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INDEPENDENT STUDY IN SUPPORT OF A NATIONAL MARITIME STRATEGY: SUMMARY REPORT

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Abstract

This congressionally mandated study for the Maritime Administration in the Department of Transportation is meant to inform development of a national maritime strategy—its ends, ways, means, strategic problems, and priorities. The focus is on the national security role of merchant mariners, commercial shipping, and commercial shipbuilding. The study identifies potential strategic aims, problems that stand in the way of achieving these aims, and relevant courses of action. It also estimates future defense and economic security needs for U.S. flag shipping, mariners, and domestic shipbuilding.

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MARAD-250319-005

Executive Summary

This congressionally mandated study for the Maritime Administration (MARAD) in the Department of Transportation (DOT) is meant to inform development of a national maritime strategy—its ends, ways, means, strategic problems, and priorities. This study focuses on the national security aspects of shipping, merchant mariners, and commercial shipbuilding. The study team consulted with other U.S. Government stakeholders, including key elements of the Coast Guard and Department of War (DOW),[1] via repeated engagements and wargames.

For this study, the CNA study team provided analytically derived estimates, ideas, and options to inform strategy development. These estimates are sensitive to assumptions that we make explicit in the analysis. The validity of these assumptions may vary depending on the U.S. or global economy, U.S. or allied defense planning, and other factors subject to change. The analysis is illustrative and provides a sense of scale, as well as ranges and alternatives. The intent is not to define or validate requirements. This effort arose out of congressional interest in the ability of the United States to sustain a war of significant duration and maintain vital seaborne trade in such a conflict.

Focus and approach

We identified potential aims for a national maritime strategy, strategic problems that stand in the way of achieving these aims, and potential courses of action (COAs) that address these problems. We estimated how much additional shipping, how many additional mariners, and how much additional shipbuilding capacity would be required to meet the United States' defense and economic security needs in a war of significant duration.

We define *potential needs* as **assured access to enough reliable shipping, mariners, and shipbuilding to sustain U.S. military operations and seaborne trade in a major war or other contingency**. These needs are scoped to minimize risk. The term *assured access* excludes various sources of capacity (for example, non-U.S. flag shipping) on which the U.S. economy currently relies that may be unavailable in a contingency. Reliable, timely access to seaborne transportation is the core of what the maritime industries do for national security and what makes them strategically important.

We examined the **risks** associated with projected **gaps** in U.S. shipping and shipbuilding capacity. We identified **options** to mitigate these risks through alternative sources of capacity. We also identified **alternative mixes of assured access shipping and shipbuilding** that might be maintained in peacetime to meet the country's wartime requirements. Finally, we compared the **trade-offs** of investing in U.S. flag shipping versus commercial shipbuilding.

As a key element of our approach, we **consulted about 75 organizations** in Government, industry, and the labor and trade associations. We held **two wargames** at CNA in late July 2024—one on shipping and one on shipbuilding. More than 100 participants in Government and the private sector participated. We developed an analytic synthesis of these engagements and wargames, which we used to identify strategic problems and suggest COAs.

[1] Prior to 2025, the Department of War (DOW) was called the "Department of Defense" (DOD). For consistency, we use *Department of War* and *DOW* throughout this document, including for events that happened before the name change.

We based our estimates of gaps in defense and economic security needs on public information regarding defense requirements and trade flows. These data sources included **current estimates and future projections** going out 5, 15, and 30 years for shipping, mariners, and shipbuilding. We developed conceptual frameworks to assess risks and options associated with these gaps. We also examined laws, regulations, and Government programs. Our work is documented in a series of task-driven interim reports delivered to MARAD over the course of fiscal year 2024. This summary report covers all relevant aspects of our earlier analysis.

Strategic aims in support of national security

We approached shipping, mariners, and shipbuilding as critical wartime capabilities. Their national security role, as indicated in national guidance related to maritime trade and sealift, is to support combat forces, sustain the defense industrial base in a large-scale conflict, and maintain seaborne trade if global shipping is disrupted. The U.S. Government does not maintain enough seaborne transportation capacity to sustain military operations or seaborne commerce in a major global conflict, nor does it maintain an industrial base capable of replacing lost tonnage on a significant scale. The Government relies instead on commercial capacity to make up the difference in a major contingency.

The primary role of a maritime strategy is to ensure that the United States has reliable access to enough shipping and shipbuilding capacity to meet its national security needs, the components of which are defense and economic security.[2] A clear, measurable aim is critical to any strategy. We offer four alternatives for leaders to consider. Each is more ambitious in scope and scale than the one before and would likely involve more economic resources to fully realize.

1. The first alternative would be to secure reliable access to enough militarily useful shipping to **meet the defense sealift needs of the U.S. military in a contingency**. Especially during a large-scale conflict, the need for sealift (i.e., seaborne transportation of military materiel in support of forward area operations) is the main reason commercial shipping and shipbuilding are strategic industries. Reliable access to adequate sealift is necessary for the military to deter and respond to aggression.

2. The second alternative would be to not only meet sealift needs but also ensure access to enough shipping capacity in a major conflict to **secure critical imports for the defense industrial base**. This alternative supports what might be called "defense industrial sustainment" (i.e., provision of goods vital to wartime defense production), which involves seaborne trade and therefore overlaps with economic security.

3. The third alternative would be to meet the above requirements and in addition **maintain continuity of U.S. seaborne exports** in a conflict, in support of broader economic security aims outlined in the National Security Strategy (NSS). The purpose would be to guarantee access to enough shipping to move U.S. exports even if global shipping is partially or totally disrupted and foreign ships can no longer be counted on to reliably move U.S. goods. To the extent that a portion of peacetime shipping capacity becomes unavailable during a conflict, identifying alternative means of supporting exports would be necessary to sustain key industries—such as U.S. agriculture—and to protect global supply

[2] This study addresses the national security aspects of economic security and therefore treats defense as a subset.

chains. As in the case of the first and second alternatives, this third alternative would be additive; that is, it would subsume the targets of the first two alternatives.

4. The fourth alternative is the most ambitious because it entails **actively competing with the People's Republic of China (PRC) in global shipping and shipbuilding** to position the United States as a leading commercial maritime rival. This alternative reflects the most expansive approach. It would require the United States to increase its global market share in shipping and shipbuilding to the point that it approaches, equals, or exceeds that of the PRC—the United States' primary strategic competitor. This aim would also entail developing tools of maritime economic statecraft that match those of the PRC. It would require significant trade-offs in how the U.S. economy allocates resources because much higher investment in maritime industries may come at the expense of other industries.

Which of these alternatives is chosen—and the combination of measures employed to implement—has sizable resource implications. For example, if the United States seeks reliable access to enough ships to meet its defense sealift needs (the first alternative) and does this solely by adding more ships to the U.S. flag fleet, the costs would be millions of dollars per year in added subsidies. Similarly, maintaining enough reliable shipping to secure critical defense imports (the second alternative), and doing so exclusively via expansion of the U.S. flag fleet, would require more than twice as many U.S. flag ships (compared to the first alternative). Doing the same for even half of U.S. exports would require a U.S. flag fleet that is several times larger still.

Competing with the PRC in shipping or shipbuilding (the fourth alternative) would involve growing the U.S. maritime industries to at least rival China's. More than 5,500 ships sail under the PRC flag. China's yards build more than 1,700 oceangoing ships per year. By comparison, fewer than 200 U.S. flag ships are actively sailing. U.S. shipyards build about 3 to 5 oceangoing commercial vessels per year. To develop a commercial shipping and shipbuilding industry that rivals China's would require a major shift in national economic resources.

These alternatives and their associated missions speak to both defense and broader national security aims as defined in previous National Defense and National Security Strategies (NDS and NSS). We address these connections in more detail in the main body of the report.

Defense and economic security needs

Articulating the four alternatives helped us scope the defense and economic security needs relevant to a national maritime strategy. We then estimated these requirements.

Central to our analysis is the concept of ***assured access shipping***, a term we adopt for the sake of clarity throughout this report. An assured access shipping fleet includes only ships that are large (more than 1,000 gross tons), oceangoing, built to commercial specifications, crewed by civilian mariners, and employable by the U.S. Government in a contingency.[3]

[3] The strategic purpose of these ships, as stated in National Security Directive 28, is to support defense deployment reliably and maintain a wartime economy at the behest of DOW and other Government agencies. See U.S. National Security Council, *National Security Directive 28: National Security Directive on Sealift*, Oct. 5, 1989.

The United States has roughly **298 such ships**. About 63 are in the Government's ready reserve and prepositioning fleets. About **185 are privately owned, actively sailing U.S. flag ships**, of which about **110 can be quickly requisitioned under emergency access agreements**.[4]

These ships vary by type (e.g., containerships, tankers, bulk carriers) and ownership (e.g., Government agencies, private companies, foreign-owned U.S. subsidiaries). Some are actively sailing and actively crewed, whereas others are laid up in reserve. About **93 operate internationally**, and a similar number engage in domestic trade only (i.e., between U.S. ports). Some are nontrading support vessels.

Defense needs for U.S. flag shipping

Our estimates of defense sealift requirements (in support of the first alternative) indicate that the United States will need assured access to an additional 68 large fuel tankers and 50 small tankers for **strategic sealift**—that is, to adequately support the military in a major conflict. These **118 tankers** will be needed mainly to sustain military operations across the vast distances of the Western Pacific.

Assuming these tankers are U.S. flag ships, our analysis indicates a shortfall of about **6,400 mariners** to fully meet defense needs in a major conflict of significant duration. This estimate accounts for the U.S. mariners needed to crew 118 additional tankers as well as Government-owned Ready Reserve Force ships when fully activated (these ships are not fully crewed when in port). It also assumes that other U.S. flag ships will be fully occupied either supporting strategic sealift or maintaining domestic seaborne trade. We provide a breakdown of these and other numbers in the main body of the report.

Economic security needs for U.S. flag shipping

We define *economic security* for the purposes of this study as the ability to maintain necessary U.S. seaborne trade in a major conflict or other national emergency that involves substantial disruption to global shipping. For the purposes of this study, whether or to what extent a requirement for assured access shipping for economic security exists depends on two primary assumptions:

1. The United States will lose reliable access to virtually all non-U.S. flag shipping that the country currently relies on for essential trade.
2. The war will last long enough that major disruptions in seaborne trade will put defense production and the U.S. economy at significant risk.

If these conservative assumptions hold true, we estimate that the United States would need assured access to **400 to 1,300 cargo ships** on top of the current U.S. merchant fleet just **to ensure critical imports for the defense industrial base** in a major war (reference the second alternative). The United States would need access to about **1,200 to 2,400 ships** on top of the current U.S. flag fleet **to maintain seaborne exports** (reference the third alternative). Each of these estimates refers to total cumulative gaps in capacity. The ships needed to maintain defense imports would be in addition to ships needed for sealift in support of defense needs (as discussed in the previous section), given that U.S. flag ships would be supporting a war effort. Likewise, the ships needed to maintain export trade would be in addition to those supporting sealift and the defense industrial base, and they would be cumulative as well.

[4] We include a breakdown of these numbers and their sources in subsequent sections.

The estimated requirements for U.S. flag shipping are substantial even under more conservative demand assumptions. For example, taking the low ranges of our estimates and assuming enough U.S. flag shipping to sustain only half of defense production and half of seaborne exports in a conflict, the requirement for assured access would still be roughly as follows:

- **215 additional ships** to ensure **50 percent of U.S. defense imports** while supporting sealift. About 8,000 additional mariners would be needed to crew these ships.
- **605 ships** on top of the current fleet to ensure **50 percent of U.S. exports** and half of defense imports while supporting sealift. 23,000 more mariners would be needed.

Commercial shipbuilding requirements

It may be necessary to build ships in the United States to meet wartime defense and economic security shipping needs. To infer such a requirement, **several assumptions must be validated** about a potential conflict. These assumptions, by design, are conservative with respect to risk:

1. Many merchant ships will be sunk and will need to be replaced.
2. A war or another related disruption to global shipping will last several years or more.
3. Key foreign shipyards will cease production or be otherwise inaccessible.
4. Non-U.S. flag ships will not be available for purchase, charter, or requisition.

If these assumptions are valid, the **United States would need to double or even quadruple peacetime production to be postured to build enough ships in a protracted war**. U.S. yards today build three to five commercial ships a year. Expert players in our shipbuilding wargame estimated that given current capacity, U.S. yards surging in wartime might be able to double or triple production of merchant ships after two years—after expanding commercial shipyards, workforces, and supply chains. Production might equal yearly attrition by the fourth or fifth year of conflict when the U.S. fleet will have been substantially degraded. These estimates are probably low given that the United States lost about 73 merchant ships a year during World War II in the Pacific, and the United States also built vessels for its allies.

Alternative shipping and shipbuilding options

Given the small size of the U.S. assured access shipping fleet and shipbuilding industry, the United States may have to turn to alternative sources in a major contingency. The greater the shortages, the more frequently this will happen. With that in mind, we examined alternative sources of capacity. We also looked at alternative fleet mix options aimed at reducing shortages. Finally, we examined trade-offs between maximizing the current fleet and growing U.S. shipbuilding.

Alternative sources of shipping capacity

U.S. assured access shipping makes up a tiny fraction of internationally trading vessels that ply the world's sea lanes. Reliable U.S. access to even a fraction of this shipping in an emergency would go a long way to filling the wartime gaps we identified. Our analysis shows that almost 14,000 ships (including U.S. owned but foreign flagged, North Atlantic Treaty Organization (NATO) or Pacific ally flagged, and

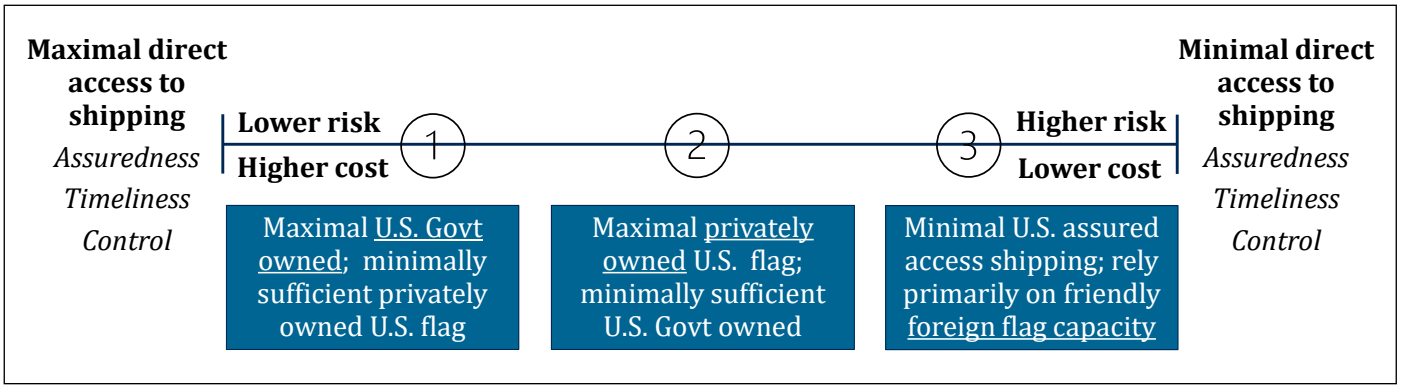
European Union or Pacific ally owned but foreign flagged) would be potentially available to the United States during a contingency. Roughly 600 of these are U.S.-owned ships operating under the four largest open flag registries.

The estimates of additional ships needed to achieve each of the four alternative aims provided in this section assume that such ships are U.S. flag, given that these have the most assured access and therefore lowest risk. Relying on non-U.S. flag shipping or shipbuilding, while possible, would require accepting added risk in three main areas: **assuredness of access** (carriers or shipbuilders may refuse to cooperate), **timeliness of access** (gaining access to ships and crews may take time), and **positive control** (shipowners, their crews, or shipbuilders may refuse to take risks). These risks vary depending on sources of shipping (e.g., U.S. flag, U.S. owned but foreign flagged, shipping companies in allied countries), the nationalities of the mariners (e.g., those from allied nations versus elsewhere), and the locations of foreign shipyards (e.g., United States versus South Korea and Japan versus Europe). Contingency plans and agreements would need to take these risks into account. Gaining access to foreign shipping without such agreements could be highly risky and take years.

Shipping fleet options

We examined three potential fleet mixes for assured access shipping. These mixes range from high cost and low risk to low cost and high risk. Options range from relying mostly on (1) Government-owned ships to (2) privately owned U.S. flag ships under access agreements to (3) non-U.S. flag ships. These options illustrate the trade-offs between relying mainly on Government-owned ships—most of which are not actively sailing or actively crewed—versus actively sailing commercial ships that employ mariners and earn revenue. These options also illustrate the trade-offs between U.S. and non-U.S. flag shipping, given significant shortages in U.S. capacity.

Shipping Fleet Options



Source: CNA.

Shipbuilding production options

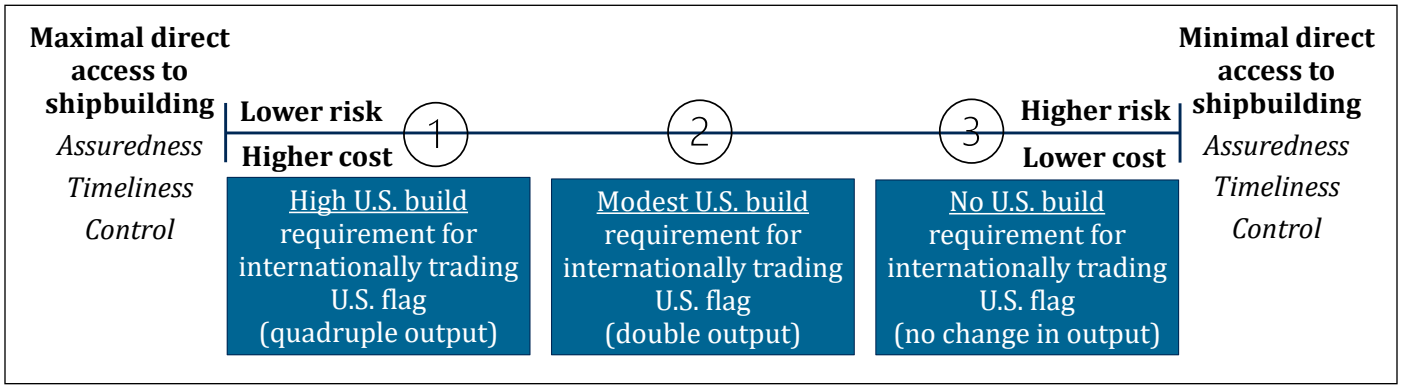
We examined shipbuilding using a similar framework. The smaller the industry in peacetime, the more the Government must rely on non-U.S. sources for new ships in wartime. The United States would have little influence over production in foreign yards. These choices and trade-offs illustrate what a national security–focused approach might entail. If a strategy aims to grow the shipbuilding industry, concrete targets must be linked to strategic aims.

Shipping versus shipbuilding

Through our engagements and wargames, we found important trade-offs between maximizing the size of the current shipping fleet and growing shipbuilding industrial capacity. U.S. build requirements for U.S. flag ships would drive up capital costs for U.S. flag operators, given the higher prices of domestically built vessels. Without proper planning, economic investments required to grow the U.S. flag fleet would compete with investments to grow domestic shipbuilding, and vice versa. From a defense standpoint, the choices mainly come down to investing in today's fleet versus investing in the ability to build ships in the run up to and during a conflict. We frame the choices this way:

- *Invest in a large enough current fleet to absorb attrition at the outset of conflict.* The focus would be on maintaining enough shipping capacity in peacetime to absorb losses at the outset and during the early stages of a conflict. **Prioritizing fleet size** would give the military more flexibility. It would strengthen deterrence by signaling to competitors such as China that the United States takes sealift and economic security seriously.
- *Invest in the capacity to build new ships to replace attrition over three or more years of full-scale mobilization.* The focus would be on delivering new ships over the course of a protracted war. **Prioritizing shipbuilding** would grow the industrial base, strengthen shipbuilding supply chains, and increase the potential to build and repair commercial vessels, military auxiliaries, and other platforms (e.g., uncrewed).

Shipbuilding Production Options



Source: CNA.

Strategic problems and courses of action

We identified four strategic problems that stand in the way of growing the U.S. assured access shipping fleet and meeting broader maritime strategy aims. We then identified courses of action to address these problems.

Overall cross-cutting

Problem 1: The strategic imperative remains poorly understood

Our analysis suggests that a strategy should clearly define the threats facing the country—especially regarding vulnerability to economic coercion and outright attack on vital seaborne trade, including seaborne imports critical to defense production in a war. MARAD and the Departments of Commerce and War could work with the Intelligence Community on an enduring analytic **program focused on threats to global maritime supply chains** and much-needed actions, authorities, resources, alliances, and so on. At a minimum, these three agencies could convene a planning board on critical defense imports.

MARAD could work with DOW to develop a **clear picture of nonmilitary maritime capabilities** and the programs necessary to support them. Policy-makers and the public would benefit from a better picture of what U.S. maritime policy is, as well as the capabilities it seeks to generate, in what quantities, and for what purpose. The Government could also make special efforts to raise public awareness of maritime transportation issues, given their relative invisibility.

Problem 2: Wartime needs for national mobilization are not well accounted for

MARAD could work more closely with DOW, the Coast Guard, and other agencies to **define wartime roles, missions, and responsibilities** for different parts of the maritime sector in a national mobilization. The U.S. homeland will likely not be a sanctuary in a future conflict; it could experience attacks on ports, shipping, and shipyards. Managing access to shipping in conflict is a task that goes beyond the military. MARAD could also work with DOW to refine total wartime needs and identify what should be in place in peacetime to ensure needs are quickly met in a national mobilization.

The military and MARAD could prepare plans to ensure access to ships in a conflict—whether through purchasing or chartering foreign flag merchant vessels or seizing those of an adversary. MARAD's expertise and relationships with private sector shipping would prove vital. Reliable crews must be available to sail requisitioned vessels, and the ships must be usable.

Problem 3: Policy, guidance, and organization are not well integrated

Congress could **establish a permanent organization in the Executive Branch that is adequately staffed and resourced and that has a broad national security mandate**. The organization could be responsible for integrating national security aims across all elements of maritime power and addressing supply chain vulnerabilities. At a minimum, the maritime strategies of MARAD, the naval services, and other critical players (for example, the Federal Maritime Commission and Department of Commerce) could be better integrated.

Problem 4: International relationships and agreements are undeveloped

MARAD could work with the Department of State (DOS) on agreements with allies. DOS could assume a larger role in maritime affairs, such as negotiating access agreements with non-U.S. companies. MARAD, DOW, and DOS could **work with NATO**

governments to expand their overall pool of allied assured access shipping to a fleet that at least approximates that of the United States. Establishing commercial maritime planning boards with European and Pacific allies may be a place to start.

Shipping and mariners

We identified six key issues and actions specific to shipping and mariners.

Problem 1: China's companies own a large portion of the world's shipping

Incentives, taxes, and agreements could be designed to lessen dependence on the PRC and reduce its leverage, especially **where large and growing market shares, anticompetitive practices, and vertical integration pose threats to trade**. Tonnage taxes could be imposed on PRC-owned and flagged ships to incentivize shippers to move cargo on non-PRC vessels. Revenue from these taxes could be invested in other maritime programs. U.S. policy should set limits on the acceptable PRC market share in shipping and other parts of the supply chain.

Problem 2: U.S. flag ships are expensive and difficult to operate

Bringing **workers compensation laws** for mariners in line with those of shoreside workers could reduce some costs and liabilities to U.S. flag shipowners. The U.S. Coast Guard and MARAD could streamline flagging and credentialing for U.S. flag ships.

Problem 3: A small U.S. flag fleet leads to few mariners and little influence

One way to incentivize carriers to operate under U.S. flag and employ U.S. mariners is to expand the maritime and tanker security programs and ensure that commercial income plus subsidies exceed operating costs. On the demand side, Congress could **incentivize cargo owners to contract with U.S. flag operators**.

Problem 4: Labor market changes are compounding mariner shortages

Congress could reduce or **eliminate taxes on mariners' income for at-sea time**, making their compensation more on par with other seafaring nations. Mariner recruitment programs could be expanded. Congress could offer permanent residency or a path to U.S. citizenship for a limited number of appropriately credentialed non-U.S.-citizen mariners to fill critical near-term shortages. With the Coast Guard, MARAD could stand up a permanent merchant marine reserve.

Problem 5: Shipping is a globalized business with complex ownership

MARAD could develop contingency **agreements with U.S. owners of non-U.S. flag ships**, as well as access agreements with allied nations and their shipping companies.

Problem 6: Commercial and military shipping are increasingly divergent

New programs could spur **innovation in new shipping technologies and designs**, especially for high-end vessels with an eye toward defense applications. These programs might include dual-use designs for military and commercial purposes. Merchant ships operating in contested environments may need capabilities that are not commercially useful.

Commercial shipbuilding

We identified three key obstacles and COAs specific to commercial shipbuilding.

Problem 1: U.S. shipyards are costly and unable to compete globally

Government and industry could work together to develop a **defensible business case** for investment in domestic shipbuilding that entails both a strategic imperative and the potential to gain competitive market share. This business case could drive planning for research and development into new ship designs and technologies. More programs could be managed through MARAD via fixed-price contracts and **private acquisitions managers**.

Problem 2: Commercial and military demand is uneven and uncoordinated

Industry needs a clearer long-term demand signal from Government. DOW and MARAD could estimate the **total shipbuilding capacity** needed across the military and commercial sectors during a major conflict. This estimate effort might include developing a set of **break-glass ship designs** for vessels that might be built in commercial yards in a conflict. DOT and DOW could develop a 30-year shipbuilding plan for the commercial sector that addresses wartime shipbuilding needs.

Problem 3: Workforce, technology, and infrastructure challenges are acute

Journeyman-level training for high-demand skills could be expanded. A public-private partnership could be established to construct a major high-end shipyard for commercial vessels focused on new ship types and technologies.

Functional areas of effort

Actions and investments in a strategy could be organized into broadly defined areas of effort. We identified six main areas that align with current programs and our recommended COAs:

Financial incentives to industry. Various funding outlays could serve as incentives, such as subsidies to U.S. flag ships and shipbuilding, Government and commercial cargo preference, tax incentives to industry and workers, grants and loans, and hazard pay.

Maritime workforce development. This development would encompass programs to expand training and education pipelines, grow the workforce, build a de facto merchant marine reserve, improve working conditions, and support other workforce programs.

Governance. This area of effort could involve reorganizing roles, responsibilities, and authorities across the maritime sector around a national strategy and ensuring that the Government is positioned to implement such a strategy.

Public-private partnerships. Efforts might entail promoting commercial-military synergies in shipbuilding and supply chains. They might also involve spurring innovation, exploring new higher end markets, and adopting more private sector practices.

International agreements. This area of effort might include agreements with foreign governments or companies in allied nations to build ships jointly, share expertise and workforces, pool shipping capacity, and incentivize shippers to put cargo on allied ships.

Offensive measures. Seizing ships of belligerent nations would fall into this area, as would economic statecraft measures aimed at imposing costs. These measures might require new authorities that enable more aggressive and expansive action.

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Introduction

The Fiscal Year 2023 National Defense Authorization Act (NDAA) directed the Secretary of the Department of Transportation (DOT), in consultation with the Secretary of the Department of Homeland Security (DHS), to develop a national maritime strategy. This strategy would focus on commercial shipping, mariners, and shipbuilding in support of national security, the components of which are defense and economic security. The purpose would be to ensure that the United States has ready access to enough of this capacity to meet the country's national security needs, especially in a time of war, with or without significant warning.

The NDAA also directed the DOT and DHS secretaries to jointly identify a federally funded research and development center to conduct an independent study in support of a national maritime strategy and to provide analytically informed suggestions as to potential ends, ways, means, priority problem sets, and alternative courses of action (COAs). The Maritime Administration (MARAD) asked CNA to conduct this study. CNA is an independent studies and analysis center that focuses on maritime affairs and national security.

This report summarizes key findings from a series of interim reports the CNA team delivered to MARAD over the course of the study effort from October 2023 to December 2024. This report also reflects input from a substantial U.S. Government interagency review that lasted from February to November 2025.

Strategic context

Demand for a national maritime strategy—and a study to support such a strategy—arose out of concern in Congress and the Executive Branch that the U.S. flag fleet, pool of U.S. citizen mariners, and U.S. commercial shipbuilding industrial base, in combination with reliable non-U.S. sources of shipping and shipbuilding capacity, may not be adequate for the country's defense and economic security needs.

The number of privately owned U.S. flag ships in international trade has shrunk considerably. These ships currently number less than 100, down from nearly 200 in 1990 and more than 850 in 1980. The number of U.S. mariners has declined along with the U.S. flag fleet, which is the primary employer of U.S. citizen mariners. Much of the Government-owned fleet of commercially built vessels—known as the Ready Reserve Force (RRF)—is nearing the end of its useful service life (the average RRF ship is 45 years old). Recapitalizing the RRF has not been a priority relative to other defense programs. U.S. shipyards routinely build only 3 to 5 oceangoing commercial ships a year for domestic use, down from 15 to 25 in the 1970s when construction differential subsidies supported a higher level of production.

Meanwhile, the strategic threats facing the United States have fundamentally changed. The top-priority region for U.S. strategic planning for large-scale conflict is no longer Europe or the Middle East, where uncontested logistics and reliable basing have been the norm. The priority region today is the Indo-Pacific, a vast maritime theater where basing and sea lines of communication are spread out and under extensive threat. China's growing inventory of increasingly precise, long-range anti-ship missiles (as well as its growing navy, coast guard, and maritime militia forces) poses unprecedented challenges for sustaining U.S. military operations. Rising tensions with the People's Republic of China (PRC) over Taiwan and the South China Sea have convinced U.S. leaders that a conflict is increasingly probable and

potentially imminent. U.S. forces might not prevail in a protracted, large-scale conflict against China if they are unable to secure adequate sealift. The PRC is aware of the U.S. military's gaps in much-needed sustainment.

The U.S. economy and the maritime supply chains upon which it depends also face risks. Less than 2 percent of U.S. seaborne trade moves on U.S. flag vessels that might be called upon in an emergency to maintain the flow of vital seaborne trade. The U.S. Government has little direct influence over (or even visibility into) the shipping companies that move the remaining 98 percent.

China's shipping companies own about 20 percent of the world's commercial tonnage and produce about 95 percent of the world's shipping containers.[5] China could disrupt and perhaps even control vital sea lanes through the Western Pacific in the event of a conflict. It could do this through its military forces and through its leverage with global shipping companies and its growing ownership of ports around the world.

The privately owned maritime industries in the United States no longer compare in scale with China's maritime industry, including its military-industrial and government-supported shipping and shipbuilding companies. Fewer than 200 ships sail under the U.S. flag, whereas more than 5,500 ships sail under Beijing's flag. Still more are owned by companies domiciled in China and operating under open registries. An authoritarian state with a largely government-planned economy, the PRC has extensive influence over these companies. China's shipyards build more than 1,700 large oceangoing ships each year compared to about 3 to 5 each year in the United States.

In addition, the United States has focused on financing only domestic port infrastructure and doing it on a smaller scale. China's leaders have openly stated their intent to become a global maritime power and supplant the United States in that regard; U.S. policy has not countered this posture. Key PRC naval leaders and strategists have quoted Alfred Thayer Mahan, whose ideas about the relationship between global influence and control over seaborne trade have been the foundation of the United States' sea power paradigm, as an inspiration for their own approach to maritime strategy.

These trends explain the demand for an overarching U.S. maritime strategy and outline the key factors this study examines. The following subsection describes CNA's analytic approach for addressing these factors and the strategic challenges they represent.

Study tasking

MARAD's tasking to CNA included the following primary activities:

- Illustrate strategic aims (ends) that support broader national defense and economic security goals.
- Characterize the problems standing in the way of achieving these aims. These obstacles or challenges fall into four categories:
  - Gaps in shipping, mariner, and shipbuilding capacity that prevent the maritime industries from adequately supporting defense and economic security goals.
  - Risks and other trade-offs associated with filling capacity gaps in a contingency.
  - Obstacles to growing these capacities.
  - Impediments to other actions in furtherance of strategic aims on the part of Government and industry.

[5] Carl W. Bentzel, *Assessment of PRC Control of Container and Intermodal Chassis Manufacturing: Final Report*, Federal Maritime Commission, 2022.

- Identify potential COAs (ways and means) to address these problems and otherwise buy down strategic risk. These COAs fall into three categories:
  - Growing U.S. flag shipping, the pool of U.S. citizen mariners, and U.S. domestic shipbuilding to meet defense and economic security needs.
  - Access alternative sources of capacity if gaps remain between what is available domestically and what may be needed in a conflict.
  - Create synergy across diverse maritime sectors and Government agencies that will enable them to mobilize effectively in a time of war.
- Recommend other actions the Government might take to meet strategic aims, including approaches to national strategy, organization, and policy.

We were asked to examine the two potential national security elements of a maritime strategy: defense and economic security. We were also asked to treat U.S. flag shipping and mariners as a potential naval auxiliary in time of war. We were not asked to examine implications for economic growth, job creation, or other issues not directly related to national security. Nonetheless, we did account for policy preferences for U.S. flag shipping, U.S. mariners, and U.S. shipbuilding enshrined in laws and regulations. We premised our analysis, including estimates of defense and economic security needs, on this policy preference for U.S. capacity whenever feasible. We focused on large oceangoing vessels capable of supporting military operations in distant contingencies and securing seaborne trade.

Study approach

For this study, we engaged in a wide range of analytic efforts in consultation with MARAD. Our objective was to provide thorough, objective, and defensible analysis across different sources and methodologies. This analysis should be valuable to any strategy development process or related set of deliberations.

We followed a mix of quantitative and qualitative methodologies appropriate to each component of our study tasking. We consulted many sources across broad subject matter given the scope. We described these methodologies and associated empirical findings in greater detail in interim reports the study team delivered to MARAD over the course of the study. This summary report covers the key findings from this analysis.

The following subsections briefly describe the methods we relied on to reach our findings.

Consult stakeholders

Engage broadly with Government and industry. We spoke one-on-one with more than 75 Government offices, private firms, and labor organizations and trade associations. We worked closely with MARAD to identify the appropriate mix of engagements. We spoke with many U.S. flag ship operators but also with U.S. companies that operate non-U.S. flag vessels to gain a broader perspective on the industry. We also spoke with companies that work in maritime finance, insurance, cargo handling, supply chains, and the like to understand the complexities of the maritime industries. We spoke with the key merchant marine labor organizations and the primary trade associations for commercial shipping and shipbuilding. We also engaged with military organizations such as the U.S. Navy's Military Sealift Command (MSC), U.S. Transportation Command (TRANSCOM), and others to better understand warfighting requirements. These engagements are listed at the end of this report. We also held a roundtable for MARAD in November 2024 that included a select group of Government and industry leaders to discuss maritime strategy.

Design and execute two wargames on commercial shipping and shipbuilding. We held two wargames across four days in late July 2024: one on shipping and the other on shipbuilding. Each lasted two days and together involved about 100 participants from industry, Government, and the labor organizations and trade associations separated into eight working groups across four days. We designed these games and built the participant lists in coordination with MARAD, which sponsored these games together with the Joint Staff in the Department of War (DOW).[6]

These events at CNA focused on concrete, future-oriented strategic problems. Players were presented with future crisis and conflict scenarios and asked to respond cooperatively, assuming no changes to Government policy aimed at addressing limitations in the shipping or shipbuilding industries. Players then returned to the present to propose long-term recommendations to overcome problems introduced earlier, reduce strategic risk, and respond better to future contingencies. The idea was to sensitize players to the gravity of the risks the country faces, the problems that would arise given today's capacity, and actions that would better prepare the country for these contingencies. Only then were the players asked to recommend policy decisions. Facilitators steered discussion toward addressing strategic problems introduced in previous turns and away from preconceived solutions and advocacy.

The shipping game focused on threats from a major strategic competitor attempting to leverage its extensive ownership over maritime supply chains to coerce the United States economically in a crisis and in a conflict. The shipbuilding game focused on total mobilization of the shipbuilding industrial base across the private and military sectors, followed by wartime construction on a large scale. The shipbuilding scenario was a major protracted war in the Pacific on the scale of World War II (WWII) in which hundreds of merchant ships are sunk and must be replaced over a period of five years. We integrated findings from these games into the study.

Synthesize findings from engagements and wargames and submit to critical scrutiny. We synthesized our notes from our engagements and wargames into facts presented to us in these discussions, as well as inferences and conclusions that followed logically from these facts. We organized this synthesis around strategic problems standing in the way of achieving strategic aims, followed by ways and means to overcome these obstacles. We set aside recommended actions and investments that we could not reasonably link to identifiable strategic problems. The study concludes by organizing the COAs we identified into functional areas of effort that might be useful when organizing a strategy document.

Estimate national security needs, risks, and gaps

Estimate defense needs. This analysis involved estimating military sealift requirements in a major war, based on the testimonies of officials at congressional hearings and other open sources.[7] Within this estimate, we included Government-owned cargo ships operated by civilian mariners as well as privately owned and operated vessels. A primary purpose of Government support to the merchant fleet is to enable it to move seaborne

[6] Prior to 2025, the Department of War (DOW) was called the "Department of Defense" (DOD). For consistency, we use *Department of War* and *DOW* throughout this document, including for events that happened before the name change.

[7] We use the term *sealift* to refer to all seaborne transportation in an emergency regardless of mission. Collins defines sealift as "a system for transporting persons or cargo by ship, especially in an emergency." "Sealift Definition in American English," Collins English Dictionary, https://www.collinsdictionary.com/us/dictionary/english/sealift.

cargo for the military in a contingency. In this respect, today's U.S. flag ships and mariners may serve as a naval auxiliary in time of war. We looked at sealift needs to support global military contingencies after consulting TRANSCOM and unclassified estimates.

We examined sealift needs across major cargo ship types (e.g., vehicle carriers, tankers) and high-priority theater contingencies (e.g., the Pacific and Europe). We made broad projections about future needs 5, 15, and 30 years into the future that account for uncertainty (e.g., in force posture and structure and alternative fuels). We estimated future defense requirements for ships and mariners to crew these ships. We also examined requirements to build merchant ships during a protracted conflict (the focus of our shipbuilding wargame).

Estimate economic security needs. We developed quantitative estimates of shipping and mariner requirements to maintain seaborne trade in a world crisis. We used these estimates to set defensible targets for a future strategy. We discovered early in the study that the term *economic security* was not well defined or consistently employed within or across agencies. No single agency is responsible for addressing economic threats in the way that DOW is for military threats. No quantitative estimates of economic security requirements existed when this study was conducted, other than a MARAD-sponsored study from 1985 that examined economic security requirements for shipping under very different circumstances.[8] No strategic guidance existed that might guide such an estimate.

In the absence of such analysis, we developed our own. We first defined the concept in a reasonable and concrete way that would (1) substantiate the term as an element of national security and as an executable strategic mission for MARAD and its Government and industry partners; (2) allow us to develop concrete estimates of shipping needs across ship types to provide a sense of scale; and (3) serve as a conservative, minimal, or what might be called a "base force" estimate.

The CNA study team examined trade data across hundreds of freight categories, coded critical imports and exports, and estimated shipping needs by tonnage and translated this data into approximations of ship numbers of different types. This analysis allowed us to provide concrete, quantitative targets regarding the potential economic security aims of a national strategy. Policy-makers would not otherwise have even a general idea of the shipping capacity needed to achieve these aims and, therefore, the scale of the aims themselves.

Estimate gaps in capacity for defense and economic security. We examined current capacity in shipping, mariners, and shipbuilding and projected these gaps 5, 15, and 30 years into the future, considering factors such as the age of ships in the RRF. We then quantified the delta between this capacity and our estimations of requirements to identify deficits that a national strategy might seek to fill. We did this analysis because it is our understanding based on our tasking from Congress and from MARAD that the primary role of a national maritime strategy is to ensure that there is enough capable seaborne transportation to meet the country's defense and economic security needs in a contingency. A national strategy would, therefore, seek to close current and future gaps, or at the very least reduce these deficits as much as possible.

[8] U.S. Department of Transportation Maritime Administration, *Economic Support Shipping Study*, 1985.

Identify alternative options

Identify alternative sources of capacity and their associated risk trade-offs. After quantifying these gaps, the CNA study team examined non-U.S. sources of shipping, with the understanding that in a contingency the Government would need to meet its defense and (possibly) economic security requirements regardless of the size of the U.S. flag fleet and pool of U.S. mariners. There must be sufficient sealift (ships and crews) to sustain U.S. military forces forward in an operational theater during conflict, even if some or much of this capacity must come from non-U.S. flag shipping and mariners. The same is true if U.S. seaborne trade comes under threat in such a conflict. The smaller the U.S. flag fleet and pool of available U.S. mariners, the more non-U.S. flag ships and non-U.S. mariners would be needed in a national emergency, when shipping needs exceed what is available from U.S. flag ships.

We cataloged the major sources of shipping, from U.S. Government–owned to commercial U.S. flag to various sources of non-U.S. flag. We also examined the quantities of shipping potentially available from these sources. We developed a simple framework to describe the risks of resorting to these sources in a contingency. These risks include such things as ability to mission-task, readiness, responsiveness, and reliability in contested environments—including the willingness of ship owners and operators to sign assured access agreements that might compel them to operate in contested waters during a contingency. We then used this framework to develop several notional options for alternative mixes of potentially available shipping, considering trade-offs in risk and cost. These alternatives are intended to help policy-makers balance cost and risk across different investments in shipping and shipbuilding, assuming the goal is to maximize access to shipping capacity subject to resource constraints.

Develop options for alternative force structures and investments. We built on our risk framework to lay out options for alternative mixes of commercial ships that might go into a future fleet. We identified trade-offs between different mixes of actively sailing U.S. flag ships, ready reserve vessels, and accessible foreign flag capacity. We examined trade-offs between building commercial ships in the United States versus in friendly foreign nations. Finally, we examined trade-offs between investing in U.S. flag shipping and domestic shipbuilding. The purpose behind these options is to provide a sense of the potential decision space and trade-offs involved in developing an overall fleet of nonmilitary ships for defense and economic security.

Examine trends, authorities, and programs

Analyze trends in global shipping, shipbuilding, and mariners. Early in the study, we gathered and analyzed data on various aspects of international shipping, mariners, shipbuilding, cargo, trade flows, and ship construction. The methodology was exploratory data analysis at a macro level. Our analysis examined past trends and some notional future projections 5, 15, and 30 years into the future. We delved into some issues in detail, such as alternative fuels and global shipping fleets. We also examined programs to support the maritime industries and the roles and responsibilities of relevant Government agencies external to MARAD, from the Navy and Coast Guard to the Departments of State and Commerce.

Examine laws, policies, and regulations. Finally, we examined laws, regulations, authorities, and policies regarding commercial shipping, shipbuilding, and mariners. We looked for gaps and opportunities to address strategic problems. We looked at programs in the naval services and the interagency as well as MARAD.

Aims of a National Maritime Strategy

Clear aims are the most important element of any strategy. In this section, we provide four alternatives, each of which may serve as the stated end of a national maritime strategy. We offer these alternatives as illustrative examples, understanding that it is the Administration's prerogative to set strategic aims.

The overall purpose of a national maritime strategy would be to ensure that the United States has access to enough shipping, mariners, and shipbuilding capacity to meet its defense and economic security needs. MARAD, as the lead agency for authoring such a strategy, may take the lead on aspects of identifying capacity in these areas and of recommending appropriate employment of this capacity in a contingency, much as the military services do in furtherance of a defense strategy.

We adhered to a few principles in designing each of these alternatives. First, they should be clear and unambiguous. Second, they should communicate *scale* (how big) and *scope* (how wide). Each alternative should be assessed as to its potential *feasibility* given likely resource constraints and potential for *acceptability* to key stakeholders whose support would be necessary to execute the strategy. In addition, for each alternative, it should be possible to assess to what degree goals are being met. Finally, it should be possible to gauge the risks of only partially achieving the goals of each alternative, given assessments of feasibility, acceptability to key stakeholders, likely resource constraints, and other realities.

We arrived at these four alternatives after extensive discussions with stakeholders, two wargames, and in-depth research into national security gaps and risks. Each alternative builds on the preceding one by adding progressively more ambitious targets for shipping capacity, mariner pool, and shipbuilding capability, representing a spectrum from the first alternative's more modest scope and scale to the fourth alternative's more expansive scope and scale. These four alternatives represent distinct aims in the sense that each is significantly different in terms of scope, scale, or direction.

These alternative aims and their associated missions speak to both defense and broader national security aims as defined in previous National Defense and National Security Strategies (NDS and NSS). The ability to meet sealift needs would be critical to defense objectives that require sustaining military operations in a major conflict, especially in the Pacific. Maintaining defense industrial base imports would be important for sustaining overall defense production, especially in a protracted war. It would also affect NSS aims related to the potential effects of economic warfare or other major disruptions to seaborne imports. Reducing risks to export trade would affect larger NSS-related aims associated with supply chain security and the continued functioning of the U.S. economy in a time of global disruption to seaborne trade. The four alternatives are as follows:

- The first alternative, which is the most modest of the four, would be to **make just enough militarily useful shipping capacity available to meet the needs of DOW in a contingency**. Support to strategic sealift (i.e., seaborne transportation of military equipment and materiel) is the main reason for providing Government support to U.S. shipping and shipbuilding as strategic industries. These minimal aims must be met to deter and respond to aggression adequately. The targets implied under the first alternative are subsumed within the more expansive aims of the next three alternatives. The needs of the first alternative are quantifiable, based on operational plans.

- The second alternative would be to not only meet the military's sealift needs but also **make enough shipping capacity available to ensure vital imports continue to flow to the defense industrial base in a contingency**. The purpose of the second alternative would be to provide enough capacity on top of what is required for the first alternative to ensure that defense production continues largely unimpeded in a major conflict while also providing sealift for the military.
- The third alternative would build on the previous two by adding yet more capacity, sufficient to **ensure enough assured access shipping to support the U.S. economy, especially critical export trade in the event of major disruptions to global shipping**. The idea would be to reduce the vulnerability of U.S. seaborne trade to disruptions in global maritime supply chains, including economic coercion or economic warfare by a major power adversary. This capacity would be in addition to that required for sealift and defense industrial sustainment as indicated in the first two alternatives.
- The fourth alternative would be to establish a domestic maritime industry capable of **competing actively with China in global shipping and shipbuilding that would thus position the United States as a leading commercial maritime rival**. This alternative would be far more ambitious and costly than the previous three; it is our attempt to clarify ideas brought to us by interlocutors advocating for a more expansive approach to strategic competition and maritime economic power. These aims would entail increasing the global market share of the United States in the maritime industries to the point that it approaches, equals, or exceeds that of the PRC. The fourth alternative would also entail developing tools of maritime economic statecraft that match those of the PRC. The metrics for assessing success under this alternative are relatively straightforward (e.g., they could be based on parity in market share). The economic resources required to achieve them, however, would be substantial (e.g., large-scale expansion of the shipping and shipyard industrial base, which could require unprecedented policies with respect to tariffs, sanctions, subsidies, and strategic alliances).

These alternatives illustrate a spectrum of potential strategic aims that may form the basis for a national maritime strategy developed in the Executive Branch, depending on the priorities of the cognizant Administration. They are broadly written but have enough fidelity to guide priorities, improve unity of effort, and communicate a sense of purpose. Such alternatives could inform future legislation. They are consistent with key legislation such as the Merchant Marine Acts of 1920 and 1936. The alternatives are clear, purposeful, logically consistent, and measurable, and they drive toward concrete outcomes. These are qualities that we would recommend for any strategy.

The scope and scale of each alternative grows progressively, as do the likely resource implications. For example, during a conflict, commercial ships supporting national security would, at a minimum, provide the first alternative's sealift in support of military operations. They might in addition to this mission transport defense industrial imports (second alternative) and key exports (third alternative), or they may be used to sustain allies and partners. The feasibility and acceptability of these alternatives are inversely related to their scope and scale. The first alternative is the most feasible to fully execute; the fourth alternative is the least feasible. Much depends on larger national priorities concerning the allocation of economic resources and the strategic risks U.S. leaders are willing to accept.

We used the PRC as the pacing threat because China is the United States' primary and most capable strategic competitor and because the Western Pacific is a vast maritime theater and locus of global seaborne trade.

Each alternative would have clear, distinct resource implications. We included these implications based on our understanding of the primary problem, which is that the United States lacks sufficient U.S. flag shipping to meet its defense and economic security needs, much less to compete with China's market share in the shipping and shipbuilding industries.

Partial realization of a given strategic alternative could be the actual goal, depending on likely constraints and the extent to which a national strategy takes these realities into account. Not all strategies are resource informed; many are aspirational. The same is often the case with military plans. A national strategy might, for example, aspire to meet defense sealift needs, but resource trade-offs and related political opposition may leave gaps unfilled or drive solutions that require fewer resources, such as partnerships and agreements to secure non-U.S. flag shipping or shipbuilding. Likewise, the strategy may result in a fully robust sealift program that aims to secure vital seaborne trade and yet leave this goal only partially fulfilled. The United States may fully meet its defense and economic security needs and aspire to challenge China's growing dominance in commercial shipping, but it may nonetheless fail to truly compete as an equal commercial player or even as a near-peer competitor.

Limited aims involve accepting risk. Defending against aggression and keeping the economy running will likely not be negotiable for the United States in a conflict. U.S. leaders would do everything they can to secure much-needed shipping capacity by whatever means necessary when facing an immediate, large-scale, and potentially existential threat. The question in wartime would be what risks and other workarounds to accept. The question in peacetime is not fundamentally different, only less immediately urgent.

Defense and Economic Security Needs

We estimated how much oceangoing cargo shipping capacity the country will need to meet its defense and economic security aims. To ensure defense needs are met, we estimated how many cargo ships of different types the military would need in a conflict to deploy combat forces and sustain operations in the Pacific and Europe. These requirements are known as strategic sealift. We based our analysis on open-source information on defense requirements, including congressional testimonies by TRANSCOM.

To ensure that economic security needs are met, we estimated how much shipping would be needed to maintain a minimum level of critical seaborne trade in such a conflict. Our goal was to provide a sense of the scale of what a strategy must achieve to buy down strategic risk and to lend concreteness to strategic aims. For both missions, we also assessed shipbuilding needs.

The current fleet

Many fleets of Government and privately owned vessels sail under the U.S. flag and are subject to different programs and agreements that might provide support for national security aims in a contingency. We refer to the totality of these ships as the U.S. assured access shipping fleet for the sake of clarity (and for lack of a better term). We have purposely limited this universe to those ships with relatively low risk to availability. No single definition or organizing principle exists for these ships. With that in mind, we define these ships as having the following attributes in common:

- Are built to commercial specifications
- Are sailing under U.S. flag
- Are crewed by U.S. citizen mariners
- Are employable by the U.S. Government in support of defense or economic security
- Are large oceangoing vessels capable of supporting remote contingencies

These ships are not combat vessels built to military specifications, nor are they generally crewed by military personnel. Most are outside the military chain of command in peacetime (i.e., they are not "organic" to the military).

This U.S. assured access shipping fleet as we have defined it does not include military vessels sometimes referred to as "naval auxiliaries," such as combat logistics force ships. We excluded non-cargo-carrying ships such as icebreakers and research and surveillance vessels. We also omitted non-oceangoing ships, such as tugs and barges, as well as U.S.-owned ships that operate under foreign flags and may not, therefore, be readily employable in support of national security aims. We address these ships in a later section when we examine foreign flag capacity as a potential option, albeit less assured, for meeting the demands of each strategic alternative.

This assured access shipping fleet is a combination of privately owned merchant vessels that carry cargo from port to port and of Government-owned reserve and prepositioning ships. Some of these merchant vessels have been modified to increase their utility in military operations. U.S. leaders would rely on these vessels and their crews to support defense aims and maintain vital seaborne trade in a national emergency.

Assured access ships as we have defined them can be characterized according to various parameters or characteristics, including the following:

- Type (e.g., containerships, tankers, roll-on/roll-off (RO/RO) ships)
- Ownership (e.g., Government versus private, U.S. company versus U.S. subsidiary)
- Whether they have signed an emergency access agreement such as the Voluntary Intermodal Sealift Agreement (VISA) or Voluntary Tanker Agreement (VTA)
- Whether they are actively sailing on a regular basis and are actively crewed
- Whether they are involved in international trade (from U.S. ports to non-U.S. ports or between non-U.S. ports) or are involved in domestic trade (between U.S. ports)[9]
- Whether they are involved in port-to-port trade or other activity such as domestic oil production (e.g., moving material to or from offshore platforms)
- Flag registry (e.g., U.S. flag, allied flag)[10]

We examined four functional classifications of vessels that make up all but a few ships in a nominal U.S. assured access shipping fleet:

- **RO/RO ships.** Ships built to transport wheeled cargo that can be moved on and off ships without cranes.
- **Containerships.** Vessels built to carry large quantities of cargo packed in standard-size shipping containers.
- **Large tankers.** Ships designed to carry liquid cargo such as crude oil, petroleum products, chemicals, and liquified gasses. This category includes vessels that DOW labels "strategic"or "inter-theater" tankers capable of moving fuel from one region of the world to another. These vessels tend to be 25,000 to 80,000 dead weight tons (DWT).[11]
- **Small tankers.** Liquid fuel–carrying vessels of 4,000 to 25,000 DWT. These vessels include general purpose tankers and coastal tankers. The category also includes offshore support vessels (OSVs), such as platform support vessels engaged in fuel production rather than port-to-port trade that could be used as tankers in wartime.
- **Bulk carriers.** Ships built to transport homogenous, unpackaged cargos such as iron ore, fertilizer, agricultural commodities, coal, and cement in large quantities.

The ships in an assured access shipping fleet can be sorted into sub-categories or sub-fleets based on ownership and legal characteristics that affect how the Government might gain access to them in national emergencies:

- **Ready Reserve Force.** About 48 Government-owned ships built to commercial specifications that can be activated within days. These ships are maintained by MARAD but operationally controlled by the U.S. Navy's MSC when at sea. RRF ships are partially crewed and in port unless activated. A small cadre crew keeps

[9] Only U.S. flag ships built in the Unites States are allowed by law to move goods between U.S. ports. These ships are often referred to as "Jones Act–eligible" ships. They may trade internationally, but most focus on domestic trade.

[10] Our definition of *U.S. assured access shipping* includes only U.S. flag ships. However, U.S.-owned ships under reputable open registries could theoretically sign assured access agreements. In addition, some North Atlantic Treaty Organization (NATO) countries maintain assured access shipping that provides reliable shipping capacity for the U.S. in an emergency. We address non-U.S. flag shipping later in the report.

[11] In DOW terminology, these vessels are referred to as Long Range 1 tankers in the Average Freight Rate Assessment system.

them maintained while in reduced operating status. To crew RRF ships fully in a contingency, U.S. mariners must be rapidly recruited from maritime labor organizations or sourced from commercial trading U.S. flag ships. RRF ships do not engage in trade or earn revenue. The RRF includes ships retrofitted to make them more militarily useful. Many of these ships are old by industry standards, expensive to maintain, and no longer commercially viable.

- **Prepositioning ships.** About 15 Government-owned cargo ships that store heavy equipment, munitions, and other supplies for the U.S. Army and U.S. Marine Corps. These ships are forward stationed near potential areas of conflict. Built to carry commercial cargo, many of these ships have been retrofitted by DOW to better suit defense needs—for example, enhanced cargo capacity, wider ramps, and communications suites. The prepositioning ships are Government owned and crewed by merchant mariners.
- **Actively sailing U.S. flag ships under VISA and VTA.** About 100 privately owned oceangoing U.S. flag ships in active trade that MARAD and DOW can redirect to support military operations or secure international maritime supply chains. Owners of these vessels have signed an Emergency Preparedness Agreement (EPA) that gives the Government access to these ships in an emergency. There are currently two types of EPAs: the VISA signed by owners of non-tanker ships and the VTA. These agreements give MARAD and DOW the authority to redirect vessels and their crews in a contingency. About 60 of these ships are enrolled in the Maritime Security Program (MSP), under which they receive an annual $5 to $6 million subsidy to operate under U.S. flag and sign a VISA. Another 10 ships are enrolled in the Tanker Security Program (TSP), under which they receive a similar subsidy for eventually registering under U.S. flag and signing a VTA. Because we did not have up-to-date data on VTA program membership, we based large tanker membership in this category on the TSP.[12]
- **Other actively sailing U.S. flag ships.** Another 100 or so U.S. flag ships that do not fall under a VISA or VTA. Fewer than 10 of these ships are involved in international trade. The remainder operate in protected domestic (or "Jones Act") maritime cabotage trade between U.S. ports. Many ferry goods to Hawaii, Puerto Rico, and Alaska. Some are smaller tankers involved in domestic fuel production (rather than moving cargo from port to port). Because they are owned by U.S. companies, these vessels could be requisitioned in wartime under the Defense Production Act. These ships fall under the jurisdiction of the United States, unlike U.S.-owned ships under foreign flag. Government planners tend to assume that most or all of these vessels would be vital to domestic U.S. supply chains and would probably not be redirected in a contingency; this assumption may or may not be valid, given that these ships could support sealift and perhaps be backfilled by private charters in a conflict. The owners of these ships have not signed agreements that give the U.S. Government ready authority over

[12] MARAD U.S. flag fleet numbers as of January 2024 showed zero ships under VTA. TSP is a new program. These ships will be required by law to sign an EPA, which for tankers is the VTA, according to Title 46 USC 53407. See U.S. Department of Transportation Maritime Administration, "Solicitation of Applications for the Award of One Tanker Security Program Operating Agreement," *Federal Register* 89, no. 42 (Mar. 1, 2024). With this in mind, we assumed that tankers enrolled in the TSP will at some point soon sign onto VTA and therefore meet our criteria for assured access.

them in an emergency. For these reasons, we left domestically trading large tankers out of our assessment of current U.S. flag ships for defense and economic security. We made an exception for a portion of largely inactive small tankers used as OSVs that are capable of moving fuel for the military within a theater of conflict.

Table 1 summarizes our estimates of ships that might be considered part of an assured access shipping fleet. These numbers go up and down monthly as ships enter or leave service or U.S. flag. Supporting analysis in our interim reports goes into greater detail on these numbers across different types of ships and sources of supply. In the interest of brevity, we provide a simplified treatment of our analysis in this summary report.

The numbers in Table 1 offer a general sense of the size and diversity of the nonmilitary ships potentially available for sealift in support of military or economic security emergencies, including Government and commercially owned and operated ships. Most of these ships are owned by various large and small companies and fall under different operating agreements and Government programs.

About 17,270 U.S. mariners (roughly 11,770 in the private sector and 5,500 in Government) crew these various ships, including the RRF when activated and military ships not included in the table that are operated by civilian mariners.[13] U.S. mariners employed on U.S. flag vessels could be shifted to RRF ships in an emergency. In fact, one of the primary reasons the Government provides subsidies to U.S. flag operators that agree to sign a VISA or VTA is to ensure a pool of ready U.S. citizen mariners to crew RRF vessels.

These numbers—taken as a whole, along with the discussion above—provide a quantitative picture of the shipping capacity that might be considered a force mix or force structure for nonmilitary sealift, if such a thing existed in official terms. Again, we refer to this shipping capacity collectively as an assured access shipping fleet. As the discussion above suggests, in reality there is not one fleet but many fleets maintained by separate Government agencies and private sector companies and funded via different Government programs and public and private revenue sources. No one agency has responsibility for it all, nor is there any predominant company that might speak with authority for the industry overall.

Defense needs and gaps

The fleet we have described would not fully meet the military's sealift needs, especially in the Pacific, where U.S. forces would have to operate across vast distances of open ocean, probably in the face of high-volume precision naval and missile attack on bases, logistical nodes, and sea and air lines of communication. TRANSCOM describes its estimates of strategic sealift requirements in annual testimony before Congress and other public forums. These estimates are general aggregate statements of requirements based on analysis of multiple regional contingency scenarios and overall global mobility. They address the needs of a military that must be prepared to operate, deter, and respond across the world, even during a major conflict in the Western Pacific.[14]

[13] For example, Navy combat logistics force ships are built to military specifications but are crewed by civilian mariners.

[14] We use the terms *needs* and *requirements* interchangeably in the broadest possible way.

Table 1: U.S. assured access shipping fleet

Source	Owner / Operator	Vessel Type					
		RO/RO	Cont.	Large Tanker	Small Tanker	Dry Bulk	Total
Ready Reserve Force	Govt	48[a]	0	0	0	0	**48**
Prepositioning vessels	Govt or charter[b]	14	1	0	0	0	**15**
Actively sailing U.S. flag ships under access agreement	Private	30	66	10	0	4	**110**
Actively sailing U.S. flag ships *not* under access agreement	Private	1	10	64	50	0	**125**
Total		**93**	**77**	**74**	**50**	**4**	**298**
Domestically trading U.S. flag ships (Jones Act) under access agreement[c]	Private	**10**	**19**	**0**	**0**[d]	**0**	**29**
Domestically trading U.S. flag ships (Jones Act) not under access agreement	Private	**0**	**8**	**55**[e]	**0**	**0**	**63**

Source: U.S. flagged commercial vessels: U.S. Department of Transportation Maritime Administration, "United States Flag Privately-Owned Merchant Fleet Report," Jan. 31, 2024, https://www.maritime.dot.gov/data-reports/us-flag-fleet-01-2024.

Note: The data in the table are what MARAD describes as oceangoing vessels greater than 1,000 gross tons that carry cargo from port to port, except for the small tanker figure. The small tanker figure comes from U.S. Transportation Command, *FY2020 NDAA Fuel Tanker Study Unclassified Executive Summary Report*, June 30, 2021. The small tankers represent an estimated portion of offshore support vessels (OSVs) that are mainly laid up and not active in domestic petroleum production. They are not included in MARAD's U.S. flag fleet numbers because they are not involved in port-to-port trade. We assumed that tankers enrolled in the TSP have signed or will sign a VTA, given that doing so is a legal requirement for participation in the TSP.

[a] The RRF RO/RO figures do not include six auxiliary cranes and aviation repair vessels. A significant number of RO/RO ships in the RRF are nearing the end of their useful service lives and will need to be replaced in the near to medium term.

[b] The prepositioning fleet is a mix of ships that are either Government owned or under long-term charters operated by the Army or Marine Corps. Both arrangements give the Government extensive control over the vessels and their crews. Our data show a fleet of 15 ships, but the actual number could be 16. These numbers may fluctuate given possible changes to prepositioning programs.

[c] These numbers are included in the totals above. It is possible that in a contingency, domestically trading U.S. flag ships (also known as Jones Act–compliant vessels) could be diverted to support sealift, if this capacity can be backfilled via other means, such as foreign flag ships. Current defense planning assumes that domestically trading vessels would be needed for domestic purposes and would not be diverted for sealift. Note that domestically trading vessels are also referred to as "Jones Act ships" because all ships involved in seaborne trade between U.S. ports must be compliant with relevant terms in the Merchant Marine Act, known colloquially as the Jones Act.

[d] What we refer to as small tankers are mainly OSVs that are not involved in trade (international or domestic). These tankers primarily move fuel between production facilities and do not fall under VISA or VTA.

[e] Of these 55 Jones Act tankers, 43 are considered militarily useful for sealift.

Shipping and mariners

The military's requirements for different types of ships vary depending on the contingency. In addition, some ships tend to be more militarily useful than others. RO/ROs, for example, are important for moving ground forces' vehicles and heavy equipment, which would be critical to a land campaign in Europe but would be of relatively less utility in the Indo-Pacific, where naval and air warfare are likely to predominate. Tankers are more critical in the Indo-Pacific for operations across vast expanses of mostly open ocean where copious amounts of fuel for ships and aircraft are a must.

Based on TRANSCOM's statements before Congress and other open sources, we developed Table 2 to summarize current military sealift requirements.

Our estimates suggest a gap of about 68 large tankers to move fuel to and from a theater such as the Pacific and 50 small tankers to distribute that fuel within the theater. The U.S. military would have to seek alternative sources of supply from non-U.S. flag sources of capacity. The greater the deficit in U.S. flag tankers, the more non-U.S. flag capacity DOW would need to access in a contingency. These numbers assume no attrition to the merchant fleet in a conflict. It may be possible in a contingency to close some of the gap in tankers using U.S.-flag ships engaged in domestic trade, if non-U.S. flag ships can be acquired to backfill this capacity and are authorized to serve the domestic U.S. market. DOW analysis of sealift needs assumes that domestically trading vessels would not be rerouted in this manner.

If we assume WWII-level attrition, we would need to adjust these numbers upward by about 15 percent to ensure that there are enough tankers in the U.S. fleet to absorb early losses. These numbers could be further adjusted looking out 5, 15, or 30 years to account for changes in force structure, operating concepts, or shifts to alternative fuels. We detail these estimates in our supporting interim reports.

The tanker deficit indicates there is continuing risk to the ability of the U.S. commercial fleet to support a major war and thus the ability of the U.S. military to sustain itself forward, especially in the Pacific. The visibility of these deficits also indicates risk to deterrence. China's leaders may be more willing to engage in military aggression—and to draw that aggression out into a protracted conflict—if they believe the United States would be unable to sustain operations in the Western Pacific for any length of time. In a regional naval war, the PRC would have the advantage of interior lines of communication and the ability to stockpile and distribute fuel relatively close to the areas of hostilities.

A conflict with little or no warning would leave TRANSCOM with the difficult and potentially impossible task of making agreements with foreign governments and shipping companies with little or no lead time or to charter ships and crews on the international market during a conflict. International agreements can take years to negotiate. Even if the Government could close some or all tanker gaps through non-U.S. flag ships in an emergency, doing so would cause delays that could put strategic objectives and U.S. forces at risk. It is widely believed that a PRC military assault on Taiwan would take the form of a fait accompli. Rapid response to threat indicators—including credibly posturing for deterrence during a PRC military buildup—could mean the difference between victory or defeat.[15]

Our estimates indicate a surplus in containerships and RO/ROs, which have less utility in the Pacific—especially considering the large gap in much-needed

[15] For example, see *Statement of Policy on Taiwan*, Title 22, U.S. Code, Sec. 3357a (Oct. 23, 2024): "*Fait accompli* refers to the resort to force by the People's Republic of China to invade and seize control of Taiwan before the United States can respond effectively."

Table 2: Defense sealift requirements and gaps

U.S. Flag Ship Type	Current Estimated Sealift Fleet	Defense Requirement	Gap / Deficit
Containerships	66	**10**[b]	0
RO/ROs	92	**84–87**	0
Bulk carriers	4	0	0
Large tankers	18[a]	**86**[c]	**(68)**
Small tankers	50	**100**[d]	**(50)**
Total	-	**280–283**	**(118)**

Source: CNA.

[a] Excluded here are large tankers that have not signed access agreements; these ships mainly operate in the domestic trades. Current estimated fleet numbers include only internationally trading ships that fall under a VISA or VTA and thus can be put to military use in a contingency in a reliable and timely fashion. Current defense planning assumes that domestically trading (i.e., Jones Act–compliant) ships would be needed domestically in a contingency and would not be diverted for sealift. Planning does not assume that the Jones Act would be waived to allow foreign flagged ships to backfill domestic capacity. In addition, the sealift gap noted above is entirely composed of tankers, and no Jones Act tankers currently fall under access agreements. That said, as of early 2024, 43 militarily useful Jones Act tankers had not signed onto emergency access agreements. Because these ships are U.S.-owned, they could in some cases be requisitioned under the Defense Production Act in a national emergency. As of the writing of this report, no militarily useful Jones Act tankers are under access agreements. The table includes 8 additional large tankers that are not under a VTA but that TRANSCOM has identified as potentially employable in a contingency. These 8 tankers are in addition to the 10 allowed in the TSP. Congress recently expanded the program to 20, but the additional slots have yet to be filled. These numbers reflect TRANSCOM estimates of the militarily useful sealift fleet based on unclassified findings from mobility studies, public testimonies, and discussions with the command (see, for example, TRANSCOM, *FY2020 NDAA Fuel Tanker Study Unclassified Summary Report*, June 2021).

[b] Our estimate of 10 containerships is derived from 2016 testimony of the TRANSCOM deputy commander before the House Armed Services Committee, during which he estimated a need to move 34,000 shipping containers or twenty-foot equivalent units (TEUs). We assumed an average capacity of 3,815 TEUs per ship based on the average capacity of containerships currently in MSP and a standard deviation of 1,413 (Lieutenant General Stephen R. Lyons, U.S. Army, Deputy Commander, TRANSCOM, Statement Before the Armed Services Committee, U.S. House of Representatives, Mar. 22, 2016).

[c] This number comes from the TRANSCOM deputy commander's 2016 testimony mentioned in the previous note.

[d] To derive this number independently from open sources, we used the average transit distance from sources to Guam to infer a theater fuel inflow rate with 86 tankers. We then assumed 20 intra-theater delivery points several hundred miles into theater to infer the number of small tankers needed to distribute the fuel.

tankers. The current surplus in total RO/RO capacity, however, is likely to be short lived as older RRF ships reach the end of their service life, including 9 in the next 5 years and 37 over the next 15 years. The surplus in containerships (approximately 24 out of a current fleet of 34) is especially large.

Bulk fuel movement is less of a problem in Europe and the Middle East. There is less need to move fuel by sea in these regions, given the relatively short distances, the numerous land bases, and, in the case of Europe, a formal alliance structure and extensive network of advanced militaries with their own logistics and sustainment capabilities. Containerships have relatively little utility for moving heavy equipment, much of which is too large for shipping containers. Containerships tend to be very large and dependent on major ports that may not be available for military use in a conflict or that might be operated by PRC-controlled port cranes.

In addition to ships, the military needs reliable crews of mariners—preferably U.S. citizens who can be relied on in a crisis or conflict, especially if service requires difficult working conditions, long deployments, and risk of injury or death. Ships are of little use without reliable, skilled mariners to crew them.

Crews are somewhat fungible in that mariners can be taken off one type of ship and put on another in an emergency, assuming they have sufficient skills. One of the primary reasons the U.S. Government subsidizes U.S. flag commercial vessel operations is to increase the overall pool of U.S. citizen mariners who are actively employed and therefore readily available to crew RRF vessels (which are not fully crewed when not activated) and other ships. U.S. flag crews must consist primarily of U.S. citizens and permanent residents.[16] In addition, as we will show in a later section of this report, the degree of control that the military has over merchant mariner crews can vary depending on their citizenship and contractual obligations.

MARAD estimated in 2017 that there is a shortage of 1,839 mariners needed to fully crew the RRF for any length of time (such as a major conflict).[17] Crewing an additional 118 U.S. flag tankers for sealift would require about 4,543 additional mariners—assuming an average crew size of 22 adjusted for crew rotation.[18] This estimate suggests a need for about 6,400 additional mariners to meet the country's sealift needs in a major conflict.

It is possible that in the long term (e.g., 30 years or so), the military's sealift needs could reduce dramatically—for example, a major shift toward uncrewed vessels or alternative fuels—and with it the need for merchant mariners. This possibility is speculative.

The U.S. Government would have to turn to other sources of mariners to close a mariner gap in the event of a conflict or face the prospect of being unable to sustain its forces adequately. Some skilled personnel could be drawn from the Navy and Coast Guard, but most of these individuals would be otherwise occupied in a major mobilization. Former mariners, including those who left the industry or have lapsed credentials, could potentially be recruited; however, additional training and certification would be needed to meet U.S. Coast Guard requirements.

[16] All officers on U.S. flag ships and at least 75 percent of the unlicensed crew must be U.S. citizens or permanent residents. Rules for the RRF are more restrictive: all RRF crew members must be U.S. citizens.

[17] U.S. Department of Transportation Maritime Administration, *Maritime Workforce Working Group Report,* 2017. MARAD is in the process of updating its estimates.

[18] We used MARAD's estimate of 1.75 mariners per billet to account for the need to rotate crews on ships surged for sealift. This rotation amounts to about three months on and two months off for each mariner. For an explanation of this multiplier, see U.S. Department of Transportation Maritime Administration, *Maritime Workforce Working Group Report.*

It is likely that in a major conflict, the Government would have to turn to non-U.S. mariners to fill some portion of critical crewing shortages either directly or indirectly (by allowing ally flag ships and their crews to serve the domestic trade to free up Jones Act ships for sealift). Doing so would pose a different set of risks regarding availability, reliability, loyalty, and so forth. As with the shipping gap, the greater the deficit in U.S. mariners in peacetime, the more the Government would need to turn to non-U.S. mariners in wartime. This would occur under considerable time pressure. We address these issues later in this report.

Shipbuilding

Other than the Jones Act requirement that domestically trading ships be U.S. built, we are unaware of any explicit requirement—whether from TRANSCOM, the Navy, or MARAD—to build commercial ships in the United States. There is also no strategic guidance on which to base an estimate of such requirements akin to what we developed for shipping and mariners. In addition, we are unaware of any reliable estimates of projected wartime attrition to the U.S. merchant fleet. As a result, we cannot say with any confidence what kind or how much commercial shipbuilding capacity the United States should have to meet its defense needs. Likewise, we cannot say with confidence whether or how much commercial ship repair capacity might be needed domestically.

U.S. flag shipping and commercial shipbuilding are different industries: one is heavy manufacturing, and the other transportation services. There is no direct link between them outside of a legal requirement in the Jones Act that domestically trading ships be built in the United States. In contrast, U.S. flag ships engaged in international trade may be built in foreign yards in South Korea, Japan, China, or other countries.[19] Foreign-built ships make up most of the vessels that the military depends on for sealift. This sealift fleet is U.S. flagged, owned, and operated. It is not, however, U.S. built.

It matters little for sealift purposes whether a ship is built in the United States or abroad unless it has built-in vulnerabilities. A ship built in China for delivery to a U.S. flag operator, for example, might have tracking devices, software vulnerabilities, or intentionally faulty welding. Absent specific threats such as these (which apply primarily to PRC-built ships rather than those constructed in allied nations such as Japan and South Korea), it is not clear why a foreign-built ship would be different than a U.S.-built ship for the purposes of strategic sealift or other missions. Once a U.S. Government agency or a private sector U.S. flag operator has taken ownership of a foreign-built ship, the government of the country where the ship was built no longer has control over it.

We conducted a wargame for MARAD in July 2024 on commercial shipbuilding as part of the study effort. It brought together commercial shipbuilding experts, industry insiders, and relevant Government officials to explore these issues in the absence of any usable guidance or analysis. The focus of the wargame was on commercial shipbuilding in a scenario involving a major war with the PRC. We developed the most stressing scenario possible within the limits of what might be considered reasonable defense planning parameters.

In order to logically infer a need to build commercial ships in U.S. yards for defense purposes, it would be necessary first to make several assumptions. These assumptions are conservative with respect to national security risk. Our experience designing, executing, and analyzing the wargame led us to this

[19] To illustrate, South Korea built about 21 percent of the world's ocean-going ships in 2022. Japan built about 17 percent and China 52 percent. See Congressional Research Service, "U.S. Commercial Shipbuilding in a Global Context," Nov. 2023.

necessary first step. For these assumptions to drive analytically defensible requirements, DOW would need to validate and incorporate them into defense planning. These assumptions are as follows:

- A major conflict would involve significant attrition to the U.S. merchant fleet, defined as ships that are sunk and that must be replaced by new construction to maintain a consistent level of sealift capacity. New ships would need to be built in a conflict only if there is a need to replace those sunk by the adversary.
- A conflict would last long enough to make mobilization of the domestic shipbuilding industrial base worthwhile. A war must be so protracted that there are at least three years to mobilize the shipbuilding industrial base and deliver newly constructed ships. Three years is an optimistic assumption. Realistically, one would probably need to assume a five- year conflict akin to WWII for U.S. shipyards to build vessels on a scale that might significantly benefit a large-scale war effort.
- Foreign shipyards, especially those in South Korea and Japan (which together built about 38 percent of the world's large, oceangoing commercial ships in 2022), would not be available in such a contingency. Perhaps the PRC strikes these yards to prevent them from building ships to support a U.S. war effort. Or perhaps Beijing puts so much pressure on Tokyo and Seoul that their yards refuse to build ships for the U.S. merchant fleet. It would also be necessary to assume that European shipyards, which build mostly passenger liners, would not (or could not) shift to building militarily useful commercial ships in wartime.
- The thousands of vessels that normally ply the world's sea lanes—including the roughly 33 percent of global dead weight tonnage owned by companies in North Atlantic Treaty Organization (NATO) countries—would not be available for charter, purchase, or requisition in a major conflict.

Participants in our wargame with experience in the commercial shipbuilding industry noted that it typically takes a year or more to build a ship. This timeline might be compressed in a large-scale mobilization. The group considered capacity at existing yards, made some back-of-the-envelope calculations, and concluded that it would take about two years to surge ship production above the current peacetime rate of about three to five per year. The group estimated that production capacity could grow to about 10 ships per year after two years and to as many as 20 ships per year after three years.

The numbers in Table 3 provide a general sense of the delta between what the U.S. commercial shipbuilding industry is likely to be able to produce in a conflict and what would be potentially needed, based on attrition to the U.S. merchant fleet in the Pacific during WWII. The table shows how many oceangoing commercial ships the United States currently produces, how many it might produce in a wartime surge environment based on findings from our July 2024 wargame, U.S. merchant ship losses during WWII in the Pacific, and potential losses if the current U.S. flag fleet of about 150 RRF and VISA/VTA ships were to experience 15 percent attrition each year of the conflict. Of about 5,000 merchant ships built in the United States during WWII, 756 were sunk (approximately 15 percent)—despite the Japanese navy's tendency to focus its offensive operations on the U.S. Navy's combat ships.[20]

[20] Albert Herberger, Ken Gaulden, and Rolf Marshall, *Global Reach: Revolutionizing the Use of Commercial Vessels and Intermodal Systems for Military Sealift, 1990–2012* (Naval Institute Press, 2016).

Table 3: Potential shipbuilding capacity versus wartime attrition

	Each Year over Five Years					Total over Five Years
Current production capacity	5					25
Likely wartime surge capacity (per year)	5	5	10	20	20	60
Likely wartime surge capacity (cumulative)	*5*	*10*	*20*	*40*	*60*	
U.S. merchant ships lost during WWII in the Pacific	73 (average)					363
15% yearly attrition to current sealift fleet (per year)	23	20	17	16	16	92
15% yearly attrition to current sealift fleet (cumulative)	*23*	*43*	*60*	*76*	*92*	
Gaps to replace 15% attrition (per year)	**18**	**15**	**7**	**-**	**-**	**32**
Gaps to replace 15% attrition (cumulative)	**18**	**33**	**40**	**36**	**32**	

Source: CNA.

Note: Yearly attrition of 15 percent is calculated as a proportion of the total RRF and commercial U.S. flag fleet under a VISA or VTA, which is 151 ships. The 15 percent figure is based on WWII attrition to the U.S. merchant fleet.

The surge shipbuilding capacity estimated in Table 3 reflects calculations by shipbuilding experts in our wargame based on their knowledge of different U.S. yards and the potential of these yards to expand in wartime. They considered infrastructure and workforce potential as the industry mobilizes, the major yards surge production, and smaller yards expand to build oceangoing ships. They estimated that it would take about two years for major expansions in U.S. yards to be complete, resulting in significantly greater output only in the third year of a conflict. Additional expansions could come online in the third year, leading to a doubling of output in the fourth and fifth years. The study team adjusted these numbers up modestly by assuming a higher peacetime baseline of five (rather than three) ships and greater capacity for expansion in smaller yards. The result is a more conservative estimate of likely gaps in needed wartime capacity. Less optimistic assumptions would indicate larger gaps and more serious risks than the numbers in Table 3 suggest.

Our overall conclusion is that under the assumptions presented in this section regarding access to foreign shipbuilding (whether charter or purchase), wartime domestic shipbuilding gaps are likely to be substantial, even under optimistic baseline

assumptions. WWII losses were astronomical compared to current production capacity. Replacing just 25 percent of the merchant ship losses in the Pacific in WWII would exceed likely surge capacity by many times, according to commercial shipbuilding experts in our July 2024 wargame.

The same can be said of replacing 15 percent annual attrition to the 150-ship core of the commercial sealift fleet. This rate of attrition is a modest baseline, in our view, considering the WWII numbers and the PRC's more substantial antiship missile capabilities compared to 1940s Japan. Assuming a modest 15 percent attrition rate to the current fleet indicates the U.S. merchant fleet would be smaller by 18 ships after the first year of conflict and by 33 and 40 ships by the second and third years.

U.S. yards might be able to replace yearly losses by the fourth or fifth year of conflict when the fleet has been cut down to less than two-thirds of its prewar size. If one assumes a more bullish rate of twice the surge capacity estimated above, U.S. yards would not be able to replace 15 percent annual attrition until at least the third year of conflict, by which time the fleet would be substantially weakened.

Expanding ship repair capacity, which uses some of the same infrastructure and workforce and would therefore naturally grow with increased shipbuilding, may mitigate some of this risk—depending on DOW's assumptions as to the number of vessels sunk or otherwise rendered unsalvageable versus merely damaged.

The cumulative gaps in Table 3 would be two to three times larger if the 118 tankers were added to the U.S. flag fleet to meet the military sealift needs identified earlier in this report. A larger fleet would require more shipbuilding output to replace the same rate of attrition.

These back-of-the-envelope estimates suggest that U.S. shipbuilding capacity would need to be about three to five times larger in peacetime to replace likely attrition in wartime—especially in the first few years of conflict. For a larger sealift fleet of the size that the military requires, the industry would need to grow by as much as five to eight times.

Economic security needs and gaps

To estimate economic security needs, we first had to define the concept and the mission. Government documents use the term *economic security* in various ways but do not define it precisely. Unlike with defense, there is no economic security strategy or set of nested plans that officials might use to estimate requirements in the way that TRANSCOM does with sealift. There are neither official estimates of shipping needs for economic security nor any contemporary analysis that we are aware of that fully addresses shipping needs for economic security.

We defined economic security as the ability to maintain necessary U.S. seaborne trade in a major conflict or other national emergency that involves substantial disruption to global shipping. We defined *necessary trade* as (1) continuity of U.S. seaborne imports critical to the defense industrial base in a major conflict and (2) continuity of U.S. seaborne exports. Our definition does not include imports beyond what is needed for the defense base. A fleet sufficient to carry most or all U.S. seaborne exports could transport most seaborne defense imports as well.

This definition has the following necessary characteristics:

- Precise enough to enable quantification of needs and gaps

- Compatible with national security and therefore oriented toward threats and contingencies as distinct from economic growth or job creation
- Relevant to commercial shipping and shipbuilding

Shipping and mariners

Using this definition, we estimated how many ships of different types would be needed to move vital U.S. seaborne trade in a major conflict with the PRC. We assumed conflict scenarios akin to those referred to in the previous section. In developing this methodology, we drew on ideas from a MARAD-commissioned study from 1985 that examined wartime shipping needs.[21]

We started by examining a "base force" of shipping needed just to maintain seaborne imports critical to the defense industrial base. This estimate provided a sense of what would be minimally necessary in a conflict. We then expanded these parameters to include seaborne exports, which led to higher numbers. Table 4 summarizes the combined defense and economic security requirements and gaps.

We provide low- and high-end estimates to account for uncertainty regarding different assumptions (e.g., identification of critical categories of traded goods, variability in economic growth, energy market changes that could affect maritime trade patterns). Low-end numbers represent conservative estimates.

These numbers provide a general sense of how much total shipping the United States may need in a conflict to sustain military operations and keep the defense industrial base going. We developed these estimates by examining customs import data organized by weight and type of goods, coding specific types of goods critical for defense production, and then translating the import volume of these types of goods into rough estimates of ship numbers based on assumptions regarding the cargo-carrying capacity of different types of vessels. We also took into account the distance between the United States and leading trade partners for critical goods. We describe these methods in greater detail in our interim reports.

These numbers illustrate substantial shipping gaps even under a narrow definition of the economic security mission that includes only imports critical to the defense industrial base—that is, critical raw materials and components for defense production in a major war. Failing to import critical materials to keep the defense industrial base going in a major war is, arguably, as important for the military as sustaining its forces forward.

Barring access to the Jones Act fleet, the United States would need ready and reliable access to anywhere from 380 to more than 1,300 ships to ensure defense production and support sealift in a major war. In the unlikely scenario that all Jones Act ships were diverted for international trade, that would reduce the gap by about 92 ships. That would leave an equivalent gap in domestic trade capacity. This is a conservative estimate under restrictive assumptions for a limited aim—that is, to ensure imports necessary for wartime defense production while sustaining U.S. forces in forward theaters of operation. The above estimates do not address shipping for the civilian economy. We provide those estimates in the next section.

The ships that the United States may need access to represent vessels that currently exist and are actively sailing. They ply the world's oceans on a regular basis under the flags of other states. Some are U.S. owned. Many are owned by companies domiciled in allied nations. The requirement is not necessarily for the U.S. Government to own or fully control these

[21] U.S. Department of Transportation Maritime Administration, *Economic Support Shipping Study*.

Table 4: Additional shipping needed to maintain critical defense imports in conflict

U.S. Flag Ship Type	Current Estimated Fleet	Combined Needs for Defense Industrial Imports and Sealift	Combined Gaps
Containerships	66	141–410	**(75–344)**
RO/ROs	92	104–177	**(12–85)**
Bulk carriers	4	160–490	**(156–486)**
Large tankers	18	106–366	**(88–348)**
Small tankers	50	100	**(50)**
Total	230	611–1,543	**(381–1,313)**

Source: CNA.

Notes: Numbers shown are ships. Current fleet numbers are drawn from Table 2. Tanker numbers reflect the assumption that tankers involved in domestic trade would likely not be available to support defense industrial sustainment without adversely affecting domestic fossil fuel distribution. The requirements and gaps shown include needs for the defense industrial base and sealift. In a conflict, the merchant fleet would need to provide sealift while also ensuring vital defense imports. Deficits, shown in parentheses, are the delta between current fleet numbers and estimated requirements. Current defense planning assumes that domestically trading (i.e., Jones Act–compliant) ships would be needed domestically in a contingency and would not be diverted for sealift. Planning also assumes that foreign flag ships would not be used to backfill gaps in domestic capacity due to Jones Act restrictions. If the 43 militarily useful tankers currently in the Jones Act fleet were diverted for sealift, it would reduce the above gap to 338–1,313. However, diverting Jones Act vessels would likely create a gap in domestic shipping capacity, which would then need to be addressed.

ships at all times; rather, it is for the United States to be certain that it reasonably could continue to move critical U.S. goods in a conflict in which global shipping has been substantially disrupted. In short, the gaps identified in this section represent potential deficits in access to existing supply.

Table 5 summarizes our analysis of the additional shipping that would be needed to maintain seaborne exports on top of maintaining defense imports and supporting strategic sealift. These numbers (about 1,200 to 2,400 ships) are substantial. Even maintaining half of U.S. seaborne exports via assured access shipping would require a very large fleet—specifically, 600 to 1,200 U.S. flag ships on top of the current fleet of about 300.

Economic security requirements would be in addition to defense sealift needs. The RRF and many privately owned U.S. flag ships would be busy supporting the military in a major conflict, with the exception of some containerships that the military may not use. The United States would need access to additional shipping to secure vital seaborne trade. In our analysis, we assumed that large tankers involved in domestic trade (i.e., that move fuel from U.S. port to U.S. port) would, by and large, not be diverted to support the military in a contingency, given their importance to the domestic economy.

If we were to take only the low ranges of the numbers in Table 5 to develop a most conservative estimate of economic security requirements, the gaps would

Table 5: Additional shipping needed to maintain seaborne exports

U.S. Flag Ship Type	Current Estimated Fleet	Combined Defense and Economic Security Needs	Combined Defense and Economic Security Gaps
Containerships	66	330–410	**(264–344)**
RO/ROs	92	104–177	**(12–85)**
Bulk carriers	4	490–1,020	**(486–1,016)**
Large tankers	18	366–876	**(348–858)**
Small tankers	50	100	**(50)**
Total	230	1,390–2,583	**(1,160–2,353)**

Source: CNA.

Notes: Numbers shown are ships. Current fleet numbers are drawn from Table 2. The requirements and gaps shown include defense and economic security needs combined; economic security would be additive. Deficits, shown in parentheses, are the delta between current fleet numbers and estimated requirements. If domestically trading (i.e., Jones Act) ships were diverted to sustain export trade, that would reduce the lower end of the estimated total combined defense and economic security gaps to about 1,068 ships. Doing so would also open a new gap of 92 ships needed to serve the domestic trades.

still be substantial. Assuming that the RRF and U.S. flag ships would be supporting the military in a contingency, we estimated the following total gaps in capacity. These are absolute minimum estimates. As noted above, each additional set of requirements is additive (i.e., the ships needed to maintain seaborne trade would be in addition to sealift and defense imports).

- The United States would need about 380 additional ships on top of its current fleet to maintain the *defense industrial base* while providing sealift in a major conflict.
  - The United States would need 214 additional ships to ensure only *50 percent of defense industrial imports* while supporting sealift.
- The United States would need about 800 additional ships to ensure continued flow of *50 percent of its seaborne exports* while maintaining the defense industrial base and supporting sealift.
  - The United States would need 604 additional ships to ensure only *50 percent of seaborne exports and 50 percent of defense industrial imports* while supporting sealift.
- The United States would need almost 1,200 additional ships to ensure continued flow of *100 percent of its seaborne exports* while maintaining the defense industrial base and supporting sealift.

The estimated requirements for U.S. flag shipping are substantial even under conservative assumptions. For example, taking the low ranges of our estimates and assuming enough U.S. flag shipping to sustain only half of defense production and half of seaborne exports in a conflict, more than 600 U.S. flag ships would still be required on top of the current fleet (Table 6).

Table 6 summarizes our most conservative estimate of shipping requirements in a large-scale conflict. It shows the total number of additional ships on top of the current fleet that would be needed to meet the higher threshold for each mission—that is, to support sealift only; to support sealift and defense production; and to support sealift, defense production, and exports.

The mariners needed for economic security in a major conflict would increase along with the number of ships under U.S. flag. We estimated that the United States would need at least 23,000 more mariners to crew a U.S. flag fleet capable of securing a substantial portion of the country's seaborne trade in a conflict, assuming that U.S. citizen crew requirements remain unchanged.

The exigencies of maintaining seaborne trade in a conflict with the PRC would be different than those of supporting the military. Commercial ships would move civilian cargo between economic ports, which would be a different mission than moving military equipment to operating forces in sometimes austere locations across contested sea lanes. The PRC might target trading ships via unrestricted economic warfare, as Japan did in the 1940s. Nonetheless, trading ships would probably face a lower threat than those engaged in sealift, assuming the adversary's forces are able to distinguish them from military vessels.

Shipbuilding

As with the defense mission, we cannot say with certainty that there is a requirement for shipbuilding in support of economic security as we have defined it. There is no strategic guidance to work from to estimate such a requirement. Ships engaged in international commerce for economic security could be purchased abroad, as is the case with many current U.S. flag vessels involved in international trade. Ships for trade might be chartered or requisitioned. In a global conflict that disrupts seaborne trade, numerous used merchant ships could be available on the global market.

For such a conflict scenario to lead to a defensible requirement for shipbuilding, one would need to make the same assumptions that we listed previously in our analysis of shipbuilding needs for sealift: (1) that there will be significant attrition to

Table 6: Minimum defense and economic security needs

Additional Ships to Support Sealift	To Ensure 50% of Seaborne Defense Imports While Supporting Sealift	To Ensure 50% of Seaborne Exports and 50% of Defense Imports While Supporting Sealift
118	215	605

Source: CNA.

Note: Numbers shown are additional ships to the number in the current fleet. If all 92 domestically trading Jones Act–eligible ships were diverted for sealift and international trade (including those not under access agreements), approximately 75 additional ships would be needed to support sealift, and approximately 116 additional ships would be needed to ensure 50 percent of seaborne defense imports while supporting sealift. The 605-ship figure in the table would not change.

the U.S. merchant fleet; (2) that the war will last for years; (3) that the United States will not be able to order new ships from foreign yards; and (4) that the thousands of ships that normally ply the world's oceans will not be available for charter, purchase, or requisition. Given the stakes in a global conflict, these assumptions are restrictive by design, as well as difficult to validate; one could argue for or against any of them. Either way, it is unlikely that the domestic shipbuilding industry will be able to grow to the size necessary to close more than a fraction of the much larger gaps in economic security needs relative to sealift.

Options and Trade-Offs

In this section, we address alternative sources of supply for shipping, mariners, and shipbuilding in the event of a major conflict in which the Government must fill critical relevant shortages. We show what these alternative sources might be, the potential pools of capacity that the Government might tap into in an emergency, and the risks and other trade-offs associated with doing so.

We then lay out a few strategic options for what a peacetime mix of commercial shipping and shipbuilding capacity might look like. Finally, we address trade-offs between investments in the shipping versus shipbuilding industries, drawing on our assessment of requirements and gaps in these two sectors. Our intention is to discuss investments holistically and to provide structure for deliberations over U.S. flag shipping, mariners, and shipbuilding—and to do this in a way that allows policy-makers to weigh requirements, risks, and other trade-offs.

Through this analysis, we seek to help policy-makers consider alternatives to reduce strategic risk in a large-scale conflict, understanding that gaps in U.S. capacity are likely to remain for some time and that failure in war is not an option. In wartime, TRANSCOM and MARAD will need to fill as much of the country's shipping deficits as possible, probably under considerable time pressure in a distorted global shipping market.

Our intent is not to promote outsourcing. On the contrary, we show that domestic capacity is critical to buying down strategic risk. The more shipping capacity the U.S. Government can quickly and reliably access and redirect for its purposes, the more secure the country will be in a conflict. Our analysis is also intended to help policy-makers think about commercial shipping capacity in a holistic and strategic manner akin to how the Government considers military force structure.

Alternative sources of shipping

U.S. flag shipping makes up a tiny fraction of internationally trading vessels that ply the world's sea lanes. There are about 5,000 ships under the national flags of U.S. allies, compared to 268 ships under U.S. flag.[22] U.S. companies have roughly another 600 ships under the world's four largest open registries. Companies in the European Union (EU) and Pacific ally nations own more than 8,000. If the United States were to have reliable access to even a fraction of this shipping in an emergency, it would go a long way to filling the wartime gaps identified in the previous section. Similarly, a relaxation of restrictions on use of foreign flag ships in the domestic trades could free some Jones Act–compliant U.S. flag vessels to support sealift and other strategic needs. Establishing reliable access to even half the ships under U.S. ownership would make a substantial difference; many of these ships are tankers.[23]

Table 7 lists potential sources of shipping capacity beyond U.S. flag. NATO member countries maintain about 15 privately owned RO/RO ships under an assured access contract that gives the alliance access

[22] The 268 figure includes RRF and prepositioning ships as well as small tankers needed for strategic sealift (see Table 1 on the current U.S. auxiliary cargo fleet as we have defined it).

[23] We do not know how many non-U.S. flag tankers there are that are U.S.-owned. The United Nations Conference on Trade and Development (UNCTAD) provides data on the total number of U.S.-owned foreign flag ships but does not break them out by type.

Table 7: Non-U.S. flag sources of shipping

Potential Source of Non-U.S. Flag Shipping Capacity	Current Across All Types of Ships
NATO assured access contract shipping[a]	15
NATO ally flagged	3,426
Pacific ally flagged	1,719
U.S. owned, foreign flagged, under the four largest registries[b]	587
EU country owned, foreign flagged, under the four largest registries[c]	4,678
Pacific ally owned, foreign flagged, under the four largest registries[d]	3,502
Total	**13,927**

Source: CNA, United Nations Conference on Trade and Development (UNCTAD).

Note: Numbers shown are total ships.

[a] Assured access contract shipping consists of approximately 15 privately owned RO/RO ships that fall under a VISA-like arrangement with contributing NATO member countries. The ships can be jointly activated by a NATO steering committee in a contingency (see "Strategic Sealift," North Atlantic Treaty Organization, Dec. 2, 2022, https://www.nato.int/cps/po/natohq/topics_50104.htm).

[b] These are the world's four largest flag registries (known as open registries) by DWT. They are the largest for U.S.-owned ships and represent most U.S.-owned, foreign flagged tonnage. These registries are those of the Marshall Islands (304 U.S.-owned ships), Bahamas (138), Liberia (87), and Panama (58).

[c] The last two rows concern ships that UNCTAD refers to by country of "beneficial ownership"—that is, ownership by companies domiciled in these countries.

[d] Pacific treaty allies include Japan, South Korea, Australia, the Philippines, Thailand, and New Zealand.

to these ships in an emergency. Some other NATO member countries may also have a small number of ships under charter or other sealift arrangement. We are not aware of such arrangements among Pacific allies. More significant are the very large fleets of actively trading vessels maintained by companies in NATO, the EU, and Pacific ally countries. Combined, the nationally flagged fleets of U.S. allies nearly match China's fleet (about 5,000 versus close to 6,000). Ships owned in the EU and Pacific ally nations (just counting those in the four largest open registries) far exceed those owned by PRC companies (about 13,300 versus nearly 8,800). Greek companies alone own more shipping capacity, measured in DWT, than China (about 393 million versus 302 million).[24] Table 7 shows ship numbers (rather than DWT) for the sake of clarity and consistency.

[24] "UNCTADstat Data Centre," United Nations Conference on Trade and Development, https://unctadstat.unctad.org/datacentre.

Hundreds of thousands of mariners from countries around the world also crew ships owned by the United States, the EU, and Pacific ally companies. Certain countries tend to produce more mariners than others. The Philippines (a U.S. ally) and India, for example, are among the largest suppliers of mariners, including officers.[25] Mariners from these countries crew many of the ships owned by companies in the United States, the EU, and Pacific ally nations.

These ships and mariners represent a large potential pool of capacity in a major conflict. It is hard to say how many might be available for employment for sealift or trade—whether vessels or willing crews. Much would depend on conditions that are difficult to anticipate, such as the state of the global economy and global shipping in a world crisis, the positions of private shipping companies given patterns of global trade (for example, with China), the relationships between these companies and the governments of countries where they are domiciled, legal or financial instruments available to various allied governments, the danger to mariners crewing these ships, and many other factors.

Risk trade-offs

Alternative sources of shipping present different sets of risks to defense and economic security aims. These risks are different for ships than for the mariners that crew them. Acquiring more ships—new or used—would present its own set of challenges. For example, relying on an RRF involves different trade-offs than does relying on a U.S. fleet of actively trading ships under access agreements such as the VISA or VTA.[26] Looking to NATO or to companies domiciled in allied countries would be viable options with different trade-offs.

Table 8 lists potential sources of shipping capacity and illustrates the overall risks involved. It shows a continuum of ships and mariners from lower to higher risk. Distinguishing between ships and mariners is important because vessels may be available but not the mariners to crew them. The Government considers U.S. flag operators, especially those under a VISA or VTA, as an important source of mariners to crew Government-owned vessels in an emergency. The maritime unions would also be involved in a general call-up. The RRF is staffed by a skeleton crew when not activated and would need additional U.S. mariners to sail.

Building ships in U.S. yards is just one potential option to replace lost or seriously damaged tonnage in a major conflict. The first order of business for the Government would probably be to charter, lease, or buy used ships from non-U.S. operators. Tens of thousands of commercial ships sail under other flags, many in allied countries. Some would likely be available for charter or purchase in a global conflict in which world trade is disrupted. There could be significant laid-up tonnage in such a conflict. The U.S. Government might also seize ships from hostile nations, particularly from belligerents in a major war. If it is not feasible to meet shipping needs this way, it may be necessary to place orders for new ships from U.S. or foreign yards.

Table 8 illustrates how risk to access varies depending on the sources of ships and the crews on these ships. We list sources of shipping capacity from lower to higher risk in terms of the likelihood of assured access in a contingency. Our intention in this table is to illustrate the various sources of shipping, mariners, and shipbuilding and to help policy-makers more easily visualize trade-offs regarding reliable access in a contingency.

[25] BIMCO and International Chamber of Shipping, *Seafarer Workforce Report*, 2021.

[26] The VISA and VTA are contracts between U.S. flag ship owners and the U.S. Government that give the U.S. Government access to some or all cargo-carrying capacity in a military contingency or other emergency. Ships that receive subsidies under the MSP and TSP must sign a VISA or VTA.

Table 8: Level of assured access to different sources of ships and mariners

Risk	Ships	Risk	Mariners
Lower	U.S. Government (RRF, Prepo.)	Lower	U.S. military (U.S. Navy, Coast Guard, etc.)
	U.S. flag operator under VISA/VTA		U.S. civil service (MSC, National Oceanographic and Atmospheric Association (NOAA), etc.)
	U.S. flag *not* under VISA/VTA		
	Ally flag under NATO access contract		U.S. merchant mariners (U.S. flag operators, unions)
	Ally flag *not* under NATO contract		
Higher	Open registry from United States, allies		Non-U.S. mariners (ally flag carriers under contract)
Lower	Purchased new from U.S. yards		
	Purchased new from non-U.S. yards		Non-U.S. mariners (other reliable carriers)
	Purchased used on global market	Higher	
Higher	Seized from adversaries		

Source: CNA.

When it comes to ships, Government-owned vessels pose the lowest risk and open registry ships pose the highest. U.S. military and civil service mariners are the least risky, followed by privately employed U.S. merchant mariners. Non-U.S. mariners bring more risks. The risks associated with access to ships are different from the risks associated with crewing these vessels. The Government may have more difficulty recruiting mariners and sending them into harm's way than in securing contracts with shipowners.

When it comes to building ships in a major conflict, the likelihood of access to reliable capacity likewise varies. U.S. yards provide the most reliable access, followed by foreign yards (especially those in allied countries). Purchasing used ships in a conflict could be challenging depending on market conditions. Seizing ships from an adversary would be problematic and uncertain.

Non-U.S. mariners employed by allied flag operators—especially if they fall under a NATO assured access agreement—would probably be lower risk than mariners employed by other carriers. Likewise, ships under NATO assured access contracts could be redirected at the behest of the alliance. There is a vast pool of ships under open registries, some of which are under the ownership or in the employ of U.S. companies. Risks vary across companies and country of beneficial ownership. The greatest uncertainty would be in the degree of control that the U.S. Government or allied governments may be able to exert when sailing into contested waters—especially ships crewed by mariners who are citizens of nations other than the United States or its allies. Using the framework in Table 8 is a way to bin and weigh these risk trade-offs.

These risks can be broken down into three general categories:

- **Assuredness of access.** This is the likelihood that the U.S. Government would be able to secure access to the shipping in question or otherwise redirect it for defense or economic security. Government-owned shipping is largely guaranteed. Foreign flag carriers may choose not to make their vessels available, no matter the price. A similar logic applies to mariners. Some may be more amenable than others, depending on the company or country of origin.
- **Timeliness.** This is how quickly the Government can gain access to or redirect ships. RRF vessels are at the ready in U.S. ports for activation within days, assuming available crews. However, active trading ships could be anywhere in the world and laden with cargo. Shipping capacity becomes available incrementally. Some might sail in days, whereas others could be weeks away.
- **Control.** This is the extent to which shipowners and mariners can be relied on to do what is asked of them in an emergency, especially if the ship or crew face significant risk. Ships may need to sail into contested waters to conduct sealift missions or to carry critical imports for the defense industrial base in a conflict. U.S. mariners, especially those with a service agreement, can be counted on with a relatively high degree of confidence. There would be more uncertainty with non-U.S. crews.

Table 9 illustrates how different risks to access apply to different sources of shipping and shipbuilding capacity when it comes to filling gaps in U.S. capacity. The table summarizes key considerations for risk in the areas of assuredness, timeliness, and control. These are complex issues that cannot be quantified and should not be treated axiomatically. Nonetheless, it may be helpful for policy-makers to consider these aspects when deciding where to focus efforts and investments.

DOW has a process to redirect actively trading U.S. flag vessels that fall under a VISA or VTA in support of sealift. However, the mariners would remain under the private employ of the shipowners. U.S. merchant mariners are not active-duty military personnel with a service agreement; they do not fall under the Uniform Code of Military Justice. The same is true of NATO sealift vessels under assured access contracts; their crews could refuse to sail into contested waters. This would also be true of non-U.S. crews on foreign flag vessels, whether owned by U.S. companies or those domiciled in allied nations.

The U.S. Government would have ready access and directive control over U.S. shipyards through the Defense Production Act in wartime. However, building ships takes time; most large oceangoing ships take at least a year to build, whether in the United States or in foreign yards. For these reasons, building ships is a high-risk option when it comes to timeliness. Purchase

Table 9: Risks broken out by source of shipping capacity

Areas of Risk		
Assuredness	**Timeliness**	**Control**
Shipping		
• There is least risk with Govt-owned, stand-by RRF. • Modest risk with private operators under VISA/VTA. • Ally contract sealift depends on private operators and NATO activation and priorities. • Other non-U.S. flag depends on markets, contracts, ownership structures, etc.	• RRF is supposed to be ready in days, but ship readiness is uneven and uncertain, and ships are not actively crewed. • VISA/VTA shipping is ready, but may take days or weeks to be available, depending on location and cargo. • Ally contract sealift ready in days to weeks, depending on location and cargo. • Other foreign ships can take days to weeks plus time to negotiate terms and contracts.	• RRF falls under military command at sea but would be crewed by civilians, most likely in private employ. • VISA/VTA ships can be redirected but are not owned by the U.S. Government and may not fall under military command. • U.S. flag mariners are not under service agreements and are privately employed. • U.S. Government authority over non-U.S. shipowners and crews would be limited and variable.
Shipbuilding		
• U.S. Government has guaranteed access to U.S. shipyards and U.S.-built ships. • Purchasing used or requisitioning from non-U.S. sources would be uncertain. • Highest risk to purchasing new from non-U.S. yards, especially in Asia in a Western Pacific contingency.	• Used ships could be purchased or requisitioned quickly, depending on market conditions. • New ships take about a year to build.	• Once purchased or requisitioned, a ship would be under U.S. Government control regardless of source. • The U.S. Government can direct ship design, delivery, and production in U.S. yards, but at best it only influences non-U.S. facilities.

Source: CNA.

or requisition is likely to be more feasible, depending on market conditions and the nature of the wartime emergency. Once acquired, ships would be under U.S. Government control regardless of where they came from. A ship built in a foreign yard is no less subject to directive control than one built in the United States.

Shipping fleet options

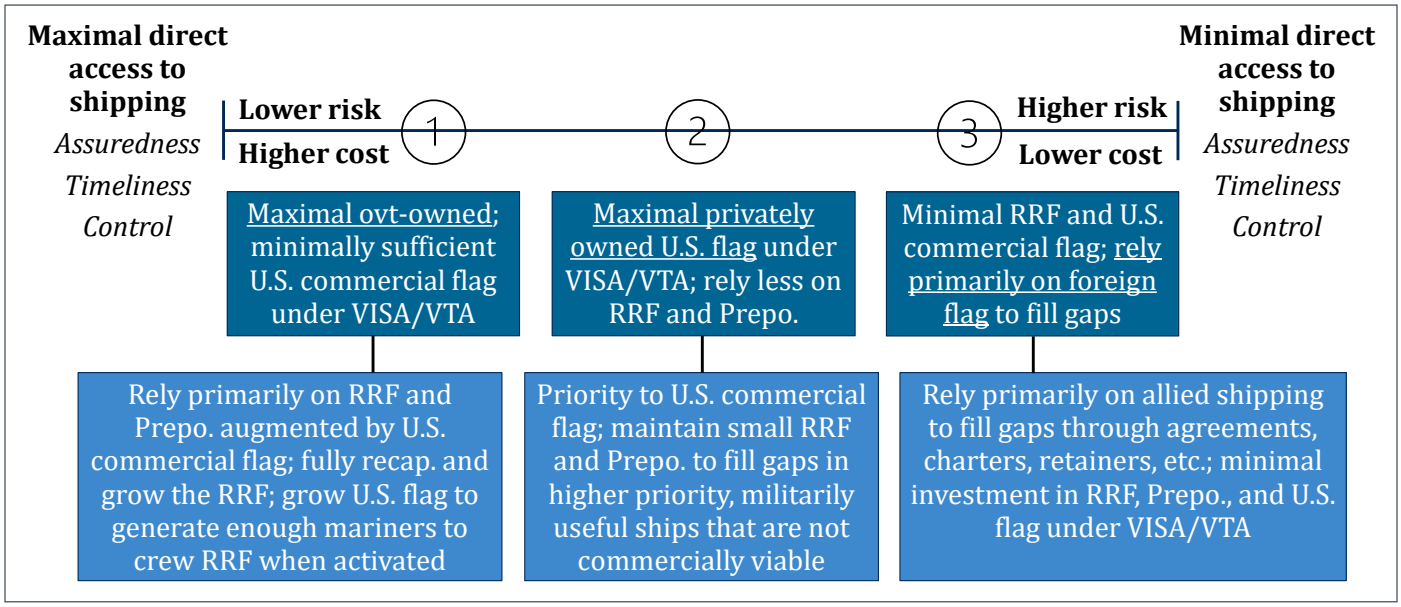
In this section, we address options for alternative fleet mixes for assured access shipping, much like how Congress and DOW consider Navy and Coast Guard force structure. To ensure that assured access shipping can support defense and economic security missions, the Government would benefit from thinking of it as a fleet and planning for the appropriate mix of capacity to meet the country's needs. This approach could be challenging given that assured access shipping is owned and operated by various Government organizations and private sector operators.

Figure 1 illustrates a way to think about option space along a spectrum from a fleet mix that provides maximal reliability of access to shipping at a higher cost to one that offers minimal reliability at lower cost. Trade-offs range from lower risk and higher cost on one end of the spectrum to higher risk and lower cost on the other.

The option space we explored ranges from (1) relying more on Government-owned ships in the RRF to (2) depending more on U.S. flag ships supplemented by a smaller RRF to (3) taking maximum risk with foreign flag shipping. The dark blue boxes in Figure 1 describe the overall concept. The light blue boxes describe what sort of force mix the concept might translate into if implemented. Any realistic plan would probably rely on some RRF, some privately owned U.S. flag, and some foreign flag ships in different quantities.

The options sketched out in Figure 1 are not either-or choices between one source of capacity and another; rather, they represent different potential mixes of capacity. For example, the more the country relies on the RRF for emergency capacity, the more U.S. flag ships operating during peacetime will be needed to sustain a pool of ready mariners. If the RRF is to grow, so must the U.S. flag fleet. The U.S.

Figure 1: Options for alternative fleet mixes



Source: CNA.

flag fleet must grow regardless just to generate the mariners needed to crew the current RRF when fully activated for any length of time.

To illustrate, we sketch out three general options along this spectrum:

1. The lower risk but more costly option would be to rely mainly on Government-owned, laid up reserve ships in the RRF and on forward-stationed prepositioning ships. TRANSCOM and MARAD have assured, timely access to these vessels and can direct them for any mission. There are no private shipowners to negotiate with or issues with liability or insurance. The Government can design the fleet and ships to align fully with requirements. That said, RRF ships are not actively sailing or crewed; mariners must come from elsewhere when the RRF is activated. Regardless of how many ships are added to the RRF, substantial gaps in capacity are likely to remain. These gaps would need to be filled through access to U.S. and foreign flag shipping.
2. A middle option would be to rely on privately owned U.S. flag ships under a VISA or VTA, supplemented by a minimal force of RRF and prepositioning ships to meet niche defense requirements. This option could entail not fully recapitalizing the RRF and putting more resources into growing privately owned U.S. flag ships. The result would be a fleet dominated by actively trading ships. The Government would rely more on private shipowners, including in smaller scale contingencies that tend to involve only the RRF. The Government would probably have less timely access to such a fleet and less control over how it is employed (how much less would depend on the relative readiness of RRF ships and the availability of credentialed mariners). Such a fleet would, however, be less expensive per ship. It would also generate more mariners per ship, thereby reducing some of the risk associated with fully crewing the RRF in a major conflict.
3. An option on the right side of the spectrum would entail relying mainly on allied flag shipping. This option would involve higher risk to reliable access but probably significantly less cost. There would be considerably less certainty over access to shipping or the ability to direct it toward defense or economic security aims, especially in a major conflict. The U.S. Government would need to pursue various initiatives to reduce this risk, such as long-term charters, retainers, and other agreements with allied governments and major shipping companies. Such agreements may be uncertain and difficult to enforce through U.S. courts in a contingency. The United States would need to maintain a fleet of RRF or prepositioning ships for immediate military needs along with a modest contingent of actively sailing trading U.S. flag ships under access agreements.

The RRF provides a dedicated, though older, standby force that could be activated in large-scale crises with guaranteed access, while U.S. flag shipping under a VISA and VTA would offer active, commercially viable ships that are more efficient and crewed by actively employed mariners. The RRF also provides militarily useful ships (mainly RO/ROs built or modified to carry heavy military equipment) that have relatively little commercial utility. RRF ships are supposed to be ready in days, but the age and condition of the vessels suggest that many could require significant maintenance before they are ready to sail. Actively sailing U.S. flag ships under a VISA or VTA might be available sooner. In addition, the age of RRF ships has made them increasingly costly to maintain. The more militarily useful RO/RO vessels there are in the privately owned U.S. flag fleet, the less need there is for the RRF, except as a source of specialized capabilities (the force was originally created to compensate for a too-small U.S. flag fleet).

It would take time to recruit mariners for RRF vessels, which are not actively sailing or crewed. Mariners for the RRF must be taken off privately owned vessels or hired through unions or contractors. Regardless of the RRF's limitations, the Government will probably need some vessels under its direct control, particularly specialized ships for military use that are not viable in commercial trade. This is likely to be the case regardless of how many U.S. flag ships are under a VISA or VTA. In addition, given the large deficits in capacity identified earlier in this report, some access to foreign flag tonnage will probably be necessary regardless of fleet mix.

In contrast, privately owned U.S. flag shipping under a VISA or VTA represents relatively new, well-maintained ships in active trade that can be quickly brought under the Government's direction in a contingency. U.S. flag ships are crewed by actively sailing U.S. merchant mariners. Actively sailing ships do not suffer from the low and often uncertain equipment readiness that afflicts the laid-up RRF. The larger the U.S. flag fleet, the larger the pool of U.S. merchant mariners. These ships are ready to sail immediately (instead of the five days or longer activation period needed for the RRF). A key downside of U.S. flag shipping is that some portion of this fleet would likely not be available for weeks—specifically, ships laden with cargo or sailing in a distant location.

However, U.S. flag shipping has many benefits. For example, private shipowners handle the purchase of new ships along with their maintenance, their crewing, and various issues that in the case of the RRF fall to the Government to manage. Private sector shipping tends to be more efficient. U.S. flag ships are also actively sailing, which means they have access to networks of port operators, relationships with cargo handling and logistics companies, influence at the International Maritime Organization, and so on.

Access to foreign flag shipping also provides benefits beyond additional tonnage and potentially mariners. U.S.-owned companies operating ships under open registries such as those of the Marshall Islands, the Bahamas, or Panama move in different trade networks than do U.S. flag operators. These networks might offer options for the U.S. Government in a contingency. They represent neutral shipping that might have certain advantages if U.S. flag ships were the target of attack. Goods might be moved relatively quietly on these neutral vessels, depending on the extent of adversary intelligence on their cargos.

Shipbuilding production options

Following a similar logic, options for growing shipbuilding capacity can be thought of on a spectrum from more to less direct access to shipbuilding industrial capacity. The smaller the industry in peacetime, the more the Government will have to rely on non-U.S. sources for new ships in wartime, assuming it needs newly built merchant ships. The Government would not have much direct influence over wartime production in foreign yards—whether it be mobilization and production times or design, construction, and supply chains. If the United States must have new ships built in a protracted war, building such ships in the United States is less risky (in terms of reliable access to shipbuilding capacity), other things being equal. Buying down this risk would require significant investment to grow the industry in peacetime.

We considered three illustrative options along a spectrum. These options include targets to double (2x) peacetime output from the current 3 to 5 ships per year to 6 to 10 or quadruple (4x) output to 12 to 20. Maintaining current production at 3 to 5 ships per year is also an option. Substantial industrial growth to 2x or 4x would probably be funded through additional U.S. build requirements imposed

on new entrants to U.S. flag, supplemented by direct subsidies to shipbuilders (e.g., shipyard grant programs).

Such targets are illustrations of possible options. The intention behind meeting these targets would be to achieve greater surge production potential in wartime by maintaining a larger industry in peacetime (defined as average yearly output). Production capacity, especially the ability to surge in wartime, is the good that the Government would be purchasing by subsidizing the construction of large commercial ships in U.S. yards. More shipbuilding capacity would also result in greater capacity to repair damaged vessels in a conflict, given the infrastructure and workforce overlaps across the construction and repair industries. Repairing damaged ships would take less time and investment than building new ones.

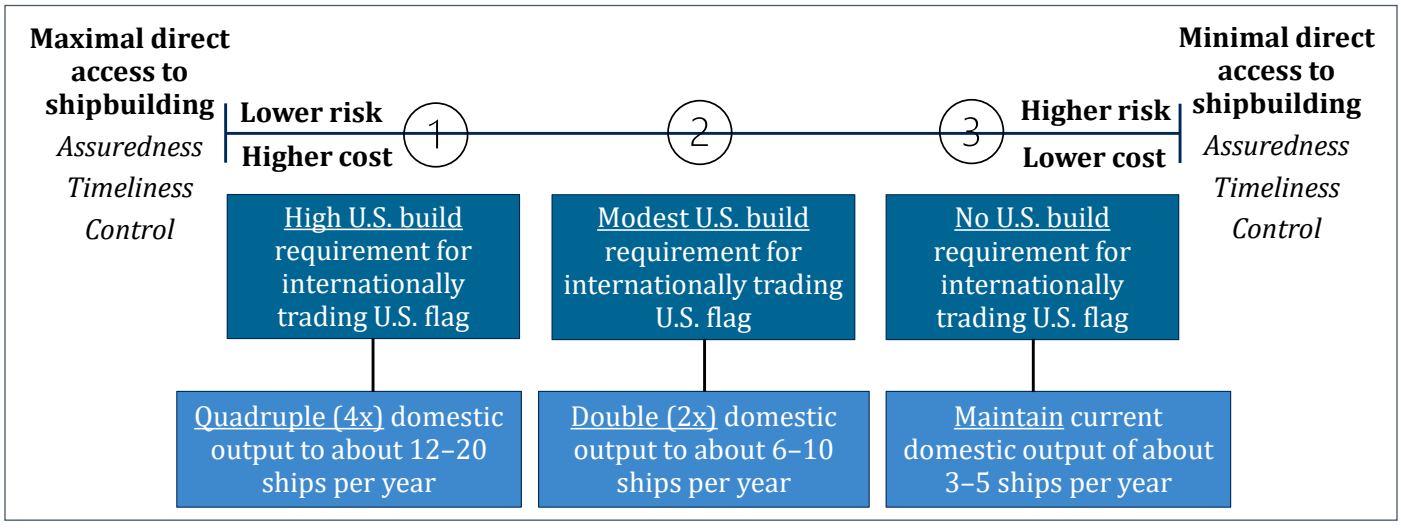
As noted in our analysis of shipbuilding requirements, a need to build commercial ships domestically would be predicated mainly on the country's shipbuilding needs in a protracted war. More U.S.-built ships in the U.S. flag fleet would be a non-vital byproduct of these subsidies, not the primary objective or strategic good. Through investments in commercial shipbuilding and repair—most likely through subsidized purchases of U.S.-built ships—the Government would be purchasing industrial capacity to surge construction in wartime.

Figure 2 depicts the spectrum we have described. In the figure, the dark blue boxes describe the overall concept behind each option. The light blue boxes illustrate the quantities that each concept might entail.

We considered three options to illustrate the potential choices and trade-offs. The idea was to help policy-makers think through growth in the shipbuilding industry, develop concrete targets, and link these targets explicitly to identifiable requirements and overall strategic aims. The three options we sketched out are as follows:

1. The lowest risk, highest cost option would be to attach a maximal U.S. build requirement to all privately owned U.S. flag shipping (phased in over time), including new ships for the RRF and prepositioning fleets, while engaging in a major expansion of U.S. assured access shipping.

Figure 2: Options for peacetime shipbuilding capacity



Source: CNA

A growth target of four times current capacity would entail increasing output from the current 3 to 5 ships per year to 12 to 20. Growth on this scale would enable the industry to replace likely wartime attrition via U.S.-built vessels in a protracted war, while modestly growing the merchant fleet in the later years of a conflict. Quadrupling current output would allow U.S. yards to replace all aging U.S. flag ships in international trade while adding about 6 to 10 U.S.-built ships to the assured access shipping fleet. If it takes 3 years to set the foundations for industrial growth and output increases by 3 to 5 ships per year thereafter, we estimate that it would take 15 or more years to double the size of the U.S. flag fleet to 180 U.S.-built vessels. It would probably take more than 20 years to triple the fleet to 270. This rate of growth assumes a steady requirement to build 3 to 5 ships per year to replace (i.e., recapitalize) aging vessels in the existing fleet. These are rough estimates.

2. A midrange growth option might involve a lower target of two times current capacity, or about 6 to 10 ships per year. This option would entail allowing some portion of the U.S. flag fleet to continue to be foreign built, while slowly shifting it to an all U.S.-built fleet over two decades. An industry with twice the current peacetime output would probably be able to replace about half of likely wartime attrition. Output of 6 to 10 ships per year would be enough for U.S. yards to replace aging ships in international trade and slowly change the composition of the internationally trading fleet to become all U.S. built in about 20 to 25 years. There would probably not be enough capacity to grow the U.S. flag fleet significantly via domestic production.

3. The highest risk but lowest cost option would be to leave the industry as is. Orders by domestically trading U.S. flag operators would continue to sustain a peacetime production rate of about three to five oceangoing ships a year with no additional financial support to the industry. U.S. yards would struggle to replace a quarter of likely wartime attrition to the U.S. merchant fleet during the early years of a conflict. The ability to repair merchant vessels early in a conflict would be limited as well. U.S. flag ships in international trade would continue to be built in non-U.S. yards, and the number of actively sailing U.S.-built vessels would not significantly grow.

U.S.-built ships would probably continue to be expensive compared to vessels built in more advanced South Korean and Japanese yards, and they may not, in the end, be internationally competitive—especially when it comes to standard ship designs. Some amount of cost premium may, therefore, be passed on to the customers of U.S.-built ships, whether the Government or U.S. flag operators. That said, commercial yards tend to require fewer workers per ship than are needed for more sophisticated and specially designed military vessels.

The United States could encounter various costs in a wartime environment if access to Japanese or South Korean shipyards were cut off, if supply chains were disrupted, or if production were to shift to Europe or the United States. The costs of rapidly shifting or growing shipbuilding capacity in a crisis or war could be significant. Growing the base from virtually nothing in a crisis would also be inefficient and driven by short-term needs. These dilemmas introduce further trade-offs between peacetime investments in the industrial base, when there would be time to plan for efficiency and strategic advantage, and emergency investments, which would involve racing to generate industrial capacity by whatever means necessary over a short time horizon.

These choices and trade-offs provide a sense of what a strategy on domestic shipbuilding might entail. If a

strategy aims to grow the industry, it is important for the strategy to have concrete targets that are clearly linked to defense and economic security aims.

Shipping versus shipbuilding

We put the above options together to address choices on shipping versus shipbuilding. Through our discussions with stakeholders and through two wargames conducted at CNA in July 2024, we found that there are important trade-offs between these two sectors. Subsidies for domestic shipbuilding would likely come at the cost of subsidies aimed at growing the size of the U.S. flag fleet—and vice versa. Additional U.S. build requirements for U.S. flag ships would drive up already high costs for U.S. flag ship operators relative to foreign competitors, given the significantly higher prices of domestically built U.S. ships compared to those built in Japan, South Korea, and China. Shipowners would need to have a business case that absorbs these added capital costs, which may require Government intervention to facilitate.

Should such intervention come in the form of additional subsidies to domestic shipbuilding, this may put downward pressure on subsidies designed to quickly grow the U.S. flag fleet, and vice versa. Requiring internationally trading U.S. flag operators to buy more expensive ships from U.S. yards (instead of continuing to allow U.S. flag operators to buy ships from Japan or South Korea, for example) would strengthen the domestic shipbuilding industry, but it would probably do so at the cost of the U.S. flag fleet. Shippers would have to offset the added costs of more expensive U.S.-built ships, which may require higher per ship subsidies to U.S. flag operators through MSP and TSP.

This analysis indicates two sets of competing strategic priorities, assuming commitment to moderate investments in growing the maritime industries:

1. **Investing in a large enough current fleet to absorb attrition at the outset of conflict.** The focus would be on maintaining enough capacity in peacetime to absorb losses at the outset and during the early stages of a potential conflict via a current fleet that is large enough to absorb attrition. Prioritizing the current fleet would give the military more operational flexibility during the run-up to and early stages of conflict. It would contribute to deterrence in peacetime by signaling to strategic competitors such as the PRC that the United States is investing more resources in ensuring that it can sustain a major conflict.

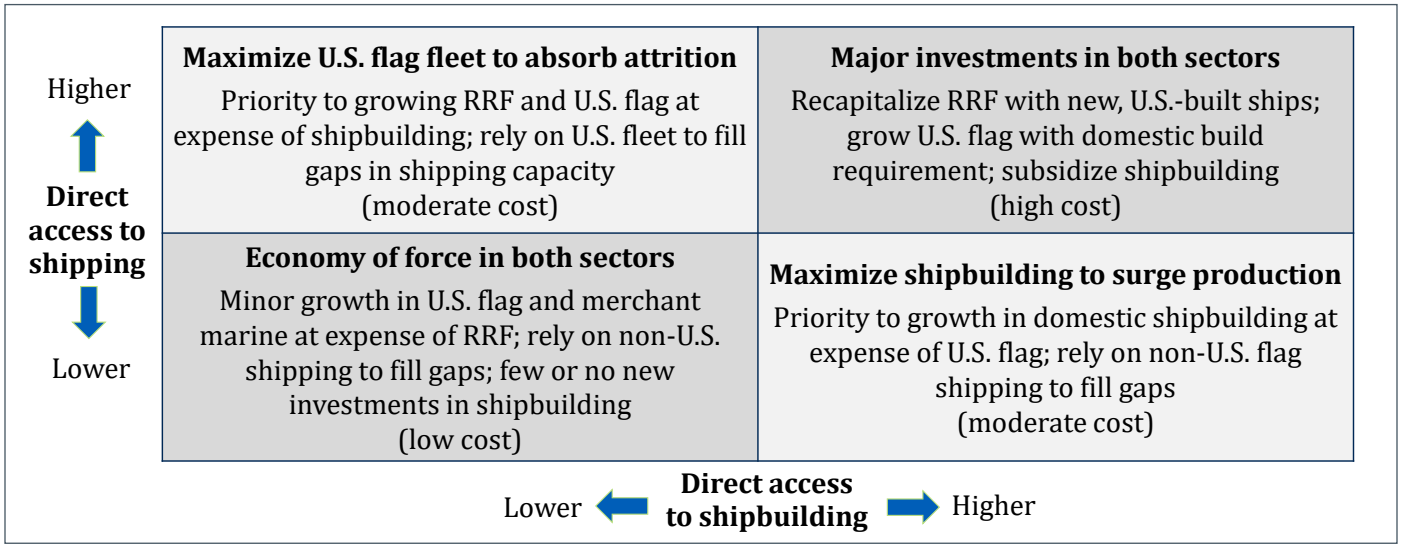
2. **Investing in the ability to build new ships during such a conflict for delivery several years after the conflict begins.** The focus would be on the capability to deliver new ships several years into a full-scale mobilization. Prioritizing domestic shipbuilding would grow the overall industrial base (its infrastructure, workforce, and supply chains) and increase the potential to build commercial ships and possibly military auxiliaries or other platforms (e.g., uncrewed) in a protracted conflict.

These trade-offs are illustrated in Figure 3 below. The upper left quadrant represents a moderate-cost option that prioritizes growing the current assured access fleet at the expense of shipbuilding capacity. This option would involve buying down risk to assured access at the outset of conflict via a larger U.S. flag fleet. The lower right quadrant denotes a moderate-cost option that prioritizes shipbuilding over the current fleet. This approach would involve buying down risk to assured access to new ships via a greater domestic shipbuilding capacity and a more robust shipbuilding industrial base.

The upper-right quadrant represents the highest cost alternative, which would be to invest in substantial growth in both sectors simultaneously. This option is an abstraction; absent a total mobilization, there will be finite resources and some need to prioritize across the two sectors. The lower left quadrant represents a low-cost option that entails little or no additional investment in either sector. An economy-of-force effort would compound difficult resource trade-offs and probably push policy-makers toward using limited resources to support the current U.S. flag fleet. Economy-of-force describes current policy.

Projected forward in wartime, the choice is between having another 30 to 40 ships at the outset of a conflict to respond to aggression and to absorb attrition or having the ability to build those ships over several years via a larger shipbuilding industrial base. The question for a national strategy is whether the benefits of a larger shipbuilding industrial base outweigh the advantages of a larger fleet.

Figure 3: Choices on shipping versus shipbuilding



Source: CNA.

Problem Sets and Courses of Action

In the following three subsections, we address strategic problems potentially standing in the way of achieving defense and economic security aims. For each set of problems, we lay out potential COAs that follow from our analysis and that directly address these problems. These proposed actions and the problem sets they address represent our input into the areas of effort of a national maritime strategy.

The first subsection addresses overarching, cross-sector problems and potential COAs. The second addresses issues specific to shipping and mariners. The third addresses shipbuilding. We addressed these problems and COAs in greater detail in several draft interim reports completed over the course of the study.

We based our framing of each problem and our recommendations on more than 75 engagements with private sector companies in the shipping and shipbuilding industries, U.S. Government agencies, and labor organizations and trade associations. We scrutinized these discussions and included only verifiable facts and inferences that logically followed from these facts. We also reviewed key independent studies and Government reports and have held continuing dialogues with Government and industry stakeholders.

We also based our analysis on two wargames on shipping and shipbuilding conducted at CNA in conjunction with MARAD. These games occurred over four days in late July 2024. They included approximately 100 participants from industry, Government, and maritime trade associations and labor organizations, as well as several congressional offices involved in maritime legislation.

Overarching cross-sector issues

In this section, we address a series of strategic problems and associated COAs that cross the shipping and shipbuilding sectors and, as such, represent overarching issues.

The strategic imperative for change remains poorly understood

The objectives implied in the Merchant Marine Acts of 1920 and 1936 have gone unmet for decades, especially regarding economic security. Policy-makers largely agree on the nature of the China threat, but the specific implications of this threat for the commercial maritime sector are unclear. This threat should be better understood to ensure resources match strategic aims. The commercial maritime domain as a whole is not as well understood as the air, ground, and cyber operational domains. It is also not well integrated into national security policy or defense planning. Policy-makers and the public would benefit from better understanding the importance of this sector to national security.

Analysis on national security–related maritime issues is thin outside the defense realm. Little research has been done on U.S. vulnerabilities to economic coercion or disruption. Relatively little is known about maritime supply chains that underpin U.S. trade and the industrial base. The U.S. Government does not maintain detailed information on these matters, and there is little usable analysis that might shed light on the nature or extent of the threat. Neither MARAD, which is in the DOT, nor the Department of Commerce track maritime supply chains and shipbuilding to the extent that is probably required to understand the threat.

Define the threat and the strategic imperative

The Government could work with the private sector to expand economic analysis on the commercial maritime domain and supply chains. The Intelligence Community could work with the Departments of Commerce, Transportation, Treasury, and State, as well as other agencies and trusted elements of the private sector, to develop an enduring program of analysis equivalent to DOW's study of adversary naval capabilities.

This analysis could be geared toward the widest possible scope and distribution. It could involve in-depth, long-range analysis as well as short-term reporting and dashboards. It could involve wargaming and outreach to experts and the private sector. It would, at a minimum, involve mapping the complex maritime supply chains that affect defense and economic security. Analysis could address various areas of the maritime domain—such as shipping, shipbuilding, ports, intermodal transportation, financing and ownership, and research and development—that tend to be treated separately and left out of national security planning. A single agency or consortium could be responsible for this analysis.

The Government would benefit from a clearer picture of the precise threat posed by China's market share in the commercial maritime industries—including what the PRC could or would do or not do, what vulnerabilities the United States has, and areas in which the United States might be able to create strategic advantage and mitigate disadvantage. National security planning would benefit from more information about the ability of other threat actors to manipulate maritime supply chains and disrupt freedom of navigation for naval forces and merchant shipping.

Threat actors should not be able to hide malign activities in the clutter of maritime traffic. To have a clear view of such threats, decision-makers must understand the state of maritime industries globally and where the United States fits into them. They need sources of information and analysis that are independent of special interests. Finally, policy-makers and the public would benefit from a better sense of the threat-based strategic risks associated with deficits in maritime capacity.

Define the requirements for economic security

The Department of Commerce could work with MARAD and other agencies to develop an official definition of economic security that could be used to estimate shipping needs. They could then develop official estimates of how much and what kinds of shipping will be needed to maintain vital seaborne trade in a major conflict or other world crisis in which global shipping has been disrupted. These estimates would be prerequisites to developing viable contingency plans for economic security. Presently, the Government does not fully know what the risks would be to the economy in a global economic crisis that affects shipping. We found through our research into economic security needs that no such estimate exists. We also found little guidance, analysis, or scenarios upon which to base an estimate. Government economic data are not well suited to estimating these requirements.

Raise public awareness of maritime issues

The U.S. Government could launch a national campaign to elevate the public profile of maritime issues across all sectors (shipping, ports, supply chains, climate, ocean resources, etc.). A campaign could educate the public on the importance of protecting freedom of navigation and ocean resources and their

relationship to national security in an environment of intensifying global strategic competition. It could provide education on how the maritime sector affects Americans' daily lives. MARAD could lead this campaign with the private sector and key agencies such as the Navy, Coast Guard, and the National Oceanographic and Atmospheric Association (NOAA).

The maritime sector is far less visible than ground or air transportation. People do not travel on ships as they do on planes, vehicles, or railways. The maritime sector may require a level of deliberate outreach that other modes of transport do not. Few Americans are aware that all but a tiny portion of U.S. seaborne trade is carried by ships sailing under a foreign flag.

Develop a more coherent, outward-facing depiction of nonmilitary maritime capabilities

MARAD could work with TRANSCOM and the private sector to develop a clearer depiction of the totality of nonmilitary shipping, shipbuilding, and U.S. mariners. It is important for experts and nonexperts alike to have a clear, cogent picture of this capacity. In our analysis of defense and economic security needs, we used the term *assured access shipping fleet*. This is an example of an overarching term that communicates assured access in a contingency of nonmilitary ships that can move people or material in a national security emergency (whether for defense or for economic security).

The ships potentially available to support defense or economic security needs come from an array of fleets—some Government owned and others privately owned. Multiple agencies operate ships crewed by civilian mariners. Many U.S. flag and U.S.-owned companies operate ships. The mariners who crew them come from different places. Adding to this complexity, different types of ships serve different purposes (e.g., RO/ROs versus containerships versus tankers). The military's sealift needs are diverse, as are the requirements to maintain seaborne trade in a contingency. It is important that MARAD has a way to describe, explain, support, and employ these nonmilitary maritime capabilities as a single capability.

Wartime national mobilization needs are not well accounted for

TRANSCOM releases information on commercial sealift needs for defense in the context of a major conflict. The related requirements are relatively well known and summarized in our analysis in a previous section. However, there are no official estimates of economic security needs in a wartime situation. There is little guidance upon which to formulate even an educated guess. The concept itself is not clearly defined. In our analysis of economic security requirements, we had to develop our own estimates of wartime shipping needs to maintain seaborne trade.

Other important aspects of commercial sealift are also not well accounted for. One is the role of the commercial shipbuilding industrial base—its infrastructure, workforces, and supply chains—in a total wartime mobilization. Another is the role of MARAD in a major contingency—its authorities, organization, and interface with DOW and with industry. The U.S. homeland is no longer a sanctuary, given the reach of new weapons and the increasingly global character of communications and other technologies critical to the private sector. These systems—including those in port facilities and operated by shipping companies—are vulnerable to attack in a crisis or conflict. Such attacks could hamper wartime mobilization.

Estimate wartime needs across all sectors—trade, defense, shipbuilding, and sealift

MARAD could work with the appropriate office in the Department of Commerce to develop official

estimates of wartime shipping needs. These estimates might focus on the numbers and types of ships that may be needed to maintain continuity of U.S. seaborne trade in a major conflict in which global maritime supply chains have been substantially disrupted. Such an effort would begin by defining *economic security* with enough fidelity to enable useful estimates and as a point of departure for anything having to do with this mission. This effort would also involve collating trade data to make useful estimates possible. Our analysis on economic security requirements could provide some ideas on how to approach this effort.

MARAD and TRANSCOM should also define what will be needed in peacetime to enable surge and mobilization in wartime. Shipping and shipbuilding are considered strategic industries mainly because of their role in defense in the context of major conflict. These sectors could be fully integrated into mobilization plans, which could then be used as a basis to develop official estimates of required capacity.

Commercial shipbuilding especially may require examination, given that (more likely than not) it would be strategically vital only in a total mobilization scenario. The U.S. Government would need to estimate what shipbuilding capacity is necessary in peacetime—including how many of what kinds of ships should be built annually—to maintain the potential to surge to enable adequate wartime surge. The focus could be broad to include workforces, infrastructure, and supply chains across the commercial and military sectors. It should also include equivalent estimates of ship repair capacity needed in commercial yards.

Define wartime roles, missions, and responsibilities for MARAD and other agencies

MARAD could work with TRANSCOM to define roles, missions, and responsibilities in wartime. MARAD's expertise and relationships regarding commercial shipping and shipbuilding would give it a central role. DOT would likely interface closely with DOW in any contingency of significant scale. The way MARAD functions in such a contingency may not be the same as it does during normal operations. Its structure, staffing, and interface with other agencies and with industry would be likely to change significantly.

Prepare for the potential to seize adversary ships in wartime

DOW could prepare for the potential to seize ships sailing under the flag or beneficial ownership of adversary nations and to make use of these vessels in a conflict. This mission is not one that the military is generally accustomed to or that receives high priority, though there is precedent going back to WWII, when U.S. forces requisitioned foreign flag ships at sea and in port. The more tonnage that can be requisitioned in a conflict, the less would need to be built in the United States or purchased from non-U.S. operators or foreign yards.

Preparing to seize ships would require identifying capable crews for these vessels. The critical wartime shortage for the United States may not be vessels; if global trade is seriously disrupted, there may be no shortage of laid-up ships available for rent or purchase. Rather, the shortage may be of willing, reliable, and able mariners. It is unlikely that crews of seized ships could be relied upon to sail on behalf of the United States or its allies. It is possible that some foreign crews may be counted on to sail into contested waters, given sufficient compensation; however, many may not.

Policy, guidance, and organization are not well integrated

No strategy or other guidance ties together the disparate elements of the maritime domain, including the military and commercial sectors. There

is no widely accepted framework or idea. Free trade and globalization have limited the Government's role in maritime affairs compared to nations such as China.

Maritime governance is dispersed and fragmented. MARAD is a small agency with limited resources and authority, particularly regarding national security. Its mission is to promote and work with industries over which it has little leverage. MARAD's ability to guide (much less direct) change is limited. The same can be said of interagency coordination bodies such as the U.S. Committee on the Maritime Transportation System.

The Federal Maritime Commission (FMC) and the Office of the United States Trade Representative (USTR) have the power to impose economic sanctions in response to malign activity, but they do not have a national security mandate. Their authorities are used to enforce antitrust and trade law, not necessarily to respond to coercive economic activity and defend U.S. interests abroad. The Navy has a national security mandate, but that mandate extends from the nation's shores outward, not inward to the domestic economy and the private sector.

Develop a single, overarching maritime policy that applies across agencies

MARAD could integrate its national maritime strategy with a naval forces strategy promulgated by the Department of the Navy. MARAD could develop a single, overarching strategy that encompasses the military and nonmilitary and the public and private sectors. It could integrate maritime defense and economic security aims. A single policy would streamline the mosaic of scattered authorities regarding commercial maritime issues.

An overarching strategy would encompass maritime aspects of defense such as industrial base supply chains, alliances and partnerships, and freedom of the seas. It would guide intelligence, international agreements, maritime commerce, oceans policy, and so forth. MARAD would need to partner with the Department of the Navy on this type of national maritime strategy. At the very least, MARAD could be a participating signatory party to the next tri-services maritime strategy.

What has gone by the name of maritime strategy in the past has been limited to naval forces; it has not substantially addressed the commercial sector and nondefense issues. MARAD and NOAA have not been signatories, and key commercial partners have not participated. The PRC, by contrast, has a well-integrated approach to the maritime domain. Its naval and maritime auxiliary forces work closely together, and many of its commercial and military shipyards are co-located. U.S. allies such as Canada and the United Kingdom (UK) have integrated maritime strategies. Canada's strategy includes a single long-range shipbuilding plan that addresses military and commercial construction.

Establish a permanent maritime organization with appropriate resources and mandate

Congress could establish a permanent organization in the Executive Branch that is adequately staffed and resourced and that has a broad national security mandate. The organization could be responsible for integrating national security aims across all elements of maritime power, defending U.S. interests abroad, and addressing supply chain vulnerabilities.

Such an organization would need more authority, staffing, and resources than those currently vested in MARAD, and its mandate would have to be broader. Such an organization would be responsible for national security issues that relate to commercial shipping, shipbuilding, ports, and so forth. It would

need to be able to develop and execute economic statecraft initiatives with a focus and precision that is not possible in the current structure.

A central maritime organization would lead action across numerous Executive Branch entities such as the Departments of War, State, Commerce, and Treasury; the USTR; the FMC; and the Intelligence Community. It would ensure that economic and diplomatic tools are leveraged across the U.S. Government. It would track efforts by the PRC to manipulate maritime supply chains.

Considering the long-term issues at stake, such a maritime office should be permanent and not subject to changing presidential administrations and temporary White House staff structures. A permanent maritime organization could operate like a military service responsible for long-term force structure planning and budgeting.

It would take a fully staffed, resourced, and empowered organization to streamline programs and achieve unity of effort across maritime governance, given how fragmented these sectors are within the Government. Authorities are often not used to their full extent or coordinated across disparate agencies toward well-understood strategic aims.

MARAD could serve in this role but is not able to do so at present. It does not have the resources or the national security mandate necessary to drive disparate agencies and private sector entities toward broad strategic aims.

International relationships and agreements are undeveloped

Agreements (or even broad understandings) with allies and partners in the nonmilitary sphere of the maritime are not well developed. There are also few tools of maritime economic statecraft with which to push back on the PRC's growing dominance in shipping and shipbuilding and its ability to leverage its market share for non-economic ends. The United States is a free-trading nation that has tended to view shipping as a globalized industry rather than an arena for interstate competition.

Commercial shipping and related industries in the global maritime supply chain play an important role not just in strategic sealift but also in strategic competition more broadly. There is more the U.S. Government could do with allies and other friendly nations, open ship registries, and companies to blunt the PRC's growing advantages in this area. MARAD, the DOS, and the Navy would be natural partners in this area. The PRC has been acting aggressively in maritime commerce and has been doing so in a unified and deliberate manner, whereas Western nations and their companies have been pursuing individual economic interests in a largely uncoordinated manner.

Pursue agreements with allied governments and friendly nation shipping companies

MARAD could work with DOS to expand bilateral and multilateral agreements with allied nations that have access to substantial shipping fleets. European carriers continue to dominate the global shipping markets and represent a vast pool of potential shipping capacity that the United States may be able to tap into in an emergency.

DOS could take on a more expansive role in maritime affairs, including negotiating access agreements with non-U.S. companies. MARAD's role could expand beyond promotion of U.S. industry, including securing access to non-U.S. capacity to fill the substantial gaps identified in this study.

MARAD could build on its current work with NATO countries on strategic sealift to reinvigorate NATO shipping bodies and develop planning boards with allies in Asia. Shipping agreements with South Korea

and Japan could be expanded to account for the realities of the Pacific theater and wartime threats to shipping.

Work with allies to expand their pool of assured access shipping

MARAD, DOW, and DOS could work with NATO to expand the alliance's pool of assured access shipping from the approximately 15 privately owned vessels that it has today to a fleet that approximates the RRF and U.S. flag ships under VISA and VTA. NATO maintained access to hundreds of ships for sealift in the 1990s. Responsibility for maintaining this capacity and making it available later reverted to member states' national policies. The pool has since shrunk to a level significantly below what the United States maintains in the RRF and the U.S. flag fleet engaged in international trade.

Following the model of the AUKUS partnership (the United States, Australia, and the UK), the United States and allied nations could create a pool of reliable access shipping and shipbuilding capacity with European and Asian allies. This might include pledges to help resupply allies in a conflict in exchange for reciprocal efforts by allies to make more shipping available. Alliance-based agreements and consortiums could enable economies of scale. Strategic partners such as India could join. Participants could hold dialogues on global supply chain resilience, maritime security, and other matters of common concern to governments and shipping companies. The United States could design policies that favor friendly nations who agree to participate.

Shipping and mariners

In this section, we address a series of strategic problems and associated COAs specific to shipping and mariners.

China's companies own a large portion of the world's shipping

The PRC has more than 5,500 merchant ships, compared to fewer than 200 under U.S. flag and fewer than 600 that are U.S. owned and operating under foreign flag. This disparity may be a strategic vulnerability for the United States, given what the PRC could do or threaten to do against global supply chains and shipping companies. China's COSCO (a state-owned company) has the largest tanker fleet in the world. The PRC is an authoritarian state with a quasi-command economy; it can integrate commercial and military enterprises to a degree that is not feasible in a democratic, free-market society. Its merchant fleet is an extension of its navy, coast guard, and gray hull fleets.

Extensive port ownership likewise supports strategic aims. China's companies have a near monopoly on the production of shipping containers. They also own a large share of ship repair capacity that U.S. and other Western shipowners rely on for maintenance (especially of tankers), though this industry remains relatively distributed globally compared to the construction of ships and containers. China's companies have access to sophisticated cargo tracking technologies that give them the potential to manipulate maritime supply chains in ways that would not be possible in the United States. Beijing can quickly assume control over these enterprises in a crisis.

Diversify access to shipping and limit China's market share

Incentive programs, import taxes, and international agreements could be designed to diversify access to shipping and contain or reduce China's market share, particularly in areas such as shipping containers and commercial ship repair, in which near monopolies, anticompetitive practices, and vertical integration

(e.g., consolidated ownership of shipping, containers, ports, and repair) could pose threats to global trade.

Additional tonnage taxes could be imposed on PRC flagged or PRC-owned ships calling at U.S. ports, thereby driving up the cost of moving cargo on these vessels compared to ships owned or flagged in other nations. Beijing might struggle to respond effectively in kind, given that the U.S. flag fleet is small in comparison to the PRC-owned and PRC flagged fleet and that it tends to focus on trade with nations other than the PRC.

The U.S. Government could identify redlines beyond which PRC ownership poses too much risk; such redlines could be the PRC causing a major disruption during a crisis or manipulating supply chains in peacetime. Antitrust policy may offer guidelines. Powerful authorities such as those held by FMC, USTR, and the U.S. Treasury Department could be leveraged to deter predatory behavior by the PRC and the maritime enterprises it influences or controls.

There is currently no consensus on, and little understanding of, the extent to which China may be able to apply such pressure and what, therefore, should be the redlines that trigger Western nations to take deliberate action. European shipping companies together still own more of the world's shipping than PRC companies do. However, European shipping companies are domiciled in different nations and operate as free-market actors in a highly globalized business. They would not be well positioned to resist a concerted effort by the PRC to exert pressure on global shipping through coordinated action among the enterprises under its direct control or influence.

It is more expensive and difficult to operate under the U.S. flag

U.S. flag ships are more costly to operate and are thus unable to compete effectively in global shipping markets. The largest cost driver is U.S. crews, which command higher salaries and benefits and fall under U.S. labor laws that allow hefty lawsuits for at-work injuries. U.S. flag carriers compete with ships under registries that have few restrictions and regulations.

Open registries operate like businesses offering lower costs and easier processes. The more reputable registries abide by international standards and face few restrictions or additional taxes at ports around the world, thereby diminishing the relative value of U.S. flag ships. U.S. operators can easily reflag from U.S. flag to an open registry but not the other way around. Shipowners reflagging to the U.S. flag must go through stringent credentialing and learn more complex regulations. Without subsidies or cargo preferences, shipowners would have little reason to trade internationally under the U.S. flag.

Expand U.S. flag subsidy programs and ensure they adequately cover costs

Operating subsidies for U.S. flag ship operators will need to keep up with actual costs to be attractive to shipowners. The programs could be more flexible to account for different cost structures across different ship types. The programs could also be made more competitive and cost-effective by, for example, competitively rebidding slots in the programs after a reasonable period.

Reform workers compensation laws for mariners

Workers' compensation may be an area in which U.S. flag costs might be reduced. Congress could reform workers compensation laws for U.S. mariners to bring them into line with those for shoreside workers. This would involve capping liabilities, handling most claims out of court, and reducing the potential for major lawsuits that drive up insurance rates and create liabilities for shipowners. The idea would be to base reforms on existing concepts for longshoremen.

Congress could consider amending the Longshoreman and Harbor Worker Act (LHWA) to include merchant mariners aboard all U.S. flag vessels as eligible claimants under the act. The provision could be codified as the "exclusive" remedy while simultaneously repealing the provisions of the Jones Act, which create a right of recovery. A dual-track approach could be applied in which an injured sailor could elect between the LHWA or Jones Act on a pilot basis.

Streamline the U.S. flagging process and simplify regulations

Congress and the Coast Guard could simplify credentialing for U.S. flag ship operators. Programs aimed at easing the process for interested shipowners may also help. The United States could accept reputable international credentials and relax some rules to match common international standards. Congress could reduce or eliminate the ad valorem tax on internationally trading shipowners who have their vessels repaired outside the United States. The tax puts additional financial burdens on U.S. flag shipowners and is widely viewed as ineffective. It rarely exceeds the savings from using repair yards abroad, and the proceeds are not reinvested in maritime programs.

Eliminate tonnage tax waivers on appropriate foreign flag ships

The Government could cease granting waivers on tonnage taxes for foreign flag ships calling at U.S. ports from countries that do not waive equivalent taxes on U.S. flag vessels. The Government could then invest that added revenue into U.S. flag ships. Under current policy, the tonnage tax for ships calling at U.S. ports is waived on visiting foreign ships if the other country waives a similar tax for U.S. vessels visiting that country's ports. Current policy gives waivers to large numbers of foreign ships calling on U.S. ports without receiving reciprocal waivers in return. The United States receives comparatively little benefit in return for its tonnage tax waivers because the number of U.S. flag ships engaged in international trade is very low.

The waiver system originally helped ensure that U.S. ships calling at foreign ports would not be subject to excessive tonnage taxes. This system was more applicable in past decades when the United States had a large flagged fleet. A better approach could be to eliminate waivers and reinstitute the tax on those ships flagged in states that rarely host U.S. merchant vessels. For those few U.S. flag ships that derive a benefit from the waiver system, the U.S. Treasury Department could indemnify them or provide a tax credit for any tonnage taxes they incur.

A small U.S. flag fleet leads to few mariners and little influence

U.S. flag operators are the primary employers of U.S. mariners on oceangoing ships (other than Government service). The merchant marine has no ready reserve. The small inelastic market for mariners in the United States is a constraint on rapid growth of the U.S. flag fleet. It also inhibits the flexibility and bench to replace attrition or surge to a high operational tempo in a major crisis. The small size of the U.S. flag fleet also means that the United States has little influence in global shipping forums such as the United Nations' International Maritime Organization.

Grow the U.S. flag fleet through expanded subsidies and commercial cargo preference

Another way to grow the U.S. flag fleet—and by extension the number of active U.S. mariners—would be to grow the maritime, tanker, and cable security subsidy programs (MSP, TSP, and the Cable Security Fleet). When it comes to commercial sealift, assured access capacity directly correlates subsidies to shipowners.

Cargo preference is another policy intended to support the U.S. flag fleet. Expanding the Government's cargo preference percentage of non-DOW goods and more stringently enforcing the requirement would generate some additional support.

However, to grow the fleet substantially through demand, cargo preference would need to expand to include commercial goods. Congress could either require or incentivize companies with cargo to ship to contract with U.S. flag ship operators. Such requirements or incentives might involve reviving proposals to encourage a substantial portion of U.S. liquified natural gas on U.S. flag vessels. Commercial cargo preference could expand to other facets of seaborne trade as well. Congress could achieve this expansion through tax credits or reimbursements to U.S. companies that put their goods on U.S. flag ships. Programs could incentivize companies to sign long-term contracts with U.S. flag shipping companies or to develop their own U.S. flag fleets.

Labor market changes are compounding mariner shortages

The United States is facing a critical shortage of mariners that is exacerbated by labor market and demographic trends. U.S. flag ships are legally required to employ U.S. citizen mariners, who command higher wages. The supply of potential mariners is low relative to demand. Shortages are especially acute among Navy-employed mariners.

U.S. flag shipping involves more stringent credentialing standards and compliance with U.S. labor, environmental, and other regulations. U.S. mariners must pay domestic income taxes on earnings at sea, unlike mariners from many other seafaring nations. Shipowners in Government programs and in the private sector have had difficulty recruiting and retaining mariners for positions that require extended time at sea when there are other high-paying jobs ashore.

Increase compensation for U.S. mariners and reduce or eliminate taxes for at-sea time

Congress could reduce or eliminate federal income tax for mariners for their time at sea. Taxes for mariners could be brought in line with those of military and diplomatic personnel. Lower taxes would incentivize more people to become and to remain mariners and may reduce labor costs. A number of seafaring nations in Europe provide tax breaks for their mariners, especially when they serve outside the country's territorial waters.

Stand up a U.S. merchant marine reserve

Creating a reserve force of trained mariners would enable rapid deployment in crises, similar to military reserve models. This structure would ensure that inactive or unemployed mariners retain their skills, increasing flexibility and readiness in an emergency. The reserve could include retired Navy and Coast Guard personnel with the right skills.

Expand MARAD recruitment and career awareness programs

Congress could authorize expansion of MARAD programs aimed at raising awareness among young people regarding opportunities in the merchant marine fleet. This effort would entail growing programs aimed at high schools and vocational-technical and trade schools. The Government could increase scholarships to merchant marine cadets to more fully cover the cost of tuition and incentivize students to sign a service agreement.

Develop an accurate and comprehensive tracking system for U.S. mariners

Establishing a system to track active mariner credentials and creating a merchant marine reserve would ensure the availability of mariners in emergencies. Similar reserve structures exist in the United States for military branches and other critical fields, providing a reliable pool of trained professionals ready to serve when needed.

Provide a path to U.S. citizenship for a limited number of non-U.S. mariners

Offering citizenship pathways for noncitizen mariners who serve on U.S. flag vessels could help address labor shortages—particularly for certain positions for which there are critical shortages. Provisions for at-sea time could be part of these arrangements. The skilled labor EB-3 work visa category could apply to mariners in high-demand billets that U.S. flag ship operators and Government agencies such as MSC are unable to fill. There are no provisions in immigration law that allow preference for high-demand workers in the maritime industries.

Shipping is a globalized business with complex ownership

More than 98 percent of U.S. trade moves on non-U.S. flag vessels over which the United States has almost no influence beyond regulations that it imposes on ships calling at U.S. ports. The United States has some ability to shift its maritime supply chains to reduce dependence on China or contested sea lanes, but options are limited and may drive up prices in some areas and therefore come at a cost to U.S. trade and consumers. The U.S. Government—and even U.S. companies—would benefit from greater knowledge of these supply chains.

Complex, opaque ownership is the norm in many parts of the shipping business. Free-trade nations' governments have little visibility, much less influence. Most U.S.-owned shipping is flagged under open registries abroad that may not be accessible to the United States in a contingency. Even if U.S. ownership can be established, gaining access would not be easy or quick. U.S.-owned vessels under foreign flag do not necessary fall under U.S. or allied naval protection.

Focus on U.S. flag ships under the VISA and VTA to meet defense and economic security needs

The globalization of shipping and its increasingly complex ownership and financing reinforces the need for a substantial fleet of ships that are registered under the U.S. flag and have signed a VISA or VTA. Although this study recommends seeking access to foreign flag shipping as a hedge against limited U.S. capacity, access to non-U.S. capacity is uncertain and is no replacement for U.S. flag ships. This uncertainty is especially a concern with ships under open registries, many of which are owned by private equity firms and shell corporations. The need for dedicated U.S. capacity is greater than ever given how financing in the industry has evolved and where it is heading.

Identify U.S. owners of non-U.S. flag ships and develop contingency agreements

MARAD could track U.S.-owned foreign flag shipping and use this information to develop agreements with the companies involved. These agreements would clarify how the United States could gain access in a contingency, especially an economic crisis involving major disruptions to global shipping. These vessels could serve as neutral shipping during a contingency in which an adversary is targeting U.S. merchant ships. Working with friendly registries,

MARAD and TRANSCOM could develop a viable list of reliable carriers that potentially could serve as a hedge against the limited U.S. flag fleet. More reliable foreign carriers could be used to backfill domestically trading U.S. flag vessels temporarily, which are needed for sealift in a conflict.

The Defense Production Act enables the Government to assert authority over U.S.-owned assets in a national emergency. A prerequisite for these authorities is basic information on ownership and knowing who to talk to in an emergency. MARAD could work with the major open registries to track "beneficial ownership." U.S. and friendly nation companies may be willing to assist the Government if there are adequate incentives, agreements, and relationships.

Track U.S. cargo globally and map financial networks in the shipping industry

The United States could develop a global tracking system for all U.S. seaborne trade, akin to what is reportedly in use in China. The Government could require more transparent financial disclosures on the part of companies doing business in the United States, especially those involved in the movement of vital cargos. Carriers moving defense industrial base goods could, at a minimum, be required to disclose beneficial ownership.

Commercial and military shipping are increasingly divergent

For years, commercial shipping has been trending toward larger ships with smaller crews that rely on developed deepwater ports. Commercial shipping has also moved toward alternative fuels. Military shipping needs have been trending toward smaller ships that can hide from missiles and unload at smaller ports.

The military needs ships that use reliable, easy-to-access petroleum fuels. It also needs smaller tankers and ships that can carry heavy military equipment. As a result, fewer commercial ships meet the military's requirements, given current (and likely future) force structure and employment concepts.

The emergence of nonfossil fuels in shipping and their adoption in certain markets has created uncertainty about future fuel standards. Ships have lifespans of 30 years or more, so shipowners (especially smaller operators) must be conservative about the bets they make on alternative fuels— whether it be ships that run on these fuels or ships that carry them.

Align defense needs to the realities of commercial shipping and alternative fuels

As global shipping trends move gradually toward alternative energy sources, the military could plan for a future fleet that relies less on fossil fuels. This plan could involve reducing demand through force structure and employment changes, access to specialized tankers capable of moving nonfossil fuels, and alternative propulsion for some ships or aircraft.

DOW could develop plans to effect this change gradually, given that the fuel transition is likely to occur incrementally in the shipping sector. Ships have service lives of 20 to 30 years; those purchased recently or soon may be in operation for decades. DOW could adopt a total force structure planning approach across the military and commercial sealift fleets that accounts for these multidecade shifts in global shipping.

Spur research and development into new fuels and shipping technologies

The fuel transition is likely to occur more rapidly on the commercial side. Private sector operators may face market pressures to explore alternative

fuel options. They may benefit from investing in new energy—whether it be ships that run on new fuel sources (including nuclear power) or ships that carry alternative fuels (e.g., specialized tankers). New technologies developed and adopted in the commercial sector might prove useful to the military and spur relevant defense innovations. The private sector is ahead of DOW when it comes to research into and fielding of nonfossil fuels.

Shipbuilding

In this subsection, we address a series of strategic problems and associated COAs specific to commercial shipbuilding in the United States.

U.S. shipyards are more costly and unable to compete globally

U.S.-built oceangoing commercial ships can cost as much as four times world market rates.[27] The cost differential has grown since shipbuilding subsidies ended in the early 1980s. Purchasing U.S.-built ships is not financially viable for U.S. shipowners absent additional subsidies. In addition, whether large-scale Government investments would lead to either a more competitive industry or much lower per-unit costs is uncertain.

Describe the business case and set clear targets

Government and industry could work together to develop a defensible business case for investment in domestic shipbuilding, ensuring there is both a strategic imperative and the potential to gain competitive market share. Efforts at a business case might include examining the role of subsidies and other government support in countries that have successfully gained dominant market share. It could involve examining the PRC's approach to integrated investment across national security and business sectors—such as China's combined approach to building commercial and naval ships and its targeted investments in future shipping technologies and alternative fuels.

Substantial investment in noncompetitive sectors such as commercial shipbuilding would need to be accompanied by a compelling business case that links investments to significant progress toward strategic aims. There should be clear linkages to national security for these investments to be considered strategic. A strategy could set clear, measurable targets that programs and investments must meet. Implementation guidance could include yardsticks to assess the degree to which proposed actions and investments align with strategic aims. MARAD could be the agency responsible for developing and monitoring these metrics.

Expand adoption of commercial best practices for government shipbuilding programs

The National Security Multi-Mission Vessel (NSMV) program, managed through a private company but overseen by MARAD, represents what is possible outside of DOW's historically problematic acquisitions process. The ships were delivered on time and on budget for significantly less than what it would have cost to build through the Navy or Coast Guard. Adopting modular designs and mass production, particularly for auxiliary or low-end vessels, might streamline manufacturing and enable rapid scaling in crises.

[27] John Fritelli, *U.S. Commercial Shipbuilding in a Global Context*, Congressional Research Service, Nov. 15, 2023, https://crsreports.congress.gov/product/pdf/IF/IF12534.

Commercial and military demand is uneven and uncoordinated

The commercial shipbuilding industry depends on Government demand for stability. Private sector demand is limited to a small market of domestic U.S. flag ship operators who do not generally coordinate orders for new ships. The result has been a boom-bust cycle. Government demand has helped but has been inconsistent. There is no commercial equivalent of the Navy's 30-year shipbuilding plan, which sends a clear long-term demand signal to builders of Navy ships.

Significant differences exist between what is needed for military versus commercial ship construction. Commercial yards compete with military yards for skilled workers and other key personnel in short supply. Nonetheless, there are overlaps and potential areas of mutual support. There has been little crossflow or integration across the two sectors—whether in ship designs, construction, management practices, or supply chains. There are some exceptions with larger yards that have a history of building ships for the military (e.g., the National Steel and Shipbuilding Company, Hanwha Philly Shipyard, Bollinger shipyards) and some smaller yards that build defense components.

Develop a 30-year shipbuilding and acquisition plan for the commercial sector

The Government could develop a single 30-year shipbuilding and acquisition plan that addresses the totality of domestic shipbuilding and repair as well as foreign purchases across all Government agencies and the commercial and military sectors. Nested under this larger plan could be a 30-year national shipbuilding plan for the commercial sector that addresses commercial practices and designs, establishes a clear demand signal, identifies peacetime production needs to enable wartime surge, and carves out a role for commercial yards in a major conflict. Both plans will be needed to identify synergies across the two sectors and to ensure that the much smaller commercial shipbuilding sector receives the attention that it requires.

Such a plan might balance domestic production and the purchase of foreign-built vessels. It might also account for future trends in new types of fuels, shipping technologies, global shipbuilding, and the composition of global shipping fleets. Repair and construction should be included. A 30-year shipbuilding and repair plan could address the growing divergence between military and commercial needs and associated trade-offs. The plan could drive integration of designs, production processes, workforces, and infrastructure across the commercial and military sectors. It could be nested under an overall maritime strategy that comprehensively addresses military and nonmilitary issues.

Establish valid requirements and designs for commercial shipbuilding in wartime

DOW, in partnership with MARAD, could develop an authoritative, analytically based estimate of the total shipbuilding capacity that will be needed across the military and commercial sectors during a major conflict. This estimate might clarify the role of commercial shipbuilding and repair in a total mobilization (i.e., what kinds of ships and how many). Such an estimate would be a necessary first step to developing a 30-year shipbuilding plan for the commercial sector. In our analysis of wartime needs, we were unable to identify a logical, empirical justification for commercial shipbuilding in wartime. This was partly because we were unable to identify scenarios, analysis, or guidance on which to base such a requirement, given how long it takes to build ships, the limited nature of U.S. production capacity, and the likely duration of a major conflict.

The Navy could work with MARAD to establish a credible demand signal and to clarify the role

of commercial industry in wartime shipbuilding and repair; for example, commercial yards could build decoys, uncrewed vessels, auxiliary ships to commercial specifications, and so on. The Government could then work with industry on a set of common ship designs for wartime production. These "break-glass" designs could be put into immediate production in commercial yards. The idea would be to have up-to-date designs for ships that are militarily useful but built to commercial specifications—preferably ships that can be built quickly and in large numbers.

An estimate of requirements should describe the character and size of peacetime production that will be needed to enable adequate surge in wartime. Future demand could then be calibrated to maintain this type and level of capacity. Estimates could include wartime contracting needs, emergency infrastructure and workforce expansion, and supply chains (which operate differently in the commercial sector than they do in military construction). These estimates could be premised on total mobilization of the commercial and military shipbuilding base and invocation of the Defense Production Act.

Workforce, technology, and infrastructure challenges are acute

There is a national shortage of qualified shipyard workers, and this shortage will likely continue for years because of economic and demographic changes that have been underway for a long time. South Korea and Japan have more advanced workforces, infrastructure, and technology.

Conduct a national survey of the shipbuilding industrial base workforce

It may be useful to conduct a national inventory to document precisely the skill shortages in shipbuilding. MARAD or DOW could consider expanding and funding programs such as those run by the Hobart Institute to provide journeyman-level training. Other high-demand skills that could warrant Government-funded training programs include fabricators (composite and metal), plumbers and pipefitters, electricians, machinists, and heating, venting, and air conditioning (HVAC) technicians.

The programs could provide incentives such as free tuition contingent on satisfactory performance and a living stipend if a student formally agrees to a period of employment in the industry after graduation. Educational institutions could apply for special grant funding to expand their training facilities and staffing to support specific skills that are in short supply. A signing bonus can be offered to students who agree to enroll in the program.

Collaborate with advanced shipbuilders in Japan and South Korea

Partnering with countries such as Japan and South Korea could bring advanced shipbuilding techniques and training to the United States, filling skill gaps and introducing innovative construction methods. Industry collaborations with allies have been beneficial in sectors such as aerospace, in which technology transfer agreements have strengthened domestic capabilities—most recently in submarine construction between the United States, Australia, and the UK under the AUKUS partnership.

Work with industry to build a major high-end shipyard

Congress could authorize a public-private partnership to construct a major high-end shipyard for commercial vessels. The focus would be on new types of ships and fuels. MARAD or the Navy would contract with a private company to design, build, and operate the yard. The facility could operate like a national laboratory (i.e., Government owned but commercially operated). The Defense Production Act could be used to establish this yard for the purposes of potential wartime use. The idea would be to build

a new, fully modernized shipyard that adopts the most advanced technologies and methods. It would focus on emerging ship designs such as specialized tankers for alternative fuels, uncrewed or minimally crewed ships, or vessels with new forms of propulsion (including nuclear). The yard could be used to train U.S. workers in high-end skills.

Prioritization of problem sets

We prioritized these problem sets using a simple framework illustrated in Figure 4. Our purpose here is to help those developing a strategy to distinguish between strategic problems that are (1) more versus less consequential, (2) more versus less difficult, and (3) shorter term versus longer term. Our intent is to introduce a framework to prioritize across complex issues and to apply that framework to the problem sets we have described.

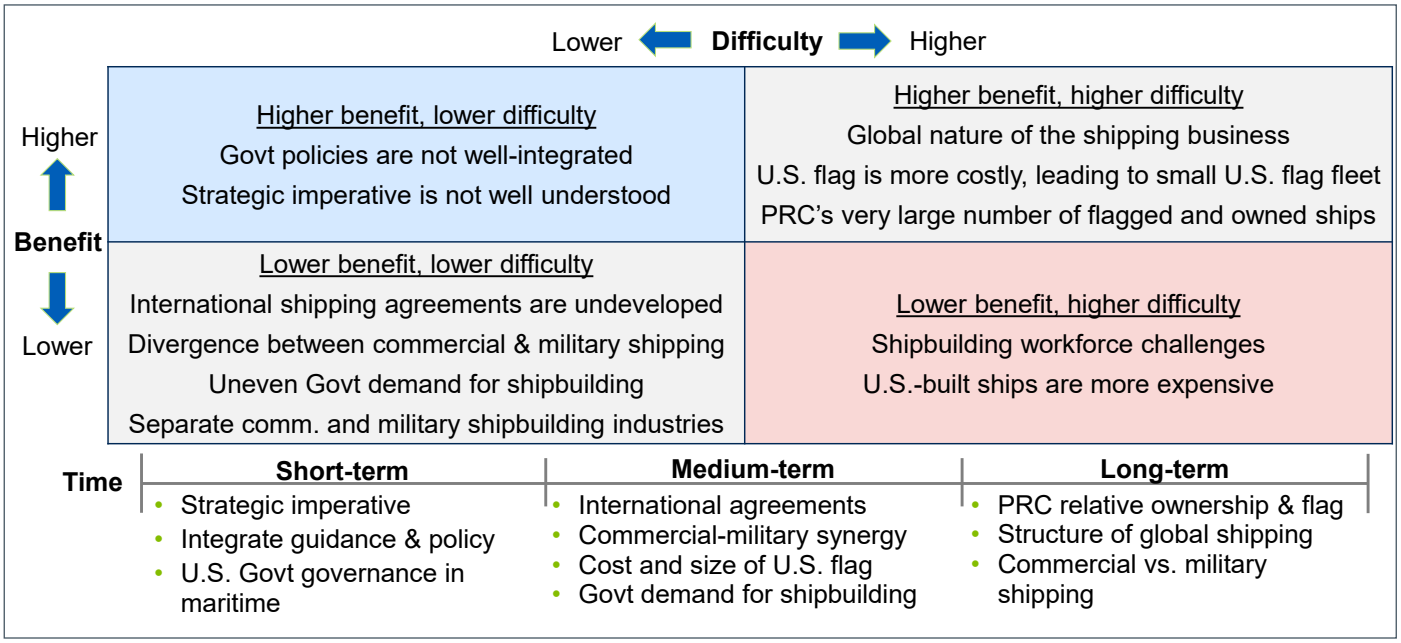
The primary problems of a national maritime strategy could be structured and ranked to determine focus areas. This structure might suggest which trade-offs may be more acceptable and which areas may make for the most economical efforts. Resolving some problems could yield more benefits with less difficulty than others, potentially earning them a higher priority. These prioritizations follow from subjective judgements by the CNA study team.

High-benefit, low-difficulty problems include the relative lack of integration of Government maritime policies and authorities and the lack of understanding of the strategic imperative behind reinvigorating the maritime sector. These two problems are considered high benefit because addressing them would lay a foundation for strategy development and execution.

High-benefit, high-difficulty problems represent some of the most challenging issues facing the U.S. maritime sector. These problems include the global nature of the shipping business, China's ownership of large shipping fleets, and how cost factors have resulted in a small U.S. flag fleet.

Low-benefit, low-difficulty problems are relatively less difficult to resolve than most other salient problems that a U.S. national maritime strategy would need to address, but resolving such problems

Figure 4: Problem sets prioritized according to benefit, difficulty, and time



Source: CNA.

would also result in fewer benefits. These problems nonetheless could pose opportunities to achieve progress with relatively little effort compared to most other salient problems.

Low-benefit, high-difficulty problems are more challenging and would not offer commensurate benefits. Problems that meet these criteria may be on the lowest end of strategic priorities. These problems could include the fact that U.S.-built ships are generally more expensive than those built elsewhere.

Areas of Effort

A strategy could be organized into broadly defined areas of effort that categorize diverse ways and means across the universe of potential Governmental action. We identified six main areas from our engagements, wargames, and literature reviews. These ways and means encompass existing programs and other current efforts, and they align with the COAs and priority problem sets discussed in previous sections. They are not exhaustive. These potential areas of effort are as follows:

1. Financial incentives to industry
2. Maritime workforce development
3. Governance
4. Public-private partnerships
5. International agreements
6. Offensive measures

Functional areas such as these could be used in a strategy to describe actions that reach across problem sets. The idea, as with any strategy or plan, is to encourage unity of effort across disparate actors, many of whom may not be in the same reporting chain. There is some overlap as well as mutual support, as is generally the case with areas of effort in any strategy or plan.

Financial incentives to industry

A strategy could feature financial incentives for shipowners and shipbuilders. In the United States, these incentives have tended to focus on compensating for U.S. industry's relative lack of global competitiveness, due to higher costs, less efficient production, changes in the global market, and so forth. Some of these measures have created demand signals that stimulated production and hiring while preserving a measure of enduring capacity.

Subsidies to industry

Subsidies could include expanded payments to U.S. flag operators under MSP, TSP, or newly designed programs focused on substantially growing the U.S. flag fleet and the number of ships that have signed assured access agreements such as a VISA or VTA. Construction differential subsidies that make shipbuilding more affordable for U.S. shipyards could be established, depending on how much additional U.S. commercial shipbuilding capacity may be needed to meet defense and economic security needs in a contingency.

Cargo preference

Cargo preference programs are mandates that create demand signals for U.S. flag shipping. These programs require that a certain amount of cargo travels on U.S. flag ships, and they include Government cargo—such as mandating that 50 percent or 100 percent of Government cargo travel on U.S. flag ships. Government cargo is a major source of demand for the U.S. flag fleet, but the potential for further growth in this area is limited.

One approach to expanding carriage of cargo on U.S. flag ships could be offering tax incentives to encourage private sector shippers (i.e., those paying to move cargo internationally) to contract with U.S. flag operators. This approach has the most potential to drive demand-side growth in U.S. flag shipping, given the massive amounts of cargo owned by U.S. companies that is currently moved on non-U.S. flag ships (more than 98 percent of U.S. international trade moved by sea is carried on foreign flag vessels).

Tax incentives

The Government uses tax incentives to shape the behavior of private sector actors without resorting to directive measures. These tax incentives could include tax benefits to mariners, such as by reducing or exempting their income taxes—as is the case in some seafaring European nations—or by classifying U.S. mariners as overseas workers. Tax incentives could be a way to encourage private sector shippers to contract with U.S. flag shipowners.

The Government could also offer tax incentives to U.S. shipbuilders to reduce the costs of domestic production. Tax incentives could be used to encourage U.S. flag shipowners to repair their vessels in U.S. yards (current policy involves an ad valorem tax penalty against U.S. flag shipowners who have their vessels repaired abroad; this tax is widely viewed as ineffective and as an unnecessary driver of U.S. flag shipping costs). MARAD does have the Capital Construction Fund Program (CCF), which provides deferrals on income for existing U.S. operators to construct and reconstruct vessels in shipyards.

Grants and loans

The Government could provide financing to lower the financial barrier to entry of engaging in shipbuilding and U.S. flag trade. Loans and leases could be given to private firms on generous terms to help absorb the cost of placing orders while mitigating the potential consequences of default. Special terms and incentives could be included in shipbuilding orders of specific ship types that are of particular importance to national and economic security.

Grants and loans could enable shipowners and shipbuilders to make capital investments and improve workforce development, infrastructure, engineering, and supply chains. MARAD already manages various grant and loan programs for the shipbuilding industry. These are modest programs aimed at helping existing industry (rather than growing U.S. shipbuilding) and encouraging greater efficiency and best practices. MARAD's Title XI Federal Ship Financing Program supports U.S. shipbuilding growth by providing federal loan guarantees that lower borrowing costs and enable long-term financing for the construction or reconstruction of U.S. flag vessels and modernization of shipyards. Using below-market interest rates and longer term financing than is available from private lenders, the program stimulates new vessel construction in domestic shipyards, drives technological upgrades, and enhances competitiveness. These activities create skilled jobs, strengthen the maritime industrial base, and ensure a modern fleet that is essential for both commerce and national security.

Hazard compensation

The Government could offer bonuses and extra pay to mariners and shipowners who contribute to national security missions. These pay incentives could be higher than the compensation that is typically offered and thereby drive growth in the workforce. This may be especially the case with hazard pay. Long-standing U.S. policy is to ensure a large enough cadre of U.S. citizen mariners to meet the country's defense and economic security needs in an emergency. This policy is based on the supposition that U.S. citizens can be relied on to sail under hazardous conditions.

Chartering

The U.S. Government could maintain a limited number of long-term charter contracts with U.S. flag operators who have not signed onto a VISA or VTA. The Government could also keep some foreign flag ships under charter or retainer contracts, especially ship types for which there are particularly significant gaps in capacity, such as large, militarily useful

tankers. Long-term charters can also be a way to forestall the potential high costs of having to secure contracts in an emergency, as well as the risks of being unable to secure such contracts in a timely fashion in an emergency.

Prioritizing incentives

The resources invested and the scope of financial incentives can differ depending on the goal of a strategy and how it prioritizes efforts. Some nations with more robust maritime industries still employ a variety of financial incentives to enhance their competitiveness, suggesting that subsidization may be necessary but insufficient for significantly building up a nation's maritime sector in the context of the current market.

Subsidies and financial incentives targeted toward shipping may be able to generate new capacity much more quickly and affordably than investments targeted toward shipbuilding, given the long lead times, infrastructure constraints, and substantial capital investments involved in building ships. Financial measures are based upon market conditions that may subsequently change or even adjust in reaction to those measures, necessitating periodic revision and indexing of financial measures to pace market conditions and ensure that the original intent is still being met.

Maritime workforce development

A strategy could feature ways and means that focus on improving and growing the maritime workforce. These methods focus on attracting quality talent and retaining sufficient workers to meet requirements and maintain the industry's competitiveness.

Training pipelines

Various institutions play a role in training the U.S. maritime workforce, including maritime academies, trade schools, and workforce development programs. A strategy could invest in modernizing these institutions and growing the training workforce to increase the number of workers who graduate from these programs. Special financial incentives could be offered to students, including tuition reimbursement, bonuses, scholarships, post-graduation service agreements, and other measures that defray the cost of training and education. These incentives might also extend to students in nonspecialist trade schools who are studying issues related to the maritime industries. Investments and incentives could be prioritized for select skills that are deemed to be in especially high demand.

Reserves

A strategy could drive toward developing an actual reserve that can be activated in contingencies. The existing maritime workforce consists of thousands of individuals, including retired mariners, with a variety of credentials and experiences. A strategy could seek to build situational awareness about the maritime workforce by developing systems to track workers with mariner credentials and create mobilization structures that incorporate those workers into reserves. U.S. mariners could be incentivized to maintain reserve status through financial benefits and workforce development opportunities.

Recruitment and retention

A strategy could develop ways and means to attract talent into the maritime workforce and retain workers. Aside from financial incentives, recruitment could be a function of messaging and outreach campaigns that resonate with prospective candidates and make students aware of opportunities in the industry—whether in specialist maritime academies or more general schools. Once talent is recruited, it could be retained by measures including quality of life benefits, competitive compensation, and even a

veteran's status for merchant mariners. Recruitment could be facilitated by creating paths to citizenship and visa priorities for foreign workers with high-demand skills and credentials.

Prioritizing workforce development

The growth potential of the maritime workforce is heavily affected by the future of the industry, as well as other industries that are competing for the same talent. Broader trends in automation and technological innovation are also influencing the shape and size of the future workforce, while the broader U.S. maritime industry is struggling to grow beyond the market share that has been protected for it by cabotage laws, subsidies, and cargo preference.

Maritime workforce development programs would need to consider how these matters affect the industry's attractiveness to younger people and subsequent generations. A strategy could consider how to expedite the incorporation of numerous foreign workers into the ranks if the current pool is insufficient to meet defense and economic security needs in a contingency.

Governance

Strategy is a function of the governance that develops and executes it. Changes to governance can accompany changes to strategy to make the mechanisms of government more responsive and aligned with strategic aims. A maritime strategy could guide changes to how the Government organizes itself across the maritime sector. This approach may be necessary for a strategy to be effectively implemented across the Executive Branch.

Authorities and structures

Maritime authorities and governance structures could be revisited to provide more clarity, ensure accountability, and delineate responsibilities. These authorities and structures could be reformed to strengthen the mechanisms for strategy development and execution.

Situational awareness

Surveys and studies could be conducted to develop more precise awareness regarding problem sets and create a foundation of information for strategy deliberation. These efforts might include supply chain surveys that identify points of vulnerability, workforce surveys that quantify worker shortfalls in specific skill areas, land surveys of potential spaces for infrastructure expansion, and studies on mobilization readiness. Building situational awareness would provide a point of departure for weighing options, trade-offs, and risks.

Defining requirements

Requirements could be defined to set clear goals and orient strategy execution. Requirements represent clear expressions of trade-offs and risk tolerance. Clear requirements could offer measurable benchmarks for gauging strategic progress and the pace of improvement while providing a common frame of reference.

Strategic communication

Strategic communication efforts could include efforts to convey the strategic imperative for maritime strategy to policy-makers and to the public. Strategic communication is intended to build common understanding to motivate policy change and deliberation. It could include themes of threat, such as the potential damage China could inflict with maritime coercion, and of positive gains, such as jobs and economic growth.

Prioritizing governance

Many aspects of governance are mutually supporting and interrelated. Improved situational awareness could lay a foundation for defining requirements, which could then be used in strategic communication to highlight shortfalls. A broader awareness of shortfalls could lead to greater appreciation of the strategic imperative. Matters of governance figure prominently because the effectiveness of a strategy is intrinsically connected to the organizations that develop and implement it. Even if a notional strategy is well designed, it may be ineffective if the Government is not organized effectively to implement its directives.

Public-private partnerships

A strategy could include public-private partnerships directed at a wide variety of projects and initiatives. These partnerships might aim to combine the unique skills and capacities of the Government and private sector to produce efficiencies, improve interoperability, and generate innovative breakthroughs.

Military-commercial integration

The military and commercial sectors could strengthen their relations to realize synergies and improve cooperation. Both could improve their interoperability through exercises, joint staffing arrangements, and mutual capabilities that facilitate command-and- control relationships. A strategy could include efforts to generate shipbuilding efficiencies, pool military and commercial workforces and infrastructure, minimize duplication, and realize greater economies of scale.

Alternative fuels

Public-private partnerships could be formed to conduct targeted research and development into emerging technologies, including alternative energy. These public-private partnerships could test and develop experimental fuels such as ammonia and nuclear power to probe cutting-edge solutions and identify opportunities for capturing new market share. Research and development initiatives could explore options for innovation. The idea would be to carve out potential niches for the U.S. shipbuilding industry in advanced shipping technology and alternative fuels.

Program management

Public-private partnerships could include commercially informed models of program management that enable better delivery schedules and improved stewardship of taxpayer dollars. These models could include further reliance on the vessel construction manager model used to produce the NSMV. These ships were produced on time and on budget and at significantly less cost than ships built under DOW acquisition programs. Innovative program management could improve relations between Government and industry while realizing savings to be reinvested in industrial development.

Prioritizing partnerships

Public-private partnerships could take many forms, so a strategy should focus on select areas that offer the most potential. Although the United States has a relatively small maritime industry, it has a world-class private sector that has not always been leveraged to its full potential via Government programs. A strategy could leverage this asymmetric advantage to modernize the maritime industries, develop new sources of advantage, and make the most of the sector's existing capacity.

International agreements

A strategy could include international agreements that facilitate collaboration with U.S. allies, strategic partners, and even the more reputable open flag registries. These agreements could encompass some of the other ways and means addressed in this report that could be worked on with friendly nations and multinational companies.

Shipbuilding

Non-U.S. shipbuilding firms could invest in U.S. shipbuilding. These investments could include buying ownership stakes and placing orders with U.S. shipbuilders. Foreign partners could collaborate to develop their industrial bases jointly and make shared investments. Trilateral industrial development efforts such as AUKUS—which involves joint submarine production between the United States, the UK, and Australia—could be a model.

Shipbuilding agreements could help the United States and its allies decouple supply chains from riskier regions and actors such as the PRC, while developing alternate sources of capacity. The United States could develop combined shipbuilding requirements and coordinate its industrial base production to meet those requirements. After all, the United States may find itself working closely with its allies to move military equipment and keep seaborne trade going in a major conflict.

Shipping

The U.S. Government could pursue international agreements focused on creating larger pools of assured or reliable access shipping in a contingency. Combined shipping capacity could be prioritized coalition-wide in a contingency. Shipping agreements could feature registries to facilitate reflagging or to precisely stipulate what sorts of protective or economic benefits a U.S. ally or strategic partner may provide for vessels under other flags. Allied agreements could encompass countervailing measures for combined response to maritime coercion.

Workforces

The U.S. Government could pursue agreements that involve joint investment workforce development across allied nations. These agreements could facilitate the transfer of workforce talent across allied nations, especially in a contingency. One example would be moving vital workforces from a country under threat to the United States.

Cargo preference among allies

Cargo preference agreements could be pursued with select partners and allies to create demand signals for specific trade flows. Such agreements could yield a reliable and targeted form of cargo preference while still tapping into the global economy. They might be combined with efforts to reduce dependencies on PRC shipping among the United States and allied nations.

Requisition and seizure

The United States and its allies could employ requisition and seizure to secure additional ships in a major conflict. Ships operating under foreign flags—especially those under the flag of a belligerent state—could be seized in ports and converted to U.S. flag. Ships owned by companies domiciled in a belligerent nation but operating under other flag registries might also be fair game.

Prioritizing agreements

International agreements offer a variety of opportunities, especially given that U.S. allies and strategic partners include some of the most powerful maritime nations. Those individuals

creating a strategy should remember that some of these nations have more maritime capacity than the United States, trade extensively with the PRC, or are within striking distance of China or Russia. An arrangement that enables the United States to leverage allies and pool maritime assets could help the United States and its allies meet defense and economic security needs. International shipping agreements can take years to negotiate and can be highly complex. Though not necessarily resource intensive (compared to, say, growing the U.S. flag fleet or shipbuilding industry), these agreements require years of lead time and extensive coordination.

Offensive measures

A strategy could include offensive measures that involve imposing consequences on foreign entities attempting to use the maritime domain coercively. These measures could include special authorities, as well as ways to generate capacity quickly in a contingency.

Countervailing measures

A strategy could involve developing countervailing measures to impose costs on strategic competitors engaged in unfair trade practices. These measures could include stopping or slowing shipping related to trade with that state and imposing special fines and penalties. These measures could be used to defend against unfair practices and manage the effects of coercion, while also selectively applying coercion of a more offensive nature.

Employment of special authorities

A strategy could invoke special authorities provided by legislation to take wide-ranging actions. In the United States, these authorities could include those found in the Defense Production Act, the Controlled Carrier Act, and the Transportation Priorities and Allocation System. Expanded authorities might be called for to enable offensive action, especially in economic affairs or against global maritime supply chains.

Prioritizing offensive measures

Offensive measures could be decisive in some respects, but they involve risk. They could have substantial economic repercussions that reverberate throughout the economy. They could harm relationships and result in legal challenges. A strategy should consider these risks relative to less bellicose means of achieving the country's aims in a conflict. The more that is done in peacetime to improve potential access in a crisis or conflict, the less necessary it will be to employ offensive measures such as these.

Concluding Summary

We found through our analysis and wargames that the U.S. commercial shipping and shipbuilding sectors likely lack sufficient capacity to meet the defense and economic security needs of the United States. In an extended great power conflict, the U.S. Government and internationally trading U.S. flag fleets alone may not be able to provide enough ships or mariners. U.S. shipyards do not currently produce enough vessels to replace likely attrition in such a conflict. These conclusions depend on analytic assumptions made explicit in the report.

The United States would likely need to take measures beyond exclusively relying on Government and internationally trading U.S. flag fleets to both respond to protracted aggression in the Western Pacific and reliably sustain imports of raw materials and components necessary to continue defense production in a protracted war. The United States may not be able to maintain its seaborne exports and protect the civilian economy in such a conflict without somehow leveraging the thousands of ships that currently operate under non-U.S. flags.

For example, the Government may need to take steps to harness the Jones Act fleet, leverage charter vessels owned by U.S. companies but operated under foreign flag, or rely on non-U.S. flagged ships owned by companies in allied nations. It may be necessary to contract with foreign shipyards if new vessels must be constructed to compensate for attrition or grow the merchant fleet. Doing so may be challenging in a world crisis that upends global supply chains. Thousands of ships regularly ply the world's sea lanes, but the United States has yet to secure assured access to this capacity in a contingency and would have to take additional measures in an emergency unless it takes steps in peacetime to obtain such assurances. Agreements with allied governments and shipping companies are not well developed.

The wartime roles of the commercial maritime industries remain underdeveloped. Our analysis led us to define four alternatives for the strategic mission for these industries and their Government partners: (1) providing sealift in support of the military in forward theaters of operation, (2) sustaining wartime defense industrial production, (3) ensuring seaborne exports if global shipping is disrupted, and (4) establishing the U.S. maritime sector as a global PRC rival. We defined what each of these progressively more ambitious alternatives entail, quantified the capacity requirements for each, and provided scalable options to meet these requirements.

We identified a series of strategic obstacles preventing the maritime industries from adequately supporting the country's defense and economic security needs. We found a need for greater understanding of the strategic imperative—that is, the nature and extent of the threats facing the United States, especially the maritime supply chains on which the U.S. economy and industrial base depend. In addition, it would be beneficial to treat the maritime industries as a strategic resource to be mobilized and surged in time of war. To do so, the roles and responsibilities of various Government agencies may need to be streamlined, and their wartime roles may need to be defined better.

The PRC's large and growing market share in shipping, shipbuilding, and other aspects of the global maritime supply chain poses a potentially serious threat to the U.S. economy and industrial base, especially in a time of crisis or all-out conflict. Our analysis and wargames indicated a need for

closer study of the PRC's growing ownership and influence in these sectors, followed by efforts to reduce U.S. vulnerabilities to economic coercion and economic warfare. The small size of the U.S. flag fleet means that the U.S. Government is responsible for either growing this fleet or creating a plan to use non-U.S. flag ships to fill any gap in shipping during a crisis. The globalized nature of the shipping business, combined with opaque ownership and myriad open flag registries, compounds these problems.

The challenges in shipbuilding are greater still. U.S. shipyards are unable to compete globally, and there is no clear business case for investment. New fuels and technologies may provide the shipbuilding sector with opportunities to become more competitive with help from the Government, especially in emergent and niche areas.

Our analysis and wargames indicated that greater integration between the military and commercial shipbuilding and repair sectors could improve economies of scale and enable commercial yards to play a more active role in supporting the defense industrial base. A clearer demand signal from the military side with an eye toward wartime construction of commercial vessels—be they merchant ships or other platforms—would help U.S. commercial shipbuilders contribute to national security.

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Tables and Figures

Abbreviations

DOS	Department of State
DOT	Department of Transportation
DOW	Department of War
DWT	dead weight tons
EPA	Emergency Preparedness Agreement
EU	European Union
FMC	Federal Maritime Commission
LHWA	Longshoreman and Harbor Worker Act
MARAD	Maritime Administration
MSC	Military Sealift Command
MSP	Maritime Security Program
NATO	North Atlantic Treaty Organization
NDAA	National Defense Authorization Act
NOAA	National Oceanographic and Atmospheric Association
NSMW	National Security Multi-mission Vessel Program
OSV	offshore support vessel
PRC	People's Republic of China
RO/RO	roll-on, roll-off
RRF	Ready Reserve Force
TEU	twenty-foot equivalent unit
TRANSCOM	U.S. Transportation Command
TSP	Tanker Security Program
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
USTR	United States Trade Representative
VISA	Voluntary Intermodal Sealift Agreement
VTA	Volunteer Tanker Agreement
WWII	World War II

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Stakeholder Organizations Consulted

The study team consulted with many organizations in government and the private sector that have a stake in maritime issues. We were unable to connect with every relevant entity because of time constraints. The following organizations participated in one-one-one discussions, wargames at CNA, or both. We spoke with multiple individuals and specialized offices in many of these organizations. We are grateful to the individuals concerned for taking the time to share ideas and provide information and source material.

Government

Agency for International Development (USAID)

American Steamship Owners Mutual Protection and Indemnity Association (American Club)

Bureau of Economic and Business Affairs (EB), Department of State

Committee on the Maritime Transportation System (CMTS)

Federal Maritime Commission (FMC)

Government Accountability Office (GAO)

Marine Corps Warfighting Laboratory (MCWL)

Maritime Administration (MARAD)

Military Sealift Command (MSC)

National Ocean Service, National Oceanographic and Atmospheric Association (NOAA)

National Security Council (NSC)

Office of the Assistant Commandant for Capability (CG-7), U.S. Coast Guard

Office of the Assistant Commandant for Prevention Policy (CG-5P), U.S. Coast Guard

Office of Design and Engineering Standards (CG-ENG), U.S. Coast Guard

Office of the Chief of Naval Operations (OPNAV)

Office of Economic Policy, Department of the Treasury

Office of the Deputy Secretary for Operations, NOAA

Office of Management and Budget (OMB)

Office of Naval Intelligence (ONI)

Office of the Secretary of War (OSW)

Office of the Secretary of Defense (OSD)

Office of the Secretary of the Navy (OSN)

Office of the Secretary of Transportation (OST)

Office of the U.S. Trade Representative (USTR)

Headquarters Marine Corps (HQMC)

Transportation Command (TRANSCOM)

U.S.-China Economic and Security Review Commission

Industry

AMA Capital Partners

American Roll-On Roll-Off Carrier (ARC)

Chevron Shipping Company

International Registries, Inc. (IRI)

International Trade Administration (ITA) in the Department of Commerce

International Seaways, Inc.

Liberty Maritime Corporation

Maersk Line, Limited (MLL)

Maritime Institute for Research and International Development (MIRAID)

International Organization of Masters, Mates & Pilots (MM&P)

Hanwha Philly Shipyard

Schuyler Line Navigation Company (SLNC)

Tote Services

Labor and trade associations

American Bureau of Shipping (ABS)

American Maritime Officers (AMO)

American Maritime Partnership (AMP)

American Maritime Congress (AMC)

Bollinger Shipyards

Intertanko

National Defense Transportation Association (NDTA)

Navy League

Seafarers International Union (SIU)

Shipbuilders Council of America (SCA)

Transportation Institute

USA Maritime

Waterman

Independent experts

Arthur Divens, managing member, Sextant Executive Solutions LLC

Jon Kaskin, expert on strategic mobility and former Navy combat logistics director

Mike Roberts, senior fellow, Hudson Institute

Brent Sadler, senior research fellow, Heritage Foundation

John Stauffer, San Jacinto College

Jim Watson, retired Coast Guard admiral and independent expert

Tom Wetherald, independent expert and former executive at General Dynamics NASSCO (National Steel and Shipbuilding Company)

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