021. The sixth reportedly is scheduled for launch in January 2023, and the seventh and eighth have been completed and are awaiting their turn in the launch queue. GPS III satellites have a civilian signal that is interoperable with other Global Navigation Satellite Systems (GNSS) such as the European Galileo network and the Japanese Quazi-Zenith Satellite System, adding an impressive level of resiliency to the constellation. Signal that it is interoperable with other Global Navigation Satellite System, adding an impressive level of resiliency to the constellation.

**Defense Meteorological Satellite Program (DMSP) (Three Satellites).** Defense weather satellites have been collecting weather data and providing forecasts for U.S. military operations since 1962 through the Defense Meteorological Satellite

Program (DMSP).<sup>34</sup> Currently, three DMSP satellites<sup>35</sup> are operational and in polar low-Earth orbit (LEO).<sup>36</sup>

The main sensors for these weather satellites are optical, and each provides continuous visual and infrared imagery of cloud cover over an area approximately 1,600 nautical miles wide, enabling complete global coverage of weather features every 14 hours.<sup>37</sup> Launched between 1999 and 2009 with a life expectancy of just five years, they have continued to deliver exceptional data well beyond their expected lifetimes.<sup>38</sup>

Military Strategic and Tactical Relay (Milstar) (Five Satellites). Milstar is a satellite communications (SATCOM) system designed in the 1980s to provide the National Command Authorities (President, Vice President, Secretary of Defense, Joint Chiefs of Staff, and Combatant Commanders) assured, survivable global communications with a low probability of intercept or detection. This constellation was designed to overcome enemy jamming and nuclear effects and was considered the DOD's most robust and reliable SATCOM system when it was fielded. Milstar was fielded from 1993 through 2004 with a designed life of 10 years.<sup>39</sup>

**Advanced Extremely High Frequency System** (AEHF) (Six Satellites). <sup>40</sup> Like Milstar, AEHF provides and sustains secure, jam-resistant communications and C2 for high-priority military assets located anywhere in the world. Each AEHF satellite provides more capacity than the entire five-satellite Milstar constellation with five times the Milstar data rates, enabling real-time video, battlefield maps, and targeting data for tactical users. <sup>41</sup> The AEHF constellation was launched into geosynchronous orbit (GEO) from 2010–2020 with a satellite design life of 14 years. <sup>42</sup>

**Defense Satellite Communications System (DSCS) (Seven Satellites).** These satellites provide nuclear-hardened, global communications to the Defense Department, the Department of State, and the National Command Authorities. The system is capable of high data rates and provides anti-jamming capabilities. These satellites were fielded from 1998 through 2003 into GEO with 10-year life spans.<sup>43</sup>

**Wideband Global SATCOM (WGS) (10 Satel-lites).** WGS is a joint-service program funded by the U.S. Air Force and U.S. Army, along with international partners Australia and Canada, and is used by all

DOD services as well as National Command Authorities. Once known as the Wideband Gapfiller Satellite,<sup>44</sup> WGS provides Super High Frequency (SHF) wideband communications, using direct broadcast satellite technology to provide C2 for U.S. and allied forces. With solid capabilities that include phased array antennas and digital signal processing technology, this system delivers a flexible architecture with a satellite life span of up to 14 years.

Fleet Satellite Communications System (FLTSATCOM) (Six Satellites). <sup>45</sup> FLTSATCOM is a constellation of five operational satellites used by the Navy, Air Force, and presidential command network. The system was launched into GEO between 1978 and 1989 to serve as a secure communications link between the three users with a design life of five years. <sup>46</sup> This constellation was transferred from the U.S. Navy to the Space Force on June 6, 2022. <sup>47</sup>

**Ultra-High Frequency Follow-On (UFO) (10 Satellites).** The UFO constellation was designed to replace FLTSATCOM to provide communications for tactical users including aircraft, ships, submarines, and ground forces. UFO provides almost twice the throughput and 10 percent more power per channel than FLTSATCOM. This UFO constellation of satellites was launched into GEO between 1993 and 2003 with a life expectancy of from 14 to 15 years. <sup>48</sup> The system was transferred from the U.S. Navy to the Space Force on June 6, 2022. <sup>49</sup>

Mobile User Objective System (MUOS) (Five Satellites). MUOS is a next-generation narrowband tactical satellite communications system designed for tactical users with the goal of significantly improving ground communications, even for troops in the most remote locations or in buildings with no other satellite access. MUOS satellites were launched into GEO from 2012 through 2016 with a design life of 15 years and provide the ability to provide the transmission of 10 times more information volume than can be transmitted with UFO.<sup>50</sup> This constellation was transferred from the U.S. Navy to the Space Force on June 6, 2022.<sup>51</sup>

**Space-Based Infra-Red System (SBIRS) (10 Satellites).** SBIRS is an integrated constellation of satellites designed to deliver early missile warning and provide intercept cues for missile defenses. This surveillance network was designed to incorporate three satellites in highly elliptical orbit (HEO) and eight others in GEO, each working in concert with ground-based data processing and command and

control centers. Because SBIRS HEO is a retaskable orbit, these satellites can be moved to more optimal orbits/viewpoints as mission requirements dictate. Four SBIRS HEO satellites and six SBIRS GEO satellites are now in orbit (GEO-6, the final satellite in this constellation, was launched into orbit on August 4, 2022).<sup>52</sup>

The funding that was removed from SBIRS was shifted to a new program, Next-Generation Overhead Persistent Infrared (Next-Gen OPIR), which will include a new ground-control system. Fielding of this strategically survivable constellation of missile warning satellites is scheduled to begin sometime in FY 2023.<sup>53</sup>

Defense Support Program (DSP) (Five Satellites). DSP is a classified constellation that was designed to detect launches of intercontinental ballistic missiles (ICBMs) or submarine-launched ballistic missiles (SLBMs) against the U.S. and its allies. Its secondary missions include detection of space launch missions or nuclear weapons testing and detonations, as well as launches of shorter-ranged ballistic missiles. The DSP constellation is in GEO and uses infrared sensors to pick up the heat from missile booster plumes against the Earth's background. Phase 1 placed four satellites in orbit from 1970 through 1973<sup>54</sup> and was followed by Phase 2, which placed six satellites in orbit from 1979-1987.55 Phase 3 consisted of 10 DSP satellites that were launched from 1989-2007.56

Although Phase 3 DSP satellites have long exceeded their design lifetimes, reliability has exceeded expectations. At least five<sup>57</sup> and as many as eight are still providing reliable data and are now integrated with and controlled by the SBIRS program ground station.<sup>58</sup>

### **Space Situational Awareness Systems**

Knowledge of hostile space systems—their locations, their positional history, and how those satellites and other spacecraft are maneuvering in real time—conveys intent and collectively shapes the protocols and counterspace decisions that follow. Space situational awareness is therefore critical to every aspect of defensive and offensive counterspace operations and forms the foundation for DOD counterspace activities.<sup>59</sup>

In addition to adversary systems, other significant threats are in orbit. The National Aeronautics and Space Administration (NASA) estimates that as many as a half-million objects with diameters between 0.4 inches and four inches are circling the Earth. 60 In August of 2021, the Space Force was tracking some 35,000 objects in LEO alone, but that was before the Russian ASAT test in November of that year that created some 1,500 additional pieces of trackable debris and thousands more that are too small to track. 61 Even very small pieces of debris moving at LEO orbital speeds of between 15,600 and 17,900 miles an hour 62 threaten everything from satellites to the International Space Station. 63

Maintaining a high level of situational awareness of satellites and debris orbiting across the depth and vast dimensions of potential Earth orbits requires a robust and seamless network of space-based and 23 terrestrial-based sensors, the earthbound portion of which is known collectively as the Space Surveillance Network (SSN). Understanding the capabilities and limitations of that network naturally begins with understanding the numbers and types of spacebased and ground-based systems.

Six acknowledged satellites (with four other likely satellites) and six dedicated and 17 collateral or contributing terrestrial-based sensors help to maintain situational awareness of satellites and other objects in space. The satellites, known collectively as the Space-Based Surveillance System (SBSS), operate in concert with ground-based sensors but without their limitations such as suitable weather and sunlight that can blind ground-based optical sensors.

Some satellites track objects and debris fields from LEO. Others operate from a much higher orbital position (GEO) and are capable of maneuvering to perform detailed inspections of orbiting items that are of especially high interest.

Geosynchronous Space Situational Awareness Program (GSSAP) (Six Satellites). This classified surveillance constellation can accurately track and characterize objects in orbit. <sup>64</sup> Operating near GEO, GSSAP satellites are maneuverable and therefore able to perform rendezvous and proximity operations (RPO) on objects of interest in space. <sup>65</sup> Launched in pairs, the first two GSSAP satellites were put in orbit on July 28, 2014; the second two were launched on August 19, 2016; and a third pair was launched on January 21, 2022. <sup>66</sup> Each GSSAP satellite has an estimated life span of seven years. <sup>67</sup>

Space-Based Space Surveillance System-1 (SBSS-1) (One Satellite). The SBSS-1 satellite was launched into LEO in 2010 to detect and track space

objects, such as satellites and orbital debris. This satellite has a seven-year life expectancy.<sup>68</sup>

Space Tracking and Surveillance System Advanced Technology Risk Reduction (STSS-ATR) (One Satellite). STSS-ATR is an RDT&E satellite placed in a polar LEO on May 5, 2009, for the Missile Defense Agency (MDA) to test an alternate technology for potential missile defense application.<sup>69</sup>

**Space Tracking and Surveillance System (STSS) (Two Satellites).** Formerly known as SBIRS-Low, the two STSS satellites carry a very capable set of infrared and visible sensors for detecting and tracking ballistic missiles through all phases of their trajectory. These satellites were launched into LEO in 2009 with programmed life spans of two years.<sup>70</sup>

Terrestrial-Based Sensors (23 Sensors). There are six dedicated, ground-based radar sensors that track satellites and orbital debris, including the Space Fence on Kwajalein Atoll in the South Pacific. Seven collateral radar sensors are part of the network, but their primary mission is to detect and track ICBMs and SLBMs and to test and evaluate other systems.71 Another 10 contributing SSN sensors controlled by other organizations or agencies provide space surveillance support upon request from the National Space Defense Center (NSD-C).72 The Space Fence radar emits a very narrow, fan-shaped beam in the north-south direction that "paints" satellites and debris from low-Earth orbit as they fly through the radar fan, and it can track objects all the way out to GEO.

Reconnaissance and Imaging Satellites (Number Unknown). Although the history of the Air Force is steeped in these reconnaissance systems, the operational details of each constellation are classified. In the late 1990s and early 2000s, the Air Force moved to develop and field a constellation of space-based radar satellites. That program (known as Lacrosse/Onyx) launched five satellites, each carrying a synthetic aperture radar (SAR) as its prime imaging sensor. Because SAR systems can see through clouds with high resolution, they offer the potential to provide a capability from which it is hard to hide.<sup>73</sup>

### **Space Launch Capacity**

The Space Force manages the National Security Space Launch (NSSL) program, a Major Defense Acquisition Program that acquires launch services

TABLE 13

### **Space Launches by Country Since 2010**

	U.S.	China	Russia	India
2010	17	16	16	3
2011	19	19	20	3
2012	12	19	12	2
2013	19	15	18	3
2014	21	15	22	4
2015	19	19	14	3
2016	24	22	13	7
2017	29	18	13	4
2018	29	39	13	7
2019	20	34	14	6
2020	53	19	21	14
2021	57	51	23	1
2022	101	26	21	5
Total	420	312	220	62

**NOTE:** Figures for 2022 include actual and projected launches.

SOURCE: Space Launch Schedule, https://www.spacelaunchschedule.com/ (accessed August 15, 2022).

▲ heritage.org

from private companies to deliver national security satellites into orbit. Currently, the NSSL uses the Atlas V and Delta IV Heavy launch vehicles from United Launch Alliance (ULA) and the Falcon 9 and Falcon Heavy from SpaceX to launch national security payloads.

In 2018, the Air Force awarded three launch services agreements to space launch companies to develop their launch vehicles for a second phase of the NSSL. In 2020, the Space Force awarded two launch services procurement contracts to ULA and SpaceX, and those two vendors will provide space launch services for the Space Force through 2027.<sup>74</sup>

In 2010, four organizations, including NASA, were involved in launching manned and unmanned systems into space. Today, 11 private American corporations are engaged in placing satellites into orbit.<sup>75</sup> In 2022, U.S. companies are scheduled to launch 101 missions into space, and China and Russia are scheduled to conduct 26 and 21 launches, respectively.<sup>76</sup> The numbers for China and Russia are based on launch schedules published for each

of those countries and are often misleading. China planned 22 launches in 2021, but it actually executed 51 missions into space, which was just behind the U.S.'s 57 space shots for that same year. America is still outpacing its peers with this vital capability, but the competition appears to be gaining.

### Capability

With an estimated 114 satellites in its portfolio, the USSF can meet much of the communications, collection, and imagery demand placed on it by the National Command Authorities and the strategic-level intelligence requirements of the Defense Department. However, getting real-time satellite intelligence to warfighters at the operational and tactical levels is still problematic. The loss of even a small number of those 114 satellites could significantly impact operational capabilities across the DOD.

**Backbone Satellites (89 Satellites).** In spite of an ever-growing demand, the PNT services offered by GPS are unrivaled in both capacity and capability. With 31 operational GPS satellites in orbit and

### U.S. Satellites in Orbit

System	Function	Satellites
GPS	Positioning, Navigation, and Timing	37
DMSP	Weather	3
Milstar	Communications	5
AEHF	Communications	6
DSCS	Communications	7
WGS	Communications	10
FLTSAT	Communications	6
UFO	Communications	10
MUOS	Communications	5
SBIRS	Missile Warning	10
DSP	Missile Warning	5
GSSAP	Space Surveillance	6
SBSS	Space Surveillance	1
STSS-ATR	Missile Defense and Space Tracking	1
STSS	Missile Defense and Space Tracking	2
Total		114

**NOTE:** Data are current as of July 31, 2022. **SOURCES:** 

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TABLE 15

### **U.S. Space Launches by Organization**

Company	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Space X	2	0	2	3	6	8	8	18	21	13	27	30	61
Northrup Grumman	2	4	1	5	2	0	2	3	2	3	5	4	5
United Launch Alliance	8	11	10	11	14	12	12	8	8	5	6	5	9
Astra	0	0	0	0	0	0	0	0	1	0	0	1	1
Rocket Lab, LTD	0	0	0	0	0	0	0	0	0	0	2	4	11
Firefly Aerospace	0	0	0	0	0	0	0	0	0	0	0	1	3
NASA	3	3	0	0	0	0	0	0	0	0	0	0	0
Blue Origin	0	0	0	0	0	2	4	0	0	1	1	6	3
Virgin Orbit	0	0	0	0	0	0	0	0	0	0	1	2	3
Terran	0	0	0	0	0	0	0	0	0	0	0	0	1
ABL Space Systems	0	0	0	0	0	0	0	0	0	0	0	0	2
Launcher	0	0	0	0	0	0	0	0	0	0	0	0	1
NASA	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	15	18	13	19	22	22	26	29	32	22	42	53	101

**NOTES:** Figures for 2022 include actual and projected launches. No Blue Origin launch to date has been orbital. **SOURCE:** Space Launch Schedule, "USA Launch Schedule," https://www.spacelaunchschedule.com/category/usa/ (accessed August 15, 2022).

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seven spaceborne (dormant) spares, the system has enough redundancy and resiliency to handle losses associated with normal (not combat-related) space operations.

The current and growing DOD demands for imagery and collection are another thing entirely. The shortfall is projected to be so great that the Departments of the Air Force and Army, the National Reconnaissance Office, and other agencies have invested in and are employing the services of commercial organizations to provide collection and imagery on demand.<sup>78</sup>

Over the past several years, the U.S. Army has conducted a series of exercises called Project Convergence (PC), which are designed to test the capability of DOD and commercial spaceborne systems to provide the intelligence, imagery, and communications linkages for warfighters in the service's "close fight." In PC20, Brigade Combat Teams (BCTs), Combat Aviation Brigades (CABs), and Expeditionary Signal Battalion-Enhanced (ESB-E) units were given access to 600 commercial SpaceX Starlink

satellites in LEO<sup>79</sup> where low latency (time for signals to get to satellites and back to other users) readily enables tactical employment.<sup>80</sup>

The capabilities associated with defense and commercial satellites in low-Earth orbit have only grown over the years. In 2021, the Army launched three Gunsmoke-J CubeSat satellites to demonstrate advanced information collection in direct support of Army combat operations, s1 expanding the Army's inherent targeting capability. Coupled with the sensors on Starlink's rapidly expanding constellation, which numbers more than 2,662 satellites, s3 these systems will enable the Army's concept for a Multi-Domain Operations (MDO)–Capable Force by 2028 and an MDO-Ready Force by 2035. S4

The capabilities and resiliency offered by commercial systems like Starlink have been clearly demonstrated in Ukraine, where thousands of deployed Starlink Internet terminals have ensured Ukraine's internal and external connectivity with Western governments, nullifying a significant part of Russia's information campaign. 85 Starlink reportedly

TABLE 16

### **Satellites by Weight**

Group Name	Weight	Size
Large Satellite	1,000+ kilograms	Large
Medium Satellite	500-1,000 kilograms	Medium
Mini Satellite	100-500 kilograms	Small
Micro Satellite	10-100 kilograms	Small
Nano Satellite (CubeSats)	1-10 kilograms	Small
Pico Satellite	0.1-1 kilograms	Small
Femto Satellite	<100 grams	Small

**SOURCE:** Table 1, "Satellites by Mass," in Chalie L. Galliand, "Study of the Small: Potential for Operational Military Use of CubeSats," 24th Annual AlAA/USU [American Institute of Aeronautics and Astronautics/Utah State University] Conference on Small Satellites, August 10, 2010, p. 1, https:// digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1199&context=smallsat (accessed August 18, 2022).

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also has the ability to provide a very accurate PNT backup for GPS, which will become increasingly important for all of the services as the competition in space intensifies. <sup>86</sup> Integrating LEO, Mid Earth Orbit (MEO), and GEO satellite capabilities will continue to increase network resiliency by providing multiple communications options for the warfighter. <sup>87</sup> The capabilities demonstrated in the PC exercise series are similar to those sought in the Air Force's Advanced Battle Management System (ABMS) and the Navy's Overmatch C2 development programs. <sup>88</sup>

Intelligence, Surveillance, and Reconnaissance (15 Satellites). The USSF has 15 known spaceborne systems dedicated to missile launch warning. While the SBIRS constellation is two GEO satellites short of design, its 10 satellites, coupled with the five DSP satellites, provide global coverage and generally excellent response times.

As noted, the current portfolio of reconnaissance satellites, while highly classified, meets many of the essential strategic requirements of the National Command Authority (NCA) and the Defense Department. However, Space Force capabilities fall well short of the needs of the services. The Department of the Air Force is therefore investing in and employing the services of commercial organizations to meet the on-demand collection and imagery needs of USSF customers. <sup>89</sup>

**Space Situational Awareness (10 Satellites and 23 Terrestrial-Based Systems).** The Space Force's six acknowledged SSA satellites, four other unacknowledged satellites, six dedicated and 17 collateral and contributing ground-based sensors help to maintain situational awareness of satellites and other objects in space. However, the limited number and inherent limitations of the sensors within the SBSS leave significant gaps in coverage. Those gaps are addressed by prediction, and every time a satellite maneuvers, "the process of initial discovery by a sensor, creation of an initial element set, and refinement of that element set needs to be repeated." 90

The backbone and ISR assets within the USSF are critically important; however, the focus of the *Index of U.S. Military Strength* is primarily on assessing the classic "hard combat power" found in defensive and offensive systems.

### **Defensive Capabilities**

Defensive systems and operations are designed to protect friendly space capabilities against kinetic anti-satellite (ASAT) weapons, high-powered lasers, laser dazzling or blinding, and high-powered microwave systems.<sup>91</sup>

The first challenge in defense is detecting an attack, and a host of sensors exist that can detect the launch of terrestrial-based ASAT weapons. With 14

satellites dedicated to detecting missile launches, it is possible for the USSF to determine an ASAT's trajectory, identify the targeted satellite, and alert operators in time for them to take evasive action with those systems. Unfortunately, the gaps in the SSA network highlighted earlier make the timely assessment of and response to such an attack on a specific U.S. satellite difficult.

Detecting other (non-missile) attacks presents another problem, and the Space Force has fielded a system that can deal with one part of that challenge. Operated by ground-based units, Bounty Hunter can detect an adversary's attempts to deceive, disrupt, deny, or degrade satellite communications by monitoring electromagnetic interference across multiple frequency bands. Bounty Hunter operators can locate sources of intentional and unintentional interference and minimize them. <sup>92</sup> This system achieved initial operational capability (IOC) in the summer of 2020 and is a significant addition to the Space Force portfolio, but it has no known capability to detect or counter lasers.

USSF satellites need a sensor package that allows them to self-detect hostile system engagement and report it to operators who are positioned to take defensive actions or that incorporates artificial intelligence (AI) that will allow the satellite to maneuver autonomously while maintaining mission capacity. Those capabilities are currently not known to exist.

Cyberattacks present a different challenge to space-based systems. Like other kinetic and non-kinetic attacks, cyber intrusions can cause service disruptions, sensor interference, or the permanent loss of satellite capabilities. Additionally, an effective cyberattack could corrupt the satellite's data stream to reliant elements or systems—or even allow an adversary to seize control of a satellite. According to the Royal Institute of International Affairs, the U.S. is well behind its peer competitors in this area and should assume that its satellite constellations have already been penetrated and compromised. 93

In spite of current limitations, protective measures that the service can take now to safeguard its spaceborne systems can be separated into two categories of systems and actions: active and passive.

 An active defense is really offensive in nature and includes engagements to destroy, nullify, or reduce enemy systems that put U.S. and allied systems and capabilities at risk. Passive defense measures increase survivability through asset diversification, including the deployment of more space systems in different orbits, as well as real-time satellite maneuverability and self-protection.<sup>94</sup>

Shortly before the USSF became an independent service, the Air Force made clear that it wanted to build a constellation of thousands of small satellites (SmallSats) in low-Earth orbit to provide a redundant, diversified portfolio of capabilities. Over time, it has become apparent that those expanding constellations will be comprised of both military and civilian satellites.<sup>95</sup>

### Offensive Systems

The Air Force's FY 2017 budget included \$158 million to develop offensive space capabilities over a period of five years. <sup>96</sup> The only offensive space system of record within the USSF that can be found in open-source literature is a system called Meadowlands.

Meadowlands is a mobile, terrestrial-based, counter-communications system (CCS) that delivers effects to thwart adversary SATCOM in a given area of responsibility (AOR). The effects of Meadowlands are reversible: When the system is turned off, the communications linkages it was targeting return to their original functionality.<sup>97</sup>

### Readiness

The Space Force was born of a congressionally mandated study that included a plan for the incremental transition of operational Air Force space assets and personnel to the new service. Throughout the plan's execution, the USSF has been deliberate in its hiring and is on a path to developing a solid cadre of personnel and a strong organizational culture.

The operations assumed by the USSF to support strategic and high-end operational-level support have proceeded uninterrupted, and readiness has remained high, but those operations were primarily supportive in nature and did not include robust, nearly real-time support to tactical units. While the service is undoubtedly moving forward on credible defensive and offensive readiness, there is little evidence that it is ready for the threat envisioned by Congress when it authorized creation of the Space Force.

# Scoring the U.S. Space Force

### **Capacity Score: Weak**

The number and types of backbone and ISR assets are sufficient to support global PNT requirements and the majority of strategic-level communications, imagery, and collection requirements of the National Command Authorities and the Department of Defense. However, the Space Force is not capable of meeting current—much less future—on-demand, operational, and tactical-level warfighter requirements.

As noted in the capability section, the gaps in the SBSS are covered by prediction, and operators of adversarial satellites can time their maneuvers to take advantage of those gaps. With the influx of SmallSats, the potential for the number of U.S. military satellites in orbit to grow from a few hundred to several thousand over the next three years is very real. (See Table 13.) If new commercial, allied, and adversary SmallSats are added to the mix, it is highly likely that the number of operational satellites in orbit will double over that same period. Although increasing numbers alone will challenge the current Space Surveillance Network, the number of unannounced orbital changes among those satellites will make it markedly more difficult to keep track of bad actors.

The U.S. had announced plans to build a second, strategically located Space Fence like the one on Kwajalein Atoll in Western Australia in 2021, but that site has yet to be funded. Even if a second Space Fence does eventually materialize, the Space Force will still need more satellites that are dedicated to this mission.

The service's two counterspace weapons systems (Meadowlands and Bounty Hunter) cover only a fraction of the offensive and defensive capabilities required to win a conflict in space. Other counterspace systems are probably being developed or, like cyber, already in play without public announcement. Nevertheless, the USSF's current visible capacity is not sufficient to support, fight, or weather a war with a peer competitor.

### Capability Score: Weak

The current space asset modernization plan that is visible to the public follows the same incremental replacement and fielding design that has been in practice for decades. The vast majority of backbone and ISR assets have exceeded their designed life spans, and the DAF's willingness to delay and/or defer the acquisition of replacement systems remains a legacy of that department.

The capability of backbone and ISR satellites is marginal, but that is more than offset by the gaps in SSA and the apparent lack of defensive and offensive capabilities ("very weak"). The capability score is therefore "weak," the result of being scored "weak" in "Size of Modernization Program," "weak" for "Age of Equipment" and "Health of Modernization Programs," and "weak" for "Capability of Equipment."

### Readiness Score: Weak

The mission sets, space assets, and personnel that transitioned to the Space Force and those that have been assigned to support the USSF from the other services have not missed an operational beat since the Space Force stood up in 2019. Throughout that period, the readiness levels have seamlessly sustained backbone and ISR support to the NCA, DOD, Combatant Commanders, and warfighters around the world.

However, there is little evidence that the USSF has improved its readiness to provide nearly real-time support to operational and tactical levels of force operations ("marginal") or that it is ready in any way to execute defensive and offensive counterspace operations to the degree envisioned by Congress when it authorized creation of the Space Force ("very weak").

### Overall U.S. Space Force Score: Weak

This is an unweighted average of the USSF's capacity score of "weak," capability score of "weak," and readiness score of "weak."

# **U.S. Military Power: Space**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		✓			
Capability		✓			
Readiness		✓			
OVERALL		<b>✓</b>			



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Navigation**

PLATFORM	Age Score	Capability Score	REPLACEMENT P	ROGRAM	Size Score	Health Score
Global Positioning System (GPS) Inventory: 37 Fleet age: 12.5 Date: 1997			GPS III Timeline: 2019-TE	BD	5	6
GPS satellites provide precise positioning, navigation, and timing (PNT) to millions of simultaneous users around the world. The current constellation of 37 satellites is comprised of Block IIR (launched from 1997-2004), IIR-M (2005-2009), IIF (2010-2016) and III/IIIF (first launch 2018) birds with steadily increasing capabilities.	6	5	incorporates more is interoperable w	et upgrade to the GPS pla e robust anti-jamming ca vith other countries' Glob which adds resilience to SPENDING (1	pabilities al Naviga the GPS :	. It tion system.

# **Missile Warning**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Inventory: 10 Fleet age: 8 Date: 2006  An integrated constellation of 10 satellites, SBIRS is designed to deliver early missile warning and provide intercept cues for missile defenses. The satellites are retaskable, which means they can be moved to more optimum orbits and viewpoints as mission requirements dictate. The program was ended early due to cost, schedule, and performance issues.	6	6	Next Generation Persistent Infrared (Next-Gen OPIR)  Timeline: TBD  When the SBIRS program was ended earl funding was shifted to its follow-on progr OPIR. This program's objective is to delive and tracking capability in a contested envadvances in adversary rocket propulsion to	am, the Ne er resilient rironment,	ext-Gen detection given the
Defense Support Program (DSP) Inventory: 5 Fleet age: 22 Date: 1970  These satellites were designed to detect intercontinental ballistic missile and Sea-launched ballistic missile launches against the U.S. and its allies. They can also detect space launch missions and nuclear weapons testing/detonations. Phase 3 satellites were launched from 1989 to 2007 and have long exceeded their designed lifetimes, but at least five of those satellites are still providing reliable data and are integrated with the SBIRS program.	0	4			



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Space Surveillance**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Space Based Surveillance System (SBSS)			None		
Inventory: 1 Fleet age: 12 Date: 2010	3	3			
This single satellite uses multiple types of sensors to track man-made objects and debris fields in orbit.					

## **Missile Defense**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Space Tracking and Surveillance System Advanced Technology Risk Reduction (STSS-ATR)			None		
Inventory: 1 Fleet age: 13 Date: 2009					
This research, development, testing, and evaluation (RDT&E) satellite was originally launched by the Missile Defense Agency to explore different capabilities and technology but was transferred to the Air Force in 2011.	3	3			

# **Space Object Tracking**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Geosynchronous Space Situational Awareness Program (GSSAP)			None		
Inventory: <b>6</b> Fleet age: <b>5</b> Date: <b>2014</b>					
This highly classified, six-satellite constellation can accurately track and characterize objects in orbit using electro-optical and emissions sensors. Their maneuverability allows them to conduct rendezvous and proximity operations (RPO) on space objects, giving them the potential to conduct offensive operations against other nations' assets.	6	6			



Procurement ■ Through FY 2022 and Spending ■ Pending

### Weather

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Defense Meteorological Satellite Program (DMSP)			Weather System Follow-on Microwave Satellite (WSF-M)		
Inventory: <b>3</b> Fleet age: <b>18</b> Date: <b>1999</b>			Timeline: <b>TBD</b>		
Since 1962, defense weather satellites in the DMSP have been collecting weather data and providing forecasts for U.S. military operations. This three-satellite constellation was launched between 1999 and 2009 with only a five-year life expectancy, but they have continued to provide accurate meteorological data well beyond that timeframe and are still in use today.	0	4	This next-generation weather satellite will be capable of mapping both terrestrial and space weather and is scheduled to be fielded in 2023. It covers three gaps in DOD's current weather monitoring capability: ocean surface vector winds, tropical cyclone intensity, and "energetic charged particles" in low earth orbit.		

## **Communications**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM		
Milstar Inventory: 5 Fleet age: 23.5 Date: 1994			None		
Milstar is a satellite communications system designed in the 1980s to provide the National Command Authorities with global communications that were assured, were survivable, and carried low probability of interception or detection. Designed to overcome nuclear effects and enemy jamming, this five satellite constellation was considered the most robust and reliable DOD SATCOM system at the time of fielding.	0	3			
Advanced Extremely High Frequency System (AEHF) Inventory: 6 Fleet age: 7 Date: 2010				Size Score Sco	
The AEHF constellation is the follow-on to Milstar. Each of the six satellites provides DOD with more capacity than the entire Milstar constellation with five times the Milstar data rates. The system offers secure, jam-resistant communications and command and control for military ground, sea, and air assets located anywhere in the world.	5	5			



Procurement ■ Through FY 2022 and Spending ■ Pending

# **Communications (Cont.)**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Defense Satellite Communications System (DSCS)			None		,
Inventory: <b>7</b> Fleet age: <b>29.5</b> Date: <b>1982</b>					
This system of seven satellites provides nuclear-hardened, global communications with anti-jamming capabilities to the Defense Department, State Department, and National Command Authorities.	0	2			
Wideband Global SATCOM (WGS)					
Inventory: <b>10</b> Fleet age: <b>9</b> Date: <b>2007</b>					
WGS, formerly known as the Wideband Gapfiller Satellite, is a joint-service program funded by the U.S. Air Force and U.S. Army along with international partners Australia and Canada. The 10-satellite constellation uses direct broadcast satellite technology to provide command and control for U.S. and allied forces.	4	6			
Fleet Satellite Communications System (FLTSATCOM)					
Inventory: 6 Fleet age: 38.5 Date: 1978					
This constellation of six operational satellites is used by the Navy, the Air Force, and the presidential command network. It was transferred from the Navy to the Space Force in June 2022.	0	3			
Ultra-High Frequency Follow-On (UFO)					
Inventory: 10 Fleet age: 24 Date: 1993					
The 10-satellite UFO constellation was designed to replace FLTSATCOM and provides communications for tactical users including aircraft, ships, submarines, and ground forces. The Navy transferred this system to the Space Force in June 2022.	0	3			



Procurement ■ Through FY 2022 and Spending ■ Pending

## **Communications (Cont.)**

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
Mobile User Objective System (MUOS) Inventory: 5 Fleet age: 8 Date: 2012			None		
This next-generation narrowband tactical satellite communications system is designed for tactical users, significantly improving ground communications even for troops in highly remote locations or buildings with no other satellite access. The Navy transferred this five-satellite constellation to the Space Force in June 2022.	4	6			

**NOTES:** See Methodology for descriptions of scores. Fleet age is the average between the last year of procurement and the first year of initial operational capability. The date is when the platform achieved initial operational capability. The timeline is from the start of the platform's program to its budgetary conclusion. Spending does not include advanced procurement or research, development, test, and evaluation (RDT&E).

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# U.S. Nuclear Weapons

## Patty-Jane Geller

To assess U.S. nuclear weapons, one must understand the essential role they play in U.S. national security, the increasing nuclear threat posed by adversaries, and the current state of U.S. nuclear forces and their supporting infrastructure.

### The Important Role of U.S. Nuclear Weapons

Understanding the importance of nuclear weapons allows for a better grasp of a framework within which to view the status of U.S. nuclear capabilities. U.S nuclear weapons have played a critical role in preventing conflict among major powers since the end of World War II. Given their ability to deter large-scale attacks that threaten the U.S. homeland, allies, and forward-deployed troops and to assure allies and partners, nuclear deterrence has remained the number one U.S. national security mission. Operationally, all U.S. military operations rely on the backstop of U.S. nuclear deterrence.<sup>2</sup> It is therefore critical that the United States maintain a modern and flexible nuclear arsenal that can deter a diverse range of threats from a diverse set of potential adversaries.

The more specific roles of U.S. nuclear weapons outlined by U.S. policy have been adjusted over time. The most up-to-date policy documents that describe these roles are the 2018 Nuclear Posture Review (NPR) and the 2020 Nuclear Employment Strategy, which reflected the deterioration of the threat environment since 2010. The NPR specifies that:

Given the diverse threats and profound uncertainties of the current and future threat environment, U.S. nuclear forces play the following critical roles in U.S. national security strategy. They contribute to the:

- Deterrence of nuclear and non-nuclear attack;
- Assurance of allies and partners:
- Achievement of U.S. objectives if deterrence fails; and
- Capacity to hedge against an uncertain future.<sup>3</sup>

These roles were outlined in more detailed language in the Obama Administration's 2010 NPR and 2013 Nuclear Employment Strategy. The 2010 NPR, for example, lists the "five key objectives of our nuclear policies and posture" as:

- 1. Preventing nuclear proliferation and nuclear terrorism;
- **2.** Reducing the role of U.S. nuclear weapons in U.S. national security strategy;
- **3.** Maintaining strategic deterrence and stability at reduced nuclear force levels;
- **4.** Strengthening regional deterrence and reassuring U.S. allies and partners; and
- **5.** Sustaining a safe, secure, and effective nuclear arsenal.<sup>4</sup>

The Biden Administration has not yet released its 2022 NPR to the public, but a fact sheet notes the continued commitment to deterring both nuclear and non-nuclear attacks and says that "[t]he United States would only consider the use of nuclear weapons in extreme circumstances to defend the vital interests of the United States or its allies and partners." These roles or their prioritization

may be adjusted over time—for instance, the Biden Administration's fact sheet seems to deemphasize (although not eliminate) the role of nuclear weapons in deterring non-nuclear attacks—but generally are likely to endure.

To achieve these objectives, the U.S. nuclear portfolio must balance the appropriate levels of capacity, capability, variety, flexibility, and readiness. What matters most in deterrence is not what the United States thinks will be effective, but the psychological perceptions—among both adversaries and allies—of America's willingness to use nuclear forces to defend its interests. If an adversary believes it can fight a limited nuclear war, for instance, U.S. leaders must convince that adversary otherwise. In addition, military roles and requirements for nuclear weapons will differ from adversary to adversary based on each country's values, strategy, and goals.

The United States also extends its nuclear umbrella to more than 30 allies and partners that rely on the United States to defend them from large-scale conventional attacks and existential threats from regional adversaries. This additional responsibility imposes requirements for U.S. nuclear force posture beyond defense of the U.S. homeland. U.S. nuclear forces underpin the broad nonproliferation regime by assuring allies—including NATO, Japan, South Korea, and Australia-that they can forgo their own development of nuclear capabilities. Erosion of the credibility of American nuclear forces could lead a country like Japan or South Korea to pursue an independent nuclear option, in which case the result could be a profoundly negative impact on stability across the region.

In addition to deterrence and assurance, the United States historically has committed to achieving its political and military objectives if nuclear deterrence fails. This goal also contributes to deterrence both by convincing an adversary that it could not start and win a nuclear war and by minimizing U.S. subjection to nuclear coercion by peer nuclear adversaries. U.S. forces must therefore be survivable and postured to engage their targets successfully if such a deterrence failure makes it necessary to use nuclear weapons.

Finally, U.S. nuclear capabilities must have the capacity to hedge against an uncertain future. It takes years or decades to develop the capabilities of nuclear weapons and their supporting infrastructure—an infrastructure that the United States neglected for

decades until quite recently. Decisions regarding nuclear forces that are made today will affect the United States for decades into the future. Since it cannot accurately predict the extent of the future threat, the U.S. must maintain a nuclear enterprise that can respond to changes in the global security environment.

# An Increasingly Threatening Global Environment

Any assessment of nuclear capabilities requires an understanding of the threat environment, as any U.S. strategy or force posture must account for the threat it is meant to deter or defeat. The threat the United States faces today is unprecedented. For the first time in its history, the United States must face two nuclear peer competitors at once—Russia and China.<sup>6</sup> This differs drastically from the paradigm based on the bilateral deterrence relationship involving the United States and the Soviet Union during the Cold War, because a multipolar nuclear threat environment presents new and complex challenges. As a result, the assessment in this *Index* must be weighed against this emerging nuclear threat.

Russia is engaged in an aggressive nuclear expansion, having added several new nuclear systems to its arsenal since 2010. The United States is only beginning to modernize its existing nuclear systems, but Russia's modernization effort is about 89 percent complete. Russia also is developing such "novel technologies" as a nuclear-powered cruise missile and nuclear-capable unmanned underwater vehicle and is arming delivery platforms with nuclear-tipped hypersonic glide vehicles.

In addition, Russia maintains a stockpile of at least 2,000 non-strategic nuclear weapons, unconstrained by any arms control agreement.9 Defense Intelligence Agency Director Lieutenant General Robert Ashley has said that Russia is expected to increase this category of nuclear weapons—a category in which it "potentially outnumber[s]" the United States by 10 to 1.10 This disparity is of special concern because Russia's recent nuclear doctrine indicates a lower threshold for use of these tactical nuclear weapons. According to the 2018 Nuclear Posture Review, Moscow "mistakenly assesses that the threat of nuclear escalation or actual first use of nuclear weapons would serve to 'de-escalate' a conflict on terms favorable to Russia."11 Russia has also been engaging in nuclear saber-rattling over its war on

Ukraine, issuing both subtle and blatant nuclear threats in an attempt to coerce the West into staying out of the conflict.<sup>12</sup>

China is engaged in what Admiral Charles A. Richard, Commander of U.S. Strategic Command (STRATCOM), has described as a "breathtaking" expansion of its nuclear capabilities as part of a strategic breakout that will require immediate and significant Department of Defense (DOD) capability shifts. The Pentagon's 2021 report on *Military and Security Developments Involving the People's Republic of China* confirmed that China would have at least 1,000 nuclear warheads—roughly five times the size of its current stockpile—by the end of the decade. In addition, China "appears to be building more than 100 new missile silos in the desert" that would likely carry the DF-41, China's most modern ICBM, which can carry multiple warheads. 15

With respect to its nuclear capabilities, China has completed its nuclear triad with the addition of a strategic nuclear-capable bomber, is deploying hundreds of theater-range ballistic missiles in the Indo-Pacific that can strike U.S. bases and allied territory with precision, and is testing and deploying nuclear-capable hypersonic weapons including one that orbited the globe on a fractional orbital bombardment system (FOBS) before being released to glide to its target. Evidence also suggests that China is shifting a portion of its nuclear forces to Launch-on-Warning (LOW) posture as it improves its early warning systems.

Combined with a refusal to discuss its forces or intent with the United States, this shift in posture increases the likelihood of mistakes and miscalculations. Unlike the United States and Russia, which share a long history of communicating through arms control discussions and treaties to reduce these risks, China has not participated in these risk reduction measures. The sheer magnitude of its nuclear expansion and qualitative upgrades has led senior leaders to conclude that China has become a nuclear peer to the United States and Russia and eventually could even surpass U.S. nuclear capabilities. China no longer has a minimum deterrence capability; instead, it "possesses the capability to employ any coercive nuclear strategy today."<sup>20</sup>

In addition to two nuclear peers, the United States must account for the nuclear threats posed by its rogue state adversaries. North Korea is advancing its nuclear weapons and missile capabilities. It continues to produce fissile material to build new nuclear weapons; has developed a new "monster" ICBM that supposedly is able to carry multiple warheads; and as of the time this book was being prepared, had conducted 31 tests of its ground-based and sea-based ballistic missiles in 2022, including its first ICBM test since 2017.<sup>21</sup> According to the U.S. Special Representative for North Korea, Pyongyang could conduct an underground nuclear test at "any time."<sup>22</sup>

Iran, in addition to being the world's principal state sponsor of terrorism, continues to enrich uranium at dangerous levels and has recently acquired enough fissile material to produce a nuclear bomb according to the International Atomic Energy Agency.<sup>23</sup> A nuclear Iran would have significant implications both for stability in the region and for U.S. non-proliferation goals.

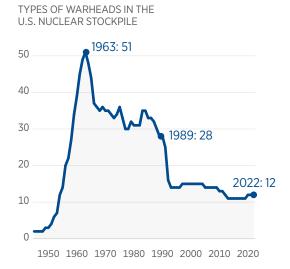
Finally, given the role of U.S. nuclear weapons in deterring attacks using conventional weapons, it is important to consider non-nuclear threats posed by adversaries. Both Russia and China are deploying advanced conventional capabilities like conventionally armed hypersonic missiles and even conventionally armed cruise missiles capable of striking the U.S. homeland just below the nuclear threshold.<sup>24</sup> China, Russia, and Iran have been accused of violating both the Biological Weapons Convention (BWC) and the Chemical Weapons Convention (CWC). 25 North Korea also is in violation of the BWC and is thought to possess chemical weapons. (It is not, however, a signatory to the CWC.) Especially since the United States does not possess chemical or biological weapons of its own, nuclear weapons will continue to play a role in deterring these threats.

# Current U.S. Nuclear Capabilities and Maintenance Challenges

To assess U.S. nuclear weapons capabilities, it is important to understand the current state of those capabilities and the challenges associated with maintaining them. The United States maintains a force posture based on the guidelines set forth by the New Strategic Arms Reduction Treaty (New START) signed with Russia in 2010.

To abide by New START limits, the United States maintains 14 *Ohio*-class ballistic missile submarines (SSBNs), 12 of which are operational and each of which is armed with 20 Trident II D5 submarine-launched ballistic missiles (SLBMs);

### A Smaller and Less Diverse Nuclear Arsenal





**NOTE:** Quantities include deployed warheads and warheads in reserve, but the U.S. is limited by New START to only 1,550 deployed warheads. **SOURCES:** 

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▲ heritage.org

400 single-warhead Minuteman III intercontinental ballistic missiles (ICBMs) deployed among 450 silos; and about 60 nuclear-capable B-52 and B-2 bombers that can be armed with gravity bombs or air-launched cruise missiles. As of September 2021, the United States was deploying 1,389 warheads under New START counting rules. The same counting rules are counting rules.

Additionally, the United States maintains about 200 B61 tactical gravity bombs. About 100 of these bombs "are deployed in Europe, of which about 60 are earmarked for use by NATO aircraft. The remaining 100 bombs are in central storage in the United States as backup and contingency missions in the Indo-Pacific region."<sup>28</sup>

The United States is working to modernize these nuclear forces, which continue to age beyond their original intended lifetimes. U.S. nuclear delivery systems, warheads, and nuclear supporting infrastructure were all developed during the Cold War and have no margin for further life extension. As stated by Admiral Richards:

We are at a point where end-of-life limitations and the cumulative effects of underinvestment in our nuclear deterrent and supporting infrastructure leave us with no operational margin. The Nation simply cannot attempt to indefinitely life-extend leftover Cold War weapon systems and successfully support our National strategy. Pacing the threat requires dedicated and sustained funding for the entire nuclear enterprise and NC3 Next Generation modernization must be a priority.<sup>29</sup>

Faced with this set of circumstances, the United States must contend with three overarching challenges:

- The need to recapitalize all components of its nuclear forces,
- The need to refurbish an aging and crumbling nuclear weapons infrastructure, and
- The need to recruit and train talented personnel that has been created by an aging workforce.

This nuclear modernization program dates back to around 2010 and is based on the size of the current arsenal, which is meant to deter only one nuclear peer: Russia. The extraordinary technical and geopolitical developments being realized to-day—China's nuclear breakout and Russia's nuclear expansion—were generally not anticipated as the Obama Administration went about finalizing our nuclear force structure for the coming decades.<sup>30</sup> This assumption of a more benign threat environment influenced decisions about the nuclear force structure that the United States is pursuing today.

The United States for the most part is replacing its nuclear forces on a one-to-one basis rather than adding new or additional capabilities. The *Columbia*-class nuclear submarine, for example, will have eight fewer missile tubes than its predecessor, the

*Ohio*-class, and therefore less firing capacity.<sup>31</sup> The only significant change in the U.S. nuclear arsenal was the deployment of W76-2 low-yield warheads for the SLBMs in 2020, and it did not increase capacity. The 2018 NPR also recommended a nuclear-armed, sea-launched cruise missile to develop in the longer term, but this proposal has not gained necessary support from the current Administration.

To provide assurance against changes in a geopolitical situation like those that are occurring today, as well as assurance against failures in the U.S. stockpile, the United States preserves an upload capability that allows it to increase the number of nuclear warheads on each type of its delivery vehicles. The U.S. Minuteman III ICBM, for example, is currently deployed with only one Mk12A/W78 warhead, but it can carry as many as three; the Trident II SLBM can carry several warheads at once; and the B-52 bomber can carry additional cruise missiles.<sup>32</sup>

The reduced number of missile tubes on the future *Columbia*-class SSBN will in turn reduce the strategic submarine force's upload capacity. However, this hedge capacity is limited, as uploading warheads onto the Minuteman III missiles would prove to be both time-consuming and costly, and the United States could not exploit the bomber upload capacity during peacetime because bombers currently remain off alert. Uncertainty as to whether the United States will have enough modern warheads or air-launched cruise missiles will remain another potential impediment to upload capacity.

The United States also maintains an inactive stockpile that includes near-term hedge warheads that "can serve as active ready warheads within prescribed activation timelines" and reserve warheads that can provide "a long-term response to risk mitigation for technical failures in the stockpile."<sup>33</sup>

The United States has not designed or built a nuclear warhead since the end of the Cold War. Instead, the National Nuclear Security Administration (NNSA) uses life-extension programs (LEPs) to extend the service lives of existing weapons in the stockpile, some of which date back to the 1960s. While LEPs replace or upgrade most components in a nuclear warhead, all warheads will eventually need to be replaced because their nuclear components—specifically, plutonium pits that comprise the cores of warheads—are also subject to aging.<sup>34</sup> The United States is the only nuclear state that lacks the capability to produce plutonium pits in quantity. The

NNSA's fiscal year (FY) 2023 budget request notes that "[t]he Plutonium Modernization program provides funding for efforts across the nuclear security enterprise to restore the Nation's capability to produce 80 pits per year (ppy)" and that "NNSA remains committed to achieving the statutory pit production capability goals on the path to 80 ppy." 35

Demographic challenges within the nuclear weapons labs also affect the ability of the U.S. to modernize its warhead stockpile. Most scientists and engineers with practical hands-on experience in nuclear weapons design and testing are retired. This means that the certification of weapons that were designed and tested as far back as the 1960s depends on the scientific judgment of designers and engineers who have never been involved in either the testing or the design and development of nuclear weapons. In recent years, NNSA has invested in enabling its workforce to exercise critical nuclear weapons design and development skills that have not been fully exercised since the end of the Cold War. These skills must be available when needed to support modern warhead development programs for U.S. SLBMs and ICBMs.

The shift in emphasis away from the nuclear mission after the end of the Cold War led to a diminished ability to conduct key activities at the nuclear laboratories. According to NNSA Administrator Jill Hruby, "the nuclear stockpile is safe, secure, reliable, and effective," but "NNSA is aware that legacy infrastructure is well beyond its intended life designs and incapable of providing all the capabilities needed to deliver on the modernization efforts, especially with the demanding production schedules." As a result of this neglect, NNSA must recapitalize the nuclear weapons complex at the same time the nation faces the need to modernize its aging nuclear warheads.

In recent years, bipartisan congressional support for the nuclear mission has been strong, and nuclear modernization has received additional funding. Preservation of that bipartisan consensus will be critical as these programs mature and begin to introduce modern nuclear systems to the force.

In FY 2022, the Biden Administration, supported by Congress, advanced the comprehensive modernization program for nuclear forces that was initiated by President Barack Obama and continued by the Trump Administration. Despite some opposition, Congress funded the two previous Presidents' budget requests for these programs as well. Because such modernization activities require consistent, stable, long-term funding commitments, this continued bipartisan support has been critical.

The NNSA received \$20.7 billion in FY 2022, which was about \$1 billion more than it received in FY 2021 and included full funding for major efforts like modernization of plutonium pit production and five warhead modernization programs.<sup>37</sup> The FY 2023 budget would continue these efforts with an NNSA topline of \$21.4 billion.<sup>38</sup> The FY 2023 budget also supports modernization programs to replace the triad, including the Ground Based Strategic Deterrent (GBSD), recently named "Sentinel"; Long Range Stand Off Weapon (LRSO); *Columbia*-class nuclear submarine; and B-21 Raider bomber.

In FY 2022, Congress also provided funding to begin research and development on a nuclear-armed, sea-launched cruise missile (SLCM-N), which was proposed in the 2018 NPR in light of the worsened security environment with Russia and China.<sup>39</sup> However, the Biden Administration removed funding for this capability in its FY 2023 budget request. President Biden's Interim National Security Strategic Guidance describes a goal of "reduc[ing] the role of nuclear weapons in our national security strategy," and it is likely that this goal influenced the decision to cancel the SLCM-N.<sup>40</sup>

### Assessing U.S. Nuclear Force Capacity

To assess the military services, other sections in this *Index* use a combination of government strategies or assessments and historical data based on capacity and capabilities that the United States has needed to fight wars in the past. For example, using data from four previous wars and strategies over time, this *Index* assesses Army Brigade Combat Team (BCT) capacity based on a total of 50 BCTs required to deal with two major regional conflicts.<sup>41</sup>

Assessing the capacity of U.S. nuclear weapons, however, presents several serious difficulties. Because a nuclear war has never been fought, there are no historical data that can be used to determine a baseline for how much nuclear capability the United States needs. The only instance of nuclear weapons employment was the U.S. bombing of Hiroshima and Nagasaki in 1945, but that does not provide any information on how much nuclear capability is needed because the United States was the only nuclear-weapon state and did not yet maintain a functioning nuclear arsenal.

Moreover, since deterrence depends on what an adversary perceives to be a credible threat, it is very difficult to determine how many warheads, and on how many and what types of platforms, the United States needs to deter an adversary. Deterrence requires an understanding of what an adversary values and what it will take to convince the adversary not to take a certain action. One way to measure needed nuclear capacity could be to analyze the size of the nuclear force that the U.S. needed to deter the Soviet Union during the Cold War, but using past data on the size of U.S. and Soviet nuclear arsenals would not apply to today's nuclear environment, because three-peer deterrence dynamics inherently differ from a two-party dynamic of "mutually assured destruction."

Nevertheless, it is possible to draw some conclusions about the adequacy of the size and structure of the current U.S. nuclear force posture. A force that is sized to deter only one nuclear peer is not likely to be sufficient to deter two nuclear peers—both Russia and China. Consensus during the early years of the Obama Administration centered around the assessment that Russia was the primary nuclear threat; that China would likely grow its nuclear arsenal, but not beyond its minimum deterrence posture; and that nuclear proliferation in Iran or an India-Pakistan nuclear conflict would dominate future nuclear threats. 42 Then-STRATCOM Commander General Kevin Chilton testified in 2010 that "I think the arsenal that we have is exactly what is needed today to provide the deterrent."43 A nuclear force that was capable of countering the threats we faced in 2010 is most likely not capable of countering the threats we face today.

There is a direct relationship between adversary capabilities and what the U.S. needs for deterrence. Fundamental to the concept of deterrence is the ability to hold at risk the assets that our adversaries value most, including their nuclear forces and accompanying infrastructure. For deterrence to be credible, the United States maintains the amount and types of nuclear weapons that it needs to convince adversaries that can strike these targets if necessary. Given the increase in targets resulting from China's nuclear expansion, this logic points to a likelihood that current U.S. nuclear weapon capacity is insufficient.

This capacity deficiency is particularly acute in the category of tactical nuclear weapons: non-strategic nuclear weapons that can be deployed directly to a region of conflict as opposed to ICBMs launched from the homeland or SSBNs that remain far out at sea. U.S. tactical nuclear weapons can be compared to Russia's arsenal of non-strategic nuclear weapons that are not limited by New START and China's arsenal of hundreds of nuclear-capable medium-range to intermediate-range missiles deployed in the Indo-Pacific. Compared to Russia's arsenal of more than 2,000 non-strategic weapons, the United States deploys about 100 tactical weapons in NATO states. Compared to China, the United States deploys no nuclear weapons to the Indo-Pacific.

The 2018 NPR studied these disparities and assessed that the United States needed two supplemental capabilities—the W76-2 and the SLCM-N—to rectify this imbalance. The United States fielded the W76-2, but the future of the SLCM-N remains uncertain. Meanwhile, this disparity has worsened since the 2018 review. In April 2022, Admiral Richard wrote in a letter to Congress that "the current situation in Ukraine and China's nuclear trajectory convinces me a deterrence and assurance gap exists." The SLCM-N is therefore necessary. Other senior military leaders who agree include:

- Admiral Charles A. Richard, Commander, U.S. Strategic Command;
- General Mark A. Milley, Chairman, Joint Chiefs of Staff;
- Admiral Christopher W. Grady, Vice Chairman, Joint Chiefs of Staff;
- General Tod D. Wolters, Commander, U.S. European Command; and
- Admiral Michael M. Gilday, Chief of Naval Operations.<sup>45</sup>

These assessments that more is needed to address the tactical nuclear threat, combined with the sheer numerical difference between the United States and its adversaries, point to a poor score for the capacity of tactical nuclear weapons. However, while this *Index* can conclude that U.S. nuclear weapon capacity is likely inadequate, it stops short of assigning this category a score ranging from "very strong" to "very weak" as the rest of the categories in this chapter are rated.

The question that remains unanswered is how much more the United States needs to account for the drastic change in the Chinese nuclear threat, Russia's continuing expansion, and the potential rise of Iran as a nuclear power in a globally critical region. In addition to the inherent constraints on determining a baseline for nuclear weapons capacity, it would be hard to determine what an ideal force posture would look like in a three-party nuclear dynamic. For example, would the United States need to double its arsenal to deter two peers? Or would only limited additions to the stockpile or changes in U.S. posture or alert status suffice? Perhaps these questions can be answered in the future, but since China's strategic breakout was revealed to the public in 2021, there has been little time for the broader policy and academic community to analyze the three-party nuclear peer dynamic.

Even assigning a score for tactical weapon capacity would be difficult despite the evidence pointing to a deterrence gap. Some might argue that this gap weakens U.S. forces only slightly in this category because existing capabilities like the air-launched cruise missile and W76-2 would contribute to the deterrence of adversary tactical nuclear strikes. Others might argue that a lack of any nuclear weapons stationed in the Indo-Pacific to counter China's arsenal would warrant a score of "very weak." But without an identified number for how many tactical nuclear weapons the United States needs both to deter adversaries and to assure allies, making this assessment remains difficult.

As a result, this *Index* concludes that U.S. nuclear weapons capacity is likely not sufficient to face two nuclear peers at once but does not assign a score in this category. This may change in future editions.

### **U.S. Nuclear Weapons Assessment**

In rating America's military services, this *Index* focuses on capacity, capability, and readiness. In assessing our nuclear forces, however, this *Index* focuses on several components of the existing nuclear weapons enterprise. This enterprise includes warheads; delivery systems; and the physical infrastructure that designs, manufactures, and maintains U.S. nuclear weapons. It also includes and must sustain the talent of people—the nuclear designers, engineers, manufacturing personnel, planners, maintainers, and operators who help to ensure a nuclear deterrent that is second to none—and additional

elements like nuclear command and control; intelligence, surveillance, and reconnaissance; and aerial refueling, all of which also play a major role in conventional operations.

While many factors make such an assessment difficult, two stand out. First, there is a lack of detailed publicly available data about the readiness of nuclear forces, their capabilities, and the reliability of their weapons. Second, many components that comprise the nuclear enterprise are also involved in supporting conventional missions. For example, U.S. strategic bombers perform a significant conventional mission and do not fly airborne alert with nuclear weapons today as they did routinely during the 1960s. Thus, it is hard to assess whether any one piece of the nuclear enterprise is sufficiently funded, focused, and/or effective with regard to the nuclear mission.

With these difficulties in mind, this assessment considers seven factors that are deemed the most important elements of the nuclear weapons enterprise:

- Reliability of the current U.S. nuclear stockpile,
- Reliability of current U.S. delivery systems,
- · Nuclear warhead modernization,
- Nuclear delivery systems modernization,
- Nuclear weapons complex,
- Personnel challenges within the national nuclear laboratories, and
- · Allied assurance.

These factors are judged on a five-grade scale that ranges from "very strong" (defined as meeting U.S. national security requirements or having a sustainable, viable, and funded plan in place to do so) to "very weak" (defined as not meeting current security requirements and with no program in place to redress the shortfall). The other three possible scores are "strong," "marginal," and "weak."

# Reliability of Current U.S. Nuclear Stockpile Score: Strong

U.S. warheads must be safe, secure, effective, and reliable. The Department of Defense defines



1 Lawrence Livermore National Laboratory

> Livermore, CA Nuclear weapons R&D

2 Sandia National Laboratories

> Livermore, CA Nuclear weapons R&D and systems engineering

3 Nevada National Security Site

Nye County, NV Subcritical experiments and test readiness 4 Sandia National Laboratories

Albuquerque, NM Nuclear weapons R&D and systems engineering

5 Los Alamos National Laboratory

> Los Alamos, NM Nuclear weapons R&D and plutonium pit production

6 Pantex Plant
Panhandle, TX
Assembly of nuclear
warheads

7 Kansas City Plant

Kansas City, MO Production of non-nuclear components for nuclear warheads

8 Y-12 National Security Complex

Oak Ridge, TN

Manufacture of
highly-enriched uranium
parts for nuclear warheads

9 Savannah River Site Aiken, SC Pit production and tritium production

heritage.org

**SOURCE:** Heritage Foundation research.

reliability as "the probability that a weapon will perform in accordance with its design intent or military requirements." Since the cessation of nuclear testing in 1992, reliability has been assessed and maintained through the NNSA's Stockpile Stewardship Program (SSP), which consists of an intensive warhead surveillance program; non-nuclear experiments (experiments that do not produce a nuclear yield); sophisticated calculations using high-performance computing; and related annual assessments and evaluations. America and its allies must have high confidence that U.S. nuclear warheads will perform as expected.

Over time, the number and diversity of nuclear weapons in the stockpile have decreased. The result is a smaller margin of error if all of one type are affected by a technical problem that might cause a weapon type or its delivery system to be decommissioned. Despite generating impressive amounts of knowledge about nuclear weapons physics and materials chemistry, the United States could find itself surprised by unanticipated long-term effects on a nuclear weapon's aging components. "The scientific foundation of assessments of the nuclear performance of US weapons is eroding as a result of the moratorium on nuclear testing," argue John

Hopkins, nuclear physicist and a former leader of the Los Alamos National Laboratory's nuclear weapons program, and David Sharp, former Laboratory Fellow and a guest scientist at the Los Alamos National Laboratory.<sup>47</sup>

The United States currently has the world's safest and most secure stockpile, but concerns about overseas storage sites, potential problems introduced by improper handling, or unanticipated effects of aging could compromise the integrity or reliability 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 without proper authorization. Some U.S. warheads have modern safety features that provide additional protection against accidental detonation; others do not.

**Grade:** Absent nuclear weapons testing, the national laboratories' assessment of weapons reliability, based on the full range of surveillance, scientific, and technical activities carried out in NNSA's Stockpile Stewardship Program, depends on the expert judgment of the laboratories' directors and the weapons scientists and engineers on their staffs. This judgment is based on experience, non-nuclear experimentation, and extensive modeling and simulation. It does not benefit from the objective data that could be obtained through direct nuclear testing, which was used in the past to diagnose and fix potential problems with nuclear warheads.

With or without nuclear testing, however, the United States maintains the world's most advanced Stockpile Stewardship Program and continues to make scientific and technical advances to help certify the stockpile. For example, NNSA is working on upgrades to the Enhanced Capabilities for Subcritical Experiments facility in Nevada (such as adding the capability to produce high-speed, high-fidelity X-ray images of subcritical experiments and to watch nuclear implosion) to improve our understanding of plutonium. 48 In addition, "[t]he Exascale Computing Initiative (ECI) will provide NNSA with next-generation simulation capabilities to support weapons design, science-based stockpile stewardship, and stockpile certification activities" and is on track "to meet its exascale system initial operation capability in FY 2023."49

Such advanced capabilities can help the NNSA to certify the stockpile more accurately and without testing, but according to Admiral Richard, confidence in the stockpile requires two other

components in addition to the Stockpile Stewardship Program:

[Y]ou have to have a flexible and modern stockpile, which means we need to move past life extensions, which we have been doing for 30 years, and move into refurbishments, which is where NNSA is about to go. And ...[y]ou have to have a modern, responsive, and resilient infrastructure, and we have delayed too long, in my opinion, giving NNSA the resources necessary to do that piece.<sup>50</sup>

To assess the reliability of the nuclear stockpile annually, each of the three nuclear weapons labs (the Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratory) reports its findings with respect to the safety, security, and reliability of the nation's nuclear warheads to the Secretaries of Energy and Defense, who then brief the President. Detailed classified reports are provided to Congress as well. The Commander of U.S. Strategic Command also assesses overall nuclear weapons system reliability, including the reliability of both warhead and delivery platforms.

In spite of concerns about aging warheads, according to the NNSA's Stockpile Stewardship and Management Plan (SSMP) for FY 2022:

DOE/NNSA conducted surveillance activities for all weapon systems using data collection from flight tests, laboratory tests, and component evaluations to assess stockpile reliability without explosive nuclear testing, which culminated in completion of all annual assessment reports and generation of laboratory director letters to the President.<sup>51</sup>

Additionally, when asked in a congressional hearing whether she "agree[s] that there is not a current or foreseeable need for the United States to resume explosive nuclear testing that produces nuclear yields," Administrator Hruby testified, "Yes...I do. And I would just go further to say our entire Stockpile Stewardship Program is designed around the principal [sic] that we will make sure we understand weapons enough so that we do not have to test."<sup>52</sup>

Based on the results of the existing method used to certify the stockpile's effectiveness, we grade the U.S. stockpile conditionally as "strong." This grade, however, will depend on whether support for an adequate stockpile, both in Congress and in the Administration, remains strong.

### Reliability of Current U.S. Delivery Systems Score: Strong but Trending Toward Marginal or Weak

Reliability encompasses not only the warhead, but strategic delivery vehicles as well. For ICBMs, SLBMs, and air-launched cruise missiles (ALCMs), this requires a successful missile launch, including the separation of missile boost stages, performance of the missile guidance system, separation of the reentry vehicles from the missile post-boost vehicle, and accuracy of the final reentry vehicle in reaching its target. <sup>53</sup> It also entails the ability of weapons systems (cruise missiles, aircraft carrying bombs, and reentry vehicles) to penetrate adversary defensive systems and reach their targets.

The United States conducts flight tests of ICBMs and SLBMs every year to ensure the reliability of its delivery systems with high-fidelity "mock" warheads. Anything from faulty electrical wiring to booster separations could degrade the reliability and safety of the U.S. strategic deterrent. U.S. strategic longrange bombers also regularly conduct continental United States and intercontinental exercises and receive upgrades to sustain a demonstrated high level of combat readiness. The Air Force tested the AGM-86B ALCM, launched from the B-52H bomber, most recently in 2017. The DOD must upgrade existing platforms and develop their replacement programs simultaneously, and diminished capabilities make this task more difficult.

**Grade:** In July 2018, the Air Force suffered its first unsuccessful ICBM test since 2011,<sup>55</sup> but it has conducted several successful tests since then, including a test in August 2020 that launched a missile armed with three reentry vehicles<sup>56</sup> and its most recent test, which was conducted in August 2021.<sup>57</sup> However, its May 2021 test was marred by a ground abort before launch, and this has provoked speculation about the reliability of the Minuteman III missile as it approaches its retirement, which is scheduled to begin in 2029.<sup>58</sup> Additionally, the DOD canceled a Minuteman III test scheduled for March 2022 (and then rescheduled to April 2022) "in a bid to lower nuclear tensions with Russia." As a result, as of the time this book was being prepared, the Air

Force had not conducted any ICBM tests in 2022.<sup>59</sup> SLBM tests in 2021 were successful.<sup>60</sup>

To the extent that data from these tests are publicly available, they provide objective evidence of the delivery systems' reliability and send a message to U.S. allies and adversaries alike that U.S. systems work and that the U.S. nuclear deterrent is ready if needed. The aged systems, however, occasionally have reliability problems, as evidenced by the failed July 2018 and May 2020 Minuteman III launches. Moreover, canceling missile tests without rescheduling deprives the United States of an additional opportunity to confirm the system's reliability.

Although delivery systems are likely reliable enough today, the evidence indicates that this reliability could dwindle with aging. For instance, because of its obsolescence against Russian air defense systems, the B-52H bomber already no longer carries gravity bombs. 61 Despite the fact that the AGM-86B passed its most recent public test in 2017, General John Hyten has stated that because of its age, "it's a miracle that [the missile] can even fly" and that the current ALCMs "do meet the mission, but it is a challenge each and every day."62 The five years that have passed since that last public test could only have exacerbated those problems. Admiral Richard has also stated that "I need a weapon that can fly and make it to the target. Minuteman-III is increasingly challenged in its ability to do that."63

The problem is made worse by advancing Russian and Chinese air and missile defenses. In addition to advanced air defense systems like the S-400, which contributed to the decision that the B-52H bomber should no longer carry gravity bombs, both Russia and China are placing a greater emphasis on longrange ballistic missile defense. Russia is modernizing its long-range interceptors-and has dozens more than the United States has—and China's missile defense capabilities, while mostly focused on regional threats, "appear to be developing towards countering long-range missiles."64 As U.S. delivery systems increasingly approach obsolescence, adversary air and missile defense increasingly calls into question the ability of U.S. weapons to strike their targets.

Both adversary defenses and system aging will continue to affect delivery platform reliability until platforms are replaced, but as this book was being prepared, no publicly released data or statements from senior leaders had indicated that U.S. delivery systems cannot currently meet mission requirements. Until that changes, this factor receives the grade of "strong." However, this grade will trend to "marginal" if not "weak" if modernization programs are not fully pursued and these aging systems are not replaced on time.

# Nuclear Warhead Modernization Score: Marginal

During the Cold War, the United States focused on designing and developing modern nuclear warheads to counter Soviet advances and modernization efforts and to leverage advances in our understanding of the physics, chemistry, and design of nuclear weapons. Today, the United States focuses on extending the life of its aging stockpile rather than on fielding modern warheads while trying to retain the skills and capabilities needed to design, develop, and produce such warheads. Relying only on sustaining the aging stockpile could increase the risk of failure caused both by aging components and by not exercising critical skills. It could signal to adversaries that the United States is less committed to nuclear deterrence.

Meanwhile, adversaries and current and future proliferants are not limited to updating Cold War designs and can seek designs outside of U.S. experiences. Other nations can maintain their levels of proficiency by developing new nuclear warheads. <sup>65</sup> As recently reported by the Department of State, "Russia has conducted nuclear weapons experiments that have created nuclear yield and are not consistent with the U.S. 'zero-yield' standard," and evidence points to China's potential lack of adherence to this standard as well. <sup>66</sup>

Fortunately, the NNSA has made noticeable improvements in this category in recent years. Since 2016, Congress has funded the Stockpile Responsiveness Program (SRP) to "exercise all capabilities required to conceptualize, study, design, develop, engineer, certify, produce, and deploy nuclear weapons." Congress funded the SRP at \$70 million in FY 2020 and FY 2021.68 It provided only \$50 million for the SRP for FY 2022, and the FY 2023 budget requests \$68.7 million.69 The SRP has demonstrated some important accomplishments in ensuring critical skills retention and has been met with enthusiasm by scientists at the national labs.

Ongoing work at the national labs to develop additional warheads will build on the success of the SRP in exercising these skills on modern warhead

programs. Starting in FY 2021, Congress appropriated funding for the W93/Mark 7 warhead program, which will replace the W76-1 and W88 warheads carried by the Trident II D5 SLBMs. To The NNSA is also developing the W87-1 warhead for the Sentinel missile. Fielding modern weapons like the W93/Mark 7 would allow American engineers and scientists to improve previous designs and devise more effective ways to address evolving military requirements (for example, adaptability to emerging threats and the ability to hold hard and deeply buried targets at risk). Future warheads could remedy some ongoing aging concerns and thereby improve reliability while also enhancing the safety and security of American weapons.

The nuclear enterprise displayed improved flexibility when it produced the W76-2 warhead, a low-yield version of the W76 warhead that was designed to counter Russia's perception of an exploitable gap in the U.S. nuclear force posture, within a year. Congress fulfilled the budget request of \$72 million for the W93/Mark 7 warhead program for FY 2022, and the FY 2023 budget requests \$240.5 million to begin funding the program's second development phase.<sup>71</sup>

The ability to produce plutonium pits, which compose the core of all nuclear weapons, will be critical to warhead modernization efforts. The NNSA currently cannot produce plutonium pits at scale and is undergoing an effort to restore this capability with a statutory requirement to produce 80 pits per year by 2030. The W93/Mk 7, the W87-1, and likely future designs are planned to use these new pits. Unfortunately, the NNSA announced last year that it would not be able to meet the 2030 deadline, and the new goal has shifted to somewhere between 2032 and 2035.

**Grade:** Before the score for this category can move up to "strong," the NNSA, with support from Congress, will need to achieve enough progress with the W93/Mk 7 and W87-1 and minimize delays in pit production. Delays in pit production will require modern warheads to use older pits, which risks jeopardizing both the functioning of those systems and the credibility of the U.S. deterrent. The NNSA eventually will also need to begin programs for future land-based, sea-based, and air-delivered warheads, all of which currently remain notional, to succeed the current programs beyond 2030.74

Moreover, future assessments will need to examine whether the NNSA's current warhead

modernization effort is sufficient to address the increasing threat. For instance, despite Russian progress in hardening and deeply burying facilities to withstand strikes by current U.S. weapons, an earth-penetrating warhead is not part of the NNSA's warhead modernization plan.<sup>75</sup> The Biden Administration's proposal to cancel the plan to keep the B83 gravity bomb (currently the only warhead capable of striking hard and deeply buried targets) beyond its planned retirement could create a capability gap.<sup>76</sup>

For now, the score for this category remains at "marginal" but could trend toward "strong" in future years.

### Nuclear Delivery Systems Modernization Score: Strong

All U.S. delivery systems were built during the Cold War and are overdue for replacement. The Obama Administration, in consultation with Congress, initiated a plan to replace current triad delivery systems within the constraints of New START. President Trump advanced this modernization program with bipartisan support from Congress. Under this modernization program:

- The Navy is fully funding the *Columbia*-class submarine to replace the *Ohio*-class submarine;
- The Air Force is funding the B-21 Raider Long-Range bomber, which will replace conventionally armed bombers before they become certified to replace nuclear-capable bombers, and the Long-Range Standoff weapon, which will replace the aging air-launched cruise missile;
- Existing Minuteman III ICBMs are expected to remain in service beyond the end of the decade, 50 years after their intended lifetime, and to be replaced by the Sentinel missile beginning in 2029;
- Existing Trident II D5 SLBMs have been life-extended to remain in service until 2042 through the end of the last *Ohio*-class submarine's lifetime; and
- The F-35 will replace the existing F-15E Dual Capable Aircraft that will carry the B61-12 gravity bomb.<sup>77</sup>

All of these programs have remained on track for the past few years, but they face high risks of delay. For instance, the U.S. Government Accountability Office (GAO) found risks in the Sentinel missile schedule related to "technology maturation," the complexity involved in operating Minuteman III missiles and Sentinel missiles concurrently during the transition period, "[l]imited schedule margin for testing," and the "aggressive pace of construction activities." Moreover, these programs are entering a new phase of risk as they move from initial research and development to testing (the Sentinel's first flight test, for example, is planned for 2023) and then procurement."

These scheduling risks are especially dangerous because years of deferred recapitalization have left modernization programs with no margin for delay. For instance, although the *Columbia*-class SSBN currently remains on schedule, the transition between the *Ohio* and the *Columbia* is so fragile that, according to Admiral Johnny Wolfe, "[d]elays to the Navy's SSBN modernization plan are not an option."

The effects of failing to replace current systems before their planned retirement dates are significant. As systems like the Minuteman III, AGM 86-B, and Ohio-class submarines continue to age, they take on greater risks. Age degrades reliability by increasing the potential for systems to break down or fail to respond correctly. Any defects can have serious implications for U.S. deterrence and assurance. Should Sentinel fail to reach initial operating capability by 2029, the United States will be left with a less-capable—and therefore less credible—ICBM fleet, which will also begin to dip below 400 missiles as the Air Force continues to use missiles for annual testing. With respect to the Navy, the GAO has reported that the consequence of failing to deliver the first Columbia-class submarine on time would be a failure to meet STRATCOM's force-generation operational requirement, which means a weaker seabased deterrent.81

**Grade:** U.S. nuclear platforms are in dire need of recapitalization. Plans for modernization of the nuclear triad are in place, and Congress and the services have largely sustained funding for these programs. Congress fully funded the FY 2022 budget requests for all modernization programs. GBSD was given the name "Sentinel" and as of April 2023 was expected to perform its "first flight test in the next 16 to 18 months." The Air Force also awarded

Raytheon an engineering and manufacturing development contract in July 2021 for the LRSO, which also remains on schedule. So Despite these successes, however, the fragility of these programs keeps them at risk of technical or funding delays, including continuing resolutions.

This modernization plan will also likely not suffice to deter both Russia's and China's advancing nuclear forces at the same time. Growth in adversary forces has a direct impact on the required size of U.S. nuclear forces because U.S. forces must be able to target adversary nuclear weapons as part of the U.S. counterforce strategy. As a result, the United States will need to consider procuring more of these modern systems than originally planned. For example, the Program Executive Officer for Strategic Submarines recently stated that "[it] clearly makes sense to have more than 12 [Columbia-class SSBNs] to meet the current requirements."

The United States will also need to consider acquiring additional capabilities to ensure that deterrence is tailored to the evolving Russian threat and the new Chinese threat. The SLCM-N, if it continues to receive funding from Congress, would begin to meet this challenge by providing the President with an option to respond more proportionally to—and therefore deter—an adversary's limited employment of nuclear weapons in a theater of conflict.

For now, replacing current systems remains the top priority, and based on the commitment to nuclear weapons modernization demonstrated by Congress and the Administration this year, this category again earns a grade of "strong." However, the score in future years will drop to "marginal" or "weak" if the United States fails to adjust its modernization program to account for the drastic change in threat. A failure to restore funding for the SLCM-N will contribute to such a drop in score.

#### **Nuclear Weapons Complex Score: Marginal**

Maintaining a reliable and effective nuclear stockpile depends in large part 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 (nuclear weapons research and development, or R&D, and plutonium pit production);

- Lawrence Livermore National Laboratories (nuclear weapons R&D);
- Sandia National Laboratory (nuclear weapons R&D and systems engineering);
- Nevada National Security Site (subcritical experiments, test readiness);
- Pantex Plant (assembly of nuclear warheads);
- Kansas City Plant (production of non-nuclear components for nuclear warheads);
- Savannah River Site (second site for pit production and tritium production); and
- Y-12 National Security Complex (manufacture of highly enriched uranium parts for nuclear warheads).

These complexes design, develop, test, and produce the weapons in the U.S. nuclear arsenal, and their maintenance is therefore of critical importance. As stated by NNSA Administrator Jill Hruby, "A resilient, flexible, and scalable infrastructure is the foundation of a modern nuclear security enterprise."85 It contributes to deterrence by enabling the United States to adapt its nuclear arsenal to shifting requirements, signaling to adversaries that the United States can adjust its warhead capacity or capabilities when needed. Maintaining a safe, secure, effective, and reliable nuclear stockpile requires modern facilities, technical expertise, and tools both to repair any malfunctions quickly, safely, and securely and to produce new nuclear weapons when they are needed.

The existing nuclear weapons complex, however, is not capable of producing some of the nuclear components needed to maintain and modernize the stockpile. So Significantly, the United States has not had a substantial plutonium pit production capability since 1993. The U.S. currently retains more than 5,000 old plutonium pits in strategic reserve in addition to pits for use in future LEPs, but uncertainties regarding the effect of aging on plutonium pits and how long the United States will be able to depend on them before replacement remain unresolved. In 2006, a JASON Group study of NNSA assessments of plutonium aging estimated that, depending on

pit type, the minimum pit life was in the range of 100 years. A work program was recommended to address additional uncertainties in pit aging, but that did not reach fruition. In addition to the pits needed for modern warheads like the W87-1 and W93, numerous pits have been in the stockpile for decades—some for more than 50 years—and will need to be replaced.

Today, the production rate is too low to meet the need to replace aging pits. The United States has demonstrated an ability to produce about 10 plutonium pits a year at the Los Alamos PF-4 facility. If executed as planned, infrastructure modernization of PF-4, as mandated by statutory law, will boost that number to 30 by 2026. In April 2021, the NNSA reached the first critical milestone for pit production at the Los Alamos National Laboratory.88 A second plutonium pit production facility is being planned to exploit the Mixed Oxide Fuel (MOX) facility that was being constructed at the Savannah River Site in South Carolina. Savannah River has a required production of no fewer than 50 pits per year by 2030 for an overall requirement of no fewer than 80 per year, but delays at the site are driving the delay in the NNSA's ability to produce 80 pits per year by 2030.

Aside from plutonium, the NNSA must maintain production of several other key materials and components that are used to build and maintain nuclear weapons. For instance, NNSA plans to increase the supply of tritium as demand increases. Because tritium is always decaying at a half-life of 12 years, delays in tritium production only increase the need to produce a timely replacement. <sup>89</sup> Other projects currently underway include a new lithium processing facility and the new Uranium Processing Facility at Y-12. So far, this facility is moving forward on schedule and cost.

Added to these considerations is the fact that the NNSA's facilities are old: About 60 percent of its 5,000 facilities are more than 40 years old, and more than half are in poor condition. OAS a consequence, the NNSA had accumulated about \$5.8 billion in deferred maintenance as of FY 2020. According to the FY 2022 SSMP, high deferred maintenance is a sign that infrastructure is in poor condition and in need of modernization. Aging facilities have also become a safety hazard: In some buildings, for example, chunks of concrete have fallen from the ceiling. Moreover, without modern and functioning NNSA facilities, the U.S. will gradually lose the ability to

conduct the high-quality experiments that are needed to ensure the reliability of the stockpile without nuclear testing.

Finally, despite the self-imposed nuclear testing moratorium that the United States has had in place since 1992, a functioning nuclear weapons complex requires a low level of nuclear test readiness. "Test readiness" refers to a single test or a very short series of tests, not a sustained nuclear testing program, reestablishment of which would require significant additional resources. The NNSA is mandated, initially under President Bill Clinton's 1993 PDD-15, to maintain a capability to conduct a nuclear test within 24 to 36 months of a presidential decision to do so.93 Whether this approach can assure that the United States has the timely ability to conduct yield-producing experiments to correct a flaw in one or more types of its nuclear weapons is open to question. The United States might need to test to assure certain weapon characteristics that only nuclear testing can validate, or to respond to another nation's nuclear weapons tests, or to communicate its unquestioned resolve.

However, the NNSA has been unable to achieve even this potentially inadequate goal. According to the FY 2018 SSMP, it would take 60 months to conduct "a test to develop a new capability."94 And per the FY 2022 SSMP, "Assuring full compliance with domestic regulations, agreements, and laws related to worker and public safety and the environment, as well as international treaties would significantly extend the time required for execution of a nuclear test."95 Because the United States is rapidly losing its remaining practical nuclear testing experience, including instrumentation of very sensitive equipment, the process would likely have to be reinvented from scratch.96 Test readiness has not been funded as a separate program since FY 2010 and is instead supported by the Stockpile Stewardship Program that exercises testing elements at the Nevada National Security Site and conducts subcritical nuclear laboratory experiments.97

**Grade:** Modernizing U.S. nuclear facilities is of critical importance because the NNSA's warhead modernization plans depend on the ability to produce certain components like plutonium pits. The importance of a functioning nuclear weapons complex has also increased as the threat posed by adversaries has worsened. Given the change to a three-party nuclear peer dynamic and both Russia's

and China's active nuclear production capabilities, the United States must maintain the ability to adapt its nuclear posture and hedge against an uncertain future.

On one hand, the United States maintains some of the world's most advanced nuclear facilities. Significant progress has been made over the past decade in getting funded plans in place to recapitalize plutonium pit production capacity and uranium component manufacturing in particular, as well as construction projects for new facilities.

On the other hand, the NNSA faces significant challenges. Some parts of the complex have not been modernized since the 1950s, and plans for long-term infrastructure recapitalization remain essential even as the NNSA embarks on an aggressive warhead life-extension effort. The weak state of U.S. test readiness is also of great concern. In a dynamic threat environment combined with an aging nuclear arsenal, the lack of this capability becomes riskier even as the NNSA improves its stockpile stewardship capabilities. Efforts to restore critical functions of the complex like pit production also face great technical challenges as well as the need to ensure stable funding. The recent shift in deadline for plutonium pit production at the Savannah River Site from 2030 to the 2032-2035 range is one example. After years of deferred modernization, any unexpected failure or disruption at a critical facility could significantly affect schedules for nuclear warhead modernization.98

Until demonstrable progress has been made toward completion of infrastructure modernization, the grade for this category will therefore remain at "marginal."

## Personnel Challenges Within the National Nuclear Laboratories Score: Marginal but Trending Toward Strong

Combined with nuclear facilities, U.S. nuclear weapons scientists and engineers are critical to the health of the complex and the stockpile. In the words of NNSA Administrator Jill Hruby:

The NNSA Federal workforce is critical to the success of the Nation's nuclear security enterprise. NNSA's expanding mission requirements and pressing modernization and recapitalization needs require recruiting, training, and retaining a skilled Federal workforce with the appropriate capabilities to meet mission requirements and deliver on our objectives.<sup>99</sup>

The ability to maintain and attract a high-quality workforce is critical to ensuring the future of the American nuclear deterrent, especially when a strong employment atmosphere adds to the challenge of hiring the best and brightest. Today's weapons designers and engineers are first-rate, but they also are aging and retiring, and their knowledge must be passed on to the next generation of experts. This means that young designers need meaningful and challenging warhead design and development programs to hone their skills. The NNSA and its weapons labs understand this problem and, with the support of Congress, are beginning to take the necessary steps to invest in the next generation.

The judgment of experienced nuclear scientists and engineers is critical to assessing the safety, security, effectiveness, and reliability of its nuclear deterrent. Without their experience, the nuclear weapons complex could not function. Few of today's remaining scientists or engineers at the NNSA weapons labs have had the experience of taking a warhead from initial concept to "clean sheet" design, engineering development, production, and fielding. The SRP is remedying some of these shortfalls by having its workforce exercise many of the nuclear weapon design and engineering skills that are needed. To continue this progress, SRP funding should be maintained if not increased.

The average age of the NNSA's enterprise-wide workforce had decreased slightly to 46 years as of the end of FY 2020, but more than a quarter of the workforce is now eligible for retirement. Given the length of time required to train new hires, the long timelines of warhead production cycles, and the time it takes to transfer technical knowledge and skills, both recruiting and retaining needed talent remain challenging for the NNSA.

**Grade:** In addition to employing world-class experts, the NNSA labs have had good success in attracting and retaining talent (for example, through improved college graduate recruitment efforts and NNSA Academic Programs). <sup>102</sup> As many scientists and engineers with practical nuclear weapon design and testing experience retire, continued annual assessments and certifications of nuclear warheads will rely increasingly on the judgments of people who have never tested or designed a nuclear weapon. Moreover:

As NNSA mission scope increases, so does the demand for increased personnel to support new facilities and capabilities being brought on-line, and to support moving to 24/7 operations at many sites across the complex. These individuals are essential to minimizing unplanned outages and to supporting safe and secure operations, particularly in high hazard operations.<sup>103</sup>

Hazardous NNSA infrastructure and facilities can also be a hindrance to recruitment and retainment, so modernizing the nuclear weapons complex will be critical to these efforts. <sup>104</sup> Admiral Richard has emphasized the importance of investing in the workforce now: "If we lose those talent bases, you can't buy it back. It will take 5 to 10 years to either retrain and redevelop the people or rebuild the infrastructure."

In light of these issues, the NNSA workforce earns a score of "marginal," but it will trend toward "strong" if these improvements continue.

# Allied Assurance Score: Strong but at Risk of Weakening

The credibility of U.S. nuclear deterrence is one of the most important components of allied assurance. The United States extends nuclear assurances to more than 30 allies who have maintained the commitment to forgo nuclear programs of their own. If allies were to resort to building their own nuclear weapons because their confidence in U.S. extended deterrence had been degraded, the consequences for nonproliferation and stability could become dire.

In Europe, the United States can coordinate with France and the United Kingdom, which already have nuclear weapons. The United States also deploys B-61 nuclear gravity bombs in Europe as a visible manifestation of its commitment to its NATO allies and retains dual-capable aircraft that can deliver those gravity bombs. The United States provides nuclear assurances to Japan, South Korea, and Australia, all of which face increasingly aggressive nuclear-armed regional adversaries: China, Russia, and North Korea. Continued U.S. nuclear deterrence assurances are critical and must be perceived as credible. Both Japan and South Korea have the capability and basic know-how to build their own nuclear weapons quickly. A decision to do so would

be a major setback for U.S. nonproliferation policies and could increase regional instability.

**Grade:** Not unlike deterrence, assurance is about allies' perceptions of the U.S. nuclear umbrella's credibility rather than what the United States perceives to be a credible extended deterrent. Any assessment of allied assurance will therefore be inherently subjective.

Based on public statements and the available data, U.S. allies do not appear to be doubting U.S. extended deterrence commitments to any serious degree or thinking of developing their own nuclear weapons. European members of NATO continue to express their commitment to and appreciation of NATO as a U.S.-led nuclear alliance even as they worry about the impact of Russia's growing non-strategic nuclear capabilities and nuclear saber-rattling over Ukraine. Additionally, both NATO allies and Asian allies like Japan and South Korea have affirmed that the strategy outlined in the 2018 NPR supports extended deterrence. Because the 2022 NPR has not yet been released publicly, allies have not publicly commented.

However, allied assurance faces increasing risks as the regional threats to U.S. allies grow in both Europe and the Indo-Pacific. In particular, as China continues to advance its capability to hold the U.S. homeland at risk with its strategic forces and to execute any nuclear strategy in the region, allies' assurance of the U.S. commitment to extend its nuclear umbrella in the region can become more fragile. While China has hundreds of nuclear-capable missiles in the region, the United States deploys none. Both South Korean and Japanese leaders have recently discussed with President Biden the need to ensure that extended deterrence remains strong in light of these threats.<sup>108</sup>

While official statements remain positive, unofficial sentiment could indicate concern about U.S. extended deterrence commitments. For example, former Japanese Prime Minister Shinzo Abe has called for Japan to consider hosting U.S. nuclear weapons, <sup>109</sup> and a senior Japanese ruling party law-maker recently called for a national debate on the U.S. nuclear umbrella. <sup>110</sup> Additionally, significant percentages of South Koreans continue to express support for an indigenous nuclear weapons capability or nuclear-sharing agreement with the United States as they face increasing nuclear threats from both China and North Korea. <sup>111</sup>

The 2018 NPR had proposed and allies had expressed support for two supplements to existing capabilities—a low-yield SLBM warhead and a new nuclear sea-launched cruise missile—as important initiatives to strengthen allied assurance. 112 The lowyield SLBM warhead, deployed in 2020, is an important component of America's ability to deter regional aggression against its Asian and NATO allies. However, the Biden Administration has proposed canceling the SLCM-N, a capability that could be deployed directly to regional theaters of conflict to help assure our allies.113 The Biden Administration had rejected a declaratory policy of "no first use" or "sole purpose," which would have made allies uneasy over U.S. extended deterrence commitments, but only after significant pressure from them.<sup>114</sup>

The score for allied assurance remains "strong," especially as the United States remains committed to modernizing its own nuclear deterrent and rejects calls to reduce its nuclear forces unilaterally, but is at risk of weakening. The increasing regional threats combined with the Biden Administration's consideration of a "no first use" policy and proposal to cancel SLCM-N could be creating concern about U.S. extended deterrence commitments. The United States will need to make concerted efforts to strengthen its commitments to extended deterrence to reflect the change in threat, both through its capabilities and by communicating resolve, if this score is to remain unchanged in future editions of this *Index*.

# Overall U.S. Nuclear Weapons Capability Score: Strong but Trending Toward Marginal or Weak

The scoring for U.S. nuclear weapons must be considered in the context of a threat environment that is significantly more dangerous than it was in previous years. Until recently, U.S. nuclear forces needed to address one nuclear peer rather than two. Given the reassurances from senior leaders of the readiness and reliability of U.S. nuclear forces, as well as the strong bipartisan commitment to modernization of the entire nuclear enterprise, this year's chapter retains its grade of "strong," but only for now.

U.S. nuclear forces face many risks that without this continued commitment to a strong deterrent could warrant an eventual decline to an overall score of "marginal" or "weak. The reliability of current U.S. delivery systems and warheads is at risk as they continue to age and the threat continues to advance. The fragility of "just in time" replacement programs only exacerbates this risk. In fact, nearly all components of the nuclear enterprise are at a tipping point with respect to replacement or modernization and have no margin left for delays in schedule. Since every other military operation—and therefore overall national defense—relies on a strong nuclear deterrent, the United States cannot afford to fall short in fulfilling this imperative mission.

Additionally, future assessments will need to consider plans to adjust America's nuclear forces to account for the doubling of peer nuclear threats. While capacity was not assessed this year, it is clear that the change in threat warrants a reexamination of U.S. force posture and the adequacy of our current modernization plans.

Therefore, this portfolio retains its score of "strong," but failure to keep modernization programs on track while planning for a three-party nuclear peer dynamic could slowly lead to a decline in the strength of U.S. nuclear deterrence in future years.

# **U.S. Military Power: Nuclear**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Nuclear Stockpile				<b>~</b>	
Delivery Platform Reliability				<b>~</b>	
Warhead Modernization			~		
Delivery Systems Modernization				~	
Nuclear Weapons Complex			~		
National Labs Talent			<b>~</b>		
Allied Assurance				<b>~</b>	
OVERALL				<b>~</b>	

#### **Endnotes**

- 1. All of the past six confirmed Secretaries of Defense—including current Secretary of Defense Lloyd Austin—have affirmed U.S. nuclear deterrence as the department's number one mission.
- Admiral Charles A. Richard, Commander, United States Strategic Command, statement before the Committee on Armed Services, U.S. Senate, April 20, 2021, p. 3, https://www.armed-services.senate.gov/imo/media/doc/Richard04.20.2021.pdf (accessed June 21, 2022).
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- 10. "Transcript: The Arms Control Landscape ft. DIA Lt. Gen. Robert P. Ashley, Jr.," Hudson Institute, May 29, 2019, p. 24, https://s3.amazonaws.com/media.hudson.org/Hudson%20Transcript%20-%20The%20Arms%20Control%20Landscape.pdf (accessed May 3, 2022). The statement "that the Russians potentially outnumber the U.S. tactical nuclear weapons 10 to 1" was made during the discussion by Hudson Institute Senior Fellow Rebekkah L. Heinrichs.
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- 21. Mary Beth D. Nikitin, "North Korea's Nuclear Weapons and Missile Programs," Congressional Research Service *In Focus* No. IF10472, updated April 8, 2022, https://fas.org/sgp/crs/nuke/IF10472.pdf (accessed June 21, 2022), and Special Briefing, "U.S. Special Representative to the Democratic People's Republic of Korea Sung Kim on Recent DPRK Missile Launches," U.S. Department of State, June 7, 2022, https://www.state.gov/u-s-special-representative-to-the-democratic-peoples-republic-of-korea-sung-kim-on-recent-dprk-missile-launches/ (accessed June 21, 2022).
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# Missile Defense

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M issile defense is a critical component of the U.S. national security architecture that enables U.S. military efforts and can protect critical infrastructure, from population and industrial centers to politically and historically important sites. It can strengthen U.S. diplomatic and deterrence efforts and provide both time and options to senior decision-makers during crises involving missiles that fly on ballistic and non-ballistic trajectories.

#### The Growing Missile Threat

Missiles remain a weapon of choice for adversaries who view them as cost-effective and symbols of power compared to other types of conventional weapons. The number of states that possess missiles will continue to increase, as will the sophistication of these weapons, as modern technologies become cheaper and more widely available.

In 2022, North Korea intensified its missile testing efforts, conducting its first test of an intercontinental ballistic missile (ICBM) since 2017 in addition to tests of several shorter-range missiles and even a hypersonic missile capable of maneuvering during flight.<sup>2</sup> These tests allow Pyongyang to keep improving and adapting its missile program and by so doing add to an already formidable threat. North Korea also continues to advance its ability to overcome missile defenses, including those that protect the United States, with missiles that supposedly can carry multiple warheads and decoys.<sup>3</sup>

Iran continues to modernize and proliferate its regional missile systems. Its recent launches of solid-fuel rockets demonstrate that Iran has the ability to build and successfully launch sophisticated missiles, which implies in turn that it has or is developing the ability to advance to an ICBM capability.<sup>4</sup>

China and Russia, in addition to their vast ballistic missile inventories, are investing in new ground-launched, air-launched, and sea-launched cruise missiles that uniquely challenge the United States in different domains and are deploying new hypersonic glide vehicles.<sup>5</sup> China is rapidly building hundreds of new missiles, including modern ICBMs that can carry multiple warheads and theater-range missiles that can strike U.S. assets with precision.<sup>6</sup> Russia is developing entirely new capabilities, such as a nuclear-powered cruise missile, that are intended to avoid U.S. sensors and missile defenses. It has employed its Kinzhal hypersonic missile for the first time in Ukraine.7 Russia's conventionally armed sealaunched and air-launched cruise missiles can strike strategic nodes within the U.S. homeland, even from Russian territory, and China is developing a longrange conventional strike capability of its own.8

#### The Strategic Role of Missile Defense

Missile defense plays a critical role both in deterring an attack and in mitigating the damage to U.S. forces, infrastructure, and population centers in the event deterrence fails. The ability to deter an attack depends on convincing the adversary that the attack will fail, that the cost of carrying out a successful attack is prohibitively high, or that the consequences will outweigh the perceived benefit of an attack. A U.S. missile defense system strengthens deterrence by offering a degree of protection to U.S. populations, military forces, and allies, making it harder for an adversary to threaten them with missiles. By raising the threshold for missile attack, missile defense can complicate an adversary's planning, remove the option for a "cheap shot" against the United States and its allies, and perhaps make the adversary think twice before launching an attack. By protecting key

U.S. assets, missile defense also mitigates an adversary's ability to intimidate or coerce the United States into making concessions.

Missile defense systems help to enable U.S. and allied conventional operations. During a regional conflict, adversaries could deny the United States the ability to conduct offensive operations by targeting U.S. and allied forward-deployed personnel or military assets. In addition, they might try to decouple the United States from defense of its allies by threatening to strike U.S. forces or the U.S. homeland if the United States intervenes in a regional conflict. Missile defenses can therefore strengthen the credibility of U.S. extended deterrence by making it easier for the U.S. military to introduce reinforcements that can move more freely through a region.

A missile defense system gives decision-makers more time to choose the most de-escalatory course of action. Without the ability to defend against an attack, U.S. authorities would be limited to an unappealing set of responses that could range from preemptive attacks to acceding to an enemy's demands or actions. By assuring some level of protection, robust missile defense systems would affect the dynamics of decision-making by removing the need to take immediate action. Missile defense can therefore be profoundly stabilizing.

Finally, missile defense minimizes damage if deterrence fails. A strong missile defense system would not only help to protect countless American lives; it would also help to keep U.S. forces available during a fight. During a campaign against China in the Indo-Pacific, for example, missile defenses deployed in the region could lower the loss rate for U.S. forces compared to the rate of replacement, thereby extending the war effort and giving U.S. forces more time to prevail.

#### The U.S. Missile Defense System

The U.S. missile defense system has three critical physical components:

- Sensors,
- Interceptors, and
- Command and control infrastructure that provides data from sensors to interceptors.

Of these, interceptors receive much of the public's attention because of their visible and kinetic

nature. Components of missile defense systems can be classified based on the phase of flight during which intercept occurs, although some—for example, the command and control infrastructure or radars—can support intercepts in various phases of flight. Interceptors can shoot down an adversary ballistic missile in the boost, ascent, midcourse, or terminal phase of its flight. As cruise missiles and hypersonic glide vehicles continue to proliferate, the Missile Defense Agency (MDA) and the military services must therefore consider intercept in the boost, glide, or terminal phase of flight.

Another way to classify missile defense systems is by the range of an incoming missile (short-range, medium-range, intermediate-range, or intercontinental-range) that an interceptor is designed to shoot down. An interceptor's flight time determines both the time available to conduct an intercept and the optimal interceptor placement to improve intercept probability. With ICBMs, the United States has "30 minutes or less" to detect the missile, track it, provide the information to the missile defense system, find the optimal firing solution, launch an interceptor, and shoot down the incoming missile, ideally with enough time to fire another interceptor if the first attempt fails. The time frame is shorter for intercepting short-range, medium-range, and intermediate-range ballistic missiles.

Finally, missile defense can be framed by the origin of interceptor launch. At present, U.S. interceptors are launched from the ground or from the sea. In the past, the United States explored possible ways to launch interceptors from the air or from space, but such efforts have been limited since the U.S. withdrawal from the Anti-Ballistic Missile Treaty in 2002.<sup>10</sup>

The current U.S. missile defense system is a result of investments made by successive U.S. Administrations. President Ronald Reagan envisioned the program—the Strategic Defense Initiative (SDI)—as a layered ballistic missile defense (BMD) system that would render nuclear missiles "impotent and obsolete." These layers would have boost, ascent, midcourse, and terminal interceptors, including directed-energy interceptors, providing the United States with more than one opportunity to shoot down an incoming missile.

The United States stopped far short of this goal even though the SDI program generated tremendous technological advances and benefits.<sup>12</sup> Instead

### **U.S. Missile Defense Assets**



GBI—Ground-based interceptors
GFC—Fire control center
GMD—Ground-based midcourse defense

- 1 Shemya, AK
  - Cobra Dane radar
  - IDT
- Pearl Harbor, HI (base)
  - Sea-based X-Band radar
- Clear, AK
   UEWR
- 4 Ft. Greely, AK
  - 40 GBIs
  - GMD
  - GFC
  - IDT
- 5 Vandenberg AFB, CA
  - 4 GBIs
- 2 IDTs
- 6 Beale AFB, CA
   UEWR

IDT—In-Flight Interceptor Communications System (IFICS) Data Terminal

- 7 Schriever AFB, CO
  - GFC
- 8 Ft. Drum, NY
  - IDT
- Oape Cod, MA
  - UEWR
- 10 Thule, Greenland
  - UEWR
- Fylingdales, UK
  - UEWR
- 12 Rota, Spain (base)
  - Sea-based Aegis BMD SPY-1 radar
- Kurecik AFB, TurkeyTPY-2 radar

TPY-2—Transportable Radar Surveillance and Control Model 2 UEWR—Upgraded early warning radar

- 14 Israel
  - TPY-2 radar
- **15** CENTCOM-Middle East
  - TPY-2 radar
- 16 Shariki, Japan
  - TPY-2 radar
- W Kyogamisaki, Japan
  - TPY-2 radar
- 18 Outer space
  - Defense support program satellites
  - Space-based infrared system satellites
  - Space-based kill assessment sensors

**NOTE:** Locations are approximate.

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of a comprehensive layered system, the United States has no boost-phase ballistic missile defense systems and no defense against the advanced ballistic missile threats from China or Russia. The volatility and inconsistency of priority and funding for missile defense by successive Administrations and Congresses—Administrations and Congresses controlled by *both* major political parties—have yielded a system that is limited both numerically and technologically and incapable of defending against more sophisticated or more numerous long-range missile attacks.

The National Missile Defense Act of 1999 made it U.S. policy to protect the homeland only from a "limited ballistic missile attack."13 The National Defense Authorization Act (NDAA) for Fiscal Year 2017 dropped the word "limited" even as it continued to focus on ballistic missiles.14 Then the 2020 NDAA made it a matter of policy to rely on nuclear deterrence to defend against "near-peer intercontinental missile threats" and focus on improving missile defense against "rogue states." In the future, as technological trends progress and modern technologies become cheaper and more widely available, North Korean or Iranian ballistic missiles may rival-in sophistication if not in numbers-those of Russia or China. Consequently, the United States must remain aware of how such threats are evolving and be prepared to alter its missile defense posture accordingly.

In January 2019, the Trump Administration published its congressionally mandated Missile Defense Review (MDR), a statement of policy intended to guide the Administration's missile defense programs. The 2019 MDR addresses the dangerous threat environment that has evolved since the previous MDR in 2010 and recognizes that future missile defense systems must defend against cruise and hypersonic missiles in addition to ballistic missiles. The Biden Administration completed its MDR in 2022 but has not yet released the document to the public.

For fiscal year (FY) 2023, the Biden Administration has requested \$9.6 billion for the MDA, $^{17}$  a decrease from the \$10.3 billion finally agreed upon for FY 2022. $^{18}$ 

#### **Interceptors**

Interceptors are one major component of the U.S. missile defense system. Different types of interceptors that respond to different missile threats have been emphasized over the years, and the composition of today's U.S. missile defense reflects these choices.

While the United States is working to improve its ability to strike down cruise missiles and hypersonic glide vehicles, the primary mission of its fully operational missile defense systems today is to intercept ballistic missiles. Missile defense interceptors are designed to intercept ballistic missiles in three different phases of flight.

- **The boost phase** extends from the time a missile is launched from its platform until its engines stop thrusting.
- The midcourse phase is the longest and thus offers a unique opportunity to intercept an incoming threat and, depending on other circumstances like the trajectory of the incoming threat and quality of U.S. tracking data, a second shot if the first intercept attempt fails.
- **The terminal phase** is less than one minute long, occurring as the missile plummets through the atmosphere toward the target, and offers a very limited opportunity to intercept a ballistic missile threat.

Boost-Phase Interceptors. The United States currently has no capability to shoot down missiles in their boost phase. Technologically, boost-phase intercept is the most challenging option because of the very short time during which a missile is boosting, the missile's extraordinary rate of acceleration during this brief window of time, and the need to have the interceptor close to the launch site. <sup>19</sup> This phase, however, is also the most beneficial time to strike. A boosting ballistic missile is at its slowest speed compared to other phases; it is therefore not yet able to maneuver evasively and has not yet deployed decoys that complicate the targeting and intercept problem.

In the past, the United States pursued several boost-phase programs, including the Airborne Laser, the Network Centric Air Defense Element, the Kinetic Energy Interceptor, and the Air Launched Hit-to-Kill missile. Each of these programs was eventually cancelled because of technical, operational, or cost challenges, and the United States has not progressed significantly on any boost-phase program since then.

**Midcourse-Phase Interceptors.** Intercepting missiles in their midcourse phase offers more time for intercept and presents fewer technological challenges than intercept in the boost phase presents, but it also allows the missile time to deploy decoys and countermeasures that can complicate interception by confusing sensors and radars. The United States deploys two systems that can shoot down incoming missiles in the midcourse phase of flight:

- The Ground-Based Midcourse Defense (GMD) system and
- The Aegis defense system.

The Ground-Based Midcourse Defense system is the only operational system capable of shooting down a long-range ballistic missile headed for the U.S. homeland. It consists of 40 Ground-Based Interceptors (GBIs) at Fort Greeley, Alaska, and four at Vandenberg Air Force Base, California. A GBI consists of a multi-staged rocket booster and an Exoatmospheric Kill Vehicle (EKV), which intercepts the incoming missile with hit-to-kill technology. In September 2021, the MDA "demonstrated the capability to select a 2-stage or 3-stage burn of a Ground Based Interceptor (GBI) booster, which enables an earlier release of the kill vehicle to greatly expand the engagement area and time to counter the inbound threat."<sup>20</sup>

To increase the probability of an intercept, the United States has to shoot multiple interceptors at each incoming ballistic missile. At present, because its inventory of interceptors is limited, the United States can shoot down only a handful of ballistic missiles that have relatively unsophisticated countermeasures.

In 2017, Congress approved a White House request to increase the number of GBIs from 44 to 64 to keep up with the advancing ballistic missile threat, particularly from North Korea. The MDA intended to produce a Redesigned Kill Vehicle (RKV) to top 20 additional GBIs that would fill the new silos, but this program was canceled in 2019 because of technological difficulties. HDA instead initiated the Next Generation Interceptor (NGI) program to build an entirely new interceptor that would add both capacity and capability to the GMD system. NGIs will begin to fill the 20 empty silos around 2028 and could eventually replace some or all of

the existing 44 GBIs. Unlike the GBIs, the NGI will feature multiple kill vehicles, enabling a single NGI to shoot at multiple objects ejected from one incoming missile.  $^{23}$ 

Contracts to develop the NGI were awarded to Lockheed Martin and a Northrop Grumman–Raytheon team in March 2021.<sup>24</sup> The FY 2023 budget request includes \$1.766 billion for NGI to support these two competing designs through Critical Design Review in FY 2025.<sup>25</sup>

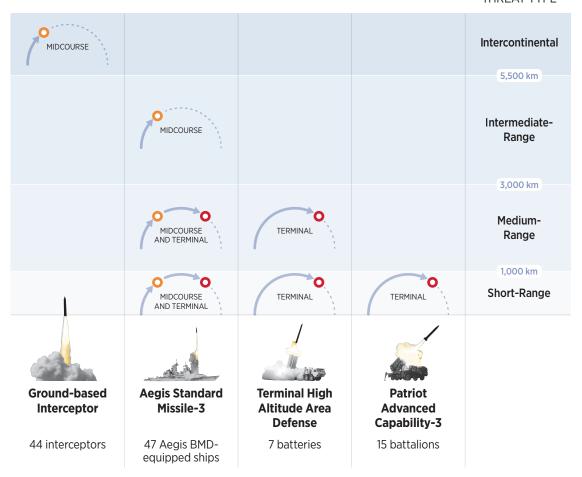
The Aegis defense system is a sea-based component of the U.S. missile defense system. It is designed to address the threat of short-range, medium-range (1,000–3,000 kilometers), and intermediate-range (3,000-5,500 kilometers) ballistic missiles. It utilizes different versions of the Standard Missile-3 (SM-3) and SM-6 depending on the threat and other considerations like ship location and quality of tracking data. The Aegis system also has capability against aerial threats and cruise missiles.26 According to the FY 2023 budget submission, the number of BMD-capable Navy Aegis ships should increase to 50 by the end of FY 2023.27 Japan also has several Aegis BMD-capable destroyers and cooperated with the United States to develop the latest SM-3 missile, the SM-3 Block IIA.<sup>28</sup>

The United States also deploys a land-based version of Aegis, called the Aegis Ashore system, in Romania, and another is nearing completion in Poland. Aegis Ashore sites relieve some of the stress on the naval fleet because BMD-capable cruisers and destroyers are multi-mission and are used for other purposes, such as wartime fleet operations and even anti-piracy operations. These Aegis Ashore sites help to protect U.S. allies and forces in Europe from the Iranian ballistic missile threat.

Aegis BMD will also play a significant role in the development of a missile defense system on the U.S. territory of Guam. Former Commander of U.S. Indo-Pacific Command (INDOPACOM) Admiral Philip Davidson has testified that "the most important action we can take to increase the joint force's lethality [in the region] is to introduce a 360-degree, persistent, air and missile defense capability on Guam (Guam Defense System (GDS))."<sup>29</sup> Current INDOPACOM Commander Admiral John Aquilino testified in March 2022 that "Guam's strategic importance is difficult to overstate" and emphasized "the importance of the island for sustaining the joint force as our main operating base and home to 130,000

## **U.S. Missile Defense: Interceptors**

MISSILE THREAT TYPE



**SOURCES:** Center for Strategic and International Studies, Missile Defense Project, "Aegis Ballistic Missile Defense," *Missile Threat*, last updated August 4, 2021, https://missilethreat.csis.org/system/aegis/ (accessed August 17, 2022), and U.S. Department of Defense, Ofce of the Under Secretary of Defense (Comptroller)/Chief Financial Ofcer, *United States Department of Defense Fiscal Year 2023 Budget Request, Program Acquisition Cost by Weapon System*, April 2022, pp. 4–5, https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2023/FY2023 Weapons.pdf (accessed August 17, 2022).

heritage.org

Americans."<sup>30</sup> The FY 2023 budget request includes a total of \$892 million to continue development of an architecture for Guam defense and to begin procurement of needed components, including SM-3, SM-6, and Aegis fire control components.<sup>31</sup>

In November 2020, the U.S. Navy and the MDA shot down an intercontinental-range ballistic missile using the SM-3 interceptor class Block IIA

against an ICBM target.<sup>32</sup> The test, FTM-44, was the first step in a plan to use SM-3 Block IIAs as an "underlay" to the GMD system to defend the homeland, with GBIs taking the first shot at an incoming target and SM-3 interceptors taking a second shot if the GBIs miss.<sup>33</sup> The MDA had initially planned to test the SM-3 IIA against a more complicated ICBM as the next step. However, the budget request for FY

2023 eliminates funds to pursue the SM-3 IIA as a homeland underlay. $^{34}$ 

**Terminal-Phase Interceptors.** The United States currently deploys three terminal-phase missile defense systems:

- Terminal High Altitude Area Defense (THAAD);
- The Patriot missile defense system; and
- · Aegis BMD.

A THAAD battery can shoot down short-range and intermediate-range ballistic missiles inside and just outside of the atmosphere.<sup>35</sup> It consists of a launcher, interceptors, the Army Navy/Transportable Radar Surveillance and Control Model 2 (AN/TPY-2) radar, and fire control.<sup>36</sup> The system is transportable and rapidly deployable. THAAD batteries have been deployed to such countries as Japan, South Korea, Israel, and the United Arab Emirates (UAE), and the U.S. signed a deal in 2020 to deliver THAAD to Saudi Arabia.<sup>37</sup> THAAD was employed successfully to intercept missiles for the first time in the UAE in February 2022.<sup>38</sup>

Patriot is an air-defense and short-range ballistic missile defense system. A battery is comprised of a launcher, interceptors, AN/MPQ-53/65 radar, an engagement control station, and diesel-powered generator units. The Patriot family of missile defense interceptors has been upgraded over time, from the initial Patriot Advanced Capability-1 (PAC-1) deployed in Europe in 1988 to the PAC-3 configuration deployed around the world today. The most recent Patriot upgrade, the PAC-3 Missile Segment Enhancement, expands the lethal battlespace with an advanced solid rocket motor. The system is transportable, and the United States currently deploys it in several theaters around the world. 40

**Assessment.** Interceptor strength is difficult to assess because, while deploying more interceptors to increase capacity or defend more targets is always preferable, deploying more short-range to medium-range interceptors to unprotected locations or increasing interceptor capacity ad infinitum is simply not feasible. Congress provided funding in FY 2022 to procure additional SM-3 Block IIA, PAC-3, and THAAD interceptors.<sup>41</sup> The FY 2023 budget would continue this effort for PAC-3 interceptors

and continue funding for the eighth THAAD battery, but it would reduce procurement for THAAD and SM-3 IIA interceptors.<sup>42</sup>

To increase the defended battlespace, the MDA is pursuing the Patriot Launch-on-Remote (THAAD) capability, which integrates the PAC-3 and THAAD systems by enabling a PAC-3 launch using a THAAD AN/TPY-2 radar. Launch-on-Remote is a significant capability that can increase the defended area by spreading out missiles.<sup>43</sup> After two failed tests for the capability in 2020, the MDA, in conjunction with the Army, conducted two successful tests early in 2022.<sup>44</sup> The Army plans to field this capability "across all Patriot battalions beginning in Fiscal Year 2023."<sup>45</sup>

Progress on building a Guam defense system has moved slowly compared to the urgency of the Chinese threat.46 Even though this missile defense system first appeared on the INDOPACOM Unfunded Priorities List in 2019, the President requested and Congress first provided funding for the system only in FY 2022.47 Even so, the \$192 million that was appropriated fell far short of the \$350 million requested by INDOPACOM for that year.48 However, the FY 2023 budget request includes \$892 million "for the Missile Defense Agency, the Army, and the Navy to develop and field missile defense capabilities" that would "augment the existing Terminal High Altitude Area Defense (THAAD) battery currently emplaced on the island...and bolster U.S. military posture in the Indo-Pacific region."49

The Commander of U.S. Northern Command (NORTHCOM), General Glen VanHerck, recently testified that "[w]hile current BMD capability and capacity is sufficient to defeat a limited ballistic missile attack from a rogue nation, North Korea's ongoing development of increasingly complex and capable strategic weapons requires the Next Generation Interceptor to be fielded on time or early."<sup>50</sup> The increasing capacity of North Korea's ballistic missiles to strike the U.S. homeland and North Korea's ability to deploy decoys cause concern that the rogue state may eventually be able to overwhelm the current GMD system.<sup>51</sup>

Following a delay in awarding the NGI contract, the program appears to be on track for an initial fielding in 2028 if not 2027.<sup>52</sup> NGI will add needed capacity and capability to the GMD system. In addition to accelerating the NGI program, the MDA and Congress continue to support a GMD service life extension program (SLEP) that is intended to

maintain the existing fleet through this decade and beyond 2030. Given that NGI will not replace the existing GBI fleet—at least not initially—it is critical that the existing interceptors can remain in service. The GMD system was largely built in the early 2000s, and many parts—including the GBI kill vehicles, boosters, and ground systems—are subject to degradation from aging. The SLEP, for instance, will include the delivery of five new boosters to ensure that the number of interceptors does not decrease, and it is essential that this effort to avoid a decrease in capacity continues. The MDA will also need to consider additional NGI purchases after the initial 20 to begin replacing existing GBIs in the 2030s.

In 2019, to strengthen homeland missile defense after the RKV was canceled and before NGI comes online, the Trump Administration proposed the development of an underlay using SM-3 Block IIA and THAAD interceptors. General VanHerck agreed to the value of an underlay in 2021, stating that "an underlayer would give us additional capacity and capability" to address threats to the homeland.54 The MDA had progressed toward this underlay after its successful test of the SM-3 IIA against an ICBM target in 2020, but the Department of Defense (DOD) had not articulated a concept of operations for employing the SM-3 Block IIA and THAAD for homeland defense, including where in the United States those systems could be deployed or how many would be required, as requested by Congress. The budget request for FY 2023 eliminates all funding for the layered homeland defense program.

While the MDA is investing both in the GMD SLEP and the NGI program to ensure defense of the homeland, forgoing a homeland underlay will deprive the homeland of added capacity against an uncertain North Korean threat. The utility of exploring the use of SM-3 and THAAD interceptors for ICBMs can also extend beyond an underlay for the continental United States, as they can work for other missions or defended assets like Hawaii, Alaska, and Guam as well. Using SM-3 and THAAD interceptors to defend against ICBMs could still be advantageous for the United States, but it would require a commitment to move quickly that neither the DOD nor Congress has demonstrated.

Currently, the only interceptor the United States has available to intercept hypersonic missiles is the SM-6.<sup>55</sup> To strengthen U.S. capability against maneuverable hypersonic missiles, the MDA is in

the early stages of developing the Glide Phase Interceptor (GPI), which is designed to intercept regional hypersonic missiles in their glide phase of flight. In 2021, the MDA awarded Other Transaction Authority (OTA) agreements to Lockheed Martin, Northrop Grumman, and Raytheon to develop design concepts for the GPI. <sup>56</sup> For FY 2022, Congress added \$39.9 million to the MDA's requested amount of \$247.9 million for hypersonic defense, <sup>57</sup> and the FY 2023 budget request includes \$225.5 million for the program. <sup>58</sup>

The Army's Indirect Fire Protection Capability Increment 2 (IFPC 2) program has been moving very slowly but has seen recent improvement. The IFPC 2 would defend against short-range rockets, artillery, and mortars as well as cruise missiles, against which the United States, as noted, lacks a sufficient defensive capability. <sup>59</sup> As a system, IFPC would fill the gap between short-range tactical air defense and ballistic missile defense like PAC-3 and THAAD.

In response to a congressional requirement that it field an interim cruise missile defense capability in response to the increasing cruise missile threat, the Army purchased two Iron Dome batteries manufactured by the Israeli company Rafael. 60 Despite prior concerns about integrating Iron Dome as part of an enduring IFPC solution, the Army is preparing the Iron Dome systems for operational deployment and integration into its future missile defense command and control system.<sup>61</sup> In 2021, the Army deployed Iron Dome to Guam and conducted a successful simulation to test the system. 62 However, no evidence indicates that Iron Dome will be integrated into the Guam defense system that is under development. In September 2021, the Army awarded a contract to Dynetics to develop its own enduring IFPC 2 system, which is scheduled to reach combat capability in FY 2023.63

Overall, the United States has multiple capable interceptors, but there is much room for improvement. The most important step for the near future will be on-time or early delivery of the NGI to ensure protection of the homeland from North Korea and to mitigate the growing threat from China.

#### Sensors

The sensor component of the U.S. missile defense system is distributed across the land, sea, and space domains and provides the United States and its allies with the earliest possible warning of a launch of enemy missiles in addition to missile tracking and discrimination. These sensors can detect a missile launch, track a missile in flight, and even classify the type of projectile, its speed, and the target against which the missile has been directed. They relay this information to the command and control stations that operate interceptor systems like Aegis (primarily a sea-based system) or THAAD (a land-based system).

**Land-Based.** On land, the major sensor installations are the upgraded early warning radars (UE-WRs), which are concentrated along the North Atlantic and Pacific corridors that present the most direct flight path for a missile aimed at the United States. They include the phased array early warning radars based in California, the United Kingdom, and Greenland that scan objects up to 3,000 miles away.<sup>64</sup> Two additional sites—one in Cape Cod, Massachusetts, and the other in Clear, Alaska—have been modernized for use in the layered ballistic missile defense system after facing delays.65 These sensors focus on threats that can be detected in the missile's boost or launch phase when the release of exhaust gases creates a heat trail that is relatively easy for sensors to detect. A shorter-range (2,000-mile) radar called the Cobra Dane is based in Shemya, Alaska.<sup>66</sup>

The United States also deploys mobile land-based sensors called AN/TPY-2s. These sensors can be forward deployed for early threat detection or kept in terminal mode to provide tracking and fire control support for the THAAD interceptors.<sup>67</sup> Of the United States' 12 AN/TPY-2 systems, five are forward deployed with U.S. allies.<sup>68</sup> The United States plans to field a 13th AN/TPY-2 radar in FY 2025 for service with the eighth THAAD battery.<sup>69</sup> In cooperation with the Republic of Korea, the United States deploys a THAAD missile system accompanied by an AN/TPY-2 on the Korean Peninsula.

To fill a gap in missile discrimination capability for tracking North Korean missiles over the Pacific, the MDA is developing the Long Range Discrimination Radar (LRDR) in Northern Alaska to improve coverage in the northern Pacific. The LRDR utilizes the SPY-7 radar, which the MDA will also purchase for the Guam defense system. The DOD had also identified the need to develop the Homeland Defense Radar–Hawaii (HDR–H) to fill a tracking and discrimination gap over Hawaii. The Trump Administration's FY 2021 budget request omitted funding for HDR–H because of budget constraints, as did

the Biden Administration's request for FY 2022. In both years, Congress provided the funding needed to proceed with the radar, and in FY 2022, it mandated that future budget requests must include adequate funding to build and operate the HDR–H by 2028. However, the FY 2023 budget request again excludes funding for the HDR–H. 72

**Sea-Based.** There are two types of sea-based sensors. The first is the Sea-Based X-band (SBX) radar, which is mounted on an oil-drilling platform and can be relocated to different parts of the globe as threats evolve. The second radar is the SPY-1 radar system, which is mounted on U.S. Navy vessels equipped with the Aegis Combat System and therefore is able to provide data that can be utilized for ballistic missile missions. The Navy is replacing all SPY-1 radars with the SPY-6 radar, which will have a greater detection range and other advanced capabilities.

**Space-Based.** Finally, U.S. missile defense sensors operate in space. From the ultimate high ground, space-based sensors have the potential to detect and track missile launches from almost any location from boost to terminal phase, unlike ground-based radars that are limited in their tracking range. The MDA, the U.S. Space Force, and the Space Development Agency (SDA) all control aspects of the space missile defense sensor system.

The oldest system that contributes to the missile defense mission is the Defense Support Program (DSP), a constellation of satellites that use infrared sensors to identify heat from booster and missile plumes to detect an initial launch. The DSP satellite system has gradually been replaced by the Space-Based Infrared Radar System (SBIRS) to improve the delivery of missile defense and battlefield intelligence. For instance, SBIRS can scan a wide swath of territory while simultaneously tracking a specific target, making it a useful means for observing tactical, or short-range, ballistic missiles. 77

The Space Force launched the sixth and final SBIRS satellite in August 2022. The Air Force originally planned to launch eight SBIRS satellites, but because of congressional funding delays, it decided to end production of SBIRS early and move on to development of its replacement, the Next-Generation Overhead Persistent Infrared (Next-Gen OPIR) satellite, in 2017. The seventh and eighth SBIRS satellites will be switched to Next-Gen OPIR satellites, the first of which is to be delivered "no later

than FY 2025."<sup>80</sup> The Next-Gen OPIR satellites are designed to be more survivable against cyber and electronic attacks.

The MDA also has developed and deployed Space-based Kill Assessment (SKA) sensors on commercial satellites. SKA uses a network of infrared sensors to provide a hit and kill assessment of homeland defense intercepts. After several years of successful testing of SKA sensors in orbit, the FY 2023 budget supports integrating SKA into the homeland defense system. SE

The United States is developing a system of satellites capable of providing global detection, tracking, and discrimination of any missile launch. Dating back as far as President Reagan's Strategic Defense Initiative, successive Administrations have called for a proliferated layer of sensing satellites in space to track the flight of any type of missile—not just ballistic—from birth to death. A layer of space-based sensors can be particularly useful in tracking hypersonic vehicles, which fly at lower altitudes than ballistic missiles and can maneuver during flight. The DSP and SBIRS systems were designed for ballistic missiles and can lose track of missiles flying at lower altitudes. Since many new threats are not flying on ballistic trajectories, Congress has been paying close attention to development of this space sensor layer.

Beginning in 2009, the MDA operated two Space Tracking and Surveillance System-Demonstrators (STSS-D) satellites in an effort to demonstrate this capability to track ballistic missiles that exit and reenter the Earth's atmosphere during the midcourse phase. Ballistic by those demonstration satellites were used to provide risk reduction to support future space trackers. Both satellites were decommissioned in March 2022. Today, the SDA, in conjunction with the MDA, is developing a space Tracking Layer of satellites proliferated in Low-Earth Orbit (LEO) as part of the SDA's National Defense Space Architecture. According to the SDA:

Once fully operational, the SDA Tracking Layer will consist of a proliferated heterogeneous constellation of Wide Field of View (WFOV) space vehicles (SVs) that provide persistent global coverage and custody capability combined with the Missile Defense Agency (MDA) Hypersonic and Ballistic Tracking Space Sensor (HBTSS) Medium Field of View (MFOV) SVs that provide precision global access capability.<sup>85</sup>

Once deployed, the Tracking Layer will be able to detect, track, and discriminate among any types of missile launch throughout the entirety of the missile's flights, including both hypersonic glide vehicles and dimmer ballistic missile targets. The SDA is also exploring the ability of space sensors to provide fire control information directly to weapon platforms like THAAD or Aegis (as opposed to the data going through a ground station).

In FY 2022, Congress provided \$256 million to the MDA for the HBTSS. In 2021, the MDA awarded contracts to Northrop Grumman and L3Harris to develop HBTSS prototypes, which are on track to launch in FY 2023. The budget request for FY 2023 includes \$89.2 million for this effort. FY Congress also added \$550 million in FY 2022 for the SDA's tracking layer. The first eight satellites as part of Tranche 0 are projected to launch in 2023. The SDA is also working to award a contract for Tranche 1 satellites to launch in 2025.

**Assessment.** Senior defense leaders have stated repeatedly that deploying sensor satellites to space to track missiles from the high ground throughout their entire flight is the best way to advance sensor capability. According to Admiral Charles Richard, Commander of U.S. Strategic Command (STRATCOM):

Future space-based sensors may be able to provide birth-to-death detection, tracking, and discrimination of hypersonic glide vehicle, cruise missile, and ballistic missile threats globally. These abilities cannot be fully achieved with the current or future terrestrial-based radar architecture due to the constraints of geography and characteristics of future missile threats.<sup>89</sup>

Initially, the space-based sensor program was plagued by insufficient funding requests and bureaucratic infighting over whether the SDA or the MDA would develop the HBTSS. 90 Since then, clear roles for the SDA and MDA have been defined, contracts for the HBTSS have been awarded, and the SDA's Tracking Layer has progressed steadily. A strong assessment of missile defense sensing capabilities will depend on progress made on the space-based sensor effort, especially in view of commanders' urgent need for improved missile tracking as well as the technological challenges associated with developing a sensor that can perform in LEO.91

Development of land-based sensors to fill the missile discrimination capability gap over the Pacific has progressed slowly. Development of the LRDR has been delayed by at least a year. The HDR-H project continues to face an uncertain future: Congress provides appropriations for the program, but the DOD does not include it in its budget request despite explicit congressional direction to do so. This way of funding a program that was originally proposed to fill a discrimination gap over Hawaii is problematic, as the DOD and Congress have never resolved their differences over the need for this capability.

Improved sensor capabilities are also critical to addressing the cruise missile threat to the homeland. As noted previously, the United States has no dedicated missile defense system to counter this threat. Due to their low-trajectories, cruise missiles are more difficult to detect and track than are ballistic missiles. Russia's ability to strike key strategic nodes in the U.S. homeland from its own territory is of particular concern. To address the cruise missile threat, General VanHerck has emphasized improving domain awareness, because early identification of a threat allows for options like left-of-launch operations or diplomacy to avoid having to shoot down cruise missiles inside the U.S. 93

The MDA included \$11 million in the FY 2023 budget request (down from \$14 million in FY 2022) to develop an architecture for cruise missile defense of the homeland. In 2021, General VanHerck requested funding for a new elevated sensor to help detect cruise missiles aimed at Washington, D.C.<sup>94</sup> The NORTHCOM unfunded priorities lists for both FY 2022 and FY 2023 include additional funding for a cruise missile defense homeland kill chain demonstration.<sup>95</sup> Developing a capability to detect, track, and eventually intercept a conventional cruise missile attack will be critical to denying adversaries the ability to hold the homeland at risk below the nuclear threshold.

The Next-Gen OPIR program appears to remain on schedule after early delays, and the FY 2023 budget request continues to fund the program. It also includes funding for several LEO and Medium Earth Orbit satellites to enhance missile warning capabilities. <sup>96</sup> The Army is also progressing quickly on development of the Lower-Tier Air and Missile Defense System radars that will provide 360-degree threat coverage for PAC-3 and other regional missile

defense batteries; the current Patriot radar can scan only one-third of the sky at a time.<sup>97</sup>

The space-sensor project is now on track compared to previous years. It is important that land-based radar coverage moves forward to stabilize the future sensor architecture.

#### **Command and Control**

Command and control of the U.S. ballistic missile defense system requires bringing together data from U.S. sensors and radars and relaying those data to interceptor operators so that they can destroy incoming missiles directed against the U.S. and its allies. The operational hub of missile defense command and control is the Joint Functional Component Command for Integrated Missile Defense (JFCC IMD), a component of STRATCOM housed at Schriever Air Force Base, Colorado. JFCC IMD brings together Army, Navy, Marine Corps, Space, and Air Force personnel and is co-located with the MDA's Missile Defense Integration and Operation Center (MDIOC). This concentration of leadership from across the various agencies helps to streamline decision-making for those who command and operate the U.S. missile defense system.98

Command and control of the GMD system to defend the homeland utilizes the Ground-based Midcourse Defense Fire Control (GFC) system, which consists of a suite of hardware, software, and personnel located in Fort Greely, Alaska, and Vandenberg Air Force Base, California. The system involves collecting data on missile movement from sensors and radars to inform the launch of GBIs.

Once a missile is launched, data from the U.S. global network of sensors and radars travel through secure satellite communications and ground-based redundant communications lines to the Command Launch Equipment (CLE) software that can task GBIs to fire at the incoming missile. Then, once the NORTHCOM Commander-who becomes the supported commander during GMD execution—in consultation with the President has determined the most effective response to a missile threat, the CLE fire response option is relayed to the appropriate GBIs in the field.<sup>100</sup> When the selected missiles have been fired, they maintain contact with In-Flight Interceptor Communications System (IFICS) Data Terminals (IDTs) to receive updated flight information that helps to guide them to their target.101

To prepare for and execute GMD operations, the NORTHCOM Commander can also utilize situational awareness data from the Command and Control, Battle Management and Communication (C2BMC) system. Through its software and network systems, C2BMC helps to process and integrate sensor information to provide a more complete picture of the battlespace. <sup>102</sup> The GMD Fire Control system acts as the primary decision aid for GMD execution, and the C2BMC system provides integrated battlefield awareness information before and during GMD operations. <sup>103</sup> It also provides information to other missile defense systems like THAAD and Patriot. Dozens of C2BMC workstations are distributed throughout the world at U.S. military bases.

C2BMC has undergone multiple technical upgrades (called spirals) since 2004 to bring more missile defense elements into the network. In 2019, the MDA completed an upgrade that will help to expand Aegis missile defense coverage by enabling Aegis Weapons Systems to engage on remote.

Regional missile defense systems like THAAD, PAC-3, and Aegis are equipped with their own individual fire control systems to control the launch of their interceptors. The C2BMC system can also provide tracking information to individual missile defense batteries from other regional sensors. Aegis BMD systems have onboard control governed by the Aegis Combat System, and they can provide their sensor data to the GMD system through C2BMC.<sup>104</sup>

C2BMC connects sensors and shooters around the world to a global network, but there is no comparable system to link sensors and shooters in a single region. The Army is developing the Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS) to provide this capability. Once fielded, IBCS would connect all sensors and shooters in a region to a single fire control network. Like IFPC, IBCS would also link defenses against smaller threats with ballistic missile defense.

**Assessment.** A strong global command and control system is critical to missile defense because linking information from sensors can increase domain awareness and the time available to engage a target, thereby improving the probability of intercept. In addition, according to General VanHerck, "[g]lobal all-domain awareness will generate a significant deterrent effect by making it clear that we can see potential aggressors wherever they are, which inherently casts doubt on their ability to achieve their

objectives."<sup>106</sup> This concept is especially important in dealing with cruise missile threats to the homeland, against which the U.S. has no comprehensive interceptor capability.

Continuing to upgrade the C2BMC will remain critical to increasing the integration of missile defense elements across the world and therefore improving chances of intercept. For instance, it was revealed in 2021 that the MDA provided U.S. Indo-Pacific Command with a hypersonic missile defense capability, largely as a result of C2BMC improvements that allow sensors to see the threat sooner. The MDA is nearing completion of another upgrade to incorporate the LRDR into C2BMC after a delay. The laso has linked C2BMC to the Army's IBCS, and the next round of upgrades will further integrate those systems as well as enhance the threat data provided to the GMD system. The last control of the last control

The United States will need a more advanced command and control capability as global missile threats shift to include cruise and hypersonic missiles in addition to ballistic missiles. The DOD is currently developing a Joint All Domain C2 (JADC2) system to integrate non-compatible sensors across all domains into a single network so that it can respond to the complex threat more efficiently. Missile defense command and control will strengthen as the services begin to field JADC2 capabilities.

In addition, NORTHCOM and the North American Aerospace Defense Command have conducted a series of Global Information Dominance Experiments (GIDE) that "provid[e] combatant commanders, intelligence and operations directors, and other participants at multiple sites with a shared, customizable, and near real-time data set" by collecting and integrating information from multiple sensors needed for decision-making and sending that information to commanders quickly. <sup>110</sup> Sensor information can tend to exist in stovepipes, and if it is not integrated, the result can be failure to detect a threat. <sup>111</sup> GIDE also uses artificial intelligence and machine learning cues to ensure that the commander receives a full data picture. <sup>112</sup>

IBCS will also provide an important improvement in regional missile defenses. The system will link all missile defense sensors and interceptors to one fire control center, as opposed to today's more stovepiped approach in which each unit operates its co-located sensor and launcher independently. By permitting air and missile defenses to function

as a joint kill web rather than as a linear kill chain, IBCS will be able to determine the best shooter to take down an incoming missile, in turn increasing the defended battlespace.

After an initial multi-year delay due to technical issues, the Army has awarded a production contract for IBCS to Northrop Grumman, and the program is now on its new schedule for full production by the end of 2022. <sup>113</sup> Advancements underway in missile defense command and control will become increasingly necessary to enable defense against the growing missile threat.

#### Conclusion

By successive choices of post–Cold War Administrations and Congresses, the United States does not have in place a comprehensive set of missile defense systems that would be capable of defending the homeland and allies from robust ballistic missile

threats. U.S. efforts have focused on a limited architecture that protects the homeland and on deploying and advancing regional missile defense systems.

Although the United States has in place multiple types of capable interceptors, a vast sensor network, and a command and control system, many elements of the missile defense system need to be improved to defend against today's threat more efficiently. At the same time, the development of missile threats, both qualitative and quantitative, is outpacing the speed of missile defense research, development, and deployment to address those threats. Senior leaders continue to stress the importance of U.S. missile defense, but if the nation is to realize the strategic benefits that missile defense provides, Congress must ensure that the funding of critical programs like NGI, space sensors, and JADC2 is commensurate with that importance.

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# Cyber Warfare and U.S. Cyber Command

### James Di Pane

The world of cyber operations is notoriously secretive. Nevertheless, even a rudimentary understanding of the domain, the threats and opportunities associated with it, and the ability of the Department of Defense (DOD) to protect the U.S. from cyberattack and enable military operations against enemies is of the greatest importance. To supplement the concise overview of military cyber capabilities provided in this discussion, two essays, "National Defense and the Cyber Domain" and "The Reality of Cyber Conflict: Warfare in the Modern Age," from previous editions of the *Index of U.S. Military Strength* provide a wealth of information about the cyber domain and how it fits into the world of national defense.<sup>1</sup>

The vulnerability of allies and the private sector to cyberattacks can lead to complications for the military services that negatively affect the ability of the United States to sustain a war effort, thereby compromising our national security. But the need for cybersecurity goes beyond the Department of Defense alone. In the words of Kenneth P. Rapuano, former Assistant Secretary of Defense for Homeland Defense and Global Security:

The increasingly provocative activities of key competitors, such as the NotPetya cyber operation conducted by Russia in February 2018, demonstrate how vulnerable the Department is to attacks against the many non-DoD-owned assets that are nevertheless critical to our ability to execute our missions. These assets include civilian ports, airfields, energy systems, and other critical infrastructure. Vulnerabilities in these areas will likely be targeted by our adversaries to disrupt military command and control, financial operations, the functioning of operationally critical contractors, logistics operations,

and military power projection, all without ever targeting the comparatively well-protected DoD Information Network. Any large-scale disruption or degradation of national critical infrastructure represents a significant national security threat.

To address these challenges, the DoD Cyber Strategy directs DoD to strengthen alliances and attract new partners to ensure that we are taking a whole-of-society approach and to enable better security and resilience of key assets....<sup>2</sup>

The use of cyber as a military tool to target enemy forces and capabilities falls into categories that are similar to those of other military operations. Cyber tools can be used in the form of conventional operations like the operations against the Islamic State that were used to disrupt command and control nodes and the group's ability to distribute propaganda. In this type of campaign, cyber supplements other military capabilities as a way to target enemy forces.

Cyber also can take the form of special operations—type activity like the Stuxnet cyber operation against Iran, which could be compared to the U.S. Navy Seal raid to kill Osama Bin Laden.<sup>4</sup> In these operations, cyber is used to achieve targeted goals, sometimes in a covert way that, like special operations, falls below the threshold of traditional armed conflict.

In conventional operations, cyber is used to support forces and commanders by ensuring that they can operate uninhibited in cyberspace or by disrupting the enemy's ability to operate in order to achieve necessary objectives more effectively. In this way,

cyber is used to gain an advantage over an adversary in much the same way advantage is sought in the other domains<sup>5</sup> (for example, when naval forces restrict the enemy's ability to use the seas to achieve strategic ends).

Like naval power, cyber is an important means with which to maximize one's own access and effectiveness while restricting the opponent's access and effectiveness. However, it differs from other domains in a very important respect: In cyber operations, time and space are incredibly compressed. A cyber force can launch an attack from anywhere in the world and strike very quickly, whereas more traditional forces need time to move, are affected by terrain and weather, and must physically position themselves to launch attacks.

### **U.S. Cyber Command**

U.S. Cyber Command (USCYBERCOM) is a capability-based Unified Combatant Command similar to U.S. Special Operations Command and is the military's primary organization for both offensive and defensive cyber activity. It is currently commanded by General Paul Nakasone, U.S. Army, who serves simultaneously as Director of the National Security Agency (NSA). The two organizations have a close cooperative relationship: The NSA and Cyber Command operate, respectively, under Title 50 and Title 10 of the U.S. Code, the sections that govern intelligence and military affairs.

U.S. Cyber Command was founded in 2010 as a sub-unified command under U.S. Strategic Command. The Trump Administration elevated it to full Unified Combatant Command status in 2018, and it reached full operational capability in the same year. Over the past approximately 12 years, Cyber Command has grown from a very small organization that was largely dependent on the NSA for personnel and resources into the much more robust and independent organization that exists today.

#### **Missions**

U.S. Cyber Command has a wide range of missions, from offensive and defensive operations to monitoring DOD networks and assisting with the defense of critical infrastructure. Its primary role is to ensure the DOD's ability to operate in a world that is increasingly dependent on cyber.

To this end, Cyber Command has three "enduring lines of operation":

- Provide mission assurance for the Department of Defense (DoD) by directing the operation and defense of the Department of Defense Information Networks (i.e. the DoDIN) and its key terrain and capabilities;
- Defeat strategic threats to the United States and its national interests; and
- Assist Combatant Commanders to achieve their missions in and through cyberspace.<sup>8</sup>

These "lines of operation" are critical to ensuring the success of the military enterprise and national defense, as any compromise in the ability to communicate or operate could jeopardize the full range of U.S. military activities.

A key part of these missions is the concept of "defending forward." As described in the 2018 DOD Cyber Strategy, "[t]his includes working with the private sector and our foreign allies and partners to contest cyber activity that could threaten Joint Force missions and to counter the exfiltration of sensitive DoD information."

Defending forward means operating as close to the origins of the cyber threat as possible before it reaches critical networks in the U.S. with the goal of collecting threat intelligence or disrupting attacks. This is contrasted with passive defense, which involves monitoring within U.S. networks for intrusions. As noted, cyber compresses time and space in the battlespace by its very nature, and attacks can emanate from anywhere in the world with similar speed. U.S. forces must therefore engage adversaries in their networks and work to disrupt attacks in their early stages, because it is often too late once the networks have been compromised. U.S. Cyber Command physically deploys teams abroad to work alongside the cyber forces of partner nations to operate in selected networks.<sup>10</sup>

#### Cyber and the War in Ukraine

Russia's invasion of Ukraine is significant for cyber because it shows how cyber can be used in conjunction with conventional military assets. While it was largely overshadowed by other aspects of Russia's invasion like the movements of armor units and use of artillery, the Russians utilized cyber throughout as part of their overall war plan. This includes some notable operations that had effects beyond Ukraine. For example:

- The Russians targeted Viasat, an American satellite communications company that provided support to the Ukrainian military, with malware designed to erase its data before disabling it. The Russians did not limit the malware's scope, and it ended up affecting other ground satellite components, causing hundreds of thousands of people outside of Ukraine to lose electrical power and their connection to the Internet.<sup>11</sup>
- A cyberattack against the City Council of Odessa, a major Ukrainian port city situated on the Black Sea, was timed to coincide with a cruise missile attack that was meant to disrupt Ukraine's response to Russian forces attacking in the south.<sup>12</sup>
- Cyberattacks have also been launched against many parts of Ukraine's infrastructure and government and civilian networks, including hospitals.<sup>13</sup>

These actions show that cyber operations are not limited to the military forces of the combatants and, like World War II strategic bombing efforts, often extend to strike at infrastructure and areas of economic significance.

U.S. Cyber Command has provided analytic support and has sought additional ways to support Ukraine. It has deployed cyber teams to support both Ukraine and NATO allies, and those efforts have proved critical to protecting U.S. networks and critical infrastructure as well as those of NATO allies. Specifically, according to General Nakasone:

U.S. Cyber Command (with NSA) has been integral to the nation's response to this crisis since Russian forces began deploying on Ukraine's borders last fall. We have provided intelligence on the building threat, helped to warn U.S. government and industry to tighten security within critical infrastructure sectors, enhanced resilience on the DODIN [Department of Defense Information Networks] (especially in Europe), accelerated efforts against criminal cyber enterprises and, together with interagency members, Allies, and partners, planned for a range of contingencies.<sup>14</sup>

#### **Budget**

Analyzing the budget for cybersecurity is difficult because of the degree of classification involved, but some data can be tracked with respect to USCYBER-COM and the broader Department of Defense. President Joseph Biden's FY 2023 budget includes \$11.2 billion for "Cyberspace Activities." This is \$800 million more than the FY 2022 DOD budget request, which included \$10.4 billion for cyberspace. <sup>16</sup>

General Nakasone testified in March 2021 that "USCYBERCOM's FY21 budget [was] roughly \$605 million, which covers the headquarters staff and the Cyber National Mission Force," and that "27 different components shape the Department's overall Cyber Activities Budget, which averages about \$10 billion a year."<sup>17</sup>

#### Capacity

The Cyber Mission Force (CMF) is the operational arm of U.S. Cyber Command, and CMF teams are distributed across various mission sets. In 2013, a force of 133 teams with 6,200 personnel was envisioned based on the mission requirements at that time. All 133 CMF teams reached full operational capability in 2018. <sup>18</sup>

These teams are distributed across functional areas. Specifically, there currently are:

- "13 National Mission Teams to defend the United States and its interests against cyber attacks";
- "68 Cyber Protection Teams to defend DoD networks and systems against rapidly evolvingthreats and technologies in cyberspace";
- "27 Combat Mission Teams to provide support to Combatant Commands by generating integrated cyberspace effects in support of operational plans and contingency operations";
- "25 Support Teams to provide analytic and planning support to National Mission and Combat Mission teams"; and
- "14 new CMF Teams created in FY 2022 and FY 2023 to support the Combatant Commanders in Space Operations and for countering cyber influence."

The teams are supported by four service components: Army Cyber Command (ARCYBER); Air Force Cyber Command (AFCYBER); Navy Fleet Cyber Command (FLTCYBER); and Marine Corps Forces Cyberspace Command (MARFORCYBER). These four commands, created at the same time that U.S. Cyber Command was created, provide the operational forces that make up the teams.

- ARCYBER supplies 41 teams to the CMF;<sup>20</sup>
- AFCYBER supplies 39 teams;<sup>21</sup>
- FLTCYBER supplies 40 teams, which reached full operational capability a year ahead of schedule in 2017;<sup>22</sup> and
- MARFORCYBER provides 13 teams.<sup>23</sup>

As of April 2022, according to General Nakasone, Cyber Command had "approximately 6,000 Service members, including National Guard and Reserve personnel on active duty," within its 133 teams" and was expecting to "grow by 14 teams over the next five years."

Recruiting and retaining cyber talent is one of the key challenges for U.S. Cyber Command, which has invested in retention and incentive programs in an effort to keep the talent it cultivates. The high demand for cyber personnel in the private sector makes this a difficult challenge.

### Capability

As noted at the outset of this discussion, the world of cyber operations is notoriously secretive, and much is classified. Thus, analyzing USCY-BERCOM's capability as reflected in open-source

(unclassified) literature is nearly impossible. However, the United States is viewed as one of the world's most capable cyber actors—an assessment that is based on its wide range of infrastructure and strategies and the advanced technologies that the U.S. is known to employ.<sup>25</sup>

#### Readiness

Because of the lack of open-source reporting, it is also nearly impossible to assess the readiness of America's cyber forces. The U.S. Government Accountability Office has identified some issues of training consistency in the past. <sup>26</sup> Standardizing and improving training is one of the main priorities for U.S. Cyber Command, along with retaining its talent, and both are critical to maintaining readiness.

#### Conclusion

Cyber is a key domain for the U.S. military. It also is increasingly important in the modern world generally. As seen in the various breaches and ransomware attacks that have come to light, cybersecurity for defense extends well beyond the Department of Defense. For the Joint Force, cyber supports military capabilities by ensuring that U.S. forces can operate in cyberspace without disruption, by making it difficult for enemies to conduct their own operations, and by conducting independent operations against targets as directed to achieve specified goals.

Within DOD, U.S. Cyber Command bears the primary responsibility for the full spectrum of military cyber operations. Having reached its authorized manning levels, USCYBERCOM has shifted its focus to training the force to ensure that it will be as capable as possible in helping to advance and protect the nation's interests.

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# Conclusion: U.S. Military Power

The Active Component of the U.S. military is twothirds the size it should be, operates equipment that is older than it should be, and is burdened by readiness levels that are more problematic than they should be. Some progress has been made, but it has been made at the expense of both capacity and modernization. Accordingly, this *Index* assesses:

- The Army as "Marginal." The Army's score remains "marginal" in the 2023 Index. The Army has fully committed to modernizing its forces for great-power competition, but its programs are still in their development phase, and it will be a few years before they are ready for acquisition and fielding. In other words, the Army is aging faster than it is modernizing. It remains "weak" in capacity with 62 percent of the force it should have but has significantly increased the force's readiness, scoring the highest level of "very strong." However, with the Army pushing operational training down to the company level, below battalion and brigade, it is unclear how ready its brigades actually are or how effective they would be in combat. The Army has a better sense of what it needs for war against a peer, but funding uncertainties could threaten its ability to realize its goals.
- The Navy as "Weak." The Navy's overall score has dropped from "marginal" in the 2022 Index to "weak" in the 2023 Index. The technology gap between the Navy and its peer competitors is narrowing in favor of competitors, and the Navy's ships are aging faster than they are being replaced. Its fleet is too small relative to workload, and supporting shipyards are overwhelmed by the amount of repair work that is needed to make more ships available. The Navy is projected to have a fleet of 280 ships by 2037,

- which is smaller than the current force of 298 and well below the 400 needed to meet operational demands. Funding to improve any of these serious deficiencies remains problematic.
- The Air Force as "Very Weak." The USAF's score has been downgraded from "weak" in the 2022 Index to "very weak" in the 2023 Index due to the deepening of previously assessed issues related to aging aircraft and very poor pilot training and retention. The retirement of aircraft is outpacing the introduction of new aircraft, worsening the service's capacity problem. The shortage of pilots and the dangerously low levels of flying time for the pilots the service does have degrade the ability of the Air Force to generate the amount and quality of combat air power that would be needed to meet wartime requirements. Although it could eventually make its contribution to winning a single major regional contingency (MRC), the time needed to win that battle and the attendant rates of attrition would be much higher than they would be if the service had moved aggressively to increase high-end training and acquire the fifth-generation weapon systems required to dominate such a fight. The USAF would struggle greatly against a peer competitor.
- The Marine Corps as "Strong." The score for the Marine Corps was raised to "strong" from "marginal" in the 2022 Index, and it remains "strong" in this edition for two reasons: (1) because the 2021 Index lowered the threshold for capacity from 36 infantry battalions to 30 battalions in acknowledgment of the Corps' argument that it is a one-war force that also stands ready for a broad range of smaller crisis-response tasks and (2) because of the Corps'

### **U.S. Military Power: Army**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		✓			
Capability			✓		
Readiness					<b>✓</b>
OVERALL			✓		

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

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity	✓				
Capability			✓		
Readiness		✓			
OVERALL		✓			

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

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity			✓		
Capability			✓		
Readiness	✓				
OVERALL	✓				

### **U.S. Military Power: Marine Corps**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		<b>✓</b>			
Capability				<b>~</b>	
Readiness				<b>~</b>	
OVERALL				<b>~</b>	

### **U.S. Military Power: Space**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity		✓			
Capability		✓			
Readiness		✓			
OVERALL		<b>✓</b>			

### **U.S. Military Power: Nuclear**

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Nuclear Stockpile				<b>~</b>	
Delivery Platform Reliability				~	
Warhead Modernization			~		
Delivery Systems Modernization				~	
Nuclear Weapons Complex			~		
National Labs Talent			<b>~</b>		
Allied Assurance				<b>~</b>	
OVERALL				<b>~</b>	

extraordinary, sustained efforts to modernize (which improves capability) and enhance its readiness during the assessed year. Of the five services, the Corps is the only one that has a compelling story for change, has a credible and practical plan for change, and is effectively implementing its plan to change. However, in the absence of additional funding in FY 2023, the Corps intends to reduce the number of its battalions even further from 22 to 21, and this reduction, if implemented, will limit the extent to which it can conduct distributed operations as it envisions and replace combat losses (thus limiting its ability to sustain operations). Though the service remains hampered by old equipment in some areas, it has nearly completed modernization of its entire aviation component, is making good progress in fielding a new amphibious combat vehicle, and is fast-tracking the acquisition of new anti-ship and anti-air weapons. Full realization of its redesign plan will require the acquisition of a new class of amphibious ships, for which the Corps needs support from the Navy.

• The Space Force as "Weak." The Space Force was formally established on December 20, 2019, as a result of an earlier proposal by President Trump and legislation passed by Congress. The 2021 Index provided an overview of the new service, explaining its mission, capabilities, and

challenges, but did not offer an assessment. With an additional year to gain more insight, the 2022 Index scored the USSF as "weak" in all measured areas, not because of lack of expertise but because the capacity of the service falls far short of the demands being placed on it. The service has done quite well in transitioning missions from the other services without interruption in support, but it does not have enough assets to track and manage the explosive growth in commercial and competitor-country systems that are being placed into orbit. The majority of its platforms have exceeded their planned life spans, and modernization efforts to replace them are slow and incremental. The force also lacks defensive and offensive counter-space capabilities. Consequently, the U.S. Space Force retains its score of "weak" overall.

### • America's Nuclear Capability as "Strong."

The status of U.S. nuclear weapons must be considered in the context of a threat environment that is significantly more dangerous than it was in previous years. Until recently, U.S. nuclear forces needed to address one nuclear peer rather than two or more. Given senior leaders' reassurances about the readiness and reliability of U.S. nuclear forces, as well as the strong bipartisan commitment to modernization of the entire nuclear enterprise, America's nuclear capability retains the grade of "strong." The reliability

of current U.S. delivery systems and warheads is at risk as they continue to age and the threat continues to advance, and the fragility of "just in time" replacement programs only exacerbates this risk. In fact, nearly all components of the nuclear enterprise are at a tipping point with respect to replacement or modernization and have no margin left for delays in schedule. Future assessments will need to consider plans to adjust America's nuclear forces to account for the doubling of peer nuclear threats. While capacity was not assessed this year, it is clear that the change in threat warrants a reexamination of U.S. force posture and the adequacy of our current modernization plans. This portfolio retains its score of "strong," but failure to keep modernization programs on track while planning for a three-party (or more) nuclear peer dynamic could slowly lead to a decline in the strength of U.S. nuclear deterrence.

In the aggregate, the United States' military posture is rated "weak." The 2023 Index concludes that the current U.S. military force is at significant risk of not being able to meet the demands of a single major regional conflict while

also attending to various presence and engagement activities. It most likely would not be able to do more and is certainly ill-equipped to handle two nearly simultaneous MRCs—a situation that is made more difficult by the generally weak condition of key military allies. The downgrading of the Air Force from "weak" to "very weak," downgrading of the Navy from "marginal" to "weak," and a Space Force score of "weak" have led to the first downgrade of the overall score since the inception of the *Index*.

In general, the military services have continued to prioritize readiness and have seen improvement over the past few years, but modernization programs continue to suffer as the failure of resources to keep pace with inflation leads to cancelations, truncation, or delay. The services have normalized the reduction in size and number of military units, and the forces remain well below the level they need to meet the two-MRC benchmark.

Mounting U.S. federal debt and creeping inflation will pressure defense accounts further at a time when competitor countries like China and Russia are redoubling their efforts to expand and improve their military forces. If it continues on this trajectory, the U.S. risks falling very short in its ability to secure its core national interests.

# Glossary of Abbreviations

### Д

A2/AD anti-access/area-denial  AAG Advanced Arresting Gear  AAMDS Aegis Ashore Missile Defense System  AAV Amphibious Assault Vehicle  ABCT Armored Brigade Combat Team  ABM Ansar Bayt al-Maqdis  ABMS Airborne Battle Management System  ACF Army contingency force  ACV Amphibious Combat Vehicle  ADIZ Air Defense Identification Zone  ADMM-Plus ASEAN Defence Ministers Meeting-Plus  AEHF Advanced Extremely High Frequency (satellite system)  AEW airborne early warning  AFAFRICA U.S. Air Force Cyber Command  AFP Armed Forces of the Philippines  AFRICOM U.S. Africa Command	
AAMDS Aegis Ashore Missile Defense System  AAV Amphibious Assault Vehicle  ABCT Armored Brigade Combat Team  ABM Ansar Bayt al-Maqdis  ABMS Airborne Battle Management System  ACF Army contingency force  ACV Amphibious Combat Vehicle  ADIZ Air Defense Identification Zone  ADMM-Plus ASEAN Defence Ministers Meeting-Plus  AEHF Advanced Extremely High Frequency (satellite system)  AEW airborne early warning  AFAFRICA U.S. Air Forces Africa  AFCYBER U.S. Air Force Cyber Command  AFP Armed Forces of the Philippines	
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AFCYBER U.S. Air Force Cyber Command  AFP Armed Forces of the Philippines	
AFP Armed Forces of the Philippines	
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AFRICOM U.S. Africa Command	
AFSOC U.S. Air Force Special Operations Command	
AFTA ASEAN Free Trade Area	
AIP Air Independent Propulsion	
AIT American Institute in Taiwan	
AMDR Air and Missile Defense Radar	
AME aeromedical evacuation	
AMPV Armored Multipurpose Vehicle	
ANSF Afghan National Security Forces	
AN/TPY-2 Army Navy/Transportable Radar Surveillance	
ANZUS Australia-New Zealand-U.S. Security Treaty	
AOR area of responsibility	
APC armored personnel carrier	
APS Army Prepositioned Stocks	
AQAP Al-Qaeda in the Arabian Peninsula	
AQI Al-Qaeda in Iraq	
AQIM Al-Qaeda in the Islamic Maghreb	
ARC Active Reserve Component	
ARCYBER U.S. Army Cyber Command	
ARF ASEAN Regional Forum	

ARG	amphibious ready group
ARNG	Army National Guard
ASAT	anti-satellite
ASBM	Anti-ship ballistic missile
ASEAN	Association of Southeast Asian Nations
ASG	Abu Sayyaf Group
ASUW	anti-surface warfare
ASW	anti-submarine warfare
AUSMIN	Australia-United States Ministerial
AW	air warfare
AWACS	Airborne Warning and Control System

### В

BBA	sipartisan Budget Act of 2015
BCA	Budget Control Act of 2011
ВСТ	Brigade Combat Team
BCW	biological and chemical weapons
BDCA	border defense cooperation agreement
BECA	Basic Exchange and Cooperation Agreement
BJP	Bharatiya Janata Party
BMD	ballistic missile defense
BUR	Bottom-Up Review
BVR	beyond visual recognition

### C

command and control

C4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CA	civil affairs
CAB	combat aviation brigade
CAPE	Cost Assessment and Program Evaluation
CATOBAR	conventional takeoff/barrier landing
СВО	Congressional Budget Office
CCG	Chinese Coast Guard
ССТ	Combat Controller Team
CELAC	Community of Latin American and Caribbean States
CENTCOM	U.S. Central Command
CFC	Combined Forces Command (South Korea–U.S.)
CFSCC	Combined Force Space Component Command

CFT	Cross-Functional Team
CHAMSI	Cooperative Humanitarian and Medical Storage Initiative
CI	counterinsurgency
CIA	Central Intelligence Agency
CISMOA	Communications and Information Security Memorandum of Agreement
CJTF-HOA	Combined Joint Task Force-Horn of Africa
CLF	Combat Logistics Force
CLU	Command Launch Units
CMF	Cyber Mission Force
CMRR	Chemistry and Metallurgy Research Replacement
CMT	combat mission team
СОСОМ	Combatant Command
CONUS	continental United States
COVID-19	Coronavirus Disease 2019
CPMIEC	China Precision Machinery Import-Export Corporation
CPT	Cyber Protection Team
CRS	Congressional Research Service
CSF	coalition support funds
CSG	carrier strike group
CSO	Chief of Space Operations
CSO	Critical Skills Operator
СТ	counterterrorism
СТС	Combat Training Center
CTF	Combined Task Force
CTIC	Counter Terrorism Information Center
CVN	aircraft carrier, nuclear powered
CVW	carrier air wing
CW	chemical warfare
CYBERCOM	U.S. Cyber Command
CYOC	Cyberspace Operations Centre

### D

D2D	deployment-to-dwell
DA-KKV	direct-ascent kinetic-kill vehicle
DCA	defense cooperation agreement
DDOS	distributed denial of service
DDPR	Deterrence and Defense Posture Review
DIANA	Defence Innovation Accelerator of the North Atlantic
DIME	diplomatic, informational, military, and economic

DMSP	Defense Meteorological Satellite Program
DMZ	demilitarized zone
DNI	Director of National Intelligence
DoAF	Department of the Air Force
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOS	denial of service
DPRK	Democratic People's Republic of Korea (North Korea)
DSCA	Defense Security Cooperation Agency
DSCS	Defense Satellite Communications System
DSG	Defense Strategic Guidance
DSR	Defense Strategic Review
DTTI	Defense Trade and Technology Initiative

### F

EAC	enhanced air cooperation
EADRCC	Euro-Atlantic Disaster Response Coordination Centre
EAS	European Activity Set
EBO	effects-based operations
ECP	engineering change proposal
EDA	excess defense articles
EDCA	Enhanced Defense Cooperation Agreement
EDI	European Defense Initiative
EEZ	exclusive economic zone
EFP	enhanced forward presence
EFV	Expeditionary Fighting Vehicle
EMALS	Electromagnetic Aircraft Launch System
EMD	engineering and manufacturing development
EMP	electromagnetic pulse
EOD	explosive ordnance disposal
ERIP	European Recapitalization Incentive Program
ESG	Expeditionary Strike Group
EU	European Union
EUCOM	U.S. European Command
EW	electronic warfare

F

**FATA** Federally Administered Tribal Areas **FATF** Financial Action Task Force **FCS** Future Combat System **FLTCYBER** U.S. Navy Fleet Cyber Command **FLTSATCOM** Fleet Satellite Communications System FOC full operational capability **FONOP** freedom of navigation operation **FRAGO** fragmentary order **FSTM** full spectrum training miles FTA free trade agreement FΥ fiscal year **FYDP** Future Years Defense Program

G

GAO Government Accountability Office (formerly General Accounting Office) **GATOR** Ground/Air Task Oriented Radar GCC geographic combatant commander GCC **Gulf Cooperation Council** GCV Ground Combat Vehicle GDP gross domestic product GEO geosynchronous orbit **GFMAP** Global Force Management Allocation Plan GMV Ground Mobility Vehicle GPF general purpose forces GPS Global Positioning System **GSOMIA** General Security of Military Information Agreement



HA/DR humanitarian assistance/disaster relief
 HEO highly elliptical orbit
 HMMWV High Mobility Multipurpose Wheeled Vehicle (HUMVEE)
 HVE homegrown violent extremist

IAMD	Integrated Air and Missile Defense
IBCT	Infantry Brigade Combat Team
ICBM	intercontinental ballistic missile
ICS	industrial control systems
ICT	Information and communications technology
IDF	Israel Defense Forces
IED	improvised explosive device
IFPC	indirect fire protection capability
IFV	infantry fighting vehicle
IMF	International Monetary Fund
INDOPACOM	U.S. Indo-Pacific Command
INEW	late analysis of Nicky and Clarkway in Nicky
	Integrated Network Electronic Warfare
INF	Intermediate-Range Nuclear Forces (treaty)
INF INFSA	-
	Intermediate-Range Nuclear Forces (treaty)
INFSA	Intermediate-Range Nuclear Forces (treaty) Integrated Naval Force Structure Assessment
INFSA IOC	Intermediate-Range Nuclear Forces (treaty) Integrated Naval Force Structure Assessment initial operating capability
INFSA IOC IRGC	Intermediate-Range Nuclear Forces (treaty) Integrated Naval Force Structure Assessment initial operating capability Islamic Revolutionary Guard Corps
INFSA IOC IRGC ISAF	Intermediate-Range Nuclear Forces (treaty) Integrated Naval Force Structure Assessment initial operating capability Islamic Revolutionary Guard Corps International Security Assistance Force



JCPOA	Joint Comprehensive Plan of Action
JeM	Jaish-e-Mohammed
JLTV	Joint Light Tactical Vehicle
JOAC	Joint Operational Access Concept
JP	joint publication
JSF	Joint Strike Fighter (F-35 Lightning II)
JSOC	Joint Special Operations Command
JSOTF-P	Joint Special Operations Task Force-Philippines
JSTARS	Joint Surveillance and Target Attack Radar System
JTF North	Joint Task Force North
JTF-SD	Joint Task Force-Space Defense
JuD	Jamaat-ud-Dawa



**KATUSA** Korean Augmentees to the United States Army

Long-Range Strike Bomber

landing ship, dock (amphibious ship)

**KFOR** Kosovo Force

LAC Line of Actual Control LAF Lebanese Armed Forces Light Armored Vehicle LAV LCAC Landing Craft Air Cushion Vehicle LCS Littoral Combat Ship LCT Littoral Combat Team Logistics Exchange Memorandum of Agreement LEMOA LeT Lashkar-e-Taiba LFP lead force package LHA landing helicopter assault (amphibious ship) LHD landing helicopter dock (amphibious ship) LNG liquefied natural gas LoC Line of Control LPD landing platform/dock or amphibious transport dock (amphibious ship) LRA Lord's Resistance Army LRASM long range anti-ship missiles LRDR long range discrimination radar LRIP Low-Rate Initial Production

M

LRS-B

LSD

MAGTF Marine Air-Ground Task Force **MANPADS** man-portable air-defense systems MARCENT U.S. Marine Corps Forces Central Command **MARFORAF** U.S. Marine Corps Forces Africa MARFORCYBER U.S. Marine Corps Forces Cyberspace Command **MARFOREUR** U.S. Marine Corps Forces Europe **MARFORPAC** U.S. Marine Corps Forces, Pacific MARSOC U.S. Marine Corps Special Operations Command MAWI Multinational Ammunition Warehousing Initiative

мсм	mine countermeasure (ship)
MCMV	mine countermeasure vessel (ship)
MCO	major combat operation (see MRC, MTW)
MDAP	Major Defense Acquisition Program
MDO	multi-domain operations
MDT	mutual defense treaty
MDTF	Multi-Domain Task Forces
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
Milstar	Military Strategic and Tactical Relay
MINUSMA	United Nations Multidimensional Integrated Stabilization Mission in Mali
MIRV	multiple independently targetable reentry vehicles
MISO	Military Information Support Operations
MLR	Marine Littoral Regiment
MNLA	National Movement for the Liberation of Azawad
MNLF	Moro National Liberation Front
MNNA	major non-NATO ally
MOJWA	Movement for Oneness and Jihad in West Africa
MPC	Marine Personnel Carrier
MPS	Maritime Prepositioning Ships
MRAP	Mine-Resistant Ambush-Protected (vehicle)
MRBM	medium-range ballistic missile
MRC	major regional conflict (see MTW, MCO)
MRF	Marine Rotational Force
MSI	Maritime Security Initiative
MTW	major theater war (see MCO, MRC)

### N

NAP	National Action Plan
NASIC	U.S. National Air and Space Intelligence Center
NATO	North Atlantic Treaty Organization
NAVAF	U.S. Naval Forces Africa
NAVEUR	U.S. Naval Forces Europe
NDAA	National Defense Authorization Act
NDN	Northern Distribution Network
NDP	National Defense Panel
NDS	National Defense Strategy
New START	New Strategic Arms Reduction Treaty

NGI	next generation interceptor
NMI	NATO Mission Iraq
NNSA	National Nuclear Security Administration
NPR	Nuclear Posture Review
NPRIS	Nuclear Posture Review Implementation Study
NSA	National Security Agency
NSC	National Security Council
NSR	Northern Sea Route
NSWC	Naval Special Warfare Command



OAR	Operation Atlantic Resolve
OAS	Organization of American States
осо	overseas contingency operations
OEF	Operation Enduring Freedom
O-FRP	Optimized Fleet Response Plan
OIF	Operation Iraqi Freedom
OMFV	optionally manned fighting vehicle
ONA	Office of Net Assessment
ONE	Operation Noble Eagle
OPCON	operational control
OPE-P	Operation Pacific Eagle-Philippines
OPIR	Overhead Persistent Infrared
OPLAN	operational plan
ОРТЕМРО	operational tempo
OSCE	Organization for Security and Co-operation In Europe
OT&E	Operational Test and Evaluation
OTFSTM	Operating Tempo Full Spectrum Training Miles

### Р

PACAF	U.S. Pacific Air Forces
PACFLT	U.S. Pacific Fleet
PACOM	U.S. Pacific Command
PAF	Philippine Air Force
PDD-15	Presidential Decision Directive-15
PFLP	Popular Front for the Liberation of Palestine
PFLP-GC	Popular Front for the Liberation of Palestine–General Command
PGM	precision-guided munitions

PIM	Paladin Integrated Management					
PKK	Kurdistan Workers' Party					
PKO	peacekeeping operation					
PLA	People's Liberation Army					
PLAAF	People's Liberation Army Air Force					
PLAN	People's Liberation Army Navy					
PLARF	People's Liberation Army Rocket Force					
PLASSF	People's Liberation Army Strategic Support Force					
PLO	Palestine Liberation Organization					
PNI	Presidential Nuclear Initiative					
PNT	positioning, navigation, and timing					
PRC	People's Republic of China					
PRT	Provisional Reconstruction Team					
PSA	Port of Singapore Authority					
PSF	Peninsula Shield Force					



QDR	Quadrennial Defense Review
QME	qualitative military effectiveness
QNSTR	Quadrennial National Security Threats and Trends

### R

RAF	Royal Air Force
RAP	readiness action plan
RBA	Ready Basic Aircraft
RCOH	refueling and complex overhaul (nuclear-powered ship)
RDJTF	Rapid Deployment Joint Task Force
RDT&E	Research, Development, Test, and Evaluation
RFP	Request for Proposals
RIMPAC	Rim of the Pacific
RKV	redesigned kill vehicle
RMA	revolution in military affairs
ROK	Republic of Korea (South Korea)
RP	Republic of the Philippines
RPG	rocket-propelled grenade

### S

SAARC	South Asia Association of Regional Cooperation					
SAC	strategic airlift capability					
SACEUR	Supreme Allied Commander Europe					
SAM	surface-to-air missile					
SAR	search and rescue					
SBCT	Stryker Brigade Combat Team					
SBIRS	Space-Based Infrared System (satellite system)					
SCN	Shipbuilding and Conversion, Navy (budget category)					
SEAL	Sea Air Land operator (Navy)					
SEATO	Southeast Asia Treaty Organization					
SFA	Strategic Framework Agreement					
SFAB	Security Force Assistance Brigades					
SIGINT	signals intelligence					
SIPRI	Stockholm International Peace Research Institute					
SLBM	submarine-launched ballistic missile					
SMU	special mission unit					
SOCAFRICA	U.S. Special Operations Command Africa					
SOCCENT	U.S. Special Operations Command Central					
SOCEUR	U.S. Special Operations Command Europe					
SOCPAC	U.S. Special Operations Command Pacific					
SOF	U.S. Special Operations Forces					
SOP	standard operating procedure					
SORT	Strategic Offensive Reductions Treaty					
SOTFE	Support Operations Task Force Europe					
SPE	Sony Pictures Entertainment					
SPMAGTF	Special-Purpose Marine Air-Ground Task Force					
SpOC	Space Operations Command					
SRBM	short-range ballistic missile					
SRM	Sustainable Readiness Model					
SSBN	ballistic missile submarine, nuclear-powered					
SSGN	guided missile submarine, nuclear-powered					
SSN	attack submarine, nuclear-powered					
SSP	Stockpile Stewardship Program					
STA-1	Strategic Trade Authorization-1					
STARCOM	Space Training and Readiness Command					
STRATCOM	U.S. Strategic Command					
SUW	surface warfare					

Τ

**TACAIR** tactical air **TAFWN** The Air Force We Need TAI total active inventory **TANAP** Trans-Anatolian Natural Gas Pipeline TAP Trans-Adriatic Pipeline TCO transnational criminal organization TDY stateside temporary duty THAAD Terminal High Altitude Area Defense TLAM/N Tomahawk Land Attack Missile/Nuclear **TMP** technical modernization program **TNW** tactical nuclear weapon TPP Trans-Pacific Partnership TRA Taiwan Relations Act **TRANSCOM** U.S. Transportation Command TSOC Theater Special Operations Command TTP Tehrik-e-Taliban Pakistan



UAE

United Arab Emirates

UAV unmanned aerial vehicle **UCLASS** Unmanned Carrier-Launched Airborne Surveillance and Strike UCP Unified Command Plan **UNASUR** Unión de Naciones Suramericanas (Union of South American Nations) UNC United Nations Council **UNCLOS** U.N. Convention on the Law of the Sea UNIFIL United Nations Interim Force in Lebanon **USAF** U.S. Air Force **USAFCENT** U.S. Air Forces Central **USAFE** U.S. Air Forces Europe **USARAF** U.S. Army Africa **USARCENT** U.S. Army Central **USAREUR** U.S. Army Europe **USARPAC** U.S. Army Pacific USASOC U.S. Army Special Operations Command **USCYBERCOM** U.S. Cyber Command USFJ U.S. Forces Japan

USFK	U.S. Forces Korea
USMC	U.S. Marine Corps

USNAVCENT U.S. Naval Forces Central
USNORTHCOM U.S. Northern Command

**USSF** U.S. Space Force

**USSOCOM** U.S. Special Operations Command

undersea warfare

Worldwide Threat Assessment

USSPACECOM U.S. Southern Command
USSPACECOM U.S. Space Command
USV unmanned surface vessel

 $\bigvee$ 

USW

 VEO
 violent extremist organizations

 VFA
 U.S.-Philippines Visiting Forces Agreement

VLS vertical launching system

W

**WWTA** 

WGS Wideband Global SATCOM (satellite system)
WMD weapons of mass destruction
WRM wartime readiness materials

## Methodology

The assessment portion of the *Index of U.S. Military Strength* is composed of three major sections that address America's military power, the operating environments within or through which that power must be employed, and threats to U.S. vital national interests.

The authors of this study used a five-category scoring system that ranged from "very poor" to "excellent" or "very weak" to "very strong" as appropriate to each topic. They chose this particular approach because it captures meaningful gradations while avoiding the appearance that a high level of precision is possible given the nature of the issues and the information that was publicly available.

Some factors are quantitative and lend themselves to discrete measurement; others are very qualitative in nature and can be assessed only through an informed understanding of the material that leads to a judgment call. Further, because conditions in each of the areas assessed are changing throughout the year, any measurement must necessarily be based on the information at hand and viewed as a snapshot in time. We understand that this is not entirely satisfactory when it comes to reaching conclusions on the status of a given matter (especially the adequacy of military power) and will be quite unsatisfactory for some readers, but we also understand that senior officials in decision-making positions will never have a comprehensive set of inarguable hard data on which to base a decision.

Purely quantitative measures alone tell only part of the story when it comes to the relevance, utility, and effectiveness of hard power. In fact, using only quantitative metrics to assess military power or the nature of an operating environment can lead to misinformed conclusions. Raw numbers are a very important component, but they tell only a part of the story of war. Similarly, experience and demonstrated

proficiency are often decisive factors in war, but they are also nearly impossible to measure.

The assessment of the *global operating environment* in this *Index* focuses on three key regions—Europe, the Middle East, and Asia—because of their importance relative to U.S. vital economic, diplomatic, and security interests.

For threats to U.S. vital interests, the Index identifies the countries that pose the greatest current or potential threats to U.S. vital interests based on two overarching factors: behavior and capability. The classic definition of "threat" considers the combination of intent and capability, but intent cannot be clearly measured. Therefore, observed behavior (including historical behavior and explicit policies or formal statements vis-à-vis U.S. interests) is used as a reasonable surrogate because it is the clearest manifestation of intent. The countries selected according to these criteria are scored in two areas:

- The degree of provocative behavior that they exhibited during the year.
- Their ability to pose a credible threat to U.S. interests irrespective of intent.

Finally, the *status of U.S. military power* is addressed in three areas: capability (or modernity), capacity, and readiness. All three are fundamental to success even if they are not de facto determinants of success (something we explain further in the section). Also addressed is the condition of America's nuclear weapons capability, which is assessed in areas that are unique to this military component and critical to understanding its real-world viability and effectiveness as a strategic deterrent. Though they are not scored according to the stated metrics, the chapter on military power includes explanatory overviews of U.S. missile defense and cyber.

#### Assessing the Global Operating Environment

Not all of the factors that characterize an operating environment are equal, but each contributes to the degree to which a particular operating environment is favorable or unfavorable to future U.S. military operations. In assessing the operating environment, we used a five-point scale that ranges from "very poor" to "excellent" conditions and covers the four regional characteristics that are of greatest relevance to the conduct of military operations:

- 1. **Very Poor.** Significant hurdles exist for military operations. Physical infrastructure is insufficient or nonexistent, and the region is politically unstable. The U.S. military is poorly placed or absent, and alliances are nonexistent or diffuse.
- 2. **Unfavorable.** A challenging operating environment for military operations is marked by inadequate infrastructure, weak alliances, and recurring political instability. The U.S. military is inadequately placed in the region.
- **3. Moderate.** A neutral to moderately favorable operating environment is characterized by adequate infrastructure, a moderate alliance structure, and acceptable levels of regional political stability. The U.S. military is adequately placed.
- **4. Favorable.** A favorable operating environment includes good infrastructure, strong alliances, and a stable political environment. The U.S. military is well placed for future operations.
- 5. Excellent. An extremely favorable operating environment includes well-established and well-maintained infrastructure; strong, capable allies; and a stable political environment. The U.S. military is exceptionally well placed to defend U.S. interests.

The key regional characteristics consisted of:

a. Alliances. Alliances are important for interoperability and collective defense because allies are more likely than non-allies to lend support to U.S. military operations. Indicators that provide insight into the strength or health of an alliance include whether the U.S. trains regularly with countries in the region, has good

interoperability with the forces of an ally, and shares intelligence with nations in the region.

- b. Political Stability. Political stability brings predictability when military planners are considering such things as transit, basing, and overflight rights for U.S. military operations. The overall degree of political stability indicates whether U.S. military actions would be hindered or enabled and reflects, for example, whether transfers of power are generally peaceful and whether there have been any recent instances of political instability in the region.
- c. U.S. Military Positioning. Having military forces based or equipment and supplies staged in a region greatly facilitates the ability of the United States to respond to crises and (presumably) achieve successes in critical "first battles" more quickly. Being routinely present in a region also helps the U.S. to maintain familiarity with its characteristics and the various actors that might try to assist or thwart U.S. actions. With this in mind, we assessed whether or not the U.S. military was well-positioned in the region. Again, indicators included bases, troop presence, prepositioned equipment, and recent examples of military operations (including training and humanitarian operations) launched from the region.
- d. Infrastructure. Modern, reliable, and suitable infrastructure is essential to military operations. Airfields, ports, rail lines, canals, and paved roads enable the U.S. to stage, launch operations from, and logistically sustain combat operations. We combined expert knowledge of regions with publicly available information on critical infrastructure to arrive at our overall assessment of this metric.

#### Assessing Threats to U.S. Vital Interests

To make the threats identified in this *Index* measurable and relatable to the challenges of operating environments and the adequacy of American military power, *Index* staff and outside reviewers, working independently, evaluated the threats according to their level of provocation (observed behavior) and their actual capability to pose a credible threat to U.S. interests on a scale of 1 to 5, with 1 representing

a very high threat capability or level of belligerency. This scale corresponds to the tone of the five-point scales used to score the operating environment and military capabilities in that 1 is bad for U.S. interests and 5 is very favorable.

Based on these evaluations, provocative behavior was characterized according to five descending categories: benign (5); assertive (4); testing (3); aggressive (2); and hostile (1). Staff also characterized the capabilities of a threat actor according to five categories: marginal (5); aspirational (4); capable (3); gathering (2); and formidable (1). Those characterizations—behavior and capability—form two halves of the overall threat level.

#### Assessing U.S. Military Power

Also assessed is the adequacy of U.S. 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 United States. The assessment draws on both quantitative and qualitative aspects of military forces, informed by an experience-based understanding of military operations and the expertise of the authors and internal and external reviewers.

It is important to note that 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.

The point is that the ability of a military force to locate, close with, and destroy an enemy depends on many factors, but relatively few of them are easily measured. The scope of this specific project does not extend to analysis of everything that makes hard power possible; it focuses on the status of the hard power itself.

This *Index* assesses the state of military affairs for U.S. forces in three areas: capability, capacity, and readiness.

**Capability.** Scoring of capability is based on the current state of combat equipment. This involves four factors:

- The ages of key platforms relative to their expected life spans.
- Whether the required capability is being met by legacy or modern equipment.
- The scope of improvement or replacement programs relative to the operational requirement.
- The overall health and stability (financial and technological) of modernization programs.

This *Index* focused on primary combat units and combat platforms such as tanks, ships, and airplanes and elected not to include the array of system and component upgrades such as a new radar, missile, or communications suite that keep an older platform viable over time. New technologies grafted onto aging platforms ensure that U.S. military forces keep pace with technological innovations that are relevant to the modern battlefield, but at some point, the platforms themselves are no longer viable and must be replaced. Modernized sub-systems and components do not entirely substitute for aging platforms, and it is the platforms themselves that are usually the more challenging items to field. In this sense, primary combat platforms serve as representative measures of force modernity just as combat forces are a useful surrogate measure for the overall military that includes a range of support units, systems, and infrastructure.

In addition, it is assumed that modernization programs should replace current capacity at a one-to-one ratio. Less than a one-to-one replacement assumes risk, because even if the newer system is presumably better than the older, until it is proven in actual combat, having fewer systems lessens the capacity of the force—an important factor if combat against a peer competitor carries with it the likelihood of attrition. For modernization programs, only Major Defense Acquisition Programs (MDAPs) are scored.

The capability score uses a five-grade scale. Each service receives one capability score that is a non-weighted aggregate of scores for four categories: (1) Age of Equipment, (2) Modernity of Capability, (3) Size of Modernization Program, and (4) Health of Modernization Program. General criteria for the capability categories are:

#### Age of Equipment

- **Very Weak:** Equipment age is past 80 percent of expected life span.
- Weak: Equipment age is 61 percent-80 percent of expected life span.
- **Marginal:** Equipment age is 41 percent–60 percent of expected life span.
- Strong: Equipment age is 21 percent-40 percent of expected life span.
- Very Strong: Equipment age is 20 percent or less of expected life span.

### **Capability of Equipment**

- Very Weak: More than 80 percent of capability relies on legacy platforms.
- Weak: 60 percent-79 percent of capability relies on legacy platforms.
- **Marginal:** 40 percent–59 percent of capability is made up of legacy platforms.
- **Strong:** 20 percent–39 percent of capability is made up of legacy platforms.
- **Very Strong:** Less than 20 percent of capability is made up of legacy platforms.

### **Size of Modernization Program**

- **Very Weak:** Modernization program is significantly too small or inappropriate to sustain current capability or program in place.
- **Weak:** Modernization program is smaller than current capability size.
- Marginal: Modernization program is appropriate to sustain current capability size.
- **Strong:** Modernization program will increase current capability size.
- **Very Strong:** Modernization program will vastly expand capability size.

#### **Health of Modernization Program**

- **Very Weak:** Modernization program faces significant problems; too far behind schedule (fiveplus years); cannot replace current capability before retirement; lacks sufficient investment to advance; cost overruns include Nunn–McCurdy breach, which occurs when the cost of a new item exceeds the most recently approved amount by 25 percent or more or if it exceeds the originally approved amount by 50 percent or more.<sup>1</sup>
- Weak: Modernization program faces procurement problems; behind schedule (three-five years); difficult to replace current equipment on time or insufficient funding; cost overruns enough to trigger an Acquisition Program Baseline (APB) breach.<sup>2</sup>
- Marginal: Modernization program faces few problems; behind schedule by one-two years but can replace equipment with some delay or experience some funding cuts; some cost growth but not within objectives.
- **Strong:** Modernization program faces no procurement problems; can replace equipment with no delays; within cost estimates.
- Very Strong: Modernization program is performing better than DOD plans, including with lower actual costs.

Capacity. To score capacity, the Army, Navy, and Air Force (be it end strength or number of platforms) are compared to the force size required to meet a simultaneous or nearly simultaneous two-war or twomajor regional contingency (MRC) benchmark. This benchmark consists of the force needed to fight and win two MRCs and a 20 percent margin that serves as a strategic reserve. The Marine Corps is handled a bit differently (see the explanatory note below and a more expanded discussion within its specific assessment).3 A strategic reserve is necessary because deployment of 100 percent of the force at any one time is highly unlikely. Not only do ongoing requirements like training or sustainment and maintenance of equipment make it infeasible for the entirety of the force to be available for deployment, but committing 100 percent of the force would leave no resources available to handle unexpected situations.

Thus, a "marginal" capacity score would exactly meet a two-MRC force size, a "strong" capacity score would equate to a plus–10 percent margin for strategic reserve, and a "very strong" score would equate to a 20 percent margin.

#### **Capacity Score Definitions**

- Very Weak: 0 percent-37 percent of the two-MRC benchmark.
- Weak: 38 percent-74 percent of the two-MRC benchmark.
- Marginal: 75 percent-82 percent of the two-MRC benchmark.
- **Strong:** 83 percent–91 percent of the two-MRC benchmark.
- **Very Strong:** 92 percent–100 percent of the two-MRC benchmark.

**Readiness.** The readiness scores are derived from the military services' own assessments of readiness based on their requirements. For many reasons, not least of which is concern about informing a potential enemy's calculations on sensitive, detailed aspects of a force's readiness for combat, the services typically classify their internal readiness reporting. However, they do make some public reports, usually when providing open testimony to Congress. Thus, instead of delving into comprehensive reviews of all readiness input factors, the *Index* relies on the public statements of the military services regarding the state of their readiness.

It should be noted that even a "strong" or "very strong" score does not indicate that 100 percent of the force is ready; it simply indicates that the service is meeting 100 percent of its own readiness requirements. Often, these requirements assume that a percentage of the military at any one time will not be fit

for deployment. Because of this, even if readiness is graded as "strong" or "marginal," there is still a gap in readiness that will have significant implications for immediate combat effectiveness and the ability to deploy quickly. Thus, anything short of meeting 100 percent of readiness requirements assumes risk and is therefore problematic.

Further, a service's assessment of its readiness occurs within its size or capacity at that time and as dictated by the Defense Strategic Guidance, National Military Strategy, and related top-level documents generated by the Administration and senior Defense officials. It does not account for the size-related "readiness" of the force to meet national security requirements, which is assessed as needed by this *Index*. Consequently, for a service to be assessed as "very strong" would mean that 80 percent-100 percent of the existing force in a service meets that service's requirements for being "ready" even if the size of the service is less than that required to meet the two-MRC benchmark. It is important that the reader keep this in mind when considering the actual readiness of the force to protect U.S. national security interests against the challenges presented by threats around the world.

#### **Readiness Score Definitions**

- **Very Weak:** 0 percent–19 percent of service's requirements.
- **Weak:** 20 percent-39 percent of service's requirements.
- Marginal: 40 percent-59 percent of service's requirements.
- **Strong:** 60 percent–79 percent of service's requirements.
- **Very Strong:** 80 percent–100 percent of service's requirements.

#### **Endnotes**

- 10 U.S. Code ch. 325: Cost Growth-Unit Cost Reports (Nunn-McCurdy), § 4371(a)(3)(A)(1) and (B)(1), https://uscode.house.gov/view.xhtml?req=granuleid%3AUSC-prelim-title10-chapter325&edition=prelim (accessed July 7, 2022).
- 2. 14 U.S. Code § 1135: Acquisition Program Baseline Breach, https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title14-section1135&num=0&edition=prelim (accessed July 7, 2022).
- 3. As noted in the introduction to the chapter assessing military power, the three large services (Army, Navy, and Air Force) are sized for global action in more than one theater at a time. The Marines, by virtue of overall size and most recently by direction of the Commandant, focus on one major conflict while ensuring that all Fleet Marine Forces are globally deployable for short-notice, smaller-scale actions. Having assessed that the Indo-Pacific region will continue to be of central importance to the U.S. and noting that China is a more worrisome "pacing threat" than any other competitor and that the Joint Force lacks the ability to operate within the range of intensely weaponized, layered defenses featuring large numbers of precision-guided munitions, the Corps is reshaping itself to optimize its capabilities and organizational structures to meet this challenge. This *Index* concurs with this effort but assesses that the Corps will still need greater capacity to succeed in war in the very circumstances for which the Marines believe they must prepare. Consequently, we assess the Marine Corps' capacity against a one-war metric.

# Senator James M. Inhofe (R-OK)

ver nearly four decades of service in the United States Congress, Senator James M. Inhofe has been a stalwart advocate for a strong national defense, consistently noting that the first function of the federal government is to protect the country. Currently serving as Ranking Member of the Senate Armed Services Committee, he has used his positions in committee leadership and on the Airland, Readiness and Management Support, and Strategic Forces Subcommittees to champion measures that strengthen America's military and support its veterans, with whom he has always had a personal connection stemming from his own service in the U.S. Army.

Senator Inhofe unapologetically champions a military that is capable of defending America's interests against the challenges posed by the People's Republic of China, Russia, and rogue regimes like those that control North Korea and Iran. In the Senator's own words: "The credibility of American deterrence rests on a simple foundation. America prevents wars by convincing its adversaries they cannot win." This is the end to which he has dedicated himself: a military that has the resources and readiness it needs to protect our country, our fellow citizens, and our way of life.

Although Senator Inhofe is retiring from public service at the end of the 117th Congress, his years of dedication to the safety and security of our country have produced a legacy that will remain profoundly meaningful for generations to come.



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