TARGET TAIWAN: CHALLENGES FOR A U.S. INTERVENTION

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October 16, 2025

A policy paper of the Asia Program
This explainer is part of the series “Target Taiwan.”

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KEY POINTS

1. China could attack Taiwan, attempting a *fait accompli* before the United States could mobilize sufficient forces in theater to defend it. Chinese advantages of proximity and will suggest that the U.S. would pay a heavy price in this scenario.
2. U.S. ground forces would struggle to enter the combat theater in the relevant time because of uncertainties related to the air and sea campaigns. Attempts to insert U.S. ground forces in peacetime could ignite the very conflict they would intend to deter.
3. Chinese missile, air, and drone assaults could damage U.S. airfields in the region and slow U.S. air support, acutely degrading U.S. maritime operations and Taiwan's ground defenses.
4. Because U.S. Navy surface forces, including aircraft carrier battle groups, are vulnerable to China's A2/AD systems, combat in a Taiwan scenario would likely be disproportionately borne by the U.S. Navy submarine force. While these submarines could do damage to the Chinese Navy, they probably lack sufficient firepower to affect the overall outcome of a war.
5. Surging forward U.S. air and naval power in a Taiwan scenario would entail incredible risks, including nuclear escalation. Any war or even intensive militarized rivalry between the U.S. and China would entail enormous risks in exchange for little gain.

CHINA'S KEY ADVANTAGES: PROXIMITY AND WILL

Can the United States defeat a Chinese invasion of Taiwan? This paper does not say absolutely one way or the other, but it assesses that the U.S. ability to defend Taiwan is far more limited than is often appreciated in the United States. The focus of this paper is thus narrow. Neither the question of whether the United States should defend Taiwan nor what allies might assist in its defense are addressed here. This paper is the second in a series and subsequent papers will tackle those questions.

The United States retains important military advantages over China. While China may now possess more warships than the U.S., this notion is misleading since U.S. naval tonnage still far outweighs that of the Chinese Navy. In key metrics of naval power, such as nuclear submarines, the U.S. continues to be significantly ahead of China, both quantitatively and qualitatively. The same is generally true when it comes to combat aircraft, particularly fifth-generation fighters.[1] Thus a comprehensive wargame report by the Center for Strategic and International Studies (CSIS) concludes that "the United States and Taiwan could successfully defend the island" and inflict "heavy losses to Chinese naval and air forces...."[2] That outcome is conceivable. However, as discussed below, the war could quite possibly go the other way.

Should U.S. forces intervene to help Taiwan against a Chinese attack, China has two key advantages: proximity and will. The island of Taiwan lies just 90 miles off the coast of China. By contrast, it is located more than 1,700 miles from Guam and over 5,000 miles from Hawaii. U.S. ground forces could not get to the island in time to combat an initial Chinese landing force, due to the volume of initial Chinese missile, drone, and air attacks that would likely disable allied airbases in the region. And given how easily the island would be blockaded by China, the window for any U.S. ground forces would close very quickly. Nor is the U.S.

Navy well positioned to break through China's dense A2/AD network. Only its submarine force could plausibly get right into the fight with limited damage. Yet even that force probably lacks the firepower to stop China's invasion.

So Beijing could at a propitious moment bring much of its armed forces to bear against a comparatively small portion of the U.S. armed forces and press for an all-out attack as a *fait accompli* before the United States can mobilize sufficient forces in theater. The United States could substantially damage China's military forces during an invasion but might lack the assets in theater to prevent China from successfully invading Taiwan. Even if the U.S. could defend Taiwan and expel Chinese soldiers, Beijing could prepare to attack again or make the U.S. position in Taiwan increasingly costly.

Some have argued this means the United States should prepare for an invasion by closing the gap and building up its assets, but seeking to achieve dominance in China's backyard would be provocative, risky, and probably impossible. The fundamental deficits the U.S. faces in a war with China over Taiwan, distance and will, cannot be overcome with more spending on deployments.

The analysis here will show that the costs of defending Taiwan could be extraordinarily high. This paper thus suggests that Taiwan is a poor place for the U.S. to draw a "red line," because the risks are too high and U.S. interests do not justify such risks.

Several assumptions underlying the analysis are worth noting up front. First, it is assumed that the U.S. receives most of the basic assistance that it asks for from allies, primarily access to bases and airfields from which it can directly intervene on behalf of Taiwan. Second, it is assumed that Taiwanese forces are engaged against invading Chinese forces, but their contributions to the various military campaigns discussed below are minimal. Third, it is assumed Beijing would be willing to withstand enormous losses in undertaking such an invasion. Fourth, it is believed that China can achieve some surprise, limiting the extensive U.S. mobilization of forces in theater. Fifth, it's maintained that China will rely heavily on its civilian fleets to deploy masses of infantry (vice armor), thus significantly complicating the U.S. targeting problem. All of these assumptions are discussed more fully in the first and third papers of this series.

A sixth assumption, unique to this paper, is that China would not use airpower and missiles to attack U.S. bases in Japan and other Pacific islands preemptively before U.S. forces move to defend Taiwan. It is certainly possible China would launch such strikes, but it is more likely they would avoid them for fear of drawing a U.S. intervention to help Taiwan. They would, that is, probably choose to trade some tactical gain for a better chance of the U.S. staying out.

Finally, this paper assumes that no U.S. ground forces will be in Taiwan to defend the island before a Chinese invasion. It's plausible that some U.S. forces could be deployed in peacetime, of course. Media reports claim that U.S. forces are in Taiwan as trainers, amounting to "about two dozen US special forces soldiers and an unspecified number of marines," with the Pentagon reportedly planning to deploy an additional 100 to 200 troops, according to the *Wall Street Journal*, though this has never been confirmed.[3] More recently, Taiwan confirmed that U.S. troops had been stationed on its outlying islands.[4] Yet that presence cannot be expanded significantly because it is well known that the deployment of U.S. forces to Taiwan constitutes a red line for Beijing and thus might well initiate armed conflict instead of deterring it.[5]

ALTERNATIVE SCENARIOS FOR TAIWAN

An all-out invasion is not the only way China might try to subjugate Taiwan. Beijing could instead elect to use a show of force to coerce Taipei, similar to what occurred in 1995–1996 when China fired missiles into sea areas near Taiwan in response to a high-level visit by the Taiwanese leader to the United States.[6] They could unleash a missile and air barrage without invading the island. Perhaps the most likely scenario is that the Chinese try to blockade Taiwan.[7]

TAIWAN DISTANCE FROM CHINA VS. U.S. BASES AND STATES

Note: Distances are approximate.

While mainland China is a mere 90 miles from Taiwan, the United States and its allies would be joining the conflict with few nearby bases and logistical supply lines thousands of miles long.

These intimidation and limited war options could be effective. However, they have two obvious drawbacks from Beijing's point of view. First, by employing coercion to make Taiwan yield rather than simply seizing it, they allow Taipei to have a determinate role in the outcome. Second, they would permit time for substantial mobilization and reinforcement of U.S. forces into the theater of operations. U.S. naval forces could impose a counterblockade to strain the Chinese economy, while trying to send aid into Taiwan—basically pitting China's pain endurance against Taiwan's. In addition, either course short of invasion could lead to a massive sanctions regime imposed on China, similar to what Russia has endured since invading Ukraine.

So all-out invasion remains a likely strategy for China if it decides to retake Taiwan. And beyond the question of plausibility, this sort of war is worth closely analyzing because it is such an important factor in the funding and planning of the U.S. military. With so much effort dedicated to a hypothetical defense of Taiwan,

questions concerning mission feasibility or the prospects for U.S. success become essential. Put another way, what would the costs of war be in this hypothetical superpower contest? This paper focuses only on how the United States, if it chose to fight, would fare in repelling China's attempted invasion of Taiwan.

Before reckoning with a head-to-head U.S.-China conflict in a Taiwan scenario, it is worth dwelling briefly on alternative U.S. options in the event of a Chinese invasion. One alternative, which we might call the "Ukraine option," is to send forces to reinforce allies, such as Japan, while also applying harsh economic sanctions to punish China. A second is what some analysts call "horizontal escalation"—imposing costs on an adversary outside the immediate conflict zone.[8] For example, even if the invasion could not be stopped, the U.S. military could try to cut off China's maritime trade through the Malacca Strait, including of crucial energy resources.[9] Both of these responses would involve difficulties, but they would have the virtue of possibly avoiding a large-scale war between the U.S. and China.

Another U.S. strategic option should also be mentioned. If it is assumed that U.S. forces are unable to rescue Taiwan from conquest, it might be argued that the American military should attempt thereafter to liberate Taiwan. Notably, Elbridge Colby's *The Strategy of Denial* devotes significant attention to this possibility. He observes that "recapture would almost certainly be a highly costly, risky, and arduous venture for the United States" and goes on to explain that such a campaign would be "far-reaching and violent… [and] would likely involve high rates of attrition. …[I]t could well be an extraordinarily ugly fight."[10]

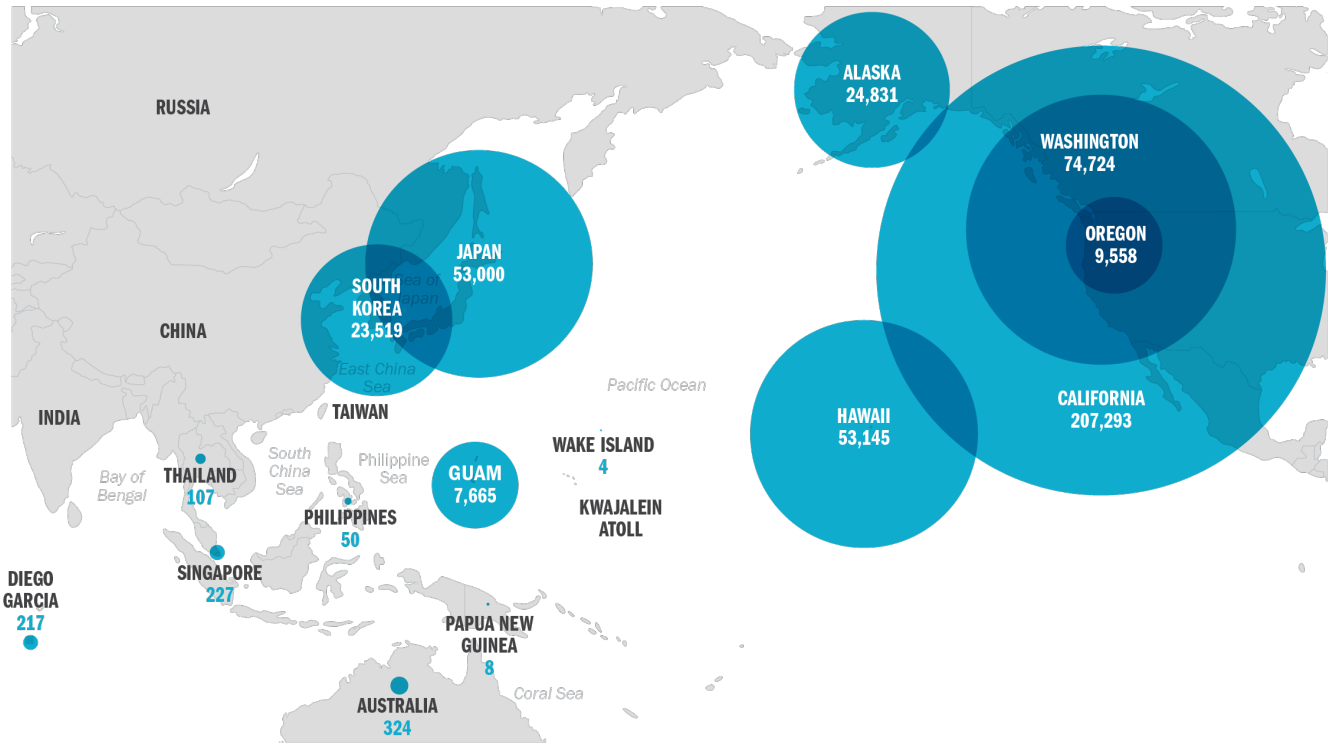
Indeed, recapturing Taiwan is a highly unrealistic proposition. Not only would China be able to bring its full forces to bear in a defensive fight, but the U.S. and its allies would be attempting an invasion of Taiwan's forbidding eastern coastline with very few proximate bases and with logistics supply lines that are thousands of miles long and quite vulnerable to attacks.

Much simpler than recapturing Taiwan, from the U.S. perspective, would be to prevent it from succumbing to China in the first place. This option, following the *fait accompli* approach, is evaluated below in significant detail, assessing each major warfare domain—land, air, and sea—as well as considering the vital nuclear issue too.

THE U.S. GROUND CAMPAIGN TO DEFEND TAIWAN

One way the United States might defend Taiwan is by inserting U.S. ground troops upon warning that a Chinese attack is imminent. An article in the *Military Review*, for example, suggested that the U.S. should prepare to send an Army heavy corps to Taiwan.[11] This approach has a certain logical appeal. Amphibious warfare does confer advantages on the defender. A disciplined, well-equipped, and well-supported force of Americans could arguably be a difference-maker in this scenario, even if they were to number just 20,000–30,000 troops. The Korean War comes to mind, wherein air and sea power proved to be essential, but boots on the ground were required to turn the tide. Yet forbidding transportation and escalation issues probably render ground troops as a non-viable option for any U.S. defense of Taiwan.

U.S. FORCES PERMANENTLY STATIONED IN THE PACIFIC THEATER



Source: DoD Personnel, Workforce Reports & Publications, December 2024, Defense Manpower Data Center.
Notes: This map excludes military personnel suspected to be serving as security attaches and embassy guards. Wake Island and Kwajalein Atoll host U.S. bases that are populated mostly by U.S. contractors and civilian Department of Defense employees, rather than military personnel. The source data does not account for personnel on temporary duty, or deployed in support of contingency operations, though further rotational, contingency personnel are regularly deployed to Australia, Papua New Guinea, and the Philippines.

The United States stations more than 470,000 active-duty and reserve forces in the Pacific theater, though most of them are thousands of miles away on the U.S. West Coast.

The U.S. Army does have forces that are on stand-by alert for emergency deployments to global hotspots, such as the 82nd Airborne. Moreover, the Army has recently resurrected an airborne unit, called the 11th Airborne Division, that would be significantly more proximate to a Taiwan scenario via air transports.[12] Other Army units are in both Hawaii and Washington State. To be sure, these forces could have roles to play in a China conflict scenario by buttressing the defenses of worried allies, such as Japan, South Korea, and the Philippines.

However, the prospect of inserting Army forces directly into the Taiwan battlefield is not a realistic one. An attempt to get U.S. forces into Taiwan on warning of invasion might not have enough time, and even if it does, the Chinese would have incentive and ample ability to prevent them from landing. Tellingly, the *Military Review* article in just a single sentence notes that "naturally" the Navy and Air Force will need to "fight through China's A2/AD-supported naval and air forces to gain secure access to Taiwan's ports and airfields."[13]

It is likely that a substantial number of ships ferrying U.S. Army forces to Taiwan would be sunk. In addition, the Taiwan ports needed to receive these forces might be pulverized by Chinese missiles and airpower early on in a hypothetical conflict. The same could be said of any Taiwan airfields large enough to accommodate air transports delivering U.S. Army forces onto the island. A hypothetical mission to escort and refuel U.S. heavy transports, for example from Alaska, would likely be ruled out as too dangerous. If each C-17 carries

about 100 paratroopers, then the possible loss of a dozen or more such aircraft would constitute a major loss—a risk U.S. leaders seem unlikely to take for Taiwan.[14]

The 2023 CSIS wargame models this scenario: "In one iteration, an attempt to insert a U.S. Army brigade onto Taiwan by air resulted in two of the three battalions (roughly 2,000 soldiers) being destroyed in the air."[15] Likewise, it is assessed: "The U.S. Maritime Prepositioning Ships squadron, which is designed to rapidly deploy large ground formations, could not get through."[16]

It is therefore unlikely that U.S. Army units would be able to deploy into a Taiwan scenario in a relevant timeframe, at least not at a cost U.S. leaders would see as tolerable. To attempt this would risk unacceptably high rates of casualties—equivalent to or even higher than those suffered by American airborne units in World War II.

U.S. MARINES TO THE RESCUE?

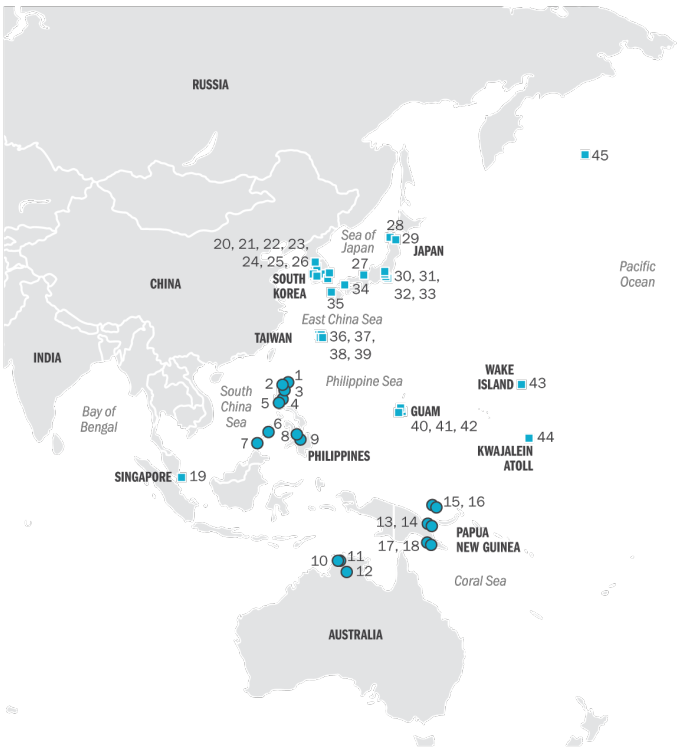
More realistic than an Army deployment would be for U.S. Marines in Okinawa to quickly enter the fray in Taiwan.[17] After all, the tilt-rotor Osprey aircraft, each of which can carry 24 Marines, could make the relatively short 390-mile hop over to Taiwan from Okinawa and could even land at austere landing areas. In theory, there could be a few thousand Marines on Taiwan within 24 hours of a U.S. leader ordering it. About 18,000 Marines are stationed on Okinawa and Futenma Air Base operates 20 Ospreys.[18] These Marine units would not have anything near the firepower of an Army heavy corps, but even a relatively small group of Marines could help to steel the nerves of Taiwan's government.

Beyond the dangers of inserting the Marines, resupplying them would be a thorny problem. In fact, the CSIS wargame saw a mission of C-17s escorted by fighters attempt to resupply U.S. Marines only to be shot down. "After that, no further attempts were made at resupply," the wargame noted, adding, "Resupply proved impossible."[19]

The airspace between Okinawa and Taiwan will likely be filled with hundreds of PLA fighters, and the *Ospreys* are vulnerable targets for the Chinese Air Force. China's large and well-developed air defense system could also endanger U.S. aircraft looking to fly into Taiwan.[20] Indeed, U.S. airbases would likely come under attack from Chinese missiles and airpower the moment the Chinese saw U.S. aircraft departing Okinawa for Taiwan, knocking them out of operation temporarily.

U.S. fighter aircraft might be in the air to protect the *Ospreys*, but the likelihood of a small number of them piercing a determined PLA A2/AD barrier would be small. After all, the PLA would certainly understand the vital importance of preventing the U.S. from getting manpower into Taiwan and would dedicate significant resources to that interdiction mission. The large air battle over and around Taiwan is discussed in some detail below, but the bottom line is that U.S. military leaders are unlikely to deploy ground units to Taiwan because they would lack air superiority in such circumstances, and thus would not risk the high probability of destruction of these units in the air battle. Losses would be too heavy.

U.S. BASES IN THE PACIFIC



Contingency U.S. presence

1 La-lo Airport
2 NB Camilo Osias
3 Camp Melchor Dela Cruz
4 Fort Magsaysay
5 Basa Air Base
6 Antonio Bautista Air Base
7 Balabac Island
8 Benito Ebuen Air Base
9 Lumbia Airport
10 Robertson Barracks
11 Royal Australian Air Force Base Darwin
12 Royal Australian Air Force Base Tindal
13 Nadzab Airport
14 Lae Seaport
15 Lombrum Naval Base
16 Momote Airport
17 Port Moresby Jacksons Int'l Airport
18 Port Moresby Seaport

Enduring U.S. presence

19 Navy Region Center Singapore
20 Marine Corps Installation Camp Mujuk
21 USAG Yongsan-Casey
22 Osan Air Base
23 Camp Humphreys
24 Kunsan Air Base
25 USAG Daegu
26 Fleet Activities Chinhae
27 Kyogamisaki Communications Site
28 Shariki Communications Site
29 Misawa Air Base
30 Yokota Air Base
31 Camp Zama
32 Naval Air Facility Atsugi
33 Fleet Activities Yokosuka
34 MCAS Iwakuni
35 Fleet Activities Sasebo
36 USAG Okinawa
37 Kadena Air Base
38 MCB Camp Butler
39 MCAS Futenma
40 MCB Camp Blaz
41 Andersen AFB
42 Naval Base Guam
43 Wake Island Airfield
44 USAG Kwajalein Atoll
45 Eareckson Air Station

Source: Luke A. Nicastro, *U.S. Defense Infrastructure in the Indo-Pacific: Background and Issues for Congress*, Congressional Research Service, June 6, 2023; U.S. Department of State, "Defense Cooperation Agreement Between the United States of America and Papua New Guinea," May 22, 2023.

The United States has a robust and growing network of bases in the western Pacific. However, most of them are within range of Chinese missiles and it's unlikely they are sufficiently hardened to defend against such attacks.

THE U.S. AIR CAMPAIGN TO DEFEND TAIWAN

China has been focusing on the aerial domain with an understanding that U.S. land and sea power would be severely hindered if the Chinese were to succeed in dominating the air. China's strength in the air battlespace, at least in the opening phases of a Taiwan scenario, is likely given that it has dozens of airbases within unrefueled fighter range of Taiwan, while the U.S. possesses at most a handful.[21]

From the U.S. perspective, a qualitative gap still separates the U.S. and Chinese air forces despite rapid Chinese improvements.[22] The 2015 RAND *Scorecard* study of the air campaign over Taiwan finds that "72 U.S. aircraft… flying 1.5 sorties per day… could potentially kill as many as 216 Chinese aircraft each day."[23] To match a surge by Chinese aerial forces, it is estimated in the study that in 2017 the U.S. would require 144 fighters engaged over the immediate battlefield and 1,000–2,000 additional fighters in the wider theater.[24]

Since this sobering estimate was made, China's airpower has only continued to grow, for example fielding a superior air-to-air missile, by some estimates, and putting its fifth-generation J-20 fighter into accelerated production.[25] The aerial balance has been shifting in Beijing's favor in the western Pacific for some time.

A LOPSIDED DOGFIGHT OVER THE MIYAKO STRAIT

Still, some dozens of U.S. fighters would likely succeed in getting into the air for a major dogfight against perhaps 300 PLA aircraft in the Miyako Strait—a nearly 10:1 ratio in favor of China.[26] A smaller initial air engagement could occur in the Luzon Strait. For this particular explainer, it is assumed (perhaps optimistically) that the United States gets base access in both Japan and the Philippines, since they are both very close, long-time treaty allies of the U.S. That assumption, which could prove false, especially in the somewhat volatile Philippines, is thoroughly analyzed in the next Taiwan explainer in this series that focuses on the role of allies. Chinese aerial losses in these combat actions could be substantial, especially if the U.S. has warning of the Chinese attack and can surge aircraft forward into bases that are being upgraded, such as Lal-lo Airport on the northern part of Luzon, but the outcome would not change substantially.[27] It is unknown how U.S. and Chinese fighter interceptors would compare in combat. However, given the U.S. edge in training and most aspects of air combat technology, it is reasonable to assume a kill ratio favoring the U.S. of approximately 3:1. Such a ratio is a plausible, conservative prediction for what combat might look like given the factors involved.[28]

Another factor to consider is that once U.S. aircraft entered the fray, China would likely launch a barrage of cruise and ballistic missiles, along with so-called "kamikaze drones" aimed chiefly at the airbases of Kadena on Okinawa and Andersen on Guam. China could strike those bases in a surprise attack, hoping to catch the aircraft on the ground, but here it is assumed that Beijing would prefer to force the United States to fire first. But U.S. fighters engaged in the initial combat might have no airstrip to land on if the major U.S. airbases have been severely damaged.

OKINAWA AND GUAM IN THE CROSSHAIRS

As noted above, there are at best a few U.S. airbases within fighters' unrefueled combat radius (less than 600 miles or 1,000 kilometers) of the Taiwan Strait. China, meanwhile, has at least 39 airbases within 500 miles (800 kilometers) of Taipei, according to an authoritative analysis from a decade ago.[29] Since then, Washington has been busy trying to improve airfields in the northern Philippines.[30] However, the PLA has also been busy building new runways, so that in 2025 it was observed that China now has 134 airbases within 1,000 miles (1,600 kilometers) of Taiwan and approximately 650 hardened aircraft shelters at these bases.[31] But the true picture is actually worse, because those U.S. airbases are very likely to be put of action, at least for the determinative early phase of the Taiwan battle. For example, the *Scorecard* study explains, "The analysis shows that if the PLA employed 36 missiles against Kadena… it could shut Kadena to fighter operations for four days or to tanker operations for more than 11 days."[32]

The United States cannot effectively deploy airpower without bases to launch from as well the capacity to refuel its planes. The 2023 CSIS study notes the psychological impact that major casualties will have on the force: "Late-deploying units to Kadena Air Force Base on Okinawa will land at a base that has entire squadrons of wrecked U.S. and Japanese aircraft bulldozed to the side of the runway, hundreds of wounded in the base hospital, and temporary cemeteries to handle the many dead. Missile attacks and air combat will have wiped out squadrons that arrived only a few days earlier."[33]

As for Andersen Air Force Base on Guam, the picture is only slightly better for U.S. forces. A salvo of 20 missiles could put the base out of action, even if some of the missiles were shot down.[34] Moreover, this pessimistic calculation was made before China revealed its new IRBM, the DF-26—the so-called "Guam Killer." In early 2024, the PLA was assessed to have more than 140 DF-26 launchers.[35] That new ballistic

missile with enhanced range means the U.S. airbase in Guam is considerably more vulnerable than was even suggested in the above appraisal.[36] A senior retired U.S. Air Force general recently revealed that U.S. airbases in the Pacific, and on Guam in particular, are lacking in bomb-proof aircraft shelters.[37] Chinese sources also imply that China's Type 055 destroyer could be employed to target Andersen with its long-range land attack cruise missiles.[38] China further has the ability to launch land-attack cruise missiles from submarines.[39]

Finally, the RAND *Scorecard* study appears to underestimate the difficulty of repairing runways under attack with the assumption that each repair would require just four to eight hours.[40] That estimate seems optimistic given that the last time the U.S. armed forces attempted operations from airfields that were under intensive and sustained aerial attack was in 1943.[41] Yet setting these questions aside, it is worth underlining the RAND *Scorecard* study's bottom line: "even a relatively small number of accurate missiles could shut the base to flight operations for critical days at the outset of hostilities, and focused, committed attacks might close a single base for weeks."[42] Thus, "basing issues will greatly complicate U.S. efforts to gain air superiority over the battlefield."[43] The 2023 Department of Defense (DoD) report on Chinese military power recognizes a growing Chinese capability to target Guam with ballistic and cruise missiles.[44]

Other conclusions from the 2023 CSIS wargame are worth noting. The study explains that forward forces "make tempting targets" and that 90 percent of U.S. aircraft losses were suffered on the ground.[45] The CSIS authors suggest that U.S. pilots are much more experienced and that U.S. fifth-generation aircraft are substantially superior to Chinese fifth-generation aircraft.[46] Yet they also tally a number of Chinese aerial advantages, including longer-range air-to-air missiles; shorter distances to fly into battle, which means less fatigued pilots; and the related point that Chinese aircraft can much more easily slip back into the "sanctuary" of China's substantial SAM "umbrella," which will be aided by Chinese surface combatants.[47] The report observes that "Chinese air defenses were so formidable initially that no aircraft could get close enough to drop short-range munitions. Even stealth aircraft [were] at risk."[48] Hence, they conclude, "U.S. airpower… had a limited ability to influence ground combat directly."[49]

U.S. BOMBERS TO THE RESCUE?

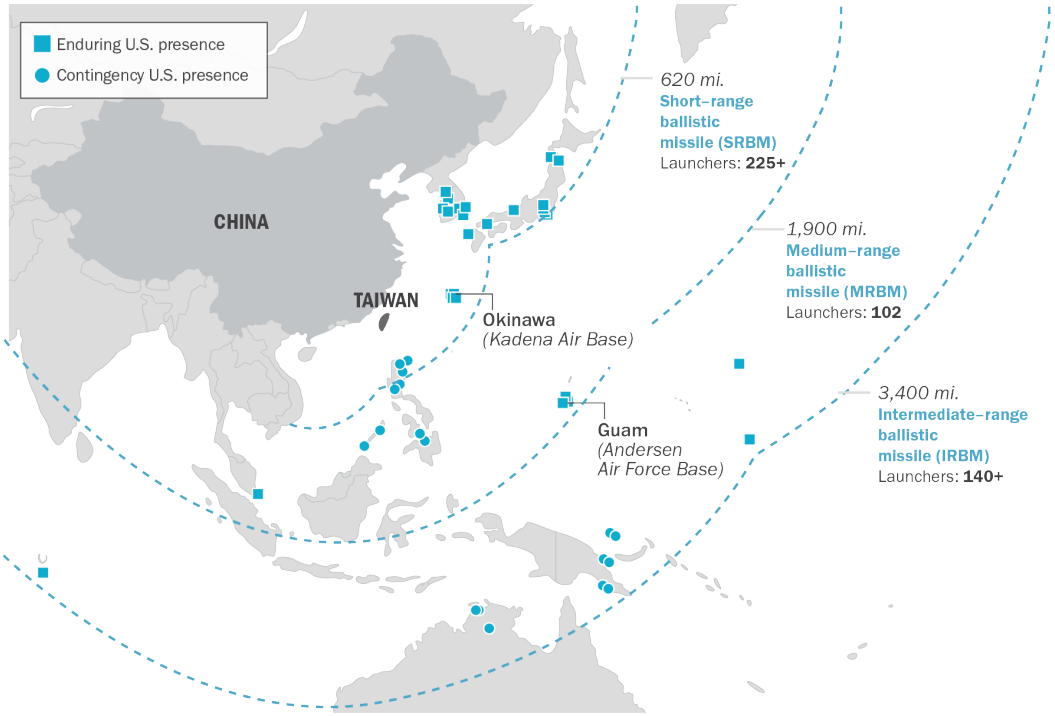
If the U.S. is unlikely to establish air superiority over the Taiwan battlespace with the requisite number of fighter jets due to few and vulnerable proximate airbases, are there other options? Bombers are an obvious alternative, and there has been an uptick in U.S. deployments of strategic bombers into the Asia-Pacific region, including to the sensitive Taiwan Strait and South China Sea areas.[50] There is a definite concern on the Chinese side regarding the firepower that U.S. bombers can deliver. For example, one Chinese source notes that a group of four B-1 Lancer bombers could fire 120 anti-ship cruise missiles, enough "to destroy an entire aircraft carrier battle group supported by air defense escorts."[51]

By sending forth both surface action groups and also long-range fighters beyond the first island chain, the PLA will also have some chance to intercept U.S. bombers, even outside the range of the LRASM (Long-Range Anti-ship Munition) that can be launched from as far as 500 miles from the target.[52] The front-line fighter aircraft for the PLA, including Su-30s, have an unrefueled combat radius well in excess of 1,000 miles.[53]

A major conclusion of the 2023 CSIS "First Battle" series of wargames is that the best U.S. option to defend Taiwan is to employ strike forces that can operate from "outside the Chinese defensive zone."[54] That approach is quite consistent with an earlier study by Stephen Biddle and Ivan Oelrich that pointed out the actual extent of China's A2/AD zone could be limited to just 250–375 miles (400–600 kilometers) from the

coast of mainland China. They point out the central role of radars in target acquisition and explain that "The sky and the surface of the sea present much simpler backgrounds than the land."[55] This analysis suggests that the PLA would have trouble pushing radars forward or outside the first island chain in the event of a conflict. The authors make some helpful recommendations for future U.S. forces, including the need to acquire much longer-range anti-radar and anti-ship missiles.[56]

U.S. BASES IN RANGE OF CHINESE BALLISTIC MISSILES



Note: Ranges are approximate.
Sources: Luke A. Nicastro, *U.S. Defense Infrastructure in the Indo-Pacific: Background and Issues for Congress*, Congressional Research Service, June 6, 2023; *The Military Balance 2024*, International Institute for Strategic Studies; Missile Defense Project, "Missiles of China," Center for Strategic and International Studies, April 12, 2021; U.S. Department of State, "Defense Cooperation Agreement Between the United States of America and Papua New Guinea," May 22, 2023.

Key U.S. bases are in range of Chinese ballistic missiles and will likely be attacked if the United States intervenes in a Taiwan scenario.

Relying on a similar logic, heavy bombers wielding long-range anti-ship cruise missiles would appear to be key instruments for the Pentagon in the Taiwan scenario. No wonder CSIS recommends urgently increasing the number of available long-range missiles for such bomber attacks.[57] Nonetheless, CSIS also sees numerous limitations on this strike capability, not least that the number of Long Range Anti-ship Missiles (LRASM) wielded by the U.S is likely to be fewer than 500 in 2026 and can only be launched from a limited number of aerial platforms.[58] At least as big a problem is the limited size of the U.S. long-range bomber force: given that the United States will not have large numbers of B-21s at its disposal until the 2030s, CSIS concludes, "There are not enough bombers to sustain attrition and launch all the strikes that are needed."[59]

Improved Chinese aerial refueling capabilities will enhance their ability to attack U.S. bombers at long range, along with improving early warning and ISR assets of all types, including long-range drones.[60] The U.S. Air Force is highly dependent on tankers, including to support long-range bomber missions, and this presents a major point of vulnerability in current U.S. strategy for the Pacific region.[61]

There are a variety of other problems with relying on long-range missile attacks from bombers. All the long-range anti-ship missiles in the U.S. arsenal are subsonic, making it likely they can be shot down, even by loitering Chinese fighters that need not be particularly advanced. These missiles are likely to be traveling down rather predictable vectors of attack, even if they do have some stealthy characteristics.[62] Finally, as discussed below and in considerable detail in the first explainer in this Taiwan series, China's amphibious invasion could rely heavily on merchant vessels that would likely number in the thousands, creating a difficult targeting problem for bomber sorties that can only launch a few dozen anti-ship missiles per mission.[63]

Another air warfare concept that has gained traction in both the USAF and the USMC is that of pushing forces out to austere landing zones in remote islands in order to reinforce the chain or belt of islands constraining Chinese naval power. The hope is that expeditionary air warfare groups, complemented by ground forces and weapons systems like HIMARS, can create a major challenge for China in a Taiwan scenario.[64] Such a model of operations may be more appropriate to areas like the Philippines or the small Ryukyu Islands. In addition, Washington has recently made serious overtures to the island of Palau, possibly with a Taiwan scenario in mind. In some respects, the USMC's F-35B VSTOL was built for exactly this mission, affording the ability to operate from undeveloped terrain or roads, and it should not be highly dependent on large airbases. However, given maintenance problems with the F-35, and most recently with its STOVL variant the F-35B, it remains questionable whether the aircraft is suitable for such a difficult mission, attempting to operate in a semi-stealthy mode within China's A2/AD range arcs.[65] These issues would likely constitute major constraints on the concept of austere airfields.

It is undoubtedly true that HIMARS has proven to be highly significant and useful in the context of Ukraine's fight against Russia. No doubt there are a variety of basing options for these or other ground-based missiles that are reasonably proximate to Taiwan. However, if the missiles have a range of up to 400 miles, this means only very tiny islets like Ishigaki in Japan or Basco in the Philippines would be in range.[66] In that case, the small size of the islands could make basing difficult—and targeting easier for the Chinese side. Luzon in the Philippines might present the only suitable basing area for HIMARS. The United States' HIMARS system failed in a high-profile April 2023 test in the Philippines against a target ship—no surprise given that HIMARS is designed to be used against stationary land targets.[67] A full order of HIMARS requested by Taiwan also isn't expected to be completed until as late as 2026, though the island's deputy defense minister has said 11 of the systems have arrived as of November 2024.[68]

'JUST TARGETS ON THE GROUND'

U.S. airbases in the western Pacific, even those that are temporary or austere, could make appetizing targets for PLA precision strikes. Chinese sources mention *Luftwaffe* attacks against France and later the USSR that destroyed 1,400 and 4,000 aircraft on the ground, respectively.[69] One article has a photo image of a C-17 and two B-1s on a tarmac and the caption: "just targets on the ground for the opponent's strike."[70] Not surprisingly, Chinese strategists also explicitly prioritize "sinking aircraft carriers" to secure air and sea control.[71]

Troubling developments with respect to the airpower balance in the western Pacific arose in CSIS wargame study showing devastating losses to U.S. airpower in a Taiwan scenario. In one game iteration, 900 U.S. fighter and attack aircraft were lost in just four weeks, or about half the combat planes of both the U.S. Air Force and U.S. Navy.[72] Scrutinizing that January 2023 game report, it seems other variations of the game were not much more optimistic.[73] One variant of the 2023 CSIS wargame saw "hundreds of massed U.S. and Japanese aircraft" destroyed on the ground.[74]

While additional airbases can be built, for example at Tinian or Palau, these are likely to be far too few and too distant to make a major difference.[75] And while the U.S. still possesses both quantitative and qualitative advantages over the Chinese Air Force, that advantage would only come into play if the air battle took place over the mid-Pacific. This air battle will be near Taiwan in China's backyard, so the quantitative discrepancy in critical fighters determines that Beijing can deploy much more combat power and will likely control the skies over and around Taiwan, at least for the first weeks of a Taiwan scenario.[76] Tankers, bombers, and missile defenses can perhaps mitigate but are not likely to solve this fundamental problem. Aircraft carriers would appear to be the simplest solution, but they also pose problems, as discussed below.

THE U.S. NAVY CAMPAIGN TO DEFEND TAIWAN

The U.S. Navy still outpaces the Chinese Navy among many key metrics of naval might, not least in terms of critical warships, including nuclear aircraft carriers and nuclear submarines. Mirroring the air combat discussion above to a large degree, if an armed conflict were to develop in the vicinity of Hawaii, or even closer to Japan, there is little doubt that the relatively youthful and inexperienced Chinese Navy would suffer a grave defeat at the hands of the U.S. Navy. However, this problem is quite different in a Taiwan scenario.[77] Chinese firepower would likely keep the U.S. surface fleet at bay. In the case of surface ships, that would greatly limit their ability to enter the fight to defend Taiwan. They could score some hits on the Chinese armada from a distance but not enough to much affect the outcome. Carrier-based airpower would likewise struggle to penetrate Chinese defenses. Only U.S. submarines would inflict heavy damage, but they lack sufficient firepower to stop the invasion.

While nuclear supercarriers are an enduring symbol of U.S. military might, these capital ships are increasingly vulnerable to fires near shore. Even during the Cold War, many strategists were concerned about the survivability of the "big decks" when facing an onslaught of threats from Soviet submarines, surface forces, and aerial strike forces.[78] Today, Beijing has not only replicated the Soviet anti-carrier system but exceeded its capabilities in most respects. The Chinese submarine force is reasonably large at roughly 70 boats, and the *Yuan*-class diesels employ advanced quieting, according to U.S. intelligence reporting.[79]

Most Chinese submarines will be capable of firing the supersonic YJ-18 ASCM that is estimated to have a range of 290 nautical miles.[80] This range critically allows a submarine to attack a carrier battle group without penetrating the escort screen. During World War II, Japanese submarines made the mistake of trying to penetrate escort screens to make torpedo attacks against U.S. capital ships. China appears to have learned the lesson of that costly and failed strategy, preferring to attack U.S. carrier groups at longer ranges, or alternatively striking their supply trains—the oilers necessary to keep the air wings flying.[81] The U.S. Navy has long recognized that its carrier groups could be vulnerable to submarine attack, including from diesel submarines, but that is far from the only threat they confront in the western Pacific.[82]

A BAD DAY FOR U.S. AIRCRAFT CARRIERS

U.S. carriers will also be challenged by Chinese aerial attack, since China's air forces now regularly sortie into the wider Pacific. The chin-mounted surface search radar on the H-6K modernized Chinese bomber betrays its central mission of hunting for American carriers and other surface ships. While these missions would involve elevated risks for Chinese bombers flying into contested airspace, they would still likely enjoy substantial support from PLA forces deep into the Philippine Sea. Major quantitative superiority in combat

aircraft and warships due to proximity will allow the PLA to operate such forces in that important sea area. The potential gain of striking at U.S. surface vessels would likely outweigh the risks.

As one recent description explains, the danger is not the bomber, but the lethal YJ-12s that it carries:

> [The speed of up to Mach 3] makes it difficult for *Aegis* Combat Systems and SM-2 surface-to-air missiles that protect U.S. carrier strike groups to identify and engage the missile since it can be launched beyond their engagement ranges, which greatly reduces the U.S. Navy's time to react. Protection against the YJ-12 is even more difficult due to its cork-screw-like turns which allow it to evade final defences.[83]

Another analysis calls the YJ-12 China's "most dangerous missile" and points to a study from the Naval Postgraduate School, which noted that in past engagements where anti-ship missiles were used against alerted surface warships, 32 percent of the missiles scored hits.[84] The same paper notes that the PLA can employ a variety of aircraft to launch this missile, including the Su-30 and J-11B. It is likely that JH-7 and J-15 also have this important capability.

Given that the United States would have difficulty gaining air superiority in a Taiwan scenario within the first island chain, PLA aircraft can hunt U.S. surface ships, including aircraft carriers, in that area. The problem outlined above is compounded by the fact that China's surface fleet is also now progressing rapidly and might have some ability to operate against U.S. targets well out into the Pacific, albeit at great risk.[85] The 2023 DoD report on Chinese military power confirms that this vessel will likely wield anti-ship ballistic missiles (ASBMs), allowing it to target ships at much longer ranges.[86] Chinese surface combatants, such as the new Type 055 cruiser and Type 052D destroyers, could pose another threat to U.S. aircraft carrier groups. Unquestionably, such SAGs would take heavy losses, but such sacrifices might be worthwhile for the PLA, especially if they can pull more U.S. strike assets away from the Taiwan invasion force.

ANTI-SHIP MISSILES

If a U.S. aircraft carrier group tried to operate from the waters proximate to Taiwan, there would be an additional concern regarding the PLA Navy's large number of light frigates and even fast attack craft—both of which are armed with anti-ship cruise missiles (ASCM).[87] These relatively conventional threats to aircraft carriers—submarine, air, and surface—have existed for decades, and in combination, especially if wielded in a coordinated fashion to yield massive volleys of ASCMs, could prove prohibitive to U.S. carrier operations in the western Pacific. But U.S. Navy strategists have worried most over the last decade about another new threat: the anti-ship ballistic missile (ASBM), often referred to as the "carrier killer."

After years of speculation about this notional system, China successfully conducted a test against a moving target in mid-2020. According to one report, Wang Xiangsui, a retired PLA officer, "had said that one DF-26B intermediate-range ballistic missile (IRBM) and one DF-21D medium-range ballistic missile (MRBM) had struck the target vessel as it sailed near the Paracel Island chain during the August exercise."[88] What makes this weapons system deadly is that anti-ship missiles have traditionally been cruise missiles. These are an ominous challenge to knock down, but ballistic missiles are even harder to track effectively, and even more difficult to shoot down or avoid, because of their immense speed. Although this test occurred in 2020, the Pentagon evaluated that China had achieved an initial operating capability for the ASBM weapon as early as 2010.[89] Notably, the 2022 DoD report on Chinese military power observes that China's deployed hypersonic missiles, namely the DF-17, could also be used to strike ships.[90]

The RAND *Scorecard* study is notably optimistic on the survivability of U.S. surface forces under ASBM attack. It concludes that "although ASBMs present a new challenge that has not been previously faced by U.S. surface combatants, they are likely not the one-shot, one-kill weapons sometimes portrayed in the popular literature."[91] Their caution regarding the ASBM results from the fact that it would take several hits to "kill" a ship in most cases and from possible Chinese shortfalls with respect to targeting. That important issue is addressed below. As soon as the ASBM threat became clear, the U.S. Navy began to explore operational and tactical countermeasures.[92] Nobody knows how effective this new system might prove in combat, but it is safe to say that the risk to U.S. Navy surface combatants would be considerably elevated in a Taiwan scenario.

SURVEILLANCE QUEUING TO STRIKE AT U.S. NAVY TARGETS

China has built a formidable system of intelligence, surveillance, and reconnaissance (ISR) that might be capable of providing timely targeting information on U.S. Navy fleet formations, especially surface ships. In space, China has over 290 ISR satellite systems—nearly doubling its in-orbit systems since 2018, according to the 2023 DoD report on Chinese military power.[93] These satellites provide electro-optical, synthetic aperture radar (SAR) imagery, along with signals intelligence data that can provide "monitoring, tracking, and targeting of U.S. and allied forces worldwide" with "all-weather, 24-hour coverage."[94] To be sure, the U.S. could attack China's system of satellites in a conflict, but that would almost certainly result in a retaliatory strike against the U.S. satellite system. China is known to have pursued robust "counterspace capabilities—including direct-ascent anti-satellite missiles, co-orbital satellites, electronic warfare, and directed-energy systems" for just such an eventuality.[95]

In addition to its space-based ISR capabilities, the PLA has invested in early warning sensors. These include large phased array radars, such as the new facility built in Shandong and revealed in spring 2022.[96] Such radars may be able to see out as far as 3,000 nautical miles (3,452 miles), though they might require secondary sources for targeting purposes. Whatever the vulnerability of these high-value, fixed radar sites, it's worth emphasizing that Washington might avoid striking mainland China due to grave risks of escalation.[97]

Many of the less powerful radars in China's air defense system are mobile and thus difficult to destroy. The 2023 DoD report on Chinese military power describes China's Integrated Air Defense System (IADS) as "one of the largest forces of advanced long-range SAM [surface-to-air missile] systems in the world."[98] That IADS network extends perhaps 300 miles outward from the Chinese coast and protects the country's coastal search radars, as well as its early warning aircraft that extend Chinese ISR "well past the range of ground-based radars."[99] The DoD report notes that the important KJ-500, China's most advanced early warning and battle management aircraft, has continued to be rapidly produced and delivered.[100]

Major U.S. strikes against the Chinese mainland for the purposes of degrading its IADS and ISR capabilities are conceivable, but may carry serious risks of escalation. These attacks could also prove difficult due to the long-range air defense systems on China's mainland.[101] Moreover, China is working on a mid-course ballistic missile defense, though the DoD believes its capacity to defend itself against cruise missile attack is currently more robust.[102]

In addition, the PLA has devoted enormous resources to all kinds of unmanned platforms, including unmanned underwater vehicles (UUVs), unmanned surface vehicles (USVs), and unmanned aerial vehicles

(UAVs)—all of which have major potential to enhance China's ISR capabilities.[103] For sure, many of these weapons can be countered and would be lost in combat. Yet they are also relatively cheap, so losses could be quite tolerable for the PLA without endangering the overall mission.

For example, a Chinese article in mid-2017 described the *Rainbow* solar-powered UAV with a wingspan of 45 meters that can stay aloft for months and even years and has significant potential to fit into China's "anti-carrier system," helping to fill in the surveillance part of the kill chain.[104]

The bottom line, as noted by the RAND study, is that "Today, U.S. surface forces could no longer operate freely without risk at close or even moderate ranges from the Chinese mainland."[105]

Nothing in the 2023 CSIS "First Battle" wargame report contradicts the above conclusions. If anything, that highly detailed study seems to be even more pessimistic about the prospects for U.S. surface ships, including for aircraft carriers. For example, at one point, the authors note that "Any [U.S. Navy] surface ship that approached Taiwan was destroyed…."[106] As for aircraft carriers, the 2023 CSIS study reports, "Chinese long-range missile strikes and massed missile strikes… almost always succeeded in overcoming U.S. naval defenses. Typically, the United States lost both forward deployed carriers within the first turn or two."[107] For CSIS, the considerable losses of U.S. Navy assets, including aircraft carriers, "reflects the vulnerability of surface ships to large salvoes of modern ASCMs."[108]

If there is a silver lining to the CSIS report, it is that the introduction of extensive U.S. naval and air forces into the western Pacific would also likely succeed in sinking a large number of Chinese warships. CSIS reports that the "base case" yields Chinese naval losses of 138 ships, and thus prevents a successful Chinese amphibious invasion of Taiwan.[109] However, as explained below in detail, that conclusion appears to rest on the questionable assumption that China wields fewer than 100 amphibious ships. Overall, that study hardly puts much faith in USN surface forces to carry the fight given the extraordinary risks. The authors conclude that U.S. losses "typically included nearly all large surface ships in the Western Pacific. In the most intense iterations, the U.S. Navy was losing a major ship every day of the war."[110]

Having built its naval forces for decades around the aircraft carrier as the primary capital ship, it is fair to say that surface ship vulnerability, in combination with the missile strikes against U.S. bases described in the prior section, undermine U.S. deterrence in the western Pacific. Confronting the risk of major losses in a Taiwan scenario, U.S. Navy surface vessels are unlikely to go near the Taiwan Strait. In fact, given the challenges of China's ever-improving anti-access/area denial system, it is possible they may not even be able to operate safely in the Philippine Sea. Getting within 1,000 miles of the Chinese coastline during a Taiwan scenario would risk the loss of major segments of the American fleet. Yet U.S. naval power does not entirely depend on aircraft carrier battle groups. Beijing will still have to reckon with the U.S. Navy submarine force.

U.S. SUBMARINES ARE DEADLY BUT LIMITED IN FIREPOWER

The best argument for a U.S. military intervention in a Taiwan scenario has long been that the USN submarine force could intervene decisively to stop a Chinese invasion. On its face, this has some merit. China has long been weak in anti-submarine warfare. The U.S. Navy wields about 30 operational nuclear-attack submarines at any given time, many of which are based at Guam or Hawaii and will soon likely

operate out of Australian bases.[111] As nuclear submarines, they can navigate at high speed without refueling, so their only fighting limitations are ordnance and food for the crew.

The 2015 RAND *Scorecard* study concludes that eight U.S. submarines could arrive in the Taiwan Strait in the first week of a conflict and, once on station, sink 41 percent of the Chinese amphibious fleet, which is assessed as sufficient to halt a Chinese invasion of Taiwan.[112] The study—now 10 years old—illustrated that trends were then moving in a negative direction, finding that the proportion of the Chinese invasion fleet that would be sunk went from 100 percent in 2003 to 73 percent in 2010 and would further decline to 41 percent in 2017.[113] Assuming that trend continued, the number was anticipated to sink below 20 percent by 2024. On the other hand, U.S. submarine losses are said to have been increasing at a nearly proportional rate from 0.5 in 2003 to 1.07 in 2010 to 1.82 in 2017. Partly accounting for this trend, the RAND study authors explain:

> Chinese anti-submarine warfare capabilities… pose a serious threat to U.S. attack submarines in this scenario. By operating in tightly constrained waters against assets that the PLA planners understand will constitute a key target set, U.S. submarines will repeatedly expose their general locations to relatively large numbers of enemy assets.[114]

While providing some definite insights, the RAND submarine attack model is flawed in at least two respects. First, it underestimates the ability of the PLA to undertake an invasion, using primarily merchant vessels to ferry the invasion forces across. To simplify, the RAND *Scorecard* study assumes that the total force in China's amphibious invasion fleet consists of 89 heavy lift naval ships. Unfortunately, the 2023 CSIS report repeats the same assumption.[115] This series by contrast argues that civilian vessels will play a major role in the transfer of forces across the Taiwan Strait.[116]

This possibility is discussed in greater detail in the first explainer in the "Target Taiwan" series, "Prospects for a Chinese Invasion."[117] Moreover, this conclusion is supported by the 2022 DoD report on Chinese military power.[118] If the number of ships in the invasion armada increases substantially, then the percentage sunk due to U.S. submarine attacks goes down to a rather insignificant number. Therefore, it could be incorrect to assume the U.S. submarine force could, on its own, sink a major proportion of Chinese ships delivering the amphibious attack forces.

Similarly, the model discussed above tends to underestimate U.S. submarine losses. First and most critically, the RAND *Scorecard* study quite accurately posits that China will create minefields on the north and south sides of the Taiwan Strait, but nowhere addresses how U.S. submarines would penetrate this barrier. Mines were a major threat to U.S. submarines in World War II and the PLA Navy's program to develop and deploy anti-submarine mines is extremely active.[119] If U.S. submarines in a Taiwan scenario fail to successfully transit these likely mine barriers, their number of hits against an invasion fleet would be limited to more challenging cruise missile strikes and, therefore, the number of sinkings would fall. Attempting to cross these barriers could be risky and time-consuming for U.S. submarines, even if they employ the latest unmanned technologies.[120]

CHINA'S ANTI-SUBMARINE WARFARE SYSTEMS

In the past, the Chinese Navy has been weak in the domain of anti-submarine warfare (ASW), but China is now on the cusp of deploying numerous new anti-submarine warfare (ASW) systems. The Z-18F large ASW helicopter and Y-8F maritime patrol aircraft are credited with two and three total platforms for 2017, respectively. Yet these platforms are now likely in serial production, so that the PLAN will soon have dozens

of these critical aircraft. The Z-20, which will become China's standard shipboard helicopter, and will likely exceed the Z-18F capabilities in some respects, is also on the cusp of serial production.[121]

Illustrative of the major turn now underway in Chinese ASW capabilities, the PLA Navy was credited in 2015 with 22 Type 56 light frigates, a platform that has been optimized for anti-submarine warfare. But in 2021 the number was reported as totaling 72, a more than threefold increase in six years.[122] Other Chinese ASW platforms will likely experience similar growth, since the PLA Navy is prioritizing anti-submarine warfare.[123] Western estimates also tend to mistakenly disregard Chinese Coast Guard (CCG) assets as potential ASW platforms, even though evidence continues to mount that they will be directly employed in this role.[124] China may also employ diesel submarines in the anti-submarine role, which would follow the Russian pattern.[125] These platforms, while quite vulnerable themselves, could be used to interdict U.S. submarines coming north through narrow Indonesian straits to approach Taiwan. Moreover, there are a large variety of unmanned platforms—air, surface, and undersea—that are certain to make a major impact on undersea warfare in the coming years as Beijing seeks to build up its "undersea great wall," which includes a sea bottom sensor network.[126] Major Chinese efforts in all these areas are likely to increase U.S. submarine losses in a Taiwan scenario.

The 2023 CSIS "First Battle" wargame report offers a relatively sober look at the role of USN submarines in a Taiwan scenario. That study concludes that submarines—unlike surface ships—can successfully "enter the Chinese defensive zone and wreak havoc with the Chinese fleet, but numbers were inadequate."[127] Indeed, losses to the Chinese Navy would be heavy, as explained below. Yet this assessment also observes the related problems that "submarines carry a limited number of munitions" and "must periodically return to port to rearm."[128] Cognizant of these drawbacks, the 2023 CSIS assessment states: "Without U.S. airpower… U.S. SSNs are insufficient to defeat a Chinese invasion."[129]

Moreover, these analysts are quite attuned to the risks that U.S. and allied submarines will face in battle. They describe a worst-case scenario as follows, "The reliance on [U.S. Navy] SSNs meant ten SSNs were lost before the climactic naval showdown," wherein an additional five U.S. nuclear submarines were sunk.[130] At another point, the analysis assumes a 20 percent attrition rate for every 3.5 days that U.S. Navy submarines spend fighting in the Taiwan Strait.[131] Understanding the key problem of munitions supply for submarines, the 2023 CSIS report recommends that the USN prepare alternative sites in the region for rearming, notably concluding that "from civilian ports," the PLA "will likely target fixed facilities."[132] In a related disturbing point, it is observed that "The Navy also needs to ensure that it has enough torpedoes" since "the historical record is that many torpedoes will miss or malfunction… and others will be destroyed when shore facilities are attacked."[133] The CSIS study is right to note that the U.S. Navy submarine force is a lethal instrument, but not a "silver bullet" in a Taiwan scenario.

Before concluding, let us briefly consider a simpler submarine attack model for a Taiwan scenario. According to the Naval Vessel Register, the Pacific Fleet commands 29 SSNs, eight SSBNs, and two SSGNs.[134] It is the best assessment of this author that the U.S. and its allies could have five submarines present within 48 hours and perhaps 10 within the first week.[135] Another 10 might be able to join during the second week of combat given the imposing distances involved. More could follow, including from the Atlantic (allowing roughly 20 days for that lengthy transit), but only about 10 deployable subs would be available during that first crucial week, and by then the most decisive landing phase of the war would likely be over. What could be done with perhaps 10 submarines during that first week? As it turns out, not much—it is unlikely that such a force could significantly impact the campaign.

As noted above, submarines have relatively small magazines (perhaps 25 torpedoes and 12 anti-ship missiles).[136] Even if every U.S. weapon was to sink a Chinese ship—a wholly unrealistic proposition in

wartime—China would only lose 370 vessels in the first week (37 weapons multiplied by 10 submarines). That would badly bloody the opponent, but it would not stop an invasion force of some 5,000 or more ships, including the Chinese navy, coast guard, and merchant and fishing fleets.[137] China knows well that its major capital ships will be targeted and is certain to insulate the invasion from losses to these ships. For example, large Ro-Ro ferries or bulkers could be used as decoys intended to draw American cruise missiles, while more important elements of the invasion force were dispersed widely among smaller vessels, comprising less obvious targets.

While painful for Beijing to lose capital ships like cruisers, amphibious attack ships, or even aircraft carriers, such losses would not likely stop a Chinese invasion of Taiwan. Finally, as outlined in a previous explainer, the initial blows against Taiwan would come through the air, first from missiles and bombers, followed by drones, helicopters, and parachutes.

Before turning to the difficult question of possible nuclear escalation in a Taiwan scenario, it is worth emphasizing that the consequences of a U.S.-China armed clash over Taiwan are incredibly difficult to predict and perhaps unknowable given the myriad factors involved. While Beijing has many advantages in this scenario, especially favorable geography, it is nevertheless important to acknowledge that China has a variety of strategic vulnerabilities as well. Most importantly, the PLA lacks combat experience. It has never attempted combined operations on the scale that would be required for an invasion of Taiwan. As noted in the first explainer in this series, achieving the necessary level of surprise for an invasion could prove difficult. Still, as has been demonstrated, the U.S. would likely face grave risks and losses in trying to insert ground forces or attempting to prevail in an air-sea campaign to defend Taiwan.

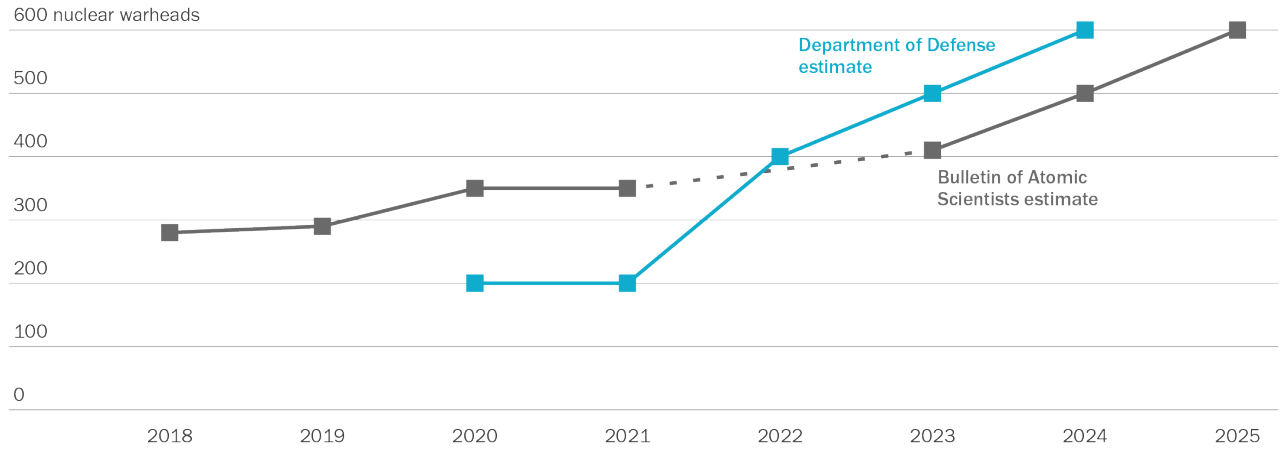
Additionally, the Chinese military has made many advances in preparing for a Taiwan scenario, but is still well behind in mustering some obvious capabilities useful for high-intensity combat, whether requisite numbers of aerial tankers or AEW (AWACS) aircraft or ASW helicopters or nuclear submarines. Then there is the possibility, however remote, that the Chinese regime, when under the stress of wartime emergency or perhaps military setback, proves to be unexpectedly brittle. Thus, many scholars have argued that Beijing, ordinarily rather cautious, would never take the extraordinary gamble of an invasion of Taiwan. Among the risks for both sides in a Taiwan scenario is the unlikely but nevertheless quite real possibility of nuclear use.

NUCLEAR SHADOWS OVER A TAIWAN CONFLICT

Nuclear considerations have not been at the forefront of U.S.-China relations, nor have they appeared to impact strategic calculations related to a prospective Taiwan scenario, at least until recently. However, it is possible that nuclear use could occur during a Taiwan scenario and that this could quickly lead to uncontrolled escalation and mutual annihilation. Putting aside arguments about a conventional war scenario, the risks attendant to war between two major nuclear powers should be sufficient for Washington strategists to strenuously question the viability of U.S. military intervention in a Taiwan scenario.

Interestingly, the 2023 CSIS “First Battle” game followed a rule that there would be no “nuclear decision making within each game iteration by the teams.”[138] Yet the shadows of nuclear use still had some impact, since in some scenarios, “concerns about nuclear escalation led to rules of engagement prohibiting the United States from attacking the Chinese mainland.”[139] Escalation dilemmas related to the U.S. striking targets in mainland China are a constant feature of nearly all U.S.-China wargame simulations because they are inescapable in reality.

CHINESE NUCLEAR ARSENAL GROWTH



Note: No BAS data was reported for 2022, and the DoD did not publish Chinese warhead estimates in its China Military Power Reports before 2020.

Sources: Department of Defense, "China Military Power Report," 2020–2024; Bulletin of Atomic Scientists, "Chinese Nuclear Weapons," 2018–2025.

A conflict between the United States and China over Taiwan carries a significant risk of nuclear escalation given that both nations are nuclear powers.

Whether or not a so-called "Goldilocks solution" to that dilemma is feasible is beyond the scope of this study, but overall the CSIS "First Battle" recommendation to abrogate the dilemma by avoiding mainland China targets seems prudent in any armed conflict involving these two nuclear superpowers.[140] The "offensive and preemptive" nature of American strategies creates escalatory dangers that could be reduced by discarding the "shoot the archer" concept requiring deep attacks into the Chinese interior.[141] It is not clear that the U.S. military at this point could credibly commit to not attacking the Chinese mainland in the event of a war, but doing so would clearly reduce nuclear escalation risk.

To some analysts, U.S. nuclear superiority would seem to obviate nuclear use, since the United States retains 3,700 warheads against approximately 600 for China.[142] In a related but somewhat different conclusion, most experts seem to agree that there is a condition of mutually assured destruction in the bilateral strategic relationship that should also lead each side toward caution in case of a military conflict.

Nevertheless, many analysts are rightly concerned that new dynamics in the U.S.-China strategic relationship are threatening to make nuclear weapons more relevant to a Taiwan scenario. Mike Sweeney, for example, offers that "States act rationally, right up until they do not," and he recommends prudence in considering the possibility of nuclear use in a Taiwan scenario.[143] Colby discusses the possibilities of Chinese "vertical escalation" and notes that "analysts frequently worry that China would go nuclear rather than lose a war over Taiwan."[144] He is confident, nevertheless, that Washington has more "opportunity for controlled, discriminate employment" of nuclear weapons than Beijing.[145] In effect, Colby, a leading advocate for U.S. military intervention in a Taiwan scenario and once again a senior official in President Donald Trump's Pentagon, admits there is a decent likelihood that such a scenario would entail a limited nuclear war with China.

To understand why either the U.S. or China might resort to nuclear weapons, one need only consider the likelihood that in a conventional war there would be a winner and a loser, in the sense of Taiwan being held by China or not. As this explainer has endeavored to illustrate, it is far from clear which side would emerge

victorious. The "winner" would have no incentive to escalate, but the "loser" might have such incentives. This could mean a desperate attempt to reverse battlefield losses, but more likely would be an effort to shock the opponent into halting the war immediately, part of a strategy to "escalate in order to deescalate." Recently, this phrase—likely an import from the discourse on Russian nuclear strategy—has become a regular feature of open Chinese nuclear expert discussions.[146]

A detailed study of Chinese nuclear strategy, for example, hints that Beijing could consider "the first use of nuclear weapons to manipulate risk to gain a coercive advantage, such as using warning shots to escalate to de-escalate a conflict."[147] The 2023 DoD report on Chinese military power likewise asserts that despite China's no first use pledge, it might resort to nuclear use "if a conventional military defeat in Taiwan gravely threatened CCP regime survival."[148] However, many U.S. nuclear experts contend that limited nuclear war could quickly turn into an all-out nuclear exchange, threatening not just the U.S. but the entire planet.

The possibility of China's resort to nuclear weapons is not the only path to nuclear escalation in a Taiwan scenario. Given the conventional scenario described above, it is also possible that China prevails in the military scenario and that Washington reaches for the nuclear cudgel.[149] In a similar vein, it might be logical for Chinese strategists to assume that low-yield nuclear weapons have recently come aboard U.S. strategic submarines for the purposes of employment against a Chinese invasion armada.

A number of recent studies advocate for U.S. first use in a Taiwan scenario. A spring 2023 academic study in a leading U.S. journal observed that this could be a logical response to China's growing military power: "[one may anticipate a] state's increasing its reliance on nuclear weapons to compensate for a weakening conventional position."[150] This is further described as "U.S. nuclear compensation."[151]

During the autumn of 2023, a set of rather incautious and even irresponsible arguments recommending consideration of U.S. first nuclear use in a Taiwan scenario were published by the Atlantic Council. In one, Matthew Kroenig concludes, "The United States might also find itself in a situation in which it could not stop a Chinese invasion force from reaching Taiwan with conventional forces, but it could do so with nuclear weapons. In this instance, the United States should be prepared to consider nuclear first use as well."[152] Such an approach might prompt escalation into general nuclear war between the two superpowers. Either way, it would almost certainly result in the immediate Chinese use of nuclear weapons against U.S. naval task forces, or alternatively against major U.S. military bases in the Asia-Pacific region, for example in Guam, Hawaii, or Alaska.

OPENING 'PANDORA'S BOX'?

Reflecting on the U.S. deployment of low-yield nuclear weapons aboard submarines, one influential Chinese strategist wrote in March 2020 that this might make the U.S. more brazen and increase the chances of nuclear conflict.[153] To counter such an approach, Beijing likely considers it necessary to undertake an expansion of its own nuclear arsenal. Just such an expansion is now underway, and there is little doubt that tensions over Taiwan are one reason for Beijing's recent moves in the nuclear domain.

A Chinese nuclear strategist warned in 2021 that the U.S. could deploy nuclear weapons in a Taiwan scenario.[154] Another Chinese specialist urges Beijing to close the nuclear gap to avoid American "strategic opportunism," suggesting a concern about nuclear blackmail.[155] With such steps to close the gap, a new concern arises with respect to China developing war-fighting strategies that include nuclear weapons.[156] Such strategies could plausibly target U.S. early warning facilities related to nuclear war-fighting. Thus, Chinese strategists recently profiled the U.S. deployment of a new and powerful early warning radar in

Alaska.[157] Even more disturbing are overt warnings in the Chinese military press that Beijing might press forward with the development of tactical nuclear weaponry.[158] According to the 2023 DoD report on Chinese military power, China "probably seeks lower yield nuclear warhead capabilities," and growing conversations about how to use them could form "the doctrinal basis for limited nuclear employment on the battlefield…."[159] Unquestionably, the existence of such weapons in the arsenals of both sides, not yet a fact but a growing possibility, would increase the chances of nuclear use in a Taiwan scenario.

Finally, one may also consider the possibility of inadvertent nuclear war in case of a miscalculation. The Cold War was replete with instances of close calls, circumstances that could have mistakenly initiated a nuclear conflict. For instance, during the Cuban Missile Crisis, the U.S. seriously entertained strikes against Soviet forces in and around Cuba that were equipped and prepared to respond with nuclear weapons.[160] The infamous "use 'em or lose 'em" problem could also precipitate inadvertent escalation.[161] Many strategists are particularly concerned that U.S. conventional strikes against command-and-control nodes or early warning sensors could be misinterpreted by Beijing, prompting a resort to nuclear weapons.[162]

The fog of war can certainly be thick, and one example of plausible confusion in a U.S.-China military scenario over Taiwan would be whether Chinese missiles are carrying conventional or nuclear warheads, since some weapons like the DF-26 can carry either.[163] According to the 2023 DoD report on Chinese military power, China is moving to a "launch-on-warning" nuclear posture with "near-continuous at-sea deterrence patrols."[164] An elevated Chinese alert posture could unfortunately increase the chances of inadvertent nuclear escalation in a crisis.

A U.S. MILITARY INTERVENTION MIGHT NOT SAVE TAIWAN

When considering a Taiwan scenario that might involve a direct U.S.-China war for the island, it is not clear that China would prevail, but it is also far from assured that the U.S. would emerge victorious even if intervening U.S. military forces are granted favorable assumptions for deployment and combat kill ratios (as they are in the analysis above). Such a direct U.S. military intervention is fraught with risks of grave losses up to and including escalation to nuclear war.

A HIGHLY RISKY ENDEAVOR

The U.S. military remains substantially superior to the Chinese armed forces in most respects. An "even fight" in the mid-Pacific would most likely result in a major defeat for Beijing. Unfortunately, the Taiwan scenario would not be fought on such a middle ground, but rather right on China's doorstep, allowing the Chinese military short interior lines and the ability to deploy a vast array of different military capabilities. For the basic reason of geographical proximity, the PLA could bring substantially more firepower in the hypothesized time and space than could U.S. forces that would be fighting at the end of a logistics tail stretching back 5,000–10,000 miles to the continental United States.

It is possible that Taiwan could be successfully defended by the U.S. armed forces. If they are willing to try—a big if given potential losses—Army and Marine forces, which have more combat experience than their PLA equivalents, might reach the beleaguered island in time to change the tide of battle, as in the Korean War. Yet it's just as likely that these units would never make it onto Taiwan during a Chinese invasion scenario

because their transit would be powerfully interdicted by myriad Chinese air and naval forces that would sever all the island's connections to the outside world in the first hours of such an operation. Some U.S. aircraft would undoubtedly get into the air to challenge Chinese airpower. Neither side can be certain of gaining air supremacy, meaning that a Chinese amphibious landing would be significantly harder than the ideal. However, it is altogether possible that U.S. airpower would be overwhelmed by the weight and proximity of Chinese airpower and anti-aircraft fires. Moreover, these initial aerial battles could be cut short by heavy missile and drone strikes against U.S. airbases that would likely halt most U.S. air operations in the vicinity of Taiwan for many weeks.

The U.S. Navy too might be able to fight its way across the Pacific in order to rescue Taiwan. U.S. carrier battle groups could help secure the skies over the island, while guarded by American surface action groups. Meanwhile, American submarines could methodically destroy the PLA Navy, along with any Chinese amphibious attack force.

But it is also very plausible that U.S. surface fleet units deployed proximate to Taiwan would suffer catastrophic losses. Those naval surface units would confront a quadruple threat from Chinese air, surface, subsurface, and ballistic missile threats, effectively foreclosing the possibility of moving U.S. aircraft carrier groups into relevant areas for operations. The U.S. Navy submarine force could be strenuously challenged to deploy enough boats and would face daunting problems, including especially small magazines, severe complications in rearming, as well as various Chinese countermeasures, such as large minefields in the vicinity of the Taiwan Strait. Even if the U.S. submarines succeeded in badly mauling the Chinese Navy, as is likely, it might fall far short of stopping the full Chinese armada arrayed against Taiwan.

INCREASED COSTS FOR MINIMAL GAIN

The above analysis illustrates that, even if U.S. forces might succeed, the chance of devastating failure is also substantial. Such a failure could involve the loss of tens of thousands of soldiers and Marines, hundreds of aircraft, and many dozens of warships—or even worse. A real war has never occurred between two nuclear powers, so the chance of nuclear escalation is also significant. Inadvertent or accidental use is possible, but so is the risk of "deliberate use," since the country losing the war could reach for the nuclear cudgel to try to stave off a total, humiliating defeat.

Finally, even if no war occurs over Taiwan—obviously a desirable outcome—there is still a persistent risk of intensive militarized rivalry that crowds out all other global cooperative imperatives. Hundreds of billions of dollars will be spent trying to prepare for a war under the most arduous conditions, since the geography is so obviously unfavorable to the U.S. and, per the logic of opportunity costs, these resources will not be spent on other national priorities. Likewise, the global agenda will continue to be dominated by great power competition, forcing other worthy economic, health, scientific, and environmental imperatives to take an inauspicious and potentially fatal downgrade among priorities. Such are the evident risks of making the defense of Taiwan the preeminent U.S. national defense objective.

While this paper has not addressed the purported benefits of defending Taiwan, it has shown that the costs of doing so are high. Moreover, these costs will grow and grow, given Chinese advantages and military priorities. And in any Taiwan war involving the United States and China, the chance of a nuclear cataclysm looms, casting heavy doubt on U.S. deterrent threats. It would take a lot of benefit to justify all that cost and risk. As subsequent papers in this series will show, those purported benefits are either insubstantial or illusory. And as the next paper will make clear, the idea that the United States would be assisted in any defense of Taiwan by a coalition of allies is likely wishful thinking.

ENDNOTES

[1] "Military and Security Developments Involving the People's Republic of China," U.S. Department of Defense, 2024, https://media.defense.gov/2024/Dec/18/2003615520/-1/-1/0/MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA-2024.PDF, 59–62; Jen Dimascio, "What is the Ratio of US and Chinese Military Aircraft?" *Aviation Week*, June 29, 2020, https://aviationweek.com/defense-space/aircraft-propulsion/what-ratio-us-chinese-military-aircraft.
[2] Mark F. Cancian, Matthew Cancian, and Eric Heginbotham, *The First Battle of the Next War*, (Washington, DC: Center for Strategic & International Studies, January 2023) 142.
[3] Julian Borger and Helen Davidson, "Secret Group of US Military Trainers Has Been in Taiwan for at Least a Year," October 7, 2021, *Guardian*, https://www.theguardian.com/world/2021/oct/07/taiwan-us-military-trainers-china; Nancy A. Youssef and Gordon Lubold, "U.S. to Expand Troop Presence in Taiwan for Training Against China Threat," *Wall Street Journal*, February 23, 2023, https://www.wsj.com/articles/u-s-to-expand-troop-presence-in-taiwan-for-training-against-china-threat-62198a83?mod=article_inline.
[4] Austin Ramzy and Joyu Wang, "Taiwan Acknowledges Presence of U.S. Troops on Outlying Islands," *Wall Street Journal*, March 19, 2024, https://www.wsj.com/world/asia/taiwan-acknowledges-presence-of-u-s-troops-on-outlying-islands-c81c3b6b.
[5] "Redline: US Troops Must Not Station in Taiwan," *Global Times*, October 28, 2021, https://www.globaltimes.cn/page/202110/1237587.shtml.
[6] On the 1995–96 Taiwan Strait Crisis, see Robert S. Ross, "The 1995-96 Taiwan Strait Confrontation: Coercion, Credibility and the Use of Force," *International Security* 25 (Fall 2000) no. 2, 87–123.
[7] See, for example, Stephen Biddle and Ivan Oelrich, "Future Warfare in the Western Pacific: Chinese Antiaccess/Area Denial, U.S. AirSea Battle, and Command of the Commons in East Asia," *International Security* 41, no. 1 (Summer 2016) 41–42. This analysis concludes that a Chinese invasion is unrealistic, but that Beijing is likely to focus on the blockade strategy. For my analysis of Chinese options in a blockade scenario, see for example: Andrew Erickson, Lyle J. Goldstein, and William S. Murray, *Chinese Mine Warfare: A PLA Navy "Assassin's Mace" Capability* (Newport, R.I.: U.S. Naval War College, 2009). With respect to a blockade, the threat has grown much more acute since that study was published.
[8] See, for example, T.X. Hammes, "Offshore Control: A Proposed Strategy for an Unlikely Conflict," INSS Strategic Forum (Washington DC: National Defense University, June 2012) https://ndupress.ndu.edu/Portals/68/Documents/stratforum/SF-278.pdf.
[9] Although there would be some operational difficulties including demanding intelligence requirements, such a distant blockade would not be too challenging given U.S. submarine strength and the many U.S. bases in the Middle East and Indian Ocean. As Sean Mirski relates: "Cumulatively, these force requirements would not particularly tax the resources of the U.S. Navy." Sean Mirski, "Consequences of an American Blockade of China," *Journal of Strategic Studies*, February 12, 2013, https://carnegieendowment.org/2013/02/12/stranglehold-context-conduct-and-consequences-of-american-naval-blockade-of-china-pub-51135. For an exhaustive treatment of related issues, see *China's Energy Strategy: The Impact on Beijing's Maritime Policies*, Gabriel Collins, Andrew Erickson, Lyle Goldstein, and William Murray, eds. (Annapolis: U.S. Naval Institute Press, 2008).
[10] Elbridge A. Colby, *The Strategy of Denial: American Defense in an Age of Great Power Conflict* (New Haven: Yale University Press, September 14, 2021) 197, 198–199.
[11] Brian J. Dunn, "Drive Them into the Sea," *Military Review*, September/October 2020, https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/September-October-2020/Dunn-Drive-Into-Sea/, 79.
[12] On the relevance of Alaska-based airborne forces to a Taiwan scenario, see Helene Cooper, "New Vehicles, Face Paint, and a 1,200 Foot Wall: The U.S. Army Prepares for War with China," *New York Times*, October 29, 2024, https://www.nytimes.com/2024/10/29/us/politics/us-military-army-china.html. Chinese strategists are quite concerned with new U.S. military deployments in Alaska, including the new airborne division. See, for example, Hao Xu [蒿旭], "The Sword Points at the Arctic: the US Military Resurrects the 11th Airborne Division" [剑指北极: 美军重建第11空降师], *Ordnance Science and Technology* [兵工科技] 11 (2022) 11–17.
[13] Dunn, 78.
[14] "C-17 Globemaster III," U.S. Air Force official site, https://www.af.mil/About-Us/Fact-Sheets/Display/Article/1529726/c-17-globemaster-iii/#:~:text=The%20C%2D17%20is%20designed,585%2C000%20pounds%20(265%2C352%20kilograms.
[15] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 106.
[16] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 106.
[17] On the U.S. Marines' newest doctrinal concept, see, for example, Brian Kerg (LTC, USMC), "A Summary of Changes in the New EABO Manual," *U.S. Naval Institute Proceedings*, July 2023, https://www.usni.org/magazines/proceedings/2023/july/summary-changes-new-eabo-manual.

[18] Brian McElhiney, "Marine Corps shrinks its Osprey fleet on Okinawa under Force Design plan," *Stars and Stripes*, February 21, 2025, https://www.stripes.com/theaters/asia_pacific/2025-02-20/marine-corps-osprey-fleet-okinawa-16903173.html.
[19] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 130.
[20] On China's robust air defense system, see "Military and Security Developments Involving the People's Republic of China," U.S. Department of Defense, 2023, 64.
[21] Eric Heginbotham, Michael Nixon, Forrest E. Morgan, Jaco L. Heim, Jeff Hagen, Sheng Li, Jeffrey Engstrom, et al, *The U.S.-China Military Scorecard: Force, Geography, and the Evolving Balance of Power 1996-2017* (Santa Monica, CA: RAND, 2015) 72. There are just two U.S. bases within unrefueled fighter range of Taiwan, but since this study was published the U.S. has been working to develop other nearby bases, for example in the Philippines.
[22] Heginbotham et al, *The U.S.-China Military Scorecard*, xxiii.
[23] Heginbotham et al, *The U.S.-China Military Scorecard*, 81.
[24] For these calculations, see Table 4.4 in Heginbotham et al, *The U.S.-China Military Scorecard*, 83.
[25] David Axe, "Unbelievable: China is a Generation Ahead on Missile Technology," *National Interest*, July 21, 2021, https://nationalinterest.org/blog/reboot/unbelievable-china-generation-ahead-missile-technology-190623; Liu Xuanzun, "China Ramps up J-20 Stealth Fighter Production after Domestic Engine Switch," *Global Times*, December 12, 2021, https://www.globaltimes.cn/page/202112/1241309.shtml.
[26] The U.S. airbase at Okinawa may have up to 54 F-15s, but it could be assumed that not all would be at full readiness, and some would be held back in reserve. "Kadena Air Base," MilitaryBases.us, http://www.militarybases.us/air-force/kadena-air-base/. On declining "mission-capable rates" in the USAF, see Stephen Losey, "Fewer Planes Are Ready to Fly: Air Force Mission-capable Rates Decline amid Pilot Crisis," *Air Force Times*, March 5, 2018, https://www.airforcetimes.com/news/your-air-force/2018/03/05/fewer-planes-are-ready-to-fly-air-force-mission-capable-rates-decline-amid-pilot-crisis/. A likely similar-sized force could be available from Guam, but this group would be quite constrained by the need for tanker support. Thus, the assumption is that several dozen U.S. aircraft might operate at any given time in the Miyako Strait. The number of U.S. fighters engaged could be higher in the case that a U.S. aircraft carrier was in range. But that is unlikely, given that China monitors the movements of U.S. carriers carefully and could time its operations accordingly. In addition, the U.S. would deploy such capital ships cautiously since they would face major risks of being sunk, and even if deployed, the airwing could be almost fully engaged in attempting to defend the carrier from aerial attack. The assumption of 300–400 PLA aircraft follows from the observation that this is a priority mission for both the PLA Air Force and Navy, but this is taken from an aggregate force of 1,900 fighters, some of which would be allocated to reserve or attacking Taiwan itself. "Military and Security Developments…" 185.
[27] On upgrades to air strips in the Philippines, see David Vergun, "New EDCA Sites Named in the Philippines," U.S. Department of Defense, April 3, 2023, https://www.defense.gov/News/News-Stories/Article/Article/3350297/new-edca-sites-named-in-the-philippines/.
[28] The RAND *Scorecard* study aircraft combat loss ratio for a 2017 Taiwan scenario of 13:1 seems not well supported and indeed the report notes on the very same page that this figure "should be treated with circumspection." Heginbotham et al, *The U.S.-China Military Scorecard*, 92. At another point in that study, the authors more transparently estimate that Chinese pilots would have 70 percent of the capability of U.S. pilots due to "differences in training in experience" (80). The latter estimate seems more realistic and is hard to square with the extreme air combat ratio listed above, especially in light of China's improving air force.
[29] Heginbotham et al, *The U.S.-China Military Scorecard*, 54.
[30] See, for example, Seth Robson, "American Forces Dust off Spartan Philippine Airport during Balikatan Exercise," *Stars and Stripes*, May 7, 2024, https://www.stripes.com/theaters/asia_pacific/2024-05-06/philippines-edca-lalo-army-balikatan-13775007.html.
[31] Thomas H. Shugart III and Timothy A. Walton, *Concrete Sky: Airbase Hardening in the Western Pacific*, Hudson Institute, January 7, 2025, 7, https://www.hudson.org/arms-control-nonproliferation/concrete-sky-air-base-hardening-western-pacific-timothy-walton-thomas-shugart.
[32] Heginbotham et al, *The U.S.-China Military Scorecard*, 60.
[33] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 120.
[34] Heginbotham et al, *The U.S.-China Military Scorecard*, 63.
[35] *The Military Balance 2024*, International Institute for Strategic Studies (Oxfordshire: Routledge, 2024) 254.
[36] Mark Montgomery, Riki Ellison, and Bradley Bowman, "Guam Needs Better Missile Defenses Urgently," Defense One, May 23, 2022, https://www.defenseone.com/ideas/2022/05/guam-needs-better-missile-defensesurgently/367275/.
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[38] Mian Weiqin [面为亲], "China's Strongest Warship that Was Just Launched Has the Unique Advantage that It Can Attack Guam on a Large Scale" [刚刚, 中国最强战舰下水, 拥有一过人之处, 可大规模攻击关岛], Sina.com, April 5, 2018,

http://k.sina.com.cn/article_6450206858_18076588a001008uh3.html?cre=tianyi&mod=pcpager_focus&loc=6&r=9&doct=0&rfunc=100&tj=none&tr=9&wm=.

[39] "Military and Security Developments…" 56.

[40] Heginbotham et al, *The U.S.-China Military Scorecard*, 61.

[41] Notably, the Taliban succeeded in raiding a U.S. airbase in Afghanistan on September 12, 2012. They seriously damaged a significant number of U.S. combat aircraft. See Barbara Starr, Chris Lawrence, and Joe Sterling, "NATO releases details of brazen raid on base in Afghanistan," CNN, September 16, 2012, https://www.cnn.com/2012/09/15/world/asia/afghanistan-fatal-attack. Likewise, similar unconventional attacks against U.S. airbases also occurred during the Vietnam War. But Chinese conventional strikes would be more sustained and many orders of magnitude more threatening due to the power of modern precision-guided munitions.

[42] Heginbotham et al, *The U.S.-China Military Scorecard*, xxiii.

[43] Heginbotham et al, *The U.S.-China Military Scorecard*, xxiii.

[44] "Military and Security Developments…" 89.

[45] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 4–5.

[46] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 78.

[47] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 37, 76–77.

[48] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 89.

[49] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 107.

[50] Renju Jose and Lewis Jackson, "U.S. Plans to Deploy B-52s to North Australia amid China Tensions – Source," Reuters, October 31, 2022, https://www.reuters.com/world/us-plans-deploy-b-52-bombers-australias-north-abc-report-2022-10-30/. Chinese strategists are tracking these developments closely and are deliberating on the PLA response. Li Jie, "Warning: the US Will Use Strategic Bomber Aircraft to Undertake New 'Strategic Deterrence,'" *Modern Ships* [现代舰船] (2020) no. 13/14, 20.

[51] Wang Xiaomeng [王小蒙], "The 'Daring Vanguard' Encroaching on the South China Sea" [干涉南海的急先锋], *Ordnance Industry Science and Technology* [兵工科技] (2021) no. 2, 9.

[52] "AGM-158C Long Range Anti-Ship Missile (LRASM)" Global Security.org, https://www.globalsecurity.org/military/systems/munitions/lrasm.htm, accessed February 9, 2022.

[53] "Su-30M Flanker-H Air-Superiority Fighter," *Airforce Technology*, https://www.airforce-technology.com/projects/su_30mk/?cf-view.

[54] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 4.

[55] Biddle and Oelrich, "Future Warfare in the Western Pacific…" 12.

[56] Biddle and Oelrich, "Future Warfare in the Western Pacific…" 44–45.

[57] Cancian, Cancian, and Heginbotham, The First Battle of the Next War, 4.

[58] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 78, 140. These authors also hope an older but more numerous long-range missile, the JASSM-ER, could be retrofitted to strike maritime targets, but that remains only a theoretical possibility.

[59] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 138, 140.

[60] Wang, "The 'Daring Vanguard,'" 11.

[61] Chinese strategists appear to be quite aware of this vulnerability. See, for example, "How Should Aerial Tankers Be Escorted Since They are Easy to Shoot Down" [加油机是不是很容易被攻击，需要护航么?], February 28, 2021, https://zhidao.baidu.com/question/104627815.html.

[62] For reports of intensive PLA exercises for point air defense, see, for example, *PLA Daily* [**解放**军报], December 12, 2022, 3, https://x.com/lylegoldstein/status/1602416055506329605?s=20; *PLA Daily* [解放军报], January 19, 2023, 4, https://x.com/lylegoldstein/status/1616277479269797890?s=20; and *PLA Daily* [解放军报], September 20, 2023, 4, https://x.com/lylegoldstein/status/1704614684421185998?s=20.

[63] For a comprehensive discussion of the civilian merchant fleet component of any Chinese amphibious invasion of Taiwan, see Lonnie D. Henley, "Civilian Shipping and Maritime Militia: The Logistics Backbone of a Taiwan Invasion," *Chinese Maritime Report*, no. 21 (Newport, RI: Naval War College, May 2022) https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=1020&context=cmsi-maritime-reports.

[64] See, for example, Megan Eckstein, "Marines Want to Field a Long-Range Anti-Ship Missile 'As Fast As Possible,'" USNI News, February 19, 2019, https://news.usni.org/2019/02/19/marines-want-field-long-range-anti-ship-missile-fast-possible.

[65] See, for example, Steven Losey, "Pentagon Grounds Some F-35s after Ejection on Texas Runway," Defense News, December 27, 2022, https://www.defensenews.com/air/2022/12/27/pentagon-grounds-small-group-of-f-35s-after-ejection-on-texas-runway/. Chinese military assessments have followed related developments in U.S. military doctrine with a consuming interest, but do not seem very perturbed, noting for example that these expeditionary air power groups still require a very large amount of support, not

least jet fuel and weapons. “A Deep Analysis of the US Armed Forces Forward Basing Concept” [美军远征前进基地概念深度解析], *Modern Ships* [现代舰船], 30.

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[68] Defense Security Cooperation Agency, “Taipei Economic and Cultural Representative Office in the United States (Tecro) – Himars, Support, and Equipment,” October 21, 2020, https://www.dsca.mil/press-media/major-arms-sales/taipei-economic-and-cultural-representative-office-united-states-15; Eric Gomez, “Taiwan Waits Longer for HIMARS, F-16s, and Abrams Tanks than Other Recipients,” Cato Institute, January 22, 2024, https://www.cato.org/blog/taiwan-waits-longer-himars-f-16s-abrams-tanks-other-recpi; Matthew Strong, “Taiwan to receive early delivery of 18 extra HIMARS systems in 2026,” *Taiwan News*, May 5, 2023, https://www.taiwannews.com.tw/en/news/4883328; “Taiwan Says Received First Batch of HIMARS from US,” Defense Post, November 6, 2024, https://thedefensepost.com/2024/11/06/taiwan-receives-himars-us/.

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[72] Alia Shoaib, “The US Could Lose up to 900 Warplanes Fighting a Chinese Invasion of Taiwan but Would Emerge Victorious, Says Think Tank,” *Business Insider*, August 14, 2022, https://www.businessinsider.com/china-us-conflict-taiwan-heavy-losses-analysis-2022-8.

[73] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 115.

[74] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 113.

[75] On the U.S. Air Force’s Agile Employment Concept (ACE), see for example, Michael Peck, “The US Air Force's Big Plan to Spread out and Take on China May Actually Make Things Easier for Beijing,” *Business Insider*, March 1, 2023, https://www.businessinsider.com/us-air-force-ace-concept-creates-logistics-base-defense-needs-2023-3.

[76] It’s worth bearing in mind that the conclusions of Biddle and Oelrich with respect to the limits of China’s A2/AD system apply to both Japan and the Philippines generally, but may not truly apply to a Taiwan scenario, wherein the most intense air battles would likely be fought within 375 miles [600 kilometers] of the Chinese mainland. After discussing the prospects for both Tokyo and Manila, they observe, “Taiwan is thus much more exposed than are other U.S. allies.” Biddle and Oelrich, “Future Warfare in the Western Pacific,” 41.

[77] On the U.S. Navy’s most recent doctrinal concept, see, for example, Harlan Ullman, “Are There Flaws in the US Navy’s Distributed Maritime Operations?” Defense News, January 23, 2023, https://www.defensenews.com/opinion/commentary/2023/01/23/are-there-flaws-in-the-us-navys-distributed-maritime-operations/.

[78] During the Cold War, the USSR developed an extensive system to monitor and attack U.S. Navy aircraft carrier groups. The main parts of this system included satellite and auxiliary vessel reconnaissance and submarine and long-range aerial strike platforms.

[79] *The PLA Navy: New Capabilities and Missions for the 21st Century* (Suitland, MD: Office of Naval Intelligence, 2015) https://www.oni.navy.mil/portals/12/intel%20agencies/china_media/2015_pla_navy_pub_interactive.pdf, 16.

[80] “2022 Report on Military and Security Developments Involving the People's Republic of China,” U.S. Department of Defense, November 29, 2022, 54.

[81] Lyle Goldstein, “Japan’s Folly Could Be China’s Gain in a War against America,” *National Interest*, July 17, 2015, https://nationalinterest.org/feature/japans-folly-could-be-chinas-gain-war-against-america-13356.

[82] Sebastian Roblin, “How a Cheap Swedish Submarine 'Ran Rings' around a US Aircraft Carrier and Its Sub-Hunting Escorts,” *Business Insider*, September 8, 2022, https://www.businessinsider.com/how-swedish-sub-ran-rings-around-us-aircraft-carrier-escorts-2021-7.

[83] “China's H-6K: The 'Old' Bomber That Could 'Sink' the U.S. Navy,” *National Interest*, May 21, 2018, https://nationalinterest.org/blog/the-buzz/chinas-h-6k-the-old-bomber-could-sink-the-us-navy-25913.

[84] Robert Haddick, “China’s Most Dangerous Missile (So Far),” War on the Rocks, July 2, 2014, https://warontherocks.com/2014/07/chinas-most-dangerous-missile-so-far/.

[85] Dan Caldwell, Joseph Freda, and Lyle Goldstein, “China's Dreadnought? The PLA Navy's Type 055 Cruiser and Its Implications for the Future Maritime Security Environment,” *CMSI China Maritime Reports* no. 5 (February 2020) 24.

[86] “Military and Security Developments…” 56.

[87] “Chinese Navy PLAN Commissions Final Type 056A Corvettes,” *Naval Recognition*, February 18, 2021, https://www.navyrecognition.com/index.php/naval-news/naval-news-archive/2021/february/9718-chinese-navy-plan-commissions-final-type-056a-corvettes.html.

[88] Joseph Trevithick, "Chinese Long-Range Ballistic Missiles Struck Moving Ship In South China Sea: Report," Drive, November 16, 2020, https://www.thedrive.com/the-war-zone/37662/chinese-long-range-ballistic-missiles-struck-moving-ship-in-south-china-sea-report.
[89] Paul S. Giarra, "A Chinese Anti-Ship Ballistic Missile: Implications for the U.S. Navy," in *Chinese Aerospace Power: Evolving Maritime Roles*, Andrew Erickson and Lyle Goldstein (eds.), (Annapolis: Naval Institute Press, 2011) 359.
[90] "2022 Report on Military and Security Developments…" VIII. The DF-17 is a high-value system and there are signs that the PLA is deploying them quite rapidly, including to the Taiwan Strait area. A recent projection is that China has 27–36 launchers already and will have 108–144 launchers by 2028. Deckler Eveleth, *People's Liberation Army Rocket Force Order of Battle 2023* (Monterey, CA: Middlebury Institute for Nonproliferation Studies) 37, 50, https://nonproliferation.org/peoples-liberation-army-rocket-force-order-of-battle-2023/.
[91] Heginbotham et al, *The U.S.-China Military Scorecard*, 170.
[92] See, for example, Thomas Culora (CAPT, USN, ret.), "The Strategic Implications of Obscurants: History and the Future," *Naval War College Review* 63, no. 3 (Summer 2010) 73–84.
[93] "Military and Security Developments…" 100.
[94] "Military and Security Developments…" 100.
[95] "2022 Report on Military and Security Developments…" 92–93.
[96] Tanmay Kaddam, "Spotted! China's 'Giant' Radar That Can Scan US Military Bases in Asia and Detect Ballistic Missiles From Thousands Of Miles," *Eurasian Times*, April 19, 2022, https://eurasiantimes.com/spotted-chinas-giant-radar-that-can-scan-us-military-bases/.
[97] This is a recommendation of the CSIS report: Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 122. On the escalation risk associated with such strikes see, Caitlin Talmadge, "Would China Go Nuclear? Assessing the Risk of Chinese Nuclear Escalation in a Conventional War with the United States," *International Security* 41, no. 4 (Spring 2017) 50–92.
[98] "Military and Security Developments…" 64.
[99] "Military and Security Developments…" 89.
[100] "Military and Security Developments…" 63.
[101] "Military and Security Developments…" 145.
[102] "Military and Security Developments…" 90.
[103] The growing effectiveness of drones in the ISR role in recent years may undermine earlier conclusions regarding Chinese ISR potential outside the first island chain. See, for example, Biddle and Oelrich, "Future Warfare in the Western Pacific," 29–30.
[104] Lyle Goldstein, "China's New Surveillance Technology May Expose U.S. Warships," *National Interest*, November 7, 2017, https://nationalinterest.org/feature/chinas-new-surveillance-technology-may-expose-us-warships-23092.
[105] Heginbotham et al, *The U.S.-China Military Scorecard*, 153.
[106] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 92.
[107] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 112.
[108] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 88.
[109] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 88.
[110] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 132.
[111] "Ship Battle Forces," Naval Vessel Register, Naval Sea Systems Command, updated January 12, 2024, https://www.nvr.navy.mil/NVRSHIPS/SHIPBATTLEFORCE.HTML. With respect to the issue of submarine maintenance in the U.S. Navy, see, for example, Oren Liebermann, "Nearly 40% of US Attack Submarines in or Awaiting Repair as Shipyards Face Worker Shortages, Supply Chain Issues," CNN, July 12, 2023, https://www.cnn.com/2023/07/12/politics/us-attack-submarines-repair/index.html.
[112] RAND *Scorecard*, 212.
[113] RAND *Scorecard*, 212.
[114] RAND *Scorecard*, 209.
[115] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 85–86.
[116] See, for example, Henley, "Civilian Shipping and Maritime Militia…"
[117] Lyle Goldstein, "Target Taiwan: Prospects for a Chinese Invasion," Defense Priorities, October 16, 2025, https://www.defensepriorities.org/explainers/target-taiwan-prospects-for-a-chinese-invasion/.
[118] "2022 Report on Military and Security Developments…" 129.
[119] See, for example, Fu Jinzhu [傅金祝], "The N Link in Employment of Sea Mine Warfare" [水雷作战使用的N个环节], *Naval and Merchant Ships* [舰船知识], October 2008, 60–63.
[120] Megan Eckstein, "US Navy nears decisions on new small, medium underwater drones," Defense News, August 12, 2021, https://www.defensenews.com/digital-show-dailies/navy-league/2021/08/12/navy-nearing-decisions-on-small-medium-uuv-replacement-options/.

[121] "The Assault, Transport and Anti-submarine Variants of the Z-20 Shipborne Helicopter" [直-20舰载突击运输型+反对潜艇型], *Shipborne Weapons* [舰载武器] (February 2021) 31–32.
[122] Liu Xuanzu, "PLA Navy Commissions Final Type 056A Corvettes Specialized in Coastal Defense," *Global Times*, February 21, 2021, https://www.globaltimes.cn/page/202102/1215722.shtml.
[123] Lyle Goldstein, "China is Improving Its Anti-Submarine Warfare Capabilities," *National Interest*, November 28, 2021, https://nationalinterest.org/blog/reboot/china-improving-its-anti-submarine-warfare-capabilities-197071.
[124] Zhang Yibei [张一钡], "A Type 056 Light Frigate was Transformed into a Coast Guard Vessel" [056型轻护变身海警舰], *Naval and Merchant Ships* [舰船知识] (February 2022) 85.
[125] See, for example, "The Type 039 Conventional Submarine Has Really Entered the World's Premier Class – It's the First Time Our Country Has Equipped Such Platforms with Anti-Submarine Capabilities" [039型常规潜艇技术真正步入世界一流 – 我国第一次具备反潜能力], June 27, 2019, https://weibo.com/ttarticle/p/show?id=2309404387588080296377.
[126] Wang Lao [王劳], "An Analysis of Our Country's Undersea Sensor System" [构建我国海洋水下观测系统的思考], *China Ocean News* [中国海洋报], December 2, 2015, 3.
[127] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 5.
[128] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 111.
[129] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 99.
[130] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 99.
[131] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 135, fn. 311. That attrition rate could be too low, given the very shallow bathymetry of the Taiwan Strait, along with the high possibility that China will set up extensive mine barriers on the northern and southern entrances to the Taiwan Strait—a factor that is hardly addressed in the CSIS study.
[132] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 136. It's worth noting that conducting rearming at civilian ports in the region may increase the number of civilian casualties in allied countries.
[133] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 136.
[134] Naval Vessel Register, "Ship Battle Forces," Naval Sea Systems Command, updated January 12, 2024, https://www.nvr.navy.mil/NVRSHIPS/SHIPBATTLEFORCE.HTML. The total U.S. Navy submarine force consists of 67 submarines, but 14 are designed (SSBN) only for nuclear contingencies. Of the attack submarine force appropriate for use in a Taiwan scenario, 37 percent are awaiting maintenance, leaving a total of 31 that are operationally ready. Ronald O'Rourke, *Navy Virginia-Class Submarine Program and AUKUS Submarine Proposal: Background and Issues for Congress*, CRS Report No. RL32418 (Washington, DC: Congressional Research Service, 2023) https://crsreports.congress.gov/product/pdf/RL/RL32418/267, 5.
[135] As noted recently by one submarine expert, "An old rule-of-thumb holds that for every vessel operating, two others are required — one preparing for deployment and a second standing down from recent operations." Mike Sweeney quoted in Eric Cheung, Will Ripley, and John Mees, "In the Dark Depths of the Pacific, US Submarines Patrol with an Eye Fixed Firmly on China," CNN, April 6, 2023, https://www.cnn.com/2023/04/05/us/us-navy-submarine-pacific-china-intl-hnk-ml/index.html. The estimates made here assume that two to four U.S. submarines are always operating proximate to Taiwan and these could be joined by four to six additional U.S. and Japanese submarines during the first week with more to follow on gradually. The calculations are reasonable, conservative, and consistent with recent available estimates. See, for example, Mike Sweeney, "Submarines Will Reign In a War with China," USNI *Proceedings*, March 2023, https://www.usni.org/magazines/proceedings/2023/march/submarines-will-reign-war-china. That analysis concludes that the total U.S. submarines (SSNs) available for a war with China would be "perhaps a dozen."
[136] O'Rourke, *Navy Virginia-Class Submarine Program and AUKUS Submarine Proposal*, 7.
[137] On China's extensive civilian maritime shipping resources, see Henley, "Civilian Shipping and Maritime Militia…." See also endnote 73 above.
[138] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 21.
[139] Cancian, Cancian, and Heginbotham, *The First Battle of the Next War*, 21.
[140] On the so-called "Goldilocks Challenge" for escalation management, see Alexandra T. Evans, Emily Ellinger, Jacob L. Heim, Nathan Beauchamp-Mustafaga, Zachary Burdette, and Lydia Grek, *Managing Escalation: Lessons and Challenges from Three Historical Cases Involving Nuclear Armed Powers* (Washington, DC: RAND, 2024) 98.
[141] Grant Willis, "Avoiding Thucydides' Trap in the Western Pacific Through the Air Domain," Wild Blue Yonder, U.S. Air University, April 27, 2020, https://www.airuniversity.af.edu/Wild-Blue-Yonder/Articles/Article-Display/Article/2164274/avoiding-thucydides-trap-in-the-western-pacific-through-the-air-domain/. On JAM-GC, see Michael E. Hutchens, William D. Dries, Jason C. Perdew, Vincent D. Bryant, and Kerry E. Moores, "Joint Concept for Access and Maneuver in the Global Commons: A New Joint Operational Concept," *Joint Force Quarterly* 84 no. 1 (2017) 134–139.
[142] "Military and Security Developments Involving the People's Republic of China," U.S. Department of Defense, 2024, 101. This report also states that China will have 1,000 operational warheads by 2030.

[143] Mike Sweeney, "Why a Taiwan Conflict Could Go Nuclear," Defense Priorities, March 4, 2021, https://www.defensepriorities.org/explainers/why-a-taiwan-conflict-could-go-nuclear.
[144] Colby, *Strategy of Denial*, 175.
[145] Colby, *Strategy of Denial*, 176.
[146] See, for example, Li Xiang and Gao Heng [李享, 高衡], "Reassessing US Limited Nuclear War Theory in the Era of Great Power Competition" [大国竞争背景下的美国有限核战争理论再判断], *Journal of Contemporary Asia-Pacific Studies* [当代亚太], October 2022, 105–134.
[147] Taylor Fravel and Fiona Cunningham, "Dangerous Confidence: Chinese Views on Nuclear Escalation," *International Security* 44, no. 2 (Fall 2019) 82.
[148] "Military and Security Developments…" 106.
[149] That is the scenario that leads a U.S.-China conflict to a nuclear denouement in Eliot Ackerman and Admiral James Stavridis (USN-ret.), *2014: A Novel of the Next World War* (Penguin: New York, 2021) 212–213.
[150] Henrik Stålhane Hiim, M. Taylor Fravel, Magnus Langset Trøan, "The Dynamics of an Entangled Security Dilemma: China's Changing Nuclear Posture," *International Security* 47, no. 4 (Spring 2023) 149.
[151] Hiim, Fravel, and Trøan, "Dynamics of an Entangled Security Dilemma," 150.
[152] Matthew Kroenig, "Deliberate Nuclear Use in a War over Taiwan: Scenarios and Considerations for the United States," Atlantic Council, September 2023, 17. A similar set of arguments are made in Greg Weaver, "The Role of Nuclear Weapons in a Taiwan Crisis," Atlantic Council, November 2023.
[153] Li Jie [李杰], "Low Yield Nuclear Weapons Will Open 'Pandora's Box'" [李杰：低当量核武或将打开'潘多拉魔盒'], *Global Times* [环球时报], March 24, 2020, https://opinion.huanqiu.com/article/9CaKrnKq4PI.
[154] Jiang Tianjiao [江天骄], "U.S. Warfighting Deterrence Nuclear Strategy: History, Theory, and Reality" [美国实战威慑核战略: 理论历史与现实], *International Security Studies* [国际安全研究], no. 2 (2021) 51–53.
[155] Hu Gaochen [胡高辰], "An Analysis of China-US Asymmetric Nuclear Stability and US Strategic Opportunism" [中美不对称核稳定与美国战略机会主义论析], *Chinese Foreign Policy* [中国外交] (May 2021) 62.
[156] "2022 Report on Military and Security Developments…" 99.
[157] "US Puts Long-Range Identification Radar' Into Service" [美国'远程识别雷达'投入使用]], *Ordnance Knowledge* [兵器知识], 6.
[158] Lan Shunzheng [兰顺正], "Why Tactical Nuclear Weapons Are 'Favored' in the United States" [战术核武器缘何在美'受宠'], *PLA Daily* [解放军报], June 20, 2019, http://www.81.cn/jfjbmap/content/2019-06/20/content_236472.htm, 11.
[159] "Military and Security Developments…" 111–112.
[160] See, for example, Svetlana Savranskaya, "Soviet Submarines in the Cuban Missile Crisis," *Journal of Strategic Studies* 28, no. 2 (April 2005) 252.
[161] On the "use 'em or lose 'em" dilemma in nuclear strategy, see, for example, Robert Legvold and Christopher Chyba, "Introduction: The Search for Stability in a New Nuclear Era," *Daedalus* 149, no. 2 (Spring 2020) 13.
[162] See, for example, Caitlin Talmage, "Would China Go Nuclear? Assessing the Risk of Chinese Nuclear Escalation in a Conventional War with the United States," *International Security* 41, no. 4 (Spring 2017) 60. It is somewhat reassuring to note that a leading Chinese academic nuclear strategist concluded recently that "while the possibility of a major China-U.S. conventional war inadvertently escalating to the nuclear level cannot be excluded, the risk is extremely low." Wu Riqiang, "Assessing China-U.S. Inadvertent Nuclear Escalation," *International Security* 46, no. 4 (Winter 2022/2023) 129.
[163] Hans Kristensen, "China's New DF-26 Missile Shows Up at Base In Eastern China," Federation of American Scientists, 2020, https://fas.org/blogs/security/2020/01/df-26deployment/.
[164] "Military and Security Developments…" 104, 107.