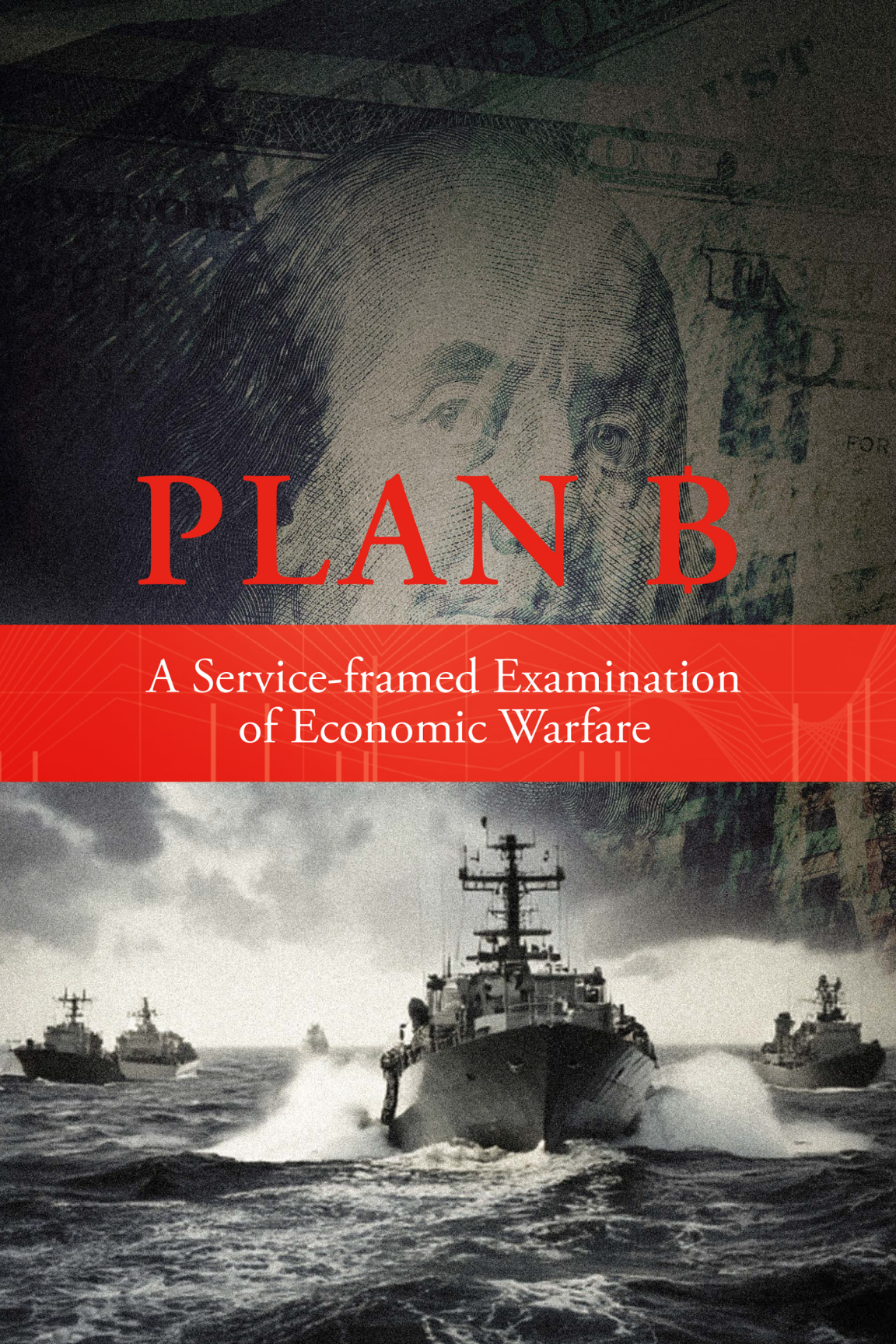
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A Service-framed Examination
of Economic Warfare

PLAN B

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of Economic Warfare

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Foreword

This publication, *Plan B: A Service-framed Examination of Economic Warfare*, written by the Commandant's Office of Net Assessment (CMC ONA), is proffered by Marine Corps University as a step in the right direction and in keeping with this institution's vision to explore history's lessons and foster strategic thinking about future challenges. This work is neither a comprehensive examination of all aspects of economic warfare, nor does it explore every single possible military mission related to inflicting economic costs on a potential adversary. *Plan B* is an effective bracketing salvo to further professional discussion among Marine Corps leaders and other professionals about what possible maritime interdiction operations or interactions with critical maritime terrain might arise in a future crisis or conflict.

The U.S. Marine Corps continues to invest in advancing a tradition of study and innovation to ensure the individual Marine is best equipped to be the most important weapon system of our arsenal. Marine Corps University will continue to examine potential missions, military challenges like conducting a blockade, to anticipate future roles for the Service. Conducting or responding to a blockade harkens back to the Marine Corps' birth and is reflected in our hymn. In 1801, the interruption of free trade and commerce provoked a military response. The Marine Corps was part of this country's re-

sponse to the interruption of commerce, and we conducted punitive expeditions to retaliate and end the threat. Should the United States choose to enforce maritime sanctions, exert pressure on a potential adversary to deter or punish acts of aggression, or attempt to bring war termination through the conduct of a blockade, the adversary will likely retaliate with military force. Maritime interdiction is not an administrative action or routine task to be taken lightly. Instead, Marine leaders should actively discuss the probability and challenge of such missions. If leaders decide that this mission set has a high probability, then we should begin to actively explore and develop techniques, tactics, procedures, technological innovations, and creative approaches to ensure future success.

The Commandant's Office of Net Assessment surveyed the literature, engaged with subject matter experts, conducted a series of workshops and wargames, including the adjudications and insights of economic experts in their white cells, as well as examined critical maritime terrain chokepoints in detail for planning considerations. CMC ONA also explored how protracted conflict might generate these missions and how the Marine Corps might contribute to the Joint Force in their execution.

CMC ONA offers some assertions they label "iron laws" about blockades, which Marine Corps University suggests deserve continued examination, challenge, research, professional discourse, and thinking by not only our students and faculty, but by all military professionals.

- A nation, or coalition, implementing a blockade should first assess the ability to impose one and their adversary's susceptibility to blockade.
- Blockades have a cost, usually paid in part by the blockading power's allies and partners. This aspect must not be overlooked and failure to mitigate will result in failure.
- A blockade's effectiveness will be challenged by an adversary's adaptation, expedients, and substitution.
- Blockades, often seen as low-risk approaches, drive adversaries to high-risk strategies.
- The economic effect of blockade translates very slowly into battlefield advantage, but also eventually yields decisive, long-term strategic effects enduring even after the conflict's end.

Plan B is a worthy read that should be incorporated into course curricula regarding the topic, and it will be a good starting point to ensuring the Marine Corps is prepared for this mission. While CMC ONA deliberately chose not to examine questions about whether the Marine Corps should or could conduct these missions, those are appropriate questions to be examined by students, faculty, and others. Proceeding from the assumption that the Marine Corps might be asked to conduct these missions is also appropriate and, if we are candid about our thinking, also a likely prospect. CMC ONA highlights three contributions the Marine Corps can make: serve as boarding forces, enable a blockade through land-based seapower, or conduct a blockade in the littorals as part of a Joint Force. They suggest a "small ecosystem" of investments to ready our Corps intellectually and materially for this mission. In my view, this is only a beginning, and I challenge readers to continue the examination and engagement on this subject.

Matthew W. Tracy
Brigadier General, U.S. Marine Corps
Commanding General, President
Education Command, Marine Corps University

Preface

As part of the Commandant's Office of Net Assessment (CMC ONA) research into alternative futures and understanding the future character of war, we examined what might be the implications from a possible Sino-American conflict for the U.S. Marine Corps in terms of expanded roles and missions. We specifically attempted to better understand the economic dimensions of this conflict, the possibilities for protracted conflict, and how existing capabilities and core competencies could be applied to Chinese vulnerabilities as part of a joint, combined effort to defeat aggression against Taiwan by the People's Republic of China (PRC).

The Department of Defense has begun to look at protracted war and its implications. The Marine Corps must consider how protraction will affect maritime strategy, amphibious forces, and the use of landpower to control the sea, especially important sea lines of communication (SLOCs) and chokepoints for military and economic purposes.

CMC ONA believes blockade, or countering a blockade, is a likely and viable mission for the Joint Force. This could occur as a result of a PRC blockade of Taiwan or other nations, or as the result of economic sanctions escalating, or because—whether Plan A fails or succeeds—neither party sees settling as a better outcome than continuing to fight a protracted war. *The PRC has*

a major vulnerability in their reliance on imported oil and other aspects of their trade-based economy. This report examines how the Marine Corps can contribute to this Joint Force mission and makes Service-level recommendations to enhance preparing the Corps, the Joint Force, and interagency and international partners for Plan B: economic warfare.

CMC ONA researched the history of blockade, which has been employed in nearly every great power war during the past 200 years. Successful blockades are ones where a power capable of imposing an effective blockade does so against a power who is vulnerable to one. Our survey indicates the existence of some "iron laws" of blockade:

- A nation, or coalition, implementing a blockade should first assess the ability to impose one and their adversary's susceptibility to blockade.
- Blockades have a cost, usually paid in part by the blockading power's allies and partners. This aspect must not be overlooked and failure to mitigate will result in failure.
- A blockade's effectiveness will be challenged by an adversary's adaptation, expedients, and substitution.
- Blockades, often seen as low-risk approaches, drive adversaries to high-risk strategies.
- The economic effect of blockade translates very slowly into battlefield advantage, but also eventually yields decisive, long-term strategic effects enduring even after the conflict's end.

History reveals uncomfortable truths about the conduct of blockades. Scholars point to the strategic effects of economic warfare and attempt to understand how these effects translate into operational effects on battlefields, but war usually terminates as a result of operational maneuver campaign effects on strategic will; in other words, military campaigns are more responsible for ending conflicts than economic stress. Blockades take time to have effects; are not completely effective; generate costs for the imposer, as well as the victim; can lead to escalatory activities to accelerate achievement of desired objectives; and may have unforeseen, long-term consequences.

The team's research also described the expected character of a possible Sino-American war, which will be determined principally by the strategies

both sides employ and the geography affecting the battlespace. In a protracted war with the United States over Taiwan, China's first and foremost objective will be to win the battle on Taiwan. The Chinese Communist Party (CCP) cannot afford to lose. The PRC likely believes its will and ability to seize Taiwan is greater than the Taiwanese ability to resist. The PRC may also believe its will and ability exceeds that of the United States.

Chain reaction warfare is a Chinese concern about conflict on Taiwan possibly triggering neighbors in other strategically important locations, such as Indonesia, the Middle East, and Africa, to take advantage of China's involvement, creating a "one against many" problem. This is a real fear, and one the PLA refers to constantly in their doctrine. A protracted conflict's expanding geography will exacerbate PRC concerns about historical and existing tensions with its neighbors.

Between fall 2022 and February 2024, CMC ONA conducted a series of SLOC wargames to examine the use of the military instrument of national power, focused on the Navy and Marine Corps, to achieve economic warfare objectives. These wargames combined expertise from several disciplines to include the energy industry and economists, in addition to Service-specific military expertise.

The wargames asked five research questions: How could the Service use land-based seapower to control key maritime terrain? What is the Marine Corps' role in economic warfare? What level of effort is required to close a SLOC? What support is necessary from the Navy and Joint Force? What special skills or competencies does the Marine Corps provide in this situation?

The games led to several insights, many of which inform this report. Key insights include:

- A Sino-American conflict will likely be protracted; despite efforts to keep the war regional, economic warfare will expand it globally.
- Implementing a blockade negatively affects the global economy, potentially undermining international support for the United States.
- A blockade will look like a series of "leaky nets," due to the challenges for effective execution, deployed globally to stop the flow of oil and degrade China's ability to refine and transport it.

- Boarding and seizing very large crude carriers (VLCCs) and giant container ships present multiple challenges the Service is not equipped to handle (this includes material solutions and tactics).

It may be tempting to contemplate using blockade to achieve operational warfighting objectives, such as reducing fuel available to the PLA. This likely will not work as intended. The PLA will not run out of fuel if the regime can help it, and it will be sure to implement many internal mechanisms to prevent this effect. The PRC views its economy instrumentally to support, facilitate, and enable political control; anything threatening the political stability, social harmony, and the PRC's primary objective of regime perpetuation would be taken very seriously. The PRC relies on economic growth and rising standards of living to provide political stability. The PRC believes the United States will attempt a blockade—the impact would be negatively felt by the PRC more broadly and, potentially, by the Communist regime more specifically. They have two principal approaches to respond: 1) increase domestic resilience by rationing oil and increasing supply; and 2) counter the blockade using diplomatic, military, and economic means. There are other materials to consider focusing the attention of a blockade to interdict, which may have disruptive and damaging effects on the PRC's warmaking potential and economic stability.

A blockade could increase the value of oil tankers as they are removed from circulation. At the same time, the PRC—the world's largest producer of tankers—by embargo or sanction, could be prevented from selling oil tankers. Logically, their first act might be to direct all new production toward replacing losses, replicating Allied shipbuilding successes in World War II denying Germany's attempted economic strangulation of Britain. The PRC could build many tankers, but shipyards located on the coast could also be degraded, hampering production. Removing the Chinese shipbuilding industry from the global market would constrain supply, raising prices. U.S. allies Japan and South Korea are the number two and three shipbuilders in the world. They would be well positioned to pick up the new demand.

The important question for the Marine Corps to answer is not should we or could we, but how do we and how much can we do. There are several reasons it would be desirable to board and seize a tanker. Boardings are reversible, and they avoid creating environmental catastrophes. Boardings generate op-

tions for mitigating the worst effects of blockade on neutrals, allies, and partners. They also make available the ships for a variety of purposes and most importantly, the reversible and measured pace of blockade may avoid fears of rapid escalation.

The Marine Corps can contribute to a blockade in three ways:

- Provide Marines to serve as boarding forces aboard U.S. Navy surface combatants.
- Enable a naval blockade through the application of land-based seapower.
- Conduct a blockade from land and the littorals, with assistance from the Joint Force.

CMC ONA recommends a small ecosystem of connected investments to prevent strategic surprise by increasing the nation's understanding of the blockade mission, relevant threat developments and counters, and the effects on the environment, particularly the global economy. First, efforts to generate consensus on the suitability of conducting blockades should be made. Second, the Marine Corps could lead the Joint Force in experimenting with active forces to improve the means and methods used in seizing and securing vessels. Third, technological and material solutions to the problem should be developed. Finally, the Service, in conjunction with the Joint Force, should make efforts to achieve the maximum deterrent effect from all of the abovementioned endeavors. Any of these concepts by themselves could be moderately effective, but synchronized efforts across broad areas would ensure the Service was well-positioned to rapidly respond to tasking and achieve the desired effect in competition and in war.

There are multiple factors indicating a likely use of economic warfare. The PRC, with its export-focused economy and reliance on imported oil via tankers through maritime chokepoints, is vulnerable to economic warfare including blockades. A naval oil blockade of the PRC is attractive because it matches key strengths and competencies of the United States with assessed and self-admitted vulnerabilities of the PRC. Blockade is a likely, and expected, response to a protracted war with the PRC regardless of the estimates of its efficacy to achieve desired strategic effects. The political and historical interest in blockades will drive it to the forefront of options under consideration. CMC

ONA expects an oil blockade, or even broader energy blockade, may still not meet desired effects and the imposition of a blockade may have to expand (or focus) the interdicted types of cargo to increase the effectiveness of economic pressure. The United States has a global military, a global network of bases, alliances, and treaty partners. In short, the United States is in a strong position to impose a blockade, and the Marine Corps is well-positioned to contribute to one. With limited investment now, we can be positioned to respond if asked to do so.

Glossary of Select Terms, Abbreviations, and Acronyms

A2/AD	antiaccess/area-denial
AFSB	afloat forward staging bases
AIS	Automatic Identification System
ALBM	air-launched ballistic missile
ALCM	air-launched cruise missile
ARG	Amphibious Ready Group
ASBM	antiship ballistic missile
ASuW	antisurface warfare
ASW	antisubmarine warfare
CCP	Chinese Communist Party
CDCM	coastal defense cruise missile
EEZ	exclusive economic zone
EOTG	Expeditionary Operations Training Group
FARP	forward area refueling point
GARC	global autonomous reconnaissance craft
IBX-30	Infantry Battalion Experiment 2030
JIATF South	Joint Interagency Task Force South

LNG	liquified natural gas
LRUSV	long-range unmanned surface vessel
LSM	landing ship, medium
LUSV	large unmanned surface vessel
MAGTF	Marine Air-Ground Task Force
MCWL	Marine Corps Warfighting Laboratory
MEU	Marine Expeditionary Unit
MIO	maritime interdiction operations
MPF	maritime prepositioning forces
MPRA	maritime patrol and reconnaissance aircraft
MRIC	Medium Range Intercept Capability
MST	Maritime Strike Tomahawks
MSTP	MAGTF Staff Training Program
NSM	naval strike missile
OAD	Operations Analysis Directorate
OSV	offshore support vessel
PLA	People's Liberation Army (China)
PLAAF	PLA Air Force
PLAN	PLA Navy
PLARF	PLA Rocket Forces
POL	petroleum, oil, and lubricant
PRC	People's Republic of China
RHIB	rigid hull inflatable boat
SLOC	sea lines of communication
TLAM	Tomahawk Land Attack Missiles
TTPs	tactics, techniques, and procedures
UAS	unmanned aircraft systems
UAV	unmanned aerial vehicle
USINDOPACOM	U.S. Indo-Pacific Command
VBSS	visit, board, search, and seizure
VEO	violent extremist organizations
VLCC	very large crude carriers

PLAN B

Introduction

This report is the result of a series of ongoing discussions in the Commandant's Office of Net Assessment (CMC ONA) about U.S. thinking on the strategy and approaches applied to current military problems, specifically related to the challenge of the People's Republic of China (PRC) as a possible, near-peer adversary. These discussions, informed by research, wargames, analysis, and engagements, indicate important structural factors govern the level of effort required for success. Additionally, for the first time in history, the land domain can control the sea domain thousands of miles from shore, generating consequential implications for traditional maritime strategies. Most published commentary focuses on studies of short war concepts and is only just beginning to highlight the possibility and implications of protracted conflict. This report provides insights generated from CMC ONA wargames and research to build awareness and understanding about the implications of protracted conflict for military roles and missions, with an emphasis on the Marine Corps.

A Sino-American war could begin with an initial Chinese victory, or success in preventing the United States from applying military power in accordance with our preferences. They also may begin and fight the war in such a way the United States and its allies see fighting as a better alternative than negotiating, settling, or staying out. This creates a situation where the United

States will find itself in a long war it cannot figure out how to end, requiring it to develop new approaches.

CMC ONA considered ways the Marine Corps could contribute to a protracted war with the PRC, specifically how existing capabilities and core competencies could be applied to Chinese vulnerabilities as part of a joint and combined effort to defeat the PRC in a war initially started over Taiwan. A *protracted war* refers to one in which multiple military operational campaigns must be sequenced to achieve the strategic effects accomplishing war termination; or, one in which strategies to achieve reduced will to fight or cause economic exhaustion are employed. This report does not address the various military campaigns or strategic bombing but instead examines one aspect of economic warfare—the blockade.[1] Blockades have been employed in nearly every great power war during the past 200 years, with varying degrees of effectiveness. Successful blockades are ones where a power capable of imposing an effective blockade does so against a power who is vulnerable to one.

In this document, we explore various aspects of a long war with the PRC and ways the Marine Corps could contribute. The Marine Corps has a long history of service aboard U.S. Navy vessels and maintains the ability to operate in the littorals, and, in conjunction with the Navy, to seize and defend key maritime terrain. This led to extended thinking about how these strengths could be applied to possible PRC vulnerabilities. We will first reflect on the history of blockades and the role of blockades and economic warfare as a component of nearly every long war between great powers. Next, we anticipate the character of a Sino-American war, showing how strategies and geography affect how the war is fought, the necessity for alliance support, and the likelihood of escalation, negotiation, and settlement. The document compares the United States and the PRC, examining strengths and weaknesses to establish a strategic context and logic. Analyzing from the strategic context to the op-

[1] Economic warfare includes military and nonmilitary means to damage an adversary's economy. Such measures, especially blockades, were once considered part of *total war* given the implicit impact on civilians, but the advent of an American-dominated international financial system enabled the weaponization of financial and other nonkinetic options to generate economic coercion. Economic warfare also includes damaging crops, scorched earth policies, blacklisting, preclusive purchasing, rewards for the capture or control of enemy assets, discriminatory tariffs, sanctions, suspension of aid, freezing of capital assets, prohibition on investments and other capital flows, and expropriation, as well as the cyber, information, and covert operations achieving similar effects.

erational level of war, a case is made for exploiting PRC vulnerabilities surrounding their economy's reliance on imports, especially oil, most of which comes from the Middle East in oil tankers.

From there, we will explore ways the Marine Corps could contribute to a maritime blockade. Almost immediately, with minimal additional effort, the Marine Corps can provide boarding teams for service aboard U.S. Navy vessels. With more effort, greater investment, and some foresight, the Marine Corps could, from the land, considerably enable and improve the effectiveness of a naval blockade by providing air support, air and missile defense, antisurface warfare capabilities, and logistics to a naval blockading force. At the most extreme end of the range of options discussed, the Marine Corps could, given access to the land and territorial waters astride a key chokepoint, conduct the entire blockade effort from the littorals, sidestepping and invalidating People's Liberation Army (PLA) strengths. Chinese responses could play into our hands and for various reasons contribute to the accomplishment of long-term and high-level goals.

These insights were also derived from a series of wargames conducted during a yearlong period examining the execution of maritime interdiction operations and blockades. While these wargames necessarily focused primarily on military means, we included economic advisors to assess economic effects and implications for the global and regional economies. We believe more efforts are needed to enhance greater understanding about the consequences of utilizing military and maritime power to achieve economic effects in the twenty-first century and future CMC ONA wargaming efforts will continue to emphasize this feature.

Chapter 1

The Challenge of Economic Warfare

> The same aspect of economic sanctions that makes them philosophically appealing to liberal internationalism—their reliance on a *homo economicus* rationale—also limits their salience. Economic sanctions do not project only material force; they also project political, social, and cultural values. Sanctions would no doubt work better in a world of perfectly rational, consistently self-interested subjects, but this is not the world that we actually inhabit. Most people in most places at most times make collective choices on the basis of a wider set of considerations. The economic weapon may be a form of politics by other means. But ultimately, stitching animosity into the fabric of international affairs and human exchange is of limited use in changing the world.
>
> ~ Nicholas Mulder[1]

When the Commandant's Office of Net Assessment (CMC ONA) started research on the conduct of maritime interdiction operations (MIO), we noted

[1] Nicholas Mulder, *The Economic Weapon: The Rise of Sanctions as a Tool of Modern War* (New Haven, CT: Yale University Press, 2022), 297.

a lack of research on the subject of economic warfare, blockades, and the implications of such for the modern and future global economies. Recent events demonstrate the urgency to expand professional commentary on the subject of economic warfare. Arguably, there is a demand for a deeper look at the United States Marine Corps' contribution to MIO and the strategic significance to maritime strategy for amphibious forces projecting power ashore, and from land to sea, along sea lines of communication (SLOCs) and in maritime chokepoints in support of economic warfare objectives. First, the global COVID-19 pandemic caused massive disruption to the world's economy and revealed the fragility of many global supply chains. Second, the Panamanian ship *EverGiven* (2018) accidentally blocking the Suez Canal for six days generated increased awareness about the vulnerability of maritime chokepoints along SLOCs. Most recently, Houthi rebels in Yemen are deliberately disrupting commercial traffic through the Bab el-Mandeb, another critical maritime chokepoint at the southern end of the Red Sea. The current Bab el-Mandeb crisis generates cause for reflection on prior Strait of Hormuz crises, which disrupted critical flows of oil for major world economies and almost started major theater wars. Underscoring the strategic and economic importance of these events, the potential for increased tensions and strategic competition between the People's Republic of China and the United States over the fate of Taiwan threatens the future of the rules-based international order on which the current fabric of the global economy rests.

The U.S. *National Defense Strategy* identifies the PRC as a strategic, near-peer competitor and pacing challenge for the Joint Force.[2] Books, articles, essays, and opinion editorials abound in discussing the potential issues raised by strategic competition between two great powers. Well-known fictional works propagate conflict scenarios and headlines of world events contain expert speculation about a potential Sino-American conflict. While political leaders and diplomats on all sides struggle to avoid a catastrophic conflict, military professionals must think more tragically to consider the strategies and implications of such a conflict. The U.S. military approach to this strategic challenge could be labelled Plan A—this report is not about Plan A.

[2] *2022 National Defense Strategy of the United States of America* (Washington, DC: Department of Defense, 2022).

It is about Plan B.

CMC ONA analysis explores how Plan B will likely focus on economic warfare. The peacetime, competitive strategies of the United States and PRC already impact and evolve conditions pertaining to economic warfare. In recent decades, the United States has frequently turned to the coercive and deterrent effects of economic sanctions to address national interests. Given the scope and scale of economic sanctions on Russia for its aggression in Ukraine, it is plausible to imagine attempts of massive sanctions against the PRC for any aggression in Taiwan. Of note, the reluctance to enforce economic sanctions against Russia in the maritime domain may not pertain to a direct confrontation between the United States and PRC. Expert-informed conflict initiation scenarios suggest the PRC may impose a blockade on Taiwan, initiating a Sino-American conflict on an economic footing. The likelihood of protracted conflict also raises the expectation of economic warfare, such as a blockade, to compel negotiation and coerce war termination, as well as to undermine an adversary's warmaking potential.

A blockade could also impose political and diplomatic risk on the United States. The PRC characterizes a blockade as an aggressive and escalatory act of war, putting global peace and prosperity at risk.[3] This messaging might erode partner confidence and support for U.S. actions due to the risk to their own economies. The United States will want to leverage diplomatic, information, and economic means to mitigate these risks. For example, during the Cuban Missile Crisis, the John F. Kennedy administration intentionally used the term *quarantine* because blockade implied a form of warfare.[4]

After examining this topic, CMC ONA concludes that an escalation of economic coercion by a form of blockade will be a mission for the Joint Force. This report assesses how the Marine Corps can contribute to this Joint Force mission and makes recommendations to enhance preparing the Service, the Joint Force, and interagency and international partners for Plan B: economic warfare.

[3] See *U.S. Indo-Pacific Command Posture*, Armed Services Committee, U.S. Senate (statement of Adm John C. Aquilino, USN, Commander, U.S. Indo-Pacific Command, 21 March 2024).
[4] "The Cuban Missile Crisis, October 1962," Office of the Historian, Department of State, accessed 21 February 2025.

Historical Context

> Escort of convoys against air and surface attack in the Persian Gulf is a reminder that the direct protection of vital shipping has an honorable history that goes back long before submarines became the high-seas raiders and buccaneers of the twentieth century.
>
> ~ Captain Wayne P. Hughes Jr., USN (Ret), and Rear Admiral Robert P. Girrier, USN (Ret)[5]

Blockade and economic warfare have been prominent features of nearly every great power conflict. Frequently, great powers incorporate aspects of economic warfare as part of a nation's strategy from the outset of conflict. However, economic warfare is also used to create conditions necessary for negotiated settlement and war termination. This survey of the history of blockades indicates the existence of some "iron laws" of blockade:

- A nation, or coalition, implementing a blockade should first assess the ability to impose one and their adversary's susceptibility to blockade.
- Blockades have a cost, usually paid in part by the blockading power's allies and partners. This aspect must not be overlooked and failure to mitigate will result in failure.
- A blockade's effectiveness will be challenged by an adversary's adaptation, expedients, and substitution.
- Blockades, often seen as low-risk approaches, drive adversaries to high-risk strategies.
- The slow-moving economic effects of blockades translate very slowly into battlefield advantage, but also eventually yield decisive, long-term strategic effects enduring even after the conflict's end.

More details on this historical analysis can be found in appendix 5; however, it bears mentioning that one of the oldest, historical references to the potential decisiveness of blockades is highlighted in Thucydides' *The History of the Peloponnesian War* (431 BCE). However, examining this record and

[5] Capt Wayne P. Hughes Jr., USN (Ret), and RAdm Robert P. Girrier, USN (Ret), *Fleet Tactics and Naval Operations*, 3d ed. (Annapolis, MD: Naval Institute Press, 2018), 146.

the work of prominent naval theorists more closely also reveals uncomfortable truths about the conduct of blockades. Blockades take time to have effects; are not always completely effective; generate costs for the imposer, as well as the victim; lead to escalatory activities to accelerate achievement of desired objectives; and have unforeseen, long-term consequences.

In Alfred Thayer Mahan's work *The Influence of Seapower upon History*, his seminal observations about the role of a navy and purpose have had enduring influence on naval doctrine and concepts regarding fleet operations and *guerre de course*. Although Mahan firmly recognized the commercial benefit to protecting commerce, as illustrated by his discussions of the Seven Years' War, he saw the economic aspect of warfare as secondary to fleet-on-fleet considerations. Notably, he ends his work with the 1805 Battle of Trafalgar, noting the commercial raiding and blockades were important to finally defeating Napoléon in 1815, but not worth his analytic effort that culminated with Trafalgar.[6] Julian S. Corbett, however, did expand on the Seven Years' War and Napoleonic naval history by emphasizing how seapower is also the ability to ensure successful commerce through sea control.[7] While both theorists focused on fleet operations, naval activities to interdict or safeguard commercial traffic were also addressed and noted as important economic effects. It may be argued that Corbett considered convoy escort duties more favorably than Mahan, who emphasized the indirect benefits for commerce based on sea control due to successful fleet on fleet operations.

Theorists examining the role of blockades in the Seven Years' War highlight the importance of sustaining fleets abroad through advanced bases close to the desired blockade or sea control area, as well as the role of frigates to scout, and the devastating impact on politics and economies by being isolated from foreign trade and colonies. Their analysis indicates a nation must be susceptible to blockade; if a nation is not reliant on maritime commerce, the blockade has less utility and effect.

Blockades have traditionally used ships, however modern warfare offers new opportunities, as the research in this report illustrates, for land-based sea control or sea denial. A close blockade, a method not used since the nineteenth

[6] A. T. Mahan, *The Influence of Seapower upon History, 1660–1783* (Boston, MA: Little, Brown, 1890).
[7] Julian S. Corbett, *Some Principles of Maritime Strategy,* Classics of Seapower Series (Annapolis, MD: Naval Institute Press, 1988).

century, meant surrounding an enemy's ports with ships, preventing any ships from leaving or entering the port. A distant blockade is a loose cordon placed at a distance where traffic is interdicted, searched, and if the cargo is deemed contraband, seized, impounded, and disposed of. With the advent of steamships and submarines, whole areas could be deemed exclusion zones where any ships seen would be sunk on sight. These were used by the Germans in two world wars and by the United States during World War II.

The mid-nineteenth century American Civil War illustrates an effective blockade by a superior navy over a weaker one. However, there is a cautionary tale. The blockade was porous, and blockade running was a thriving business. Confederate commerce raiders were legendary, roaming as far afield as the Pacific Ocean whaling fleets; but ultimately, the lack of shipbuilding (commerce raiders had to be built or procured in Europe) led to economic difficulties sapping Confederate military strength. This, despite the development of steam-powered, armor-protected ironclads, revolutionized naval warfare into the next century.

During World Wars I and II (WWI, WWII), the concepts of conducting a blockade and fleet design were interlinked, with the navy's role in economic warfare clearcut and emphasized. Germany's U-boat campaigns in the Atlantic are contrasted with the American submarine campaign in the Pacific. In the Atlantic, Allied navies turned to convoy operations, antisubmarine warfare, and reliance on speed and technology to overcome the German effort at unrestricted warfare. The German blockade effort failed because Allied shipbuilding more than made up for losses in transit and the Allies were able to ensure resources reached Britain. It is important to note the political aspect and pressures generated by the salience of sinkings and the outsized impact of losing expensive warships. It was only during post-WWII analysis where quantitative investigations into the facts illustrate Britain was never as near starvation and defeat as the public or government may have feared. The apparent near success the German Navy managed was effectively countered by Allied naval operations, highlighting how even when most successful, economic warfare can be rapidly reversed if political will remains strong and shipbuilding capabilities are preserved.[8]

[8] For more on U.S. Navy and Marine Corps naval operations during the period, see *History of U.S. Marine Corps Operations in World War II*, 5 vols. (Washington, DC: Historical Branch, G-3 Division, Headquarters Marine Corps, 1958–69).

In the Pacific, the U.S. Navy reluctantly turned to *guerre de course*, almost accidentally. In Clay Blair Jr.'s *Silent Victory*, the story of U.S. submarine focus on Japanese warships brilliantly illustrates this process. While focused on finding carriers, intercepted Japanese fleet signals offered opportunities to have significant operational effects in disrupting Japanese military supply operations to distant island battles. Once the effectiveness of sinking transports and tankers was realized, U.S. submarines shifted to attempting to control the sea lines of communication to Japan, while still hunting aircraft carriers and battleships. Submarine captains were rewarded for sinking warships, but their most devastating contribution was destroying Japan's mercantile assets, including sinking them in Japan's home waters. Postwar consideration of submarine operations by all sides in the war seems to focus more on the deleterious effects of unrestricted warfare targeting commerce and less on the advantages of degrading an adversary's economic potential. In actuality, the economic damage to Japan may have been so severe as to warrant a reconsideration of the utility of nuclear weapons usage. Japan mismanaged the antisubmarine warfare campaign and their shipbuilding industry and, were it not for the fanatical aspects of their overly militarized policy formulation, Japan's dire economic situation may have been more relevant.[9] CMC ONA research seeks to reopen this professional debate on the impact of blockades on domestic politics and the requirement for war termination efforts via economic warfare to be paired with successful military operations.

In the modern era, Suez Canal closures as a result of conflict, national policy, and accident greatly impacted global commerce and caused reconsideration of the fragility of complex global supply chains. Iran has threatened multiple times to close the Strait of Hormuz, vital for global oil and gas supplies, and during the Iran-Iraq War in the 1980s, a so-called "Tanker War" demonstrated the importance of protecting commercial shipping with naval forces. The quote at the start of this chapter illustrates the well-regarded *Fleet Tactics and Naval Operations* view.

It is worth noting the ongoing tensions in the Bab el-Mandeb and Red Sea due to Houthi targeting of commercial vessels with various types of unmanned

[9] Clay Blair Jr., *Silent Victory: The U.S. Submarine War against Japan* (Annapolis, MD: Naval Institute Press, 2001).

aerial vehicles (UAVs) and antiship cruise missiles, requiring interception by U.S. and partner warships. The persistence of the Houthi threat despite the conduct of U.S. and partner strikes against them illustrates both the opportunity and the challenge of sea control or denial from littorals. The persistence of Houthi abilities to disrupt commerce has been so effective that online memes suggest the presumed future effectiveness of the Marine Corps' stand-in forces concept in the Western Pacific was actually stolen from the Houthis.[10]

This historical context illuminated the framework we eventually dubbed the "Iron Laws of Blockade" articulated above. The internal campaign of learning about the historical context paralleled practical efforts to examine this strategic challenge and military problem through structured analytic activities—the SLOC series of wargames.

SLOC Series of Wargames

Between fall 2022 and November 2023, CMC ONA conducted a series of SLOC wargames to examine the use of the military instrument, focused on the Navy and Marine Corps, to achieve economic warfare objectives. Six events were conducted: a seminar-style SLOC access and basing wargame, three Marine Corps SLOC control access and basing wargames, a Center for Naval Analyses (CNA)-led economic warfare and blockade expert panel, and an Indonesia access and basing tabletop exercise.[11] The wargames presented five enduring research questions:

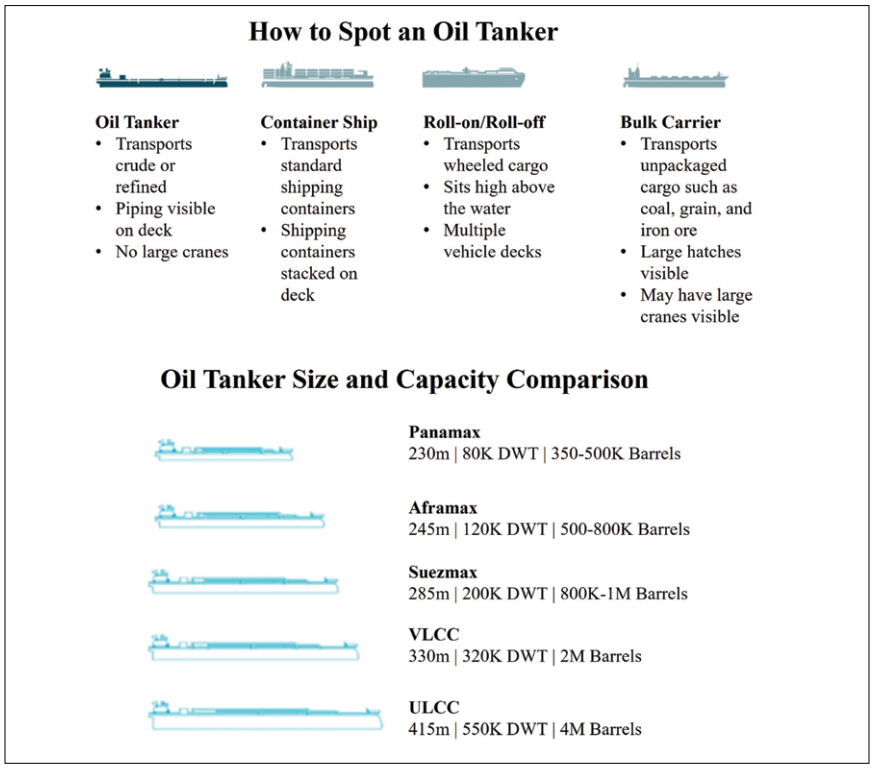
1. How could the Marine Corps use land-based seapower to control key maritime terrain?
2. What is the Marine Corps' role in economic warfare?
3. What level of effort is required to close a SLOC?
4. What support is necessary from the Navy and Joint Force?
5. What special skills or competencies does the Marine Corps provide in this situation?

[10] *A Concept for Stand-in Forces* (Washington, DC: Headquarters Marine Corps, 2021).
[11] Wargame reports are available on request. In this report, use of the terms red or blue indicates findings or observations germane to the wargame; where CMC ONA analysis affirms wargame results, this report substitutes United States or PRC for blue and red.

The games led to several insights, many of which inform this report. Key insights include:

- A Sino-United States conflict will likely be protracted; winning or losing on Taiwan or the first island chain may not lead to the end of the war.
- Despite efforts to keep the war regional, economic warfare expands it globally; implementing a blockade negatively affects the global economy, undermining international support for blue.
- Blockading the PRC is a global challenge, encompassing all aspects of national power.
- An effective blockade will look like a series of "leaky nets" deployed globally to stop the flow of oil and degrade the PRC's ability to refine and transport it. Not every vessel will be able to be stopped given the scale, scope, and variables in modern maritime commerce, but selected sets of vessels can be effectively targeted.
- Tactical implementation of a blockade is difficult, and the PRC has several political, diplomatic, and informational responses available, including unique, asymmetric counters to U.S. efforts and sustaining warmaking potential over domestic requirements.
- MIO operations were most survivable when conducted outside red antiship missile ranges; the Amphibious Ready Group/Marine Expeditionary Unit's (ARG/MEU) organic mobility is an important advantage.
- Boarding and seizing, or sinking, very large crude carriers (VLCCs) present multiple challenges. There are more than 800 VLCCs, with more than 300 owned and operated by PRC companies.
- Despite strategic risks, blue opted to initiate mainland strikes because blockade efforts were not having the desired operational impacts on red warmaking potential.
- Economic warfare delivers economic pain to the target but rarely works in changing the target's behavior.
- Red's dominant position in shipbuilding meant they could quickly rebuild their merchant fleet or build the type of combatants necessary to nullify blue global advantages. This could have far-reaching, postwar consequences.

Figure 1. Oil tankers



Note: see appendix 3 for more detail on oil industry basics.
Source: courtesy of the Office of Net Assessment, adapted by MCUP.

CMC ONA wargames focus on enhancing realism to improve analytic substance. One fundamental factor in CMC ONA's wargaming approach is to emphasize economics by including professional subject matter experts in economic issues as part of the white cell. Where possible, we encourage player cells to engage with the white cell economic experts to inform their planning and decision making throughout the wargame. Adjudication of wargame events includes potential impacts to global, regional, and local economies. Another fundamental factor in CMC ONA wargames is to ensure examination of the future character of war, which is a core line of effort in CMC ONA's long-term research agenda.

Chapter 2

Anticipated Character of a Sino-American War

The character of a Sino-American conflict will be determined principally by the strategies both sides employ and the geography affecting the battlespace. This chapter analyzes the character of a protracted war between the United States and the PRC over Taiwan. Although some factors are beyond the direct influence of a military Service, they nonetheless have significant implications for how a war in general will be waged. The more military Services think through how these factors may affect military operations, the more resilient their plans and structures will be to changes in the war's character.

As long as Taiwan resists, a war between the United States and the PRC over Taiwan will likely be protracted. Researchers define *protracted war* differently.[1] This work defines it as a war lasting longer than political leadership ex-

[1] A Cold War Rand study of Central Europe defines *protraction* as a war lasting longer than 30 days. John K. Setear, *Protracted Conflict in Central Europe: A Conceptual Analysis* (Santa Monica, CA: Rand, 1989), 1. A CNAS study examining a U.S. and China conflict defines a *protracted* war as lasting longer than 180 days. Andrew F. Krepinevich Jr., *Protracted Great-Power War: A Preliminary Assessment* (Washington, DC: Center for New American Security, 2020), 1. A different CNAS study also examining a U.S. and China conflict that defines protraction as occurring after "at least one cycle of exhaustion and recovery . . . a protracted war is a conflict that lasts longer than leaders expect." Andrew Metrick, *Rolling the Iron Dice: The Increasing Chance of Protraction* (Washington, DC: Center for New American Security, 2023), 1.

pects, where neither side achieves immediate political ends or decisive results through conventional means.

Protraction

Neither the PRC nor United States will achieve their political objectives as the result of the first battle. Rapidly seizing Taiwan will require the PLA to execute the world's largest forcible entry operation since the end of WWII, followed by the seizure and occupation of an island home to 23 million people mostly resistant to Chinese Communist Party (CCP) rule.[2]

Decisively defeating a PLA invasion force will be exceedingly difficult. The United States will have to rely on a mix of shorter-range "stand-in" systems such as fighters, ground forces, and submarines already positioned in the Western Pacific, along with longer-range "stand-off" systems such as bombers to blunt a PLA invasion. Although these forces can degrade PLA operations, the density of PLA air-defense systems, quantity of PLA targets, and difficulty of bringing the totality of U.S. military might to bear 7,000 miles away from the West Coast to inhibit effective interdiction.[3]

Because neither side will achieve immediate objectives and each will feel politically compelled to continue the fight, a protracted war will ensue. Protraction requires a revaluation of each side's interests, strategies, and perceptions about adversary intentions. In short, a war between the United States and PRC over Taiwan may involve multiple actors with differing interests, differing views regarding adversary intentions, and differing domestic political considerations.[4]

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[2] Assuming Taiwan's military can implement necessary reforms, and the Taiwanese political leadership is able to rally support, the PLA could face a 3.5-million-person Taiwanese defense force supported by unknown numbers of civilians, resisting them every step of the way. Ian Easton et al., *Transformation of Taiwan's Reserve Force* (Santa Monica, CA: Rand, 2017), https://doi.org/10.7249/RR1757; and Timothy R. Heath, Sale Lilly, and Eugeniu Han, *Can Taiwan Resist a Large-Scale Military Attack by China?* (Santa Monica, CA: Rand, 2023), v, https://doi.org/10.7249/RRA1658-1. Population figures are taken from the Taiwan National Development Council website. For further analysis on the difficulty the PLA would have in rapidly seizing Taiwan, see Metrick, *Rolling the Iron Dice*, 15–16.

[3] Metrick, *Rolling the Iron Dice*, 14–15.

[4] Robert Jervis, *Perception and Misperception in International Politics* (Princeton, NJ: Princeton University Press, 1976); and John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York: W. W. Norton, 2001), 31.

PRC scholars say reunification with Taiwan is a matter of territorial integrity marking the last battle in a multidecade civil war and a core component of the CCP's legitimacy.[5] U.S. scholars frame a PRC invasion as leading to a "hegemonic" war over the future of the international order, a threat to U.S. credibility as well as a fellow democracy, and more specifically a PRC bid to achieve Western Pacific hegemony.[6] The longer the war protracts, the more likely other countries will get pulled into the conflict.[7] How those countries perceive their different interests and future intentions of the primary belligerents will directly impact balancing and bandwagoning dynamics. The majority may view it as in their interest to avoid picking sides in a war between the world's two leading economies and opting for neutrality. Other countries may attempt to balance against perceived threats or bandwagon with perceived victors.[8]

Protraction makes war termination difficult. Unless both sides change stated views about the questionable utility of nuclear weapons escalation, and both sides remain reluctant to actively seek regime change in the other (ex-

[5] Jia Qingguo and Alan D. Romberg, *Debating China: The US-China Relationship in Ten Conversations*, ed. Nina Hachigian (New York: Oxford University Press, 2014), 186; *PLA Operational Concepts and Centers of Gravity in a Taiwan Conflict*, U.S.-China Economic and Security Review Commission, Hearing on Cross Strait Deterrence (testimony of Lonnie Henley, Washington, DC, 2021), 4, hereafter Henley testimony.

[6] Robert Gilpin, *War and Change in World Politics* (Cambridge, UK: Cambridge University Press, 1981), 198, https://doi.org/10.1017/CBO9780511664267; Rush Doshi, *The Long Game: China's Grand Strategy to Displace American Order* (New York: Oxford University Press, 2021); Elbridge A. Colby, *The Strategy of Denial: American Defense in an Age of Great Power Conflict* (New Haven, CT: Yale University Press, 2021); and Mearsheimer, *The Tragedy of Great Power Politics.*

[7] Japan echoes the American view but also adds CCP control of Taiwan as a threat to Japanese survival. Southeast Asian nations view a fight as destabilizing the region. Russia, Iran, and North Korea may not actually care who controls Taiwan but rather view a fight as an opportunity to get concessions from either China or the United States. South Korea could worry a fight will heighten tensions with North Korea. Yasuhiro Matsuda, interview by Darlene Onuorah, "The 2021 Defense White Paper and Japan's Taiwan Policy," National Bureau of Asian Research, 12 December 2021; William Sposato, "Taro Aso'a Taiwan Slip Was Likely Deliberate," *Foreign Policy*, 12 July 2021; Shunsuke Oba and Mitsuru Obe, "Japan's Kishida Says Taiwan's Security Is a Global Issue," *Nikkei Asia*, 10 May 2023; Sharon Seah et al., *The State of Southeast Asia 2023: A Survey Report* (Singapore: ASEAN Studies Centre at the ISEAS-Yusof Ishak Institute, 2023), 14; and Jonathan Chin, "Taiwan Has Right to Independence: Iran Newspaper," *Taipei Times*, 15 December 2022.

[8] Stephen M. Walt, *The Origins of Alliances* (Ithaca, NY: Cornell University Press, 1987); for the concept of bandwagoning for gain, Randall L. Schweller, "Bandwagoning for Profit: Bringing the Revisionist State Back In," *International Security* 19, no. 1 (Summer 1994), https://doi.org/10.2307/2539149; Jervis, *Perception and Misperception*; and Mearsheimer, *The Tragedy of Great Power Politics*, 31.

cept for the PRC against Taiwan), the war will eventually end via negotiated settlement, most likely while the fighting is still raging.[9]

Domestic politics also matters in war, as international dynamics regarding support for the conflict in Ukraine and Russia illustrate.[10] This can be especially true for autocratic leaders fearing their own survival if the war is viewed as a failure.[11]

Protraction requires all sides to rely on the home front for large-scale mobilization. Industrial capacity to meet mobilization directives will depend on government provided lead time and centralized planning.[12] A government's ability to implement large-scale mobilization will depend on public support, as well as other competing requirements. If governments choose to fight without public support, then alternative warfighting strategies, such as a reliance on unmanned systems or contractors may be adopted.[13] Mobilization also tends to increase a war's length; as one side mobilizes, the other side reciprocates. History demonstrates societies can have vast reserves of latent power permitting renewed cycles of force generation, employment, depletion, and regeneration.

In protraction, when the conflict turns toward economic warfare, each side faces strategic dilemmas about targeting the other's homeland and attempting to undermine or damage the other's warmaking potential. Economic war-

[9] Each side's "bargaining range," or terms they are willing to accept, will expand and contract during the course of the war as battles are won or lost and interests become more focused. A war perceived as a larger struggle or "contest between alternative values and ways of life," can be more difficult to end, as specific military objectives may not directly translate into political objectives, which in turn makes it difficult to define the notions of winning and losing. A war fought purely for territory is easier to assess, as military and political objectives are identical. Wars with multiple countries participating, especially "late-joiners" who balanced or bandwagoned after the war began, will delay and complicate bargaining dynamics. Paul R. Pillar, *Negotiating Peace: War Termination as a Bargaining Process* (Princeton, NJ: Princeton University Press, 1983), 11, 27, 29, 40; Zachary C. Shirkey, "When and How Many: The Effects of Third Party Joining on Casualties and Duration in Interstate Wars," *Journal of Peace Research* 49, no. 2 (2012): 332, https://doi.org/10.1177/0022343311431597.

[10] As of this writing, the Russo-Ukrainian War remains ongoing. For another historical look at the domestic context for a war in East Asia, see Elizabeth A. Stanley, "Ending the Korean War: The Role of Domestic Coalition Shifts in Overcoming Obstacles to Peace," *International Security* 34, no. 1 (Summer 2009).

[11] Alexandre Debs and H. E. Goemans, "Regime Type, the Fate of Leaders, and War," *American Political Science Review* 104, no. 3 (August 2010): 440.

[12] Mark F. Cancian, *Industrial Mobilization: Assessing Surge Capabilities, Wartime Risk, and System Brittleness* (Washington, DC: Center for Strategic and International Studies, 2021).

[13] Timothy R. Heath, Weilong Kong, and Alexis Dale-Huang, *U.S.-China Rivalry in a Neomedieval World: Security in an Age of Weakening States* (Santa Monica, CA: Rand, 2023), https://doi.org/10.7249/RRA1887-1.

fare will be both an escalation from international sanctions and punishment for aggression in the current international rules-based order, as well as a strategic approach to avoid escalation risks inherent in a decision to attack an adversary's homeland.

Strategies

In a protracted war with the United States over Taiwan, the PRC's first and foremost objective will be to win the battle on Taiwan. The CCP cannot afford to lose.[14] The PRC likely believes its capacities to secure Taiwan will outlast the Taiwanese capacities to resist; it is also betting national will to secure Taiwan will outlast American will to fight. These foundational principles provide the strategic logic. [15]

The PRC is expected to account for the diplomatic and economic costs related to possible international sanctions, including the loss of oil, prior to making any decision to invade.[16] Although a U.S.-led blockade will not compel capitulation, it will play into Chinese fears of "chain reaction warfare,"

[14] Lonnie Henley testified that "The Communist Party (CCP) leadership could not afford to accept defeat. The passions aroused by the war itself and by the propaganda effort in support of the war would not allow the Party to stop short of a political outcome they could credibly sell as a victory." See Henley testimony.

[15] Regarding Taiwan, the PRC will do whatever it can to compel the capitulation of the Taiwanese government, formalizing the end of a multidecade Chinese civil war. If the initial plan were unable to establish a lodgment or achieve a breakthrough, or the PLA gets bogged down in intense urban combat, the PLA will resume joint firepower strikes to soften up the Taiwanese defense, and then echelon its follow-on forces. China knows seizing an island is going to be tough. Its doctrine says island landing operations are "complicated . . . subject to . . . fierce confrontations, and high risks . . . [and that] it is necessary . . . to formulate multiple plans." With 31 combined arms brigades totaling 155,000 personnel in the eastern and southern theater command alone, as well as the remaining 52 combined arms brigades assigned to other theater commands, the PLA is expecting its first waves will need follow-on reinforcements. Xiao Tianliang ed., *The Science of Military Strategy*, trans. ed. (Montgomery, AL: China Aerospace Studies Institute, Air University, 2020), 205–12, 217, for descriptions of "front-line combat groups" or first wave forces, "follow-up forces" or second wave forces, and "cover forces" will provide air, sea, and information superiority to protect each wave's transit. Sale Lilly, "Killing Rats in a Porcelain Shop: PLA Urban Warfare in a Taiwan Campaign," in *Crossing the Strait: China's Military Prepares for War with Taiwan* (Washington, DC: NDU Press, 2022), offers discussion of PLA deficiency in urban combat.

[16] Quoted in Henley testimony, "Chinese leaders certainly would think far more than twice before going to war against the United States. The military cost is only one of myriad reasons not to do it, and not the most important reason by far. If they decide they must do so anyway, they will have made that decision in full acceptance the war will be economically devastating to China for decades to come and that its failure would severely endanger the Communist Party's hold on power. At that point, the 'cost imposition' dial is at 11; it won't go any higher."

cause its decision-making system to become "overloaded," and cause the PRC to make strategic missteps.[17]

The PRC may pursue one of three strategies during its attempt to seize Taiwan by force: indefinite blockade of Taiwan, negotiation without compromise to accept its fait accompli, or nuclear escalation.

One hypothesis on how a Sino-American conflict will begin includes the PRC implementing a blockade of Taiwan.[18] Implementing expected lessons from the Russia-Ukraine conflict, the PRC will likely attempt to isolate Taiwan by cutting all outside communication. In addition, after landing on Taiwan it will seize whatever Taiwanese stockpiles it can find and engage in intense psychological operations to compel the Taiwanese population to cease resistance. The PLA troops already on Taiwan could either continue slogging it out against Taiwanese resistance, or consolidating whatever gains made by establishing defensible strong points around the island, emplacing short-range air defense and coastal defense cruise missiles and artillery in Taiwan's mountainous region to the east, and mining all of Taiwan's ports except those needed to resupply their own force. Long-range PLA Rocket Forces (PLARF), PLA Air Force (PLAAF), and PLA Navy (PLAN) assets would focus on counterintervention, while shorter-range forces execute the close blockade. In either case, initial action or follow-on to invasion, the purpose of an indefinite blockade will be to ensure Taiwan receives no outside support.

A second hypothesis shows how the PRC could use negotiation to find a political off-ramp or to compel acceptance of its fait accompli. The viability of such an off-ramp would depend on the invasion's goals. If the goal was to "prevent independence," as opposed to "achieve reunification," then perhaps an even a failed landing that decimated the Taiwanese military could allow the PRC to claim it "taught Taiwan a lesson" and step back from a forceful

[17] Chain reaction warfare is defined on pp. 30–31 in this work. Tianliang, *The Science of Military Strategy*, 46. For a description of "overloading" the Chinese decision-making system, Joel Wuthnow, *System Overload: Can China's Military Be Distracted in a War Over Taiwan?* (Washington, DC: Institute for National Strategic Studies, National Defense University, 2020). For a historical analysis of how economic pressure led to poor strategic decision making by Germany in World Wars I and II, see Erik Sand, "Desperate Measures: The Effects of Economic Isolation on Warring Powers," *Texas National Security Review* 3, no. 2 (Spring 2020): 17–37.
[18] See Lonnie Henley, "Beyond the First Battle: Winning the Long War Over Taiwan," China Maritime Studies Institute, 22 March 2023, for a description of a Chinese blockade of Taiwan and U.S. response.

reunification attempt that was going badly.[19] If the goal was reunification, it will be difficult, if not impossible for CCP leadership to negotiate over Taiwan.[20] If the United States or Taiwan inflicted substantial costs on the PRC, it is conceivable a change in CCP leadership could allow new leaders who did not initiate the war to have the domestic political space to reframe PRC war aims and negotiate.[21] Given the high level of interest the CCP leadership articulates regarding success over Taiwan, the negotiation strategy seems unlikely to compromise with stated U.S. interests and this strategy likely yields protracted conflict.

Finally, as a strategy adopted to drive war termination after other efforts have failed, the PRC could engage in nuclear signaling, carry out a nuclear demonstration, or conduct a limited nuclear strike to coerce the United States into accepting Chinese terms.[22] A signal or demonstration would show how important Taiwan is to the PRC and a willingness to vertically escalate. The PRC could attempt a limited nuclear strike against Taiwan to defeat pockets of Taiwanese resistance or decapitate the leadership. The obvious drawback would be inciting international condemnation and destroying the object for which the PRC is fighting. If CCP leadership felt they had no other choice, they could conduct a limited nuclear strike against U.S. forces in international waters, while simultaneously redoubling their efforts to seize Taiwan. The PRC would not make this decision lightly and will attempt to lessen the likelihood the United States responds in kind. If the United States believed the only way to reestablish global nuclear deterrence was to respond with a limited nuclear strike of its own, while also not risking nuclear retaliation against U.S. cities, then finding appropriate nonmainland targets could be challenging.[23]

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[19] Laura Southgate, *ASEAN Resistance to Sovereignty Violation: Interests, Balancing and the Role of the Vanguard State* (Bristol, UK: Bristol University Press, 2019), 87.
[20] Stanley, "Ending the Korean War"; and Debs and Goemans, "Regime Type, the Fate of Leaders, and War."
[21] Pillar, *Negotiating Peace*, 40.
[22] Henley, "Beyond the First Battle." "If the amphibious landing failed . . . there is a risk that Beijing could escalate to a limited nuclear strike at this point, despite their avowed policy of never being the first to use nuclear weapons."
[23] Matthew Kroenig, *Deliberate Nuclear Use in a War Over Taiwan: Scenarios and Considerations for the United States* (Washington, DC: Atlantic Council, 2023).

Geography

Assuming a multidomain, conventional conflict leveraging competing reconnaissance fires kill webs, geography is the next most significant factor determining the character of the conflict.

Unlike the Russia-Ukraine conflict, where technological parity and tactical similarities devolved into a World War I-style trench warfare of positional forces with limited maneuver space, in the maritime geography the opposite occurs, where maneuver and dynamic force employment will be the character of the fight. The maritime and insular nature of the Western Pacific theater geography will reinforce maneuver as an important continuity in warfare because the vast distances with limited numbers of platforms (at Pacific Ocean and Asian continent scales) offer opportunities for commanders to decide the apportionment of limited capabilities and forces. However, the key terrain of Taiwan will have a concentrating effect on each side's maneuver forces; each side will resort to stratagem and operational design to achieve tactical advantages.

Taiwan's large and dense urban areas and mountainous geography mean an invasion could easily turn into a protracted slog for the PLA. The battlefield on Taiwan may mirror certain aspects of the Russia-Ukraine fight, especially if Taiwan attempts to replicate similar effects achieved by Ukraine during its defense, as well as the PRC attempting to leverage lessons learned from the cognitive domain.[24]

However, the conventional fight between PRC and U.S. militaries will involve a finding, fixing, and targeting challenge created by battlespace geometries and electromagnetic properties affected by such distances. Maritime battlespace awareness requirements, time and distance factors, and electromagnetic spectrum factors will drive an emphasis on long-duration, multipurpose, multidomain drone usage and sustainment of drone-related capabilities. The sensing aspect of drone usage will face off with signature management efforts that exacerbate the tyranny of distance challenge to find and fix moving targets. Additionally, the distances mean continuous combat will place such a strain on logistic sustainment, each side will be forced to pulse operations, including for multipurpose drone swarms. Attrition and the operational tempo

[24] Taipei Chung-yang T'ung-hsun-she online in Chinese; a website of Taiwan's major, state-run, domestic and international press agency Central News Agency (Zhongyang Tongxun She).

of missile combat will preclude the ability to rotate sufficient forces to resupply munitions or drones without an operational pause. However, the battlespace being close to the PRC will give the PLA an advantage if their domestic drone production can be leveraged to influence the battlefield.

Except in the case of operations immediately in and around the Taiwan Strait, geography in a Sino-American war favors the United States. In the context of a military operation to seize Taiwan, the PRC clearly possesses the advantage of geography as Taipei is roughly 100 miles from the PRC's coast, while it is 400 miles to Okinawa, and 1,700 miles to Guam. One analyst believes these distances will enable the PRC to generate twice as many air sorties and deliver hundreds more air-delivered weapons per day, compared to the United States.[25] However, this proximity means China's central government, major population and economic centers, as well as their naval shipbuilding facilities and ports are in the zone of conflict. One study estimates Chinese gross domestic product (GDP) could decline by 25–35 percent if global shipping is truly constrained from accessing the Chinese coast due to this "war-zone effect."[26]

In a broader strategic sense, the PRC is in a much worse geographic position compared to the United States. [27] China's 14,000 miles of land borders are the longest in the world, bordering 14 separate countries, including 4 nuclear powers. The PRC also shares a maritime border with seven different countries, three of which are U.S. allies. Since 1945, the PRC has had military conflicts with six of its neighbors, to include recent military standoffs involving the

[25] Metrick, *Rolling the Iron Dice*, 15.
[26] David C. Gompert, Astrid Stuth Cevallos, and Cristina L. Garafola, *War with China: Thinking Through the Unthinkable* (Santa Monica, CA: Rand, 2016), 48, https://doi.org/10.7249/RR1140. The report estimates the PRC would experience an 80-percent decline in regional trade and a 50-percent decline in global trade, resulting in a 25-35 percent cut to GDP. For context, the report states that "China's GDP [decline] can be compared with Germany's 29 percent decline in real GDP during WWI, when Germany itself was spared heavy damage, as well as Germany's 64 percent GDP decline and Japan's 52 percent GDP decline during WWII, when both were heavily attacked."
[27] Andrew J. Nathan and Andrew Scobell, *China's Search for Security* (New York: Columbia University Press, 2012), 15.

positioning of tens of thousands of troops and long-range fires.[28] The United States, on the other hand, has two land borders with countries who have traditionally viewed the United States favorably from a security standpoint, one of which is a treaty ally. Neither U.S. neighbor possesses nuclear weapons nor fought against the United States in more than a century.[29]

As the conflict around the Taiwan Strait protracts and the strategies of both sides emphasize economic warfare to pressure the adversary, undermine warmaking potential, and compel a path to negotiated war termination, the geography expands globally to exacerbate two Chinese concerns: the Malacca Dilemma and chain reaction warfare.

The Malacca Dilemma

The *Malacca Dilemma* is a term first used by Chinese president Hu Jintao in 2003.[30] While the term refers specifically to the Strait of Malacca, it describes the vulnerability of Chinese seaborne oil imports from the Middle East. Despite the term being 20 years old, the Malacca Dilemma still exists. The PRC has done some things to address its underlying causes, but these efforts have been marginal at best.

It is important to note the term Malacca Dilemma is theirs, not ours; this is a real fear for the CCP regime.[31] Efforts the PRC is making include building more pipelines and rail capacity, increasing the size of the state-owned tanker fleet, investing in alternative sources of energy, and building new coal-fired generating stations ensuring oil dependency is limited to the transportation sector. During a Sino-American conflict, PRC concerns about the Malacca

[28] Since 1945, China has fought against Japan, South Korea, India, Russia, Taiwan, and Vietnam. Against India, China deploys 100,000 troops along with its most modern PCL-191 long-range rocket launchers. See Aadil Brar, "China and India's Firepower Along Their Disputed Border," *Newsweek*, 20 October 2023; and "China to Field PCL191 MRLS, a New High-altitude System, against India," *Frontier India*, 20 July 2022. Russia is currently preoccupied with Ukraine; but, once the Ukraine war is over and Russia rearms, Russian and Chinese relations could become more strained.

[29] Fifty-seven percent of Canadians and 63 percent of Mexicans have a favorable view of the United States, see Richard Wike et al., *International Views of Biden and U.S. Largely Positive* (Washington, DC: Pew Research Center, 2023).

[30] Navya Mudunuri, "The Malacca Dilemma and Chinese Ambitions: Two Sides of a Coin," *Diplomatist*, 7 July 2020.

[31] Sometimes, we invent terms or concepts and inadvertently ascribe them to the Chinese. The so-called "String of Pearls," or bases and places in the Indian Ocean meant to encircle India, was completely created by the West. The Chinese never said it.

Dilemma might generate additional strain on their resources. They could either direct forces allocated to the defense of South China Sea possessions to the mission, reduce forces somewhere else to generate new forces, or develop entirely new forces to solve the problem.

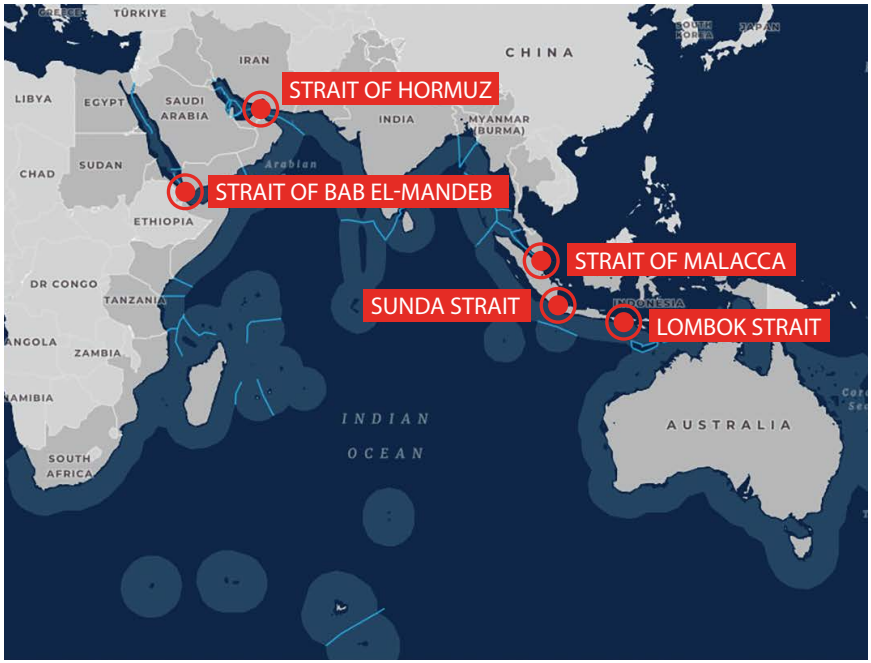
The Malacca Dilemma is not just a PRC concern, it reflects the real geography of global trade through the Indian Ocean to East Asia. The strategically important Indian Ocean region, by virtue of the PRC SLOCs and the Malacca Dilemma, will become a key operational area in which both sides seek advantage. The Indian Ocean is the world's third-largest body of water, linking together Asia, Africa, Australia, and the Indian subcontinent. Its waters touch more than 30 countries and thousands of islands and coral atolls. The Indian Ocean contains the world's most strategically important SLOCs and maritime chokepoints: the Cape of Good Hope, Bab el-Mandeb, Strait of Hormuz, Strait of Malacca, and important straits through Indonesia's archipelago.

As a crucial corridor for international trade, the Indian Ocean's chokepoints and sea lines of communication play a pivotal role in global trade, geopolitics, and maritime security. Geopolitical dynamics, environmental conditions, and the constant evolution of global trade patterns all contribute to the complexity of managing and securing these crucial sea routes (see appendix 2 for a deeper discussion of Indian Ocean SLOCs and chokepoints, including several insight-generating data cards).

While geographically distant, the Indian Ocean SLOCs are linked through their roles in facilitating maritime traffic through the Indian Ocean, the larger Indonesian archipelago, and the Red Sea. Shifts in global shipping patterns or geopolitical developments affecting one SLOC may indirectly influence considerations for vessels navigating through others, particularly in terms of route planning, risk assessment, and cost. Understanding these interconnected dynamics is crucial for policymakers, maritime authorities, and shipping companies to anticipate and manage potential challenges in the Indian Ocean region. Geopolitical events, changes in energy markets, and environmental factors all contribute to the changing dynamic in the Indian Ocean.

The Indian Ocean is characterized by powerful monsoon-driven currents, such as the Southwest monsoon and the Northeast monsoon. These currents influence the oceanic throughflows, which involves the flow of warm, relatively fresh water from the Pacific Ocean to the Indian Ocean through the com-

Map 1. Maritime chokepoints in the Indian Ocean region



NOTES: Cape of Good Hope: not technically a chokepoint but critically important part of Indian Ocean region.

Bab el-Mandeb: a narrow and shallow strait connecting the Red Sea to the Gulf of Aden; it is useful to consider the Bab el-Mandeb, the Red Sea, and the Suez Canal as a single SLOC.

Strait of Hormuz: a narrow, shallow strait connecting the Persian Gulf to the Gulf of Oman through which a significant portion of the world's oil and gas shipments pass. In 2018, its daily oil flow averaged 21 million barrels per day, representing more than 20 percent of the world's daily consumption.

Strait of Malacca: a narrow passage between the Malay Peninsula and the Indonesian island of Sumatra; one of the world's busiest maritime chokepoints, boasting more than 200 vessels transiting per day or 85,000–90,000 per year.

Sunda Strait: running northeast to southwest, is a narrow waterway connecting the Java Sea to the Indian Ocean. The strait is 16–70 miles (26–110 km) wide, between the islands of Java and Sumatra. Despite more than 35,000 ships passing through annually, the strait's narrowness, shallowness, currents, multiple depth changes, significant crossing traffic, and lack of accurate charting make it unsuitable for many modern large ships.

Lombok Strait: a relatively narrow waterway, 12–25 miles wide and 37 miles long, between the islands of Bali and Lombok, linking the eastern Java Sea, Flores Sea, and the Pacific with the Indian Ocean. The average depth of the Lombok Strait is 820 feet, with a maximum depth of more than 4,000 feet; when compared to Sunda, the Lombok Strait is considered the safest route for supertankers.

Source: Carnegie Endowment for International Peace, adapted by MCUP.

INDIA

India is a rising global power, likely to more actively pursue regional and global interests as its economic and diplomatic influence grows during the next decade. India's security interests are already an important factor in the region, which other great powers must consider, but India's influence across all security-related sectors will increase in significant relevance to a Sino-American protracted conflict. India's defense activities and expanding military inventory and infrastructure are critical posture-related and contingency-related factors, essential for future planning efforts. While India is not otherwise dealt with deeply in this report, its dominant presence and relevance to the Indian Ocean theater will be a key consideration in further discussions of economic warfare.

plex network of straits between the Indonesian islands. The primary straits involved in the throughflow include the Makassar Strait (between Borneo and Sulawesi), the Lombok Strait, and the Ombai-Wetar Strait. The implications of this network are the environmental consequences resulting from the inadvertent or purposeful sinking of a crude carrier in this area will have fast, wide-ranging, and potentially cascading impacts. These impacts will likely outpace any mitigation or containment measures.

It is also worth considering the other, numerous waterways through the Indonesian islands linking the Indian and Pacific Oceans. If one or more of the larger straits were closed or restricted, many of these smaller straits could also support the passage of warships or commercial vessels. The Alas Strait, between the islands of Lombok and Sumbawa, can handle large commercial vessels if needed. The depth at the northern end of the Alas Strait is approximately 1,300 feet. Along the north-south strait, the water depth decreases slightly from 590 feet to 410 feet, with a sill at 312 feet depth. The Bali Strait, between the islands of Java and Bali, is only 1.5 miles wide at its narrowest

point, but still maintains an average depth of 200 feet, enough to support the largest ships. In the event of conflict affecting the trafficability of the Strait of Malacca, the Lombok Strait would be the preferred route for commercial and military traffic, compared to these smaller straits, though all routes connecting the Indian and Pacific Ocean would most likely be used.

Chain Reaction Warfare

While the battle for Taiwan rages, the PRC will carefully monitor its borders for signs of chain reaction warfare. Chain reaction warfare is a Chinese belief that conflict on Taiwan could trigger border countries such as India, Pakistan, Russia, Vietnam, and North Korea, as well as nonborder, yet strategically important locations such as Indonesia, the Middle East, and Africa, to take advantage of China's involvement, creating a "one against many" problem.[32] The PLA may reinforce its border positions prior to launching an invasion, but will go into diplomatic overdrive to convince the periphery the PRC does not pose a threat.

The conflict's geography expanding will exacerbate PRC concerns about historical and existing tensions with its neighbors. The PLA's *2020 Science of Military Strategy* describes chain reaction warfare as:

> The security environment around China is severe and complex . . . once the scale of military conflict expands . . . we will face a severe situation of "one-to-two" or even "one-to-many" . . . [and] . . . the risk of triggering a chain reaction. The linkage of security issues around China is increasing, and problems in one strategic direction may trigger a chain reaction in other strategic direction.[33]

CMC ONA observes geography and protraction in a Sino-American conflict will present strategic choices about seeking leverage through escalation,

[32] Regarding chain reaction warfare the *2020 Science of Miliary Strategy* states, "The linkage of security issues around China is increasing, and problems in one strategic direction may trigger a chain reaction in other strategic directions. The judgment of the risk of triggering a chain reaction includes: in which strategic direction a chain reaction may occur, whether a chain reaction will occur in multiple directions at the same time, the threat sequence of a chain reaction in multiple directions at the same time, the nature and scale of the chain reaction, the favorable conditions and unfavorable factors of us dealing with the chain reaction." See Tianliang, *The Science of Military Strategy*, 46.

[33] Tianliang, *Science of Military Strategy*, 46.

preying on PRC concerns.[34] As part of economic warfare, the United States will face a strategic choice in targeting the PRC's overseas energy and mineral supplies.[35] Economic escalation could involve sanctions, extraterritorial export controls, currency weaponization, nationalization of the other's property, or complete trade embargos.[36] Beyond the concerns the PRC will have about its neighbors exploiting a Sino-American conflict, horizontal escalation dynamics could include nonkinetic homeland attacks, like cyber attacks, whose purpose would be to sap the country's will to fight and hamper military deployments.[37] These attacks would have to be carefully calibrated to avoid a climb up the nuclear escalation ladder.[38] Vertical escalation is balanced by the risk of nuclear retaliation. Both sides "would confront the challenge of finding the 'sweet spot' between using force to advance their aims and tempering its use to avoid crossing their adversaries' red lines and thus triggering a runaway spiral towards total war."[39]

Technology

A Sino-American conflict will also see the accelerated and continuous introduction of new technologies and tactics to achieve a battlefield advantage.[40] The difficulty of finding land and subsurface targets, compared to targets in the air and sea domains, will offer opportunities for land-based units to have

[34] Krepinevich, *Protracted Great-Power War;* and Hal Brands, *Getting Ready for a Long War with China: Dynamics of Protracted War in the Western Pacific* (Washington, DC: American Enterprise Institute, 2022).
[35] Fiona S. Cunningham, "The Maritime Rung on the Escalation Ladder: Naval Blockades in a US-China Conflict," *Security Studies* 29, no. 4 (2020): 730–68, https://doi.org/10.1080/09636412.2020.1811462.
[36] Emily Kilcrease, *No Winners in This Game: Assessing the U.S. Playbook for Sanctioning China* (Washington, DC: CNAS, 2023).
[37] Glenn Thrush and Adam Goldman, "China Is Targeting U.S. Infrastructure and Could 'Wreak Chaos,' F.B.I. Says," *New York Times*, 31 January 2024; and Elvira N. Loredo et al., *The End of Sanctuary: Protecting the Army's Installations from Emerging Threats* (Santa Monica, CA: Rand, 2020), https://doi.org/10.7249/RRA107-1, for an analysis of nonkinetic threats to U.S. Army continental U.S. installations.
[38] Jonathan Falcone et al., "Prove It Before You Use It: Nuclear Retaliation under Uncertainty," *War on the Rocks*, 1 June 2023.
[39] Krepinevich, *Protracted Great-Power War*, 17.
[40] Andrew F. Krepinevich Jr., *The Origins of Victory: How Disruptive Military Innovation Determines the Fates of Great Powers* (New Haven, CT: Yale University Press, 2023).

asymmetric, cross-domain effects.[41] A fully mature reconnaissance and precision strike regime means the necessity of blinding one's opponent to facilitate maneuver, especially in the air and sea domains, will increase the likelihood of fighting in space.[42] Missiles will be the preferred weapon to engage air and maritime targets; based on missile defense capability, this will lead to large quantities of munition expenditures.[43] Depending on when the future the conflict occurs, unmanned systems will play an increasingly important role in the fighting.[44]

The American military culture of emphasizing rapidly targeting or blinding "the archer" to gain advantage instead of "destroying the arrows" will be challenged by the battlefield geometries of the Taiwan fight. The PLA has deliberately chosen to emphasize building better "arrows," or longer range and very capable antiship and antiair missiles.[45] Penetrating the antiaccess/area-denial (A2/AD) bubbles while maneuvering will be the defining condition for military operations for both sides. Varying efforts to constrain maneuver, especially at chokepoints, by employing naval mines or blockades is expected.[46]

Other technologies such as artificial intelligence, quantum computing, directed energy weapons, hypersonic weapons, information and perception manipulation technologies, and robotic systems, when matured and used in

[41] Stephen Biddle and Ivan Oelrich, "Future Warfare in the Western Pacific: Chinese Antiaccess/Area Denial, U.S. AirSea Battle, and Command of the Commons in East Asia," *International Security* 41, no. 1 (Summer 2016): 7–48.
[42] Krepinevich, *The Origins of Victory*.
[43] Mark F. Cancian, Matthew Cancian, and Eric Heginbotham, *The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan* (Washington, DC: Center for Strategic and International Studies, 2023), 73–74.
[44] David Hambling, "New Report: Ukraine Drone Losses Are 10,000 per Month," *Forbes*, 22 May 2023; Joseph Clark, "Defense Innovation Official Says Replicator Initiative Remains on Track," *DOD News*, 26 January 2024; and Megan Eckstien, "U.S. Navy Aims to Field Manned-Unmanned Fleet within 10 Years," *Defense News*, 12 April 2023.
[45] The archer and arrow analogy is useful for battlefield descriptions but should not be exaggerated to strategic implications. Modern warfare is already multidomain, and the various aspects of stealth, electronic warfare, sensing, stand-off ranges, and counter-countermeasures mean overemphasizing the analogy as a strategic approach is risky. Wilson Vorndick, "Is the Pentagon Overplaying the Archer and Arrow Analogy," *National Interest* (blog), 5 December 2016; and James Joyner, "Dempsey on Missile Defense, Arrows, and Archers," *Outside the Beltway* (blog), 2013.
[46] Biddle and Oerlich, "Future Warfare in the Western Pacific."

combination, are already transforming new approaches to force employment.[47] A Sino-American conflict will incite a competitive race on all sides to continually assess which capabilities and tactics are most effective, and which require military organizations to repeatedly generate and supply forces at the cutting edge.

In summary, the character of a Sino-American conflict will be described by who is fighting the war, why the war is being fought, how the war is fought or escalated, the degree of societal mobilization achieved, and how it will be terminated. The SLOC series of wargames generated numerous insights about the possible character of the conflict, as well as specific insights regarding relative advantages and disadvantages which is the subject of the next section (see appendix 4 for extended insights on the SLOC series of wargames).

[47] Michael J. Mazarr et al., *Disrupting Deterrence: Examining the Effects of Technologies on Strategic Deterrence in the 21st Century* (Santa Monica, CA: Rand, 2022), 65, https://doi.org/10.7249/RRA595-1.

Chapter 3

Relative Strengths and Weaknesses
Assessing the Balance

Within the context of the above-described considerations, this chapter assesses relative strengths and weaknesses across regional viewpoints and economic assets. This assessment is not all encompassing; there are many other factors to be analyzed when examining a war between the world's leading two powers, including the critical issue of national will, and more work is to be done. CMC ONA analysis of SLOC series wargame insights highlights the below comparison.

The Relative Balance of Viewpoints

The relative balance of viewpoints and strength of interest in a protracted Sino-American war favors the PRC. Taiwan is currently recognized by only 11 of the United Nation's 193 member states, plus the Vatican.[1] Although not every country's "One China policy" is identical to the PRC "One China principle," the divergence is only slight, and most countries recognize that the PRC views Taiwan as a domestic issue.[2]

[1] Taiwan's diplomatic allies came from the Ministry of Foreign Affairs, Republic of China (Taiwan) website.
[2] Chong Ja Ian, *The Many "One Chinas": Multiple Approaches to Taiwan and China* (Washington, DC: Carnegie Endowment for International Peace, 2023).

Table 1. SLOC series wargame analysis

Factor	Which side is favored and why?	Impact
Views on Taiwan	Favors PRC: Only 11 countries recognize Taiwan; most "one-China policies" recognize PRC views Taiwan as a domestic issue.	Many countries may not view Taiwan as worth going to war over.
Views on United State versus PRC as a threat	Favors United States: Almost all countries view the PRC as more economically and military threatening than the United States.	Many countries may diplomatically protest PRC overt use of force and will be more disposed to believe the U.S. narrative.
Aerospace manufacturing	Favors United States: Western companies provide most airframes, parts, avionics, and tooling to Chinese commercial airlines. PLAAF military platforms utilize domestic or Russian technology.	In concert with Europe, sanctions could ground Chinese commercial airlines at economic costs to Western companies.
Maritime manufacturing	Favors PRC: PRC accounts for 46.59 percent of the global ship building market, while the United States accounts for 0.13 percent.	PRC will be able to replenish ships faster. The United States may be forced to rely on Japanese and South Korean shipbuilding or strike Chinese shipyards to slow ship production.
Microchips	Mixed: The United States and its allies dominate key aspects of the microchip value chain such as design and high-end production, while the PRC can produce lots of lower end chips still useful in military applications.	All sides will increase chip production necessary to modern weapons. The United States will need assistance from South Korea and Japan, but America could increase its output via CHIPS and Science Act (2022). Both sides will want to control the Taiwan Semiconductor Manufacturing Company.
Food	Favors United States: PRC produces only 66 percent of what it consumes, has a population of 1.4 billion, and 8 percent of world's arable land. Many food imports come from the Americas. The United States is food self-sufficient, has one-quarter of China's population, and holds 11 percent of the world's arable land.	The United States could cut off food exports to PRC, though the PRC may be able to find substitutes for U.S. agricultural products faster than the United States could find new purchasers. The PRC's focus on basic foods likely prevents starvation.
Minerals	Favors PRC: PRC currently dominates minerals and rare earth refining but is dependent on imports from nonaligned countries for several minerals. Exporting countries are requiring more domestic refining. The United States possesses large quantities of mineral and rare earth deposits but does little refining.	The United States will need to open more mines and acquire a mining workforce. Both sides could target the other's overseas mineral shipments.
Energy	Favors United States: PRC imports 80 percent of its crude oil with 97 percent arriving on ships from the Middle East, Russia, Africa, and the Americas. The United States imports 22 percent of its crude oil with the majority coming from Canada or Mexico.	VLCCs are high-value targets. Mitigating disruptive effects, the PRC will ration domestically produced fuel for PLA use and maximize capacity in Russian pipelines, build new pipelines, and use railroads and trucks.

Source: Commandant's Office of Net Assessment data.

Global and especially regional threat perception regarding an attempted forcible unification favors the United States. Even though other countries do not officially recognize Taiwan, they would still view a PRC invasion as threatening. Several surveys indicate regional countries, such as Japan and other allies, view a war over Taiwan as destabilizing, do not want force used, and perceive the PRC as a greater threat than the United States.[3]

Both the United States and the PRC will battle over opposing narratives. These narratives will be reinforced by international perceptions of how the war starts and who initiates conflict with the other (not just PRC aggression against Taiwan). The PRC will focus on the domestic nature of the conflict, attempt to remain nonthreatening, and try to limit the number of countries involved. The United States will try to paint the PRC as threatening as possible and will actively seek to build a regional and global coalition. Given the constraining geographic nature of the first island chain, how narratives are viewed and whether a coalition can be formed will have significant implications for the degree of difficulty with which the United States can implement Chinese containment.

The Relative Balance of Aerospace Manufacturing and Shipbuilding

The relative aerospace manufacturing balance, especially commercial, provides a marked advantage to the United States, although the PRC can leverage its domestic manufacturing base and Russian assistance in the military sector. The United States and European commercial aerospace companies are significantly ahead of their Chinese competitors with Western companies providing the majority of aircraft, engines, avionics, and tooling to Chinese state-owned commercial aircraft companies such as the Commercial Aircraft Corporation of China, making Chinese commercial planes a "facsimile of a Western plane."[4]

[3] Sharon Seah et al., *The State of Southeast Asia 2023: A Survey Report* (Singapore: ASEAN Studies Centre at the ISEAS-Yusof Ishak Institute, 2023), 14–15; Bonny Lin et al., *Regional Responses to U.S.-China Competition in the Indo Pacific: Study Overview and Conclusions* (Santa Monica, CA: Rand, 2020), 38, https://doi.org/10.7249/RR4412; and Laura Silver et al., "Comparing Views of the US and China in 24 Countries," Pew Research Center, 6 November 2023.

[4] Emily Kilcrease, *No Winners in This Game: Assessing the U.S. Playbook for Sanctioning China* (Washington, DC: CNAS, 2023), 24–25.

PLA military aerospace capabilities, however, are either indigenously developed or reliant on Russian technology and designs.[5]

The United States and Europe could ground all of China's commercial air fleet by denying parts, servicing support, and finished aircraft. This would negatively affect Western companies' financial bottom line, some of which are key members of the defense base (i.e., Boeing), as the PRC is projected to become the world's largest aviation market in terms of numbers of passengers and will account for nearly one of every five projected plane deliveries in the coming years.[6]

The shipbuilding balance is tilted decisively toward the Chinese, although with political will, the United States could leverage Japanese and South Korean ship building capacity. The PRC dominates the shipbuilding industry, accounting for 47 percent of the global ship building market, while the United States accounts for 0.13 percent, South Korea accounts 29 percent, and Japan accounts 17 percent.[7] Additionally, unlike China's commercial aerospace industry, its ship building companies are "nearly self-sufficient for all shipbuilding needs."[8]

During conflict, both sides will ramp up ship production. The United States may require support from allies and partner shipbuilding industries. However, reliance on the strong shipbuilding capacity of South Korea and Japan is complicated by their proximity to the PRC. Either side may contemplate targeting the other's shipbuilding capacity and such targeting must carefully calculate escalation dynamics. Recall one of the key economic warfare factors in WWII was the Allies' (particularly the United States') shipbuilding industry that far outstripped any damage caused by German U-boats.

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[5] Kilcrease, *No Winners in This Game,* 24.

[6] Kilcrease, *No Winners in This Game.*

[7] For shipbuilding percentage of global market, see "Ships Built by Country of Building, Annual," UN Conference on Trade and Development, accessed 21 February 2025. The U.S. Navy relies on 7 shipyards, owned by 4 prime contractors, to build its ships, while the PLA Navy relies on 20 shipyards, along with "dozens of commercial shipyards that dwarf the largest US shipyards in size and throughput." Senators Jack Reed and Jim Inhofe, "To Provide and Maintain a Navy: Understanding the Business of Navy Shipbuilding," U.S. Naval Institute *Proceedings* 147, no. 7 (July 2021). See also Jack Trevitthick, "Alarming Navy Intel Slides Warns of China's 200 Times Greater Shipbuilding Capacity," *Warzone*, 11 July 2023.

[8] Kilcrease, *No Winners in This Game*, 24.

The Relative Balance of Commodities

The relative balance of microchips is mixed.[9] The United States and its allies dominate key aspects at the top of the microchip value chain, such as design and high-end production, while the PRC has parity or advantage toward the bottom.[10] In terms of production, the PRC accounts for 21 percent of global chip manufacturing capacity, followed by Taiwan accounting for 19 percent, South Korea 17 percent, Japan 16 percent, and the United States 11 percent.[11] In terms of assembly, packaging, and testing, the PRC again leads with 38 percent of global capacity, compared to Taiwan's 19 percent, South Korea's 9 percent, and the United States' 5 percent.[12] Despite this Chinese advantage in chip production, only Taiwan can produce the most advanced three nanometer chips.[13] However, the older legacy chips the PRC is capable of producing are still useful in military platforms.[14]

Both sides rely on microchips for all major defense platforms.[15] Microchip plants will be targets for cyber, other nonkinetic forms of attack, and possibly sabotage. The United States will ensure the safe transit of chips from Japan and South Korea, and may evacuate key staff from the Taiwan Semiconductor Manufacturing Corporation (TSMC) or plan to sabotage the ac-

[9] CMC ONA recommends Chris Miller, *Chip War: The Fight for the World's Most Critical Technology* (New York: Simon & Schuster, 2022), for an in-depth discussion of semiconductors.
[10] U.S. firms account for 60 percent of global chip sales by companies who specialize in design, and the top three chip design firms (Broadcom, Qualcomm, and Nvidia) are American companies. Manpreet Singh, John F. Sergeant Jr., and Karen M. Sutter, *Semiconductors and the Semiconductor Industry* (Washington, DC: Congressional Research Service, 2023), 14. The Netherlands, a U.S. ally, also has the only company in the world, ASML, who produces the lithography machines needed to make the most advanced logic chips. Erik Roos, *Supply Chain Vulnerabilities Likely to Persist* (Washington, DC: Office of the Comptroller of the Currency, 2023), 3.
[11] Singh, Sergeant, and Sutter, *Semiconductors and the Semiconductor Industry*, 9. These numbers vary depending on the specific type of chip (e.g., logic, memory, analog, optoelectronics, sensors, or discrete).
[12] Singh, Sergeant, Sutter, *Semiconductors and the Semiconductor Industry*, 16.
[13] For TSMC comments on three nanometer chips visit their website at TSMC.com. The Chinese firm Huawei did report it was able to develop advanced five nanometer chips with dated equipment, albeit in a highly inefficient and wasteful manner. Jeff Pao, "SMIC to Sell Huawei Costly, Inefficient 5nm Chips," *Asia Times*, 8 February 2024.
[14] Kilcrease, *No Winners in This Game*, 28.
[15] Sujai and Charles Wessner, "Semiconductors and National Defense: What Are the Stakes?," Center for Strategic and International Studies, 8 June 2022.

tual facilities so technical know-how does not fall into PRC hands.[16] For its part, the PRC could intentionally avoid striking TSMC, expecting access to its advanced production facilities and to mitigate any international backlash against its seizure of the island.

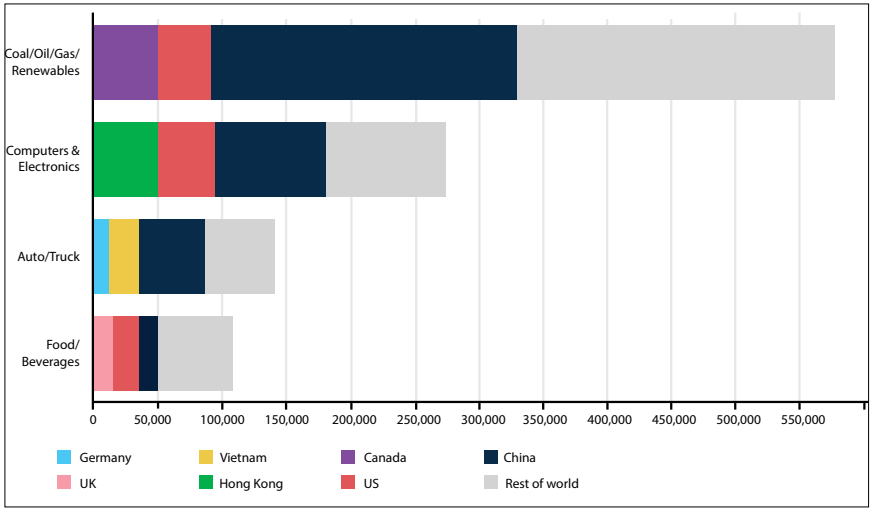
Food production provides the United States with clear advantage and degree of leverage. The PRC is not food self-sufficient, as it produces only 66 percent of what it consumes, has a 1.4 billion person population on 8 percent of the world's arable land, and land is negatively impacted by urban development, pollution, and climate change.[17] In 2021, China's three largest sources of agricultural imports were Brazil, the United States, and Ukraine; however, the PRC is making major efforts to develop agricultural trade links with Africa, Latin America, and Eastern Europe.[18] The United States meanwhile, with 11.3 percent of the world's arable land and one-quarter of China's population, is food self-sufficient, and in 2022 exported $120 billion worth of food products, primarily to Canada, Mexico, Japan, South Korea, and the PRC.[19]

In war, the United States could cease food shipments to the PRC, but the PRC accounts for 50 percent of U.S. soybean and feedstock exports. If this occurred, the PRC may find substitutes for U.S. agricultural products faster than the United States could find new purchasers to make up for the lost Chinese market, thereby requiring massive U.S. government subsidies.[20] Additionally, China's focus on basic foods is most likely sufficient to ensure a sufficient caloric intake for its population regardless of food embargos.

China's dominant position in critical mineral and rare earth refining capacity are a clear advantage over the United States, as minerals and rare earths have

[16] Depending on when in the future a war between the United States and the PRC occurs, the United States could have its own increased domestic production capacity due to the CHIPs Act of 2022. The CHIPs Act "establishes and provides funding for the Creating Helpful Incentives to Produce Semiconductors (CHIPS) for America Fund to carry out activities relating to the creation of incentives to produce semiconductors in the United States." For more description on the CHIPs Act, see H. R. 4346 - CHIPS and Science Act, 117th Cong. (9 August 2022).
[17] Zongyuan Zou Liu, "China Increasingly Relies on Imported Food. That's a Problem," Council on Foreign Relations, January 2023.
[18] Genevieve Donnellon-May, "China's Food Dilemma," Lowy Institute, May 2023.
[19] U.S. food data derived from the World Atlas, U.S. Department of Agriculture, and the World Bank.
[20] Kilcrease, *No Winners in This Game*, 32.

Figure 2. Augmented China outward direct investment to target sectors by ultimate target parent nationality USD, millions, 2005–23



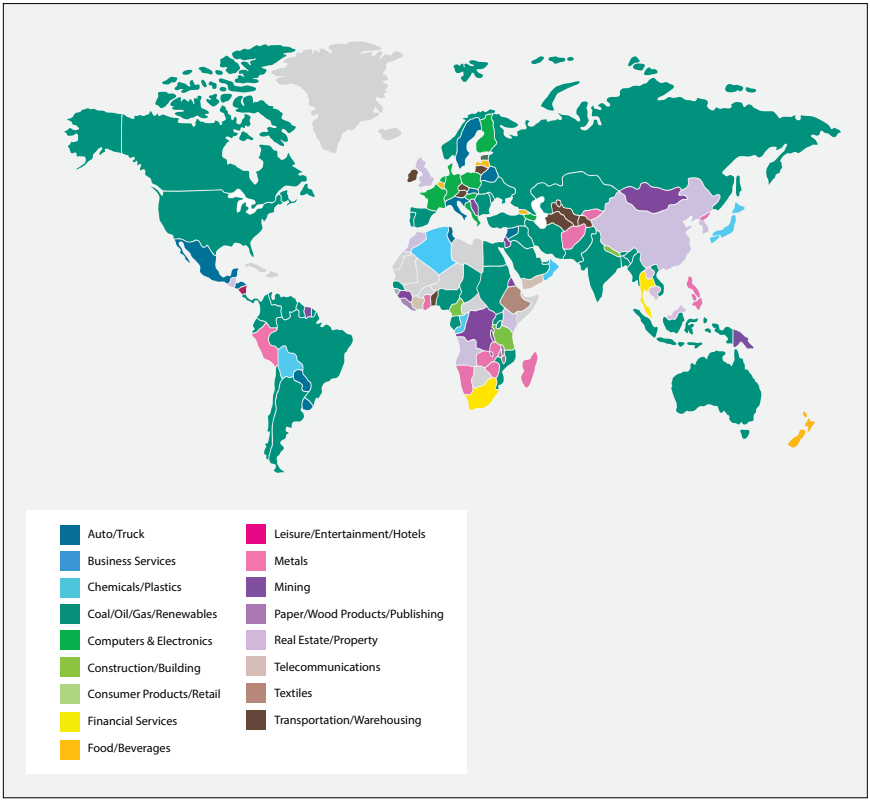
Source: based on data from Fathom Consulting, adapted by MCUP.

significant industrial and defense applications.[21] Various reports quantify this dominance and demonstrate the degree to which the United States is dependent on the PRC for the majority of its refined mineral and rare earth imports. This condition in turn makes the United States vulnerable to a Chinese embargo.[22] Despite the PRC possessing a significant share of the world's rare

[21] Kilcrease, *No Winners in This Game*, 29; and *Military and Security Developments Involving the People's Republic of China, 2023: Annual Report to Congress* (Washington, DC: Department of Defense, 2023), 161.

[22] A U.S. International Trade Commission report shows that the U.S. imports 78 percent of its rare earth elements from the PRC. "Rare Earth Elements Supply Chains, Part 1: An Update on Global Production and Trade," U.S. International Trade Commission, December 2020. A Department of the Treasury report identified 16 different strategic minerals where the United States relies on China for more than 50 percent of its sourcing. "Supply Chain Vulnerabilities Likely to Persist," Office of the Comptroller of the Currency, 8 December 2023. The DOD's 2023 China military power report cites a 2022 Brookings study estimating the PRC refines 68 percent of nickel globally, 40 percent of copper, 59 percent of lithium, and 73 percent of cobalt. *Military and Security Developments Involving the People's Republic of China, 2023*, 161. As one Center for New American Security Study put it, "the US, and most of the world, depends on China for critical mineral and metal extraction and processing." Kilcrease, *No Winners in This Game*, 32.

Map 2. Augmented China



Source: World Book, adapted by MCUP.

earth element deposits within its borders, it too depends on imports of minerals not located within the PRC.[23] The United States also possesses mineral and rare earth deposits, but conducts relatively little mining and refining,

[23] As of 2023, China possessed 16 percent of the world's graphite deposits, 86 percent of the world's gallium, and 34 percent of various rare earths. It is important to note that new deposits are constantly being discovered, so these percentages could shift in the future. In 2019, China accounted for 50 percent of the world's copper imports, 60 percent of the world's iron ore, 83 percent of the world's nickel, 75 percent of the world's antimony, 75 percent of the world bauxite, 71 percent of the world's manganese, 68 percent of the world's lithium, 55 percent of the world's chromium, 46 percent of the world's cobalt, 28 percent of the world's rare earths, 27 percent of the world's titanium, and 23 percent of the world's fluorspar. See Jorge A. Alvarez et al., *Geoeconomic Fragmentation and Commodity Markets* (Washington, DC: International Monetary Fund, 2023).

and suffers from a dearth of trained miners.[24] For example, as of 2019, the United States possessed only one rare earth mine, although others are in planning; and in 2020 had only 14 schools offering mining programs producing 327 graduates compared to China's 44 schools producing 5,000 graduates.[25]

When war is imminent, both sides will attempt to stockpile as many critical minerals as possible, increase domestic refining, secure overseas supply chains, and attempt to disrupt the supply chains of the other. Allies and partners may be willing to cut off China's access to its sources of iron ore and other minerals, but the dominant Chinese market position will make this costly.[26] The PRC could use its substantial refining output to cut off supplies of minerals and rare earths to the United States and its supporters.[27] Unless the United States or other allies have built up the requisite structure to replace the loss of Chinese capacity, there could be an initial rationing of certain minerals and rare earths critical to military hardware. Both sides could attempt to interdict the shipping of the other's overseas mineral trade, but targeting the specific ships without collateral damage to neutrals will be difficult. It is worth noting, although the global mineral supply chain is currently concentrated in a few countries, this could change in future years as new mineral and rare earth

[24] In 2023, the United States discovered 20–40 million tons of lithium along the Nevada-Oregon border, potentially making it the largest lithium deposit in the world; and in 2024, the 2.34 billion metric tons of rare earth elements discovered in Wyoming are believed to be the most valuable in the world. See Anthony King, "Lithium Discovery in U.S. Volcano Could Be Biggest Deposit Ever Found," *Chemistry World*, 6 September 2023; and Michael Auslin, "Wyoming Hits the Rare-Earth Mother Lode," *Wall Street Journal*, 14 February 2024.

[25] For a review of U.S. mining projects, see Brandon S. Tracy, *An Overview of Rare Earth Elements and Related Issues for Congress* (Washington, DC: Congressional Research Service, 2020). For an analysis of the U.S. mining workforce, see Jim Constantopoulos, "To Meet Soaring Demand for Rare Minerals, America Needs to School More Mining Engineers," Real Clear Energy, 6 December 2023; and "Federal Support for U.S. Mining Schools," Society for Mining and Metallurgy, March 2013.

[26] In 2020, Australia provided China with 66 percent of its iron ore imports. See Richard McGregor, "Chinese Coercion, Australian Resilience," Lowy Institute, 20 October 2022.

[27] China has been unafraid to use this leverage. In 2010, China embargoed rare earth elements to Japan. In 2020, it cut off graphite to Sweden. In 2022, it announced export controls on gallium (used in integrated circuits and optical devices) and germanium (used in defense systems and fiber optics) to the United States. Wilson Shirley and Klara Svensson, "Resource Realism: The Geopolitics of Critical Mineral Supply Chains," Goldman Sachs Office of Applied Innovation, 13 September 2023.

deposits are routinely discovered and countries could adopt more favorable mining policies.[28]

Energy production and security provides the United States with a clear advantage. The PRC is heavily reliant on imported oil and natural gas, whereas the United States is not. U.S. International Energy Agency predicts China's dependence on imported crude oil will reach 80 percent in 2040.[29] In 2022, the PRC was dependent on imports for 41 percent of its natural gas.[30] Nearly all of China's crude oil imports arrive via seaborne shipments (97 percent) and the rest come via pipeline.[31] Forty-one percent of China's liquified natural gas (LNG) imports come via pipelines from Russia and Central Asian states, while the rest is imported on ship.[32] The United States meanwhile imports around 22 percent of its crude oil supply, with 62 percent being from either Canada or Mexico.[33] The United States is a net LNG exporter.[34]

During a war, the United States could adopt "novel market mechanisms" to incentivize China's overseas oil and LNG suppliers to *not* sell their com-

[28] Examples of mineral concentration include: Indonesia accounts for 25 percent of the world's tin production, Russia accounts for 20 percent of the world's nickel production, and the Democratic Republic of the Congo provides the majority of the world's cobalt. When examining exported products more generally, not just refined minerals, a McKinsey Global Institute reports says there are "180 products across value chains for which one country accounts for 70 percent or more of exports." "Supply Chain Vulnerabilities Likely to Persist"; and "Risk, Resilience, and Rebalancing in Global Value Chains," McKinsey, 6 August 2020. An example of how new mineral deposit discoveries could impact a future supply chain is 2013 when China was thought to have 50 percent of rare earth reserves. By 2022, the figure dropped to 34 percent, while Brazilian, Russian, and Vietnamese assessed quantity of rare earth's increased to 16–17 percent of the world's reserves. In 2023, Sweden discovered Europe's largest deposits of rare earth minerals. Shirley and Svensson, "Resource Realism." For recent U.S. discoveries, see King, "Lithium Discovery in U.S. Volcano"; and Auslin, "Wyoming Hits the Rare-Earth Mother Lode."

[29] "Oil Imports and Import Dependency in Selected Asian Countries 2010–2040," International Energy Agency, September 2019.

[30] Ziwei Zhang, Shangyou Nie, and Erica Downs, "Inside China's 2023 Natural Gas Development Report," Center on Global Energy Policy, Columbia University, 11 September 2023.

[31] The bulk of China's oil imports (56 percent) come from the Middle East, with 18 percent coming from Russia, 12 percent coming from a combination of Venezuela, Brazil, and the United States, and 11 percent coming from Africa. *China Country Analysis Brief* (Washington, DC: U.S. Energy Information Administration, 2023).

[32] China's sea-delivered natural gas comes from a combination of countries with Australia providing 20 percent, Qatar providing 15 percent, and the rest coming from Southeast Asian countries or Russia by sea. *China Country Analysis Brief*.

[33] "Frequently Asked Questions: How Much Petroleum Does the United States Import and Export?," U.S. Energy Information Administration, accessed 21 February 2025.

[34] "Energy Explained: Your Guide to Understanding Energy," U.S. Energy Information Administration, accessed 21 February 2025.

Table 2. Major sources of China crude oil imports, 2019

Rank	Country (top 10)	Quantity (metric tons)	Percent of China crude oil imports
1	Saudi Arabia	83,329,560	17%
2	Russia	70,706,113	15%
3	Iraq	51,798,040	11%
4	Angola	51,234,536	11%
5	Brazil	37,681,418	8%
6	Oman	33,866,380	7%
7	Kuwait	22,688,750	5%
8	Iran	14,770,561	3%
9	Libya	13,273,822	3%
10	Venezuela	11,384,982	2%
TOTAL		390,734,163	82%

Source: BACI/Fathom Consulting, adapted by MCUP.

Table 3. Major sources of China LNG imports, 2019

Rank	Country (top 10)	Quantity (metric tons)	Percent of China LNG imports
1	Turkmenistan	29,938,402	25%
2	Australia	28,092,338	23%
3	Qatar	11,793,834	10%
4	Malaysia	7,513,081	6%
5	Myanmar	6,765,319	6%
6	Indonesia	4,950,341	4%
7	United Arab Emirates	4,511,340	4%
8	Oman	3,118,916	3%
9	Uzbekistan	3,091,075	3%
10	Papua New Guinea	2,922,992	2%
TOTAL		102,697,639	86%

Source: BACI/Fathom Consulting, adapted by MCUP.

Table 4. Major sources of China crude oil imports, 2022

Rank	Country (top 10)	Quantity (metric tons)	Percent on China LNG imports
1	Australia	22,391,227	22%
2	Qatar	18,905,366	18%
3	United States	10,869,090	11%
4	Russia	9,676,093	9%
5	Malaysia	7,633,552	7%
6	Turkmenistan	7,603,341	7%
7	United Arab Emirates	6,197,200	6%
8	Oman	4,531,204	4%
9	Indonesia	3,527,592	3%
10	Papua New Guinea	2,523,711	2%
TOTAL		93,858,376	91%

Source: BACI/Fathom Consulting, adapted by MCUP.

Table 5. Major sources of China LNG imports, 2022

Rank	Country (top 10)	Quantity (metric tons)	Percent of China crude oil imports
1	Saudia Arabia	87,488,520	18%
2	Russia	86,248,060	17%
3	Iraq	55,486,680	11%
4	United Arab Emirates	39,527,554	8%
5	Oman	39,370,090	8%
6	Malaysia	33,939,472	7%
7	Kuwait	33,283,290	7%
8	Angola	30,087,900	6%
9	Brazil	27,415,415	6%
10	United States	9,221,679	2%
TOTAL		442,068,660	89%

Source: BACI/Fathom Consulting, adapted by MCUP.

modities to the PRC.[35] Unless the Middle East, Russia, South America, and Africa support U.S. war objectives, the incentives would have to be significant, as the PRC is their largest customer. Blocking China's access to oil, even if its suppliers willingly agree, will have significant second-order effects, as the PRC is the world's largest exporter of refined fuel products, holding 17 percent of global refining capacity.[36] A military option, like blockade, offers an alternate path to blocking PRC access to oil, if sanctions and market incentives fail.

[35] Kilcrease, *No Winners in This Game*, 30.
[36] Kilcrease, *No Winners in This Game,* 31.

Chapter 4

Why Blockade Oil?

As noted earlier, there are multiple factors indicating a likely use of economic warfare. A naval oil blockade of the PRC is attractive because it matches key strengths and competencies of the United States with assessed and self-admitted vulnerabilities of the PRC. The United States has a global military, a global network of bases, alliances, and treaty partners; in short, the United States is in a strong position to impose a blockade. The PRC, with its export focused economy and reliance on imported oil via tankers through maritime chokepoints, is vulnerable to one.

Oil is usually the first commodity considered when exploring the subject of blockade for good reason. History provides us with a guide. While not a blockade, strategic bombing was a form of economic warfare employed by the allies during WWII against both Japan and Germany. Initially, a range of targets were attacked. The U.S. Eighth Air Force and British Bomber Command eventually settled on oil and transportation infrastructure like bridges, rail sidings, and locomotives. This was because previous bombing efforts had decentralized German and Japanese production, meaning oil and transportation was necessary for final assembly and movement of end items into the the-

ater of battle.[1] The PRC, despite extensive use of coal for electrical generation and efforts to transition away from fossil fuels to renewables, still relies heavily on oil for transportation. Oil powers commercial air traffic, freight rail, and especially trucks, which move most Chinese freight. Throttling the supply of oil would have an impact, likely economic, although a limited military impact may be felt.[2] The economic impact and pain would imperil the "Chinese Dream" and threaten a key prop of the CCP's brittle legitimacy. The Chinese are particularly vulnerable to this as most of the Chinese economy is powered by the export of goods to overseas markets.[3] This could provide an opening for a negotiated end to war. When the oil blockade fails to have the desired effect—a possible outcome—the blockade can expand or focus on other vital materials for the Chinese economy.

Most discussions of an oil blockade veer at some point into strategic effectiveness. Understanding the strategic goals and economic rationale enables a commander to craft a more effective blockade. At first glance, a blockade may seem a reasonable response to protracted war. It is possible the Joint Force will be asked to implement a blockade if the Plan A strategy fails. Whether a naval oil blockade would be effective or not, the U.S. military may still be directed to execute one. CMC ONA expects there will be political pressures to mount a blockade of oil, but a more informed perspective may result in better targeting of a blockade's intended interdiction of vital cargoes. Certainly, even if an initial oil blockade were to fail to achieve results, the blockade would likely be expanded to an energy blockade; and subsequently to blockade cargoes deemed likely to cause the desired economic damage or coercion.

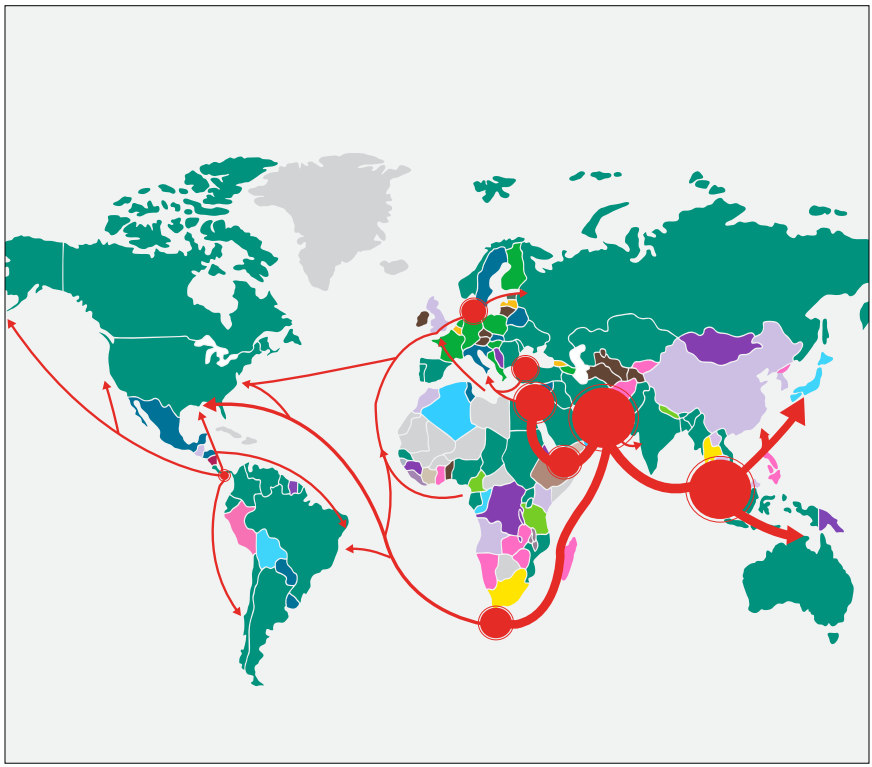
The important question for the Marine Corps to answer is not should we or could we, but how do we, and how much can we do. The Navy is beginning to think seriously about blockade; assisting them in their planning and concept development, including finding creative ways to apply land-based

[1] Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, NY: Cornell University Press, 1994).

[2] If the blockade is expanded and becomes an integrated, whole-of-government effort to deny the PRC oil, and includes options such as destroying pipelines, rail lines, refineries, and terminals inside the PRC, then the supply of jet and marine fuel could be seriously constrained. This likely has escalatory consequences.

[3] This contrasts with the United States, which imports more than it exports. The majority of the U.S. economy is driven by domestic consumption.

Map 3. SLOCs and passage of oil



Source: "World Oil Transit Chokepoints," U.S. Energy Information Administration, 25 July 2017, adapted by MCUP.

seapower to the problem could greatly improve the nation's capacity to wage this style of war. [4]

A naval oil blockade may be useful for its deterrent effect. It appears the age of unconstrained Chinese finance may be ending.[5] Resources available to the PLA may become constrained in the future, limiting Chinese options and the range of available responses.

[4] Gabriel Collins, "A Maritime Oil Blockade Against China—Tactically Tempting but Strategically Flawed," *Naval War College Review* 71, no. 2 (2018).
[5] Logan Wright, "China's Slow-Motion Financial Crisis Is Unfolding as Expected," Center for Strategic and International Studies, 21 September 2022.

PRC efforts to preserve the PLA's access to fuel may directly support the accomplishment of U.S. objectives because it would require the PRC and PLA to focus away from Taiwan. Additionally, the objective of a blockade at its most basic level would be "strong US, weak China."[6] Several economic goals in support of the objective could be met: the migration of supply chains out of the PRC to countries allied with or at least neutral toward the United States, the curtailment of economically enabling activity such as commercial air travel, and damage to the chemical industry resulting from denied access to feedstock. The economic logic of this approach would be to raise the cost of transportation to a point where many enterprises, especially in the manufacturing sector, would suffer in productivity. The Chinese economy depends on integrated supply chains to manufacture low-cost goods for export. Losses in productivity will disrupt the Chinese mainland integrated supply chain ecosystem. The global economy will eventually rebalance by shifting to alternate supply chains in the rest of Southeast Asia or Mexico.

The United States and the PRC have different understandings of the place of the economy in society. In the United States, the economy and the generation of wealth is seen as an end unto itself. The purpose of the economy, in the PRC's view, is to support, facilitate, and enable political control; anything threatening the political stability, social harmony, and the PRC's primary objective of regime perpetuation would be taken very seriously.[7] The shaky legitimacy of the PRC forces them to rely, among other things, on economic growth and rising standards of living.

Insights on Conducting a Blockade

It is tempting to contemplate using an energy blockade to achieve operational warfighting objectives. The easiest concept to reach for is the use of a broad energy-related blockade to reduce the fuel available to the PLA. This will not work. The PLA may not run out of fuel if the regime can help it, and it is expected to be able to keep the PLA supplied by internal mechanisms. Absent

[6] This echoes Ronald W. Reagan's 1988 formulation of U.S. Cold War strategy: "we win, they lose." See Richard Allen, Ronald Reagan Oral History Project interview, Miller Center of Public Affairs, University of Virginia, 28 May 2002, 26–27.

[7] Thomas Orlik, *China: The Bubble that Never Pops* (New York: Oxford University Press, 2020); and Arthur R. Kroeber, *China's Economy: What Everyone Needs to Know* (New York: Oxford University Press, 2020).

a comprehensive and integrated campaign against oil like the one conducted by the Eighth Air Force and British Royal Air Force during WWII, the PRC can ensure the PLA has fuel by giving the PLA first priority for any fuel produced in the country and recalibrating the domestic oil industry to preserve the ability to make the fuels necessary to continue fighting.[8] This task is not a challenge as the relative portion of the PLA's fuel consumption relative to the rest of the Chinese economy is quite small.[9] It is improbable the PRC would decide against keeping the highest priority to fueling its military.

The PRC has several strategic options for blunting the worst economic effects of an energy blockade. It can increase domestic production, coal could be turned into liquid fuel, and plant-based ethanol could substitute for certain uses. The PRC could increase imports from Russia or the Central Asian republics. They could construct pipelines and add rail connections to increase overland transport on oil. They could also accelerate investments intended to mitigate the Malacca Dilemma, like the China-Myanmar and China-Pakistan economic corridors, even though these efforts would be incremental at best (less than 3 percent of overall consumption requirements).[10] The regime has options on the demand side as well. Commercial air travel could be greatly restricted. Use of passenger cars could be curtailed. Other means of transportation would likely be strictly controlled. These efforts all could attempt to ensure a steady flow of fuel to the PLA.

A blockade could increase the value of oil tankers as they are removed from circulation. At the same time, the PRC, by embargo or sanction, could be prevented from selling oil tankers. Logically, their first act would be to direct all new production toward replacing losses. The PRC could build many tankers, but shipyards located on the coast could be targeted, hampering production. Removing the Chinese shipbuilding industry from the global mar-

[8] The feasibility and acceptability of this idea requires further examination. The United States does not have even a small percentage of the bomber fleet it had in WWII. It also has no partner like the wartime UK. Chinese air defenses are among the best in the world and most importantly, China is a nuclear power. Widespread bombing of hundreds of sites inside China could entail a significant risk of nuclear war.

[9] Collins, "A Maritime Oil Blockade Against China."

[10] One of the goals of these investments is to achieve "virtual bi-coastality." This means China has access to ports outside the Strait of Malacca. The port and land bridge to China makes interdicting oil more difficult but not impossible. Once a tanker was to offload at a coastal terminal, Chinese rail, road, and pipeline investments would transport the oil into the interior.

ket would constrain supply, raising prices. U.S. allies Japan and South Korea are the number two and three shipbuilders in the world; they would be well positioned to pick up the new demand.

Naval blockade is not without risk. Proponents of blockade claim its nonescalatory characteristics make it a good policy option. However, an oil blockade threatening key props of the regime will likely be viewed as an existential threat and therefore as escalatory. The debate is substantive and both sides of the argument make good points. The slow moving and cumulative nature of a blockade does support the argument there would be more signposts or indicators alerting decision makers they are ascending the rungs of the escalation ladder, similar to nuclear escalation dynamics.[11] The idea that a blockade could undermine a key aspect of the regime's legitimacy and not incur a significant response is difficult to accept. Further, anything important enough to the PRC to get them to negotiate an end to a war is also potentially important enough for them to consider escalation. Conversely, anything not important enough to trigger an escalatory response would not likely be important enough to compel war termination. Where on this continuum does an oil blockade fall?

Much military thinking on a blockade is informed by current peacetime practice. This is potentially misleading. A maritime oil blockade conducted during a Sino-American war would be a game played by different rules. For the past few decades, the closest thing to a naval blockade conducted by the United States has been counterinsurgency boardings, counterterrorism boardings, and the Proliferation Security Initiative.[12] These are peacetime, low-risk operations demanding careful procedures for adherence to international law and rules of evidence. Because of these factors, boarding a vessel at sea is often the most desirable way to approach the problem. Stopping the flow of oil would be a different problem. A different approach may be warranted if we are not at peace, not interested in collecting evidence, and have less sensitivity to casualties.

Why would the United States need to board vessels in the first place? Why not just sink tankers wherever they can be found? Short answer, boarding is

[11] This refers to Herman Kahn's 44 rung nuclear escalation ladder. See Kahn, *On Escalation: Metaphors and Scenarios* (New York: Praeger, 1965).
[12] "Proliferation Security Initiative," U.S. Department of State, accessed 21 February 2025.

not necessary in every case, but boarding vessels provides the United States with a better range of options.[13] There are several reasons it would be desirable to board and seize a tanker. Boardings are reversible, and they avoid creating environmental catastrophes. Boardings generate options for mitigating the worst effects of blockade on neutrals, allies, and partners. They also make available the ships for a variety of purposes and most importantly, the reversible and measured pace of blockade may avoid fears of rapid escalation.

The reversibility of boardings makes good policy sense. Sinking a tanker cannot be undone and would likely kill at least some of the crew. Sinking a full VLCC would also create tremendous environmental damage.[14] In certain places, like the territorial waters of a neutral or allied nation or in their exclusive economic zone (EEZ) where an ally or partner fishes this would create undesirable follow-on consequences outweighing whatever advantage sinking the vessel created.

A tanker's cargo is valuable. As of this writing, a full 2-million-barrel VLCC carries cargo worth about $154 million (USD). The tanker is worth about $120 million.[15] Once seized, the United States could sell the oil, impound it to effect global prices, or give it to allies as compensation for economic damages caused being inside the blockade zone. Sinking a tanker prevents the United States from benefitting from the cargo.

The tankers could become an important asset as well. A blockade would reduce the PRC's inventory of VLCCs. In addition to denying them to the PRC, seizing tankers makes them available to the United States. They could be used as part of the Navy's fleet logistic train, addressing a well-known vulnerability.[16] They could be sold, funding a portion of the war. Like their cargo, the tankers could be gifted to allies, or they could be used as floating storage both for economic and military purposes. PRC strikes on unprotected, above-ground pe-

[13] Sinking tankers, especially empty ones, makes great sense in certain situations. An all-out effort to deny the PRC access to imported oil would include the destruction of the Chinese state-owned tanker fleet by any means possible. Sinking empty tankers in the open ocean would be nearly impossible for the Chinese to stop.

[14] Stephen Haycox, "Fetched Up: Unlearned Lessons from the Exxon Valdez," *Journal of American History* 99, no. 1 (June 2012): 219–28, https://doi.org/10.1093/jahist/jas050.

[15] Fotios Katsoulas, Izzaty Kamal, and Yen Ling Song, "Tankers at Sea Insight: VLCC Segment Breaks out of Rut as Higher Employment in Summer Buoys Earnings," S&P Global Market Intelligence, 7 September 2022.

[16] The Navy does not have a lot of tankers and sealift ships. This is compounded by the nation's inability to build a wide range of ships quickly.

troleum, oil, and lubricant (POL) storage are expected to cause problems. The emptying of the Red Hill storage facility in Hawaii has already significantly reduced our oil storage in U.S. Indo-Pacific Command (USINDOPACOM). Having a "shock absorber" to mitigate the impact of strikes seems like a possible, good use for a captured tanker carrying refined products.

Responses to a Blockade

The PRC believes the United States will attempt a blockade.[17] In response, the PRC has two principal approaches. One is to increase domestic resilience by rationing oil and increasing supply. The other is to counter the blockade directly using diplomatic, military, and economic means.

Domestic Resiliency

The PRC will rely on its domestic oil supply and rationing to mitigate the effects of a U.S. blockade. Some analysts believe China's domestic oil production of 4 million barrels of oil per day is enough to fuel PLA operations, others do not.[18] To minimize the effect of an oil blockade, the PRC will ration its existing oil supply primarily by restricting the use of private automobiles and commercial aviation.[19] The PRC is a major exporter of refined oil products. Many esti-

[17] In the chapter discussing convoy operations, *The Science of Military Strategy* states that "hegemonic countries may exercise control over important air routes that are of great interest to China; some countries that have disputes with China may also pose a threat to the security of China's sea lanes," while the chapter focused on PLAN development states, "It is extremely important to ensure the safety of maritime oil and trade and shipping channels for the development of China's economy." See Xiao Tianliang et al., *The Science of Military Strategy*, 295, 365.

[18] Gabriel Collins, "A Maritime Blockade of China: Tactically Tempting, but Strategically Flawed," *Naval War College Review* 21, no. 2 (2018): 12, believes the PLA can rely on its domestic stocks and pipelines to support a protracted war, saying, "At the height of the US wars in Afghanistan and Iraq, the US military used the equivalent of 10 percent of China's domestic oil supply." Lonnie Henley is not as confident in "How Well Do We Understand PLA Logistics?," in *PLA Logistics and Sustainment: PLA Conference 2022*, ed. George R. Shatzer and Roger D. Cliff (Carlisle, PA: U.S. Army War College Press, 2023), 201. "It is hard to assess how a near-total cessation of trade would affect a continental-sized economy operating on a war footing. How large are China's stockpiles of key resources? How vulnerable are they to enemy attack? What would China's wartime consumption rates be, with tight rationing offset against huge increases in military consumption? How much of which materials could they expect to get through if Russia remained friendly—and how much if it did not? At what point would economic disruption affect PLA operational capabilities?"

[19] China already restricts automobile use in major cities and commercial plane use could be reduced to support the war effort. China's immense public transportation network would be very crowded but could still facilitate civilian travel. See Henley, "How Well Do We Understand PLA Logistics?," 12–13.

mates on PRC oil import quantities fail to account for this throughput factor affecting how much oil imports are required for domestic consumption. The PRC will be able to leverage the refined products, which were initially intended for export, for their purposes until exports are possible again. In addition to these measures, prior to a decision to invade, the PRC will likely ensure its strategic petroleum reserves are topped off.[20]

The PRC will also increase its overland sources of oil. The Atasu-Alashankou pipeline from Russia to northwestern China via Kazakhstan can likely increase the capacity of its throughput by 200,000 barrels per day to nearly 600,000.[21] The Skovorodino-Daqing pipeline from Russia to northeastern China can move around 1 million barrels of oil per day.[22] The PRC can transport an additional 230,000 barrels per day from Russia via trucks and rail as it did prior to the construction of the Skovorodino to Daqing pipeline.[23] The PRC is likely capable of building, in approximately six months, an additional pipeline to Russia with a 700,000–800,000 daily barrel capacity.[24] It can also double track rail lines and produce more rolling stock to move additional imported oil.

Domestic production can also be increased by pumping more from existing fields, drilling in identified but currently unprofitable reserves and increasing exploration.[25] The PRC can use fuel extenders such as methanol, and replace 15 percent of its refined blend stocks from crude oil, replacing the equivalent of 300,000 barrels of crude per day.[26] One analyst assesses if the PRC adopted the above strategy, and reduced consumption by 45 percent of prewar levels, it could hold out for eight years before oil supplies ran out.[27]

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[20] One analyst believes the PRC's strategic reserve sites can store 700 million barrels of oil. Collins, "A Maritime Blockade of China," 19.
[21] Carol Zu, "Russia Crude Oil Pipeline: Capabilities to Mainland China," S&P Global Commodity Insights, 1 April 2022.
[22] Collins, "A Maritime Blockade of China," 15.
[23] Collins, "A Maritime Blockade of China."
[24] For context, during WWII, the United States built the "Big Inch" pipeline from the Gulf of Mexico to the East Coast in a little less than a year. The distance from the gulf to the East Coast is half the distance from Russia's borders to Daqing. Collins, "A Maritime Blockade of China," 16.
[25] This makes sense because the price of oil will be much higher making currently unprofitable fields money makers. The state could drill at a loss.
[26] Collins, "A Maritime Blockade of China," 17.
[27] Collins, "A Maritime Blockade of China," 19.

Counter the Blockade

To directly counter the blockade, the PRC will first use diplomatic means. This aligns with the Chinese narrative about Taiwan as a domestic matter, the United States as an aggressor, and the PRC as nonthreatening. The PRC will attempt to drive a wedge between the United States, its allies, and nonaligned countries by a concerted diplomatic campaign to remind the world, once again, the United States is interfering in "other countries' internal affairs," and engaging in "hegemonism . . . and double standards."[28] The narrative will include reminding all countries the PRC adheres to the five principles of peaceful coexistence.[29] The PRC will attempt to make itself appear as nonthreatening as possible. To promote this message, the PRC will likely emphasize it has never stated it will use force to settle other disputes, unlike its policies regarding Taiwan.[30] It would point to the rapidly deteriorating global economy and highlight the U.S. willingness to damage the entire world's economy to interfere in a domestic civil war. The PRC could produce deep-fake videos of U.S. military ineptness or cruelty to local populations as a reminder of the risks of being involved in U.S. operations, and it assuredly will broadcast images of any real-life mistakes. The PRC would highlight it is willing to "eat bitterness" (吃苦) indefinitely, while the United States, as displayed in Vietnam, Iraq, Afghanistan, and Ukraine is not. The PRC would ask the world, why should they support the U.S.'s destruction of the world's economy, when in a few years the United States will leave, the PRC will remain, and the PRC will still consider Taiwan a part of China. In short, the PRC will attempt great

[28] Xi Jinping, "Hold High the Great Banner of Socialism with Chinese Characteristics and Strive in Unity to Build a Modern Socialist Country in All Respects," *Report to the 20th National Congress of the Communist Party of China,* (Beijing: CCP, 2022), 52–53.

[29] The five principles of mutual respect for sovereignty and territorial integrity, mutual nonaggression, noninterference in each other's internal affairs, equality and mutual benefit, and peaceful coexistence.

[30] *The Taiwan Question and China's Reunification in the New Era* (Beijing: Taiwan Affairs Office of the State Council and the State Council Information Office, 2022), states, "We will work with the greatest sincerity and exert our utmost efforts to achieve peaceful reunification. But we will not renounce the use of force, and we reserve the option of taking all necessary measures." Regarding the South China Sea and Senkakus/Diaoyu disputes, the *China's National Defense in the New Era* (Beijing: State Council Information Office, 2019), states "China is committed to resolving related disputes through negotiations with those states directly involved on the basis of respecting historical facts and international law. China continues to work with regional countries to jointly maintain peace and stability. It firmly upholds freedom of navigation and overflight by all countries in accordance with international law and safeguards the security of sea lines of communication (SLOCs)."

lengths to ensure the United States pays a long-term diplomatic price with as many countries as possible for implementing a blockade.

For the oil shipments, the PRC will make tracking and seizing its tankers as difficult as possible. Chinese oil tankers will spoof Automatic Identification System (AIS) locations to complicate U.S. targeting. The PRC will engage in spot trading; by having Russia or some other country purchase the oil from the Middle East supplier, only to have the PRC purchase it once it is through the blockade. The PRC could propose a combined task force of Shanghai Cooperation Organization countries, BRICS (Brazil, Russia, India, China, South Africa; as of 2024, includes Egypt, Ethiopia, Iran, and United Arab Emirates), non-PRC flagged vessels, or perhaps just Russian and Iranian ships to serve as convoy escorts, forcing the United States to target non-PRC ships. The PRC could employ its vast maritime fishing fleet as convoy escorts, complicating the ability to get close enough to Chinese oil tankers to conduct a boarding. The PRC could fly PLA or armed private security contractors to the tankers Middle Eastern point of origin to provide armed escort; such contingents could be equipped with small arms, grenades, and man-portable air defense or antitank systems. These same techniques could apply to any efforts to ensure the arrival of materials the United States and its allies sought to interdict.

Whether the PLA intervened directly against a U.S. blockade would depend on how much progress was made toward developing an Indian Ocean or "far seas" fleet, as well as how much capacity it could spare relative to the Taiwan fight.[31] *The Science of Military Strategy* highlights the need for convoy operations due to "threat[s] to the security of China's sea lanes."[32] To support far seas convoy operations, the PLA could utilize nuclear-powered aircraft carrier task groups, amphibious capability, and nuclear-powered submarines currently in development.[33] The PLA would direct its oil tankers to route as close

[31] See David Brewster, "The Red Flag Follows Trade: China's Future as an Indian Ocean Power," in *Strategic Asia 2019: China's Expanding Strategic Ambitions* (Washington, DC: National Bureau of Asian Research), 174–209, for three different descriptions of PLA presence in the Indian Ocean Region based on a 1) military operations other than war (MOOTW) strategy, 2) sea-denial strategy, or 3) sea-control strategy. See also Jennifer Rice and Erik Cobb, "The Origins of 'Near Seas Defense and Far Seas Protection'," China Maritime Studies Institute, February 2021, for descriptions of the "Far Seas" protection mission.
[32] Tianliang, *The Science of Military Strategy*, 295, 365, says the Navy is to "ensure the security of the national maritime strategic channel," especially regarding maritime oil and trade.
[33] Rice and Cobb, "The Origins of 'Near Seas Defense and Far Seas Protection'," 12–13.

to the South Asian subcontinent as possible, under the watchful eye of PLAN Indian Ocean presence, making it risky for U.S. military interdiction of oil supplies from the Middle East. The PRC will attempt to keep India out of the conflict, while putting diplomatic pressure on Singapore, Indonesia, and Malaysia, who sit astride the various straits connecting the Indian Ocean to the South China Sea, to not grant access to U.S. forces. Once through the Southeast Asian straits, tankers would attempt to hug the Vietnamese coastline, under the protection of the Southern theater command.

To support convoy operations, the PLA could leverage its overseas logistics hubs and dual-use facilities. If the PRC were able to turn its facilities in Cambodia, Myanmar, Sri Lanka, and Pakistan into air and naval bases, it could utilize these locations to provide additional protection to its tanker fleet.[34] Air bases with unmanned aircraft systems (UAS) and maritime patrol and reconnaissance aircraft (MPRA) support targeting of U.S. vessels; land-based fighters provide direct air cover to the tanker fleet; and air-to-air refuelers extend the range of carrier and land-based aircraft. Naval bases support the launch, rearm, and repair of submarines and surface combatants necessary to support convoy operations. Finally, the PRC could leverage long-range, antiship ballistic missiles, such as the DF-26B, based in western China to target U.S. ships attempting to impose a blockade. These measures require the PRC to convert its commercial port access and logistics facilities into actual military bases.[35] The PLA would also need to expand its inventory of special mission aircraft, submarines, and other naval assets which will also be heavily engaged in a protracted conflict over Taiwan.

Whether the PRC decided to use force from overseas locations is based primarily on political factors. Chinese doctrine is explicit on the linkage of over-

[34] *Military and Security Developments Involving the People's Republic of China, 2023*, 155.

[35] Daniel R. Russel and Blake H. Berger, *Weaponizing the Belt and Road Initiative* (New York: Asia Policy Society Institute, 2020) argue, "It would be a mistake to regard China's strategic strongpoints as precursors to Yokosuka or Subic Bay–style mega-bases following the US model. . . . China has a long history of vowing never to set up foreign military bases. . . . China has no genuine military alliances, whereas the United States has more than 60 agreements with allies for mutual defense in wartime. . . . And China seems unlikely to try to deploy the defensive weaponry necessary to protect overseas facilities . . . particularly since that would undercut the projects' commercial interests as well as the claimed benign image of the [Belt and Road Initiative] BRI brand. Additionally, not only would China require a much larger navy to support this endeavor, but it does also not make strategic sense for China to deploy the bulk of its forces so far away from the mainland as would leave it vulnerable to attack from other potential adversaries."

seas military forces to support larger national political objectives, as well as the risk of conducting military operations beyond those necessary to achieve political goals, which is understandable, given PRC fear of containment and chain reaction warfare.[36] If the PRC decides to use overseas locations to strike the United States, the host country risks becoming a belligerent and would likely demand defense guarantees.[37] Historically, the PRC has eschewed such commitments. During war, Chinese leaders may be more open to leveraging international partnerships to match similar U.S. practice. A key factor, regarding PRC use of overseas facilities to strike U.S. targets, will be whether the host nations provide requisite wartime access, basing, and overflight. If not willing to provide wartime access, the PRC may attempt to force countries to accept Chinese terms. This would be risky, likely not work with nuclear-armed countries, and plays into U.S. narratives about the PRC as a threat. Ultimately, recalling Thucydides-related arguments, strong-arm PRC approaches to access increase the likelihood of chain reaction warfare and invite serious consequences if defeated.[38]

[36] Tianliang, *The Science of Military Strategy*, 317, "War is a continuation of politics, and the use of military power overseas is also a continuation of politics. The country's political strategy and development strategy have a clear guiding and prescriptive effect on the overseas use of military power. If there is no political support and demand, the overseas use of military power will lose its fundamental direction and basic conditions. Therefore, the overseas use of military forces must be planned from the height of the implementation of national political tasks." When discussing war termination, on p. 258, "The military objectives of the war are determined on the basis of political objectives. If the desired goal has been achieved, we will never engage in combat beyond political goals. Otherwise, things will be reversed. On the contrary, the benefits of war will be reduced due to the expansion of the results of the war, and the advantage will be wiped out." Also see, Andrew J. Nathan and Andrew Scobell, *China's Search for Security* (Ithaca, NY: Columbia University Press, 2012), 15, for Chinese defense planners, "potentials for conflict are everywhere around China's periphery."

[37] Lucas Meyers, "China's Economic Security Challenge: Difficulties Overcoming the Malacca Dilemma," *Georgetown Journal of International Affairs* (22 March 2023) asks, "Without guarantees of Chinese protection or security benefits, why would Pakistan risk American wrath by allowing PLAN vessels to operate out of Gwadar Port during wartime?" Isaac B. Kardon and Wendy Leutert, "Pier Competitor: China's Power Position in Global Ports," *International Security* 46, no. 4 (Spring 2022), https://doi.org/10.1162/isec_a_00433, states, "China's lack of allies remains a major obstacle because a host state's decision to permit military use of a port on its soil would almost certainly require it to assume a belligerent status in an international conflict."

[38] See Robert B. Strassler, *The Landmark Thucydides: A Comprehensive Guide to the Peloponnesian War* (New York: Touchstone Publishing, 1996), 351–57, for the Melian dialogue; and Donald Kagan, *The Peloponnesian War* (London: Penguin Books, 2003), 478–84, for an account of the punishment Sparta's allies wanted to inflict on Athens at the war's conclusion.

Chapter 5

Potential Marine Corps Contributions to a Maritime Blockade

Given the assessed likelihood a maritime blockade will be a Joint Force mission, CMC ONA focused on Marine Corps contributions to shape further development of this subject. This chapter will discuss potential Marine Corps contributions to a maritime blockade of the PRC. The previous chapters discussed the reasons a war would be fought, the character of a war between the United States and the PRC, the relative advantages of each nation, and the strategic rationale for blockade. Turning to the operational realm, we discuss ways the Marine Corps could implement a blockade. Part of the Service chief's role is to provide advice to the political leadership; another part is to implement decisions. Strategic desirability aside, there is a real possibility Marine forces could be directed to participate in an economic warfare campaign.

Beyond the seizure of ports or designated key terrain (commercial, industrial, or maritime), Marine forces could do this in three ways:

- Provide Marines to serve as boarding forces aboard U.S. Navy surface combatants.
- Enable a naval blockade through the application of land-based seapower.
- Conduct a blockade from land and the littorals, with limited assistance from the Joint Force.

Consider the following hypothetical vignette as a jumping off point for understanding and evaluating the potential contributions. This vignette is adapted from the scenario used in the CMC ONA wargaming effort.[1]

The Marine Corps' contributions considered here must occur in the context of a global campaign to deny the PRC oil employing every dimension of national power. None of these efforts alone would be decisive, especially not individual unit efforts to seize tankers. Viewed holistically, all the following efforts when combined could be effective in establishing an energy blockade:

- Declaration of a legal blockade.
- Sanctions on countries who continue to export oil to the PRC.
- Place tanker operators who refuse to comply with the blockade on the Department of Treasury entity list.[2]
- Freeze the assets of owners and those at the top of the corporate hierarchies.
- Make diplomatic efforts to incentivize oil-producing (and other energy products) countries to not sell to the PRC.
- Ensure the continued supply of oil and other energy products to allies and partners.
- Apply a wide range of military options to impact the PRC's supply of energy, including, but not limited to, kinetic tools, cyber attacks, and electronic warfare to destroy, disrupt, or degrade tankers, oil transportation, and refining.

Given the size and strength of the Chinese Navy and their impressive A2/AD capabilities, a near or close blockade is out of the question. A distant blockade conducted at a middle distance (along the Indonesian archipelago including the Strait of Malacca) is within the range of some Chinese capabilities. These vulnerabilities are an important consideration when determining appropriate Marine Corps contributions to a maritime blockade of the PRC and

[1] The complete and more detailed scenario is available on request.

[2] The entity list is more properly known as the Specially Designated Nationals (SDN) and Blocked Persons List. The U.S. Department of Treasury Office of Foreign Assets Control posts a list of individuals and companies owned or controlled by, or acting for or on behalf of, targeted countries. It also lists individuals, groups, and entities, such as terrorists and narcotics traffickers designated under programs not country specific. Collectively, such individuals and companies are called SDNs. Their assets are blocked, and U.S. persons are generally prohibited from dealing with them.

why a more innovative approach could be warranted. Ground and littoral forces have traits and characteristics to contribute in unique ways to a blockade.

Option 1: Provide Boarding Teams for Service aboard U.S. Navy Surface Combatants

Despite their relative scarcity and vulnerability, surface combatants would play a role in any blockade of the PRC. The Marine Corps can and should enable this effort. A major way the Marine Corps can contribute is by providing boarding forces for service on surface combatants. Some boarding capacity already exists in the Marine Expeditionary Units although the current capability is focused on violent extremist organizations (VEO). The MEUs should play a role in a blockade but in their current form lack capacity. The current approach to visit, board, search, and seizure (VBSS) is informed by decades of experience conducting boardings against small vessels potentially operated for or by VEOs, or boardings conducted as part of the Counterproliferation Initiative by the Department of State. These boardings are typically medium to low risk (when compared to what could be in store for boarding parties in an envisioned future), involve compliance with multiple legal procedures, are surgical in their approach, and have a low tolerance for failure or risk.

Boardings conducted against Chinese state-owned enterprise VLCCs attempting to run a blockade could present a problem very different from routine MIO actions. Boarding missions rarely occur, and difficult, sensitive, and challenging missions are reserved for special forces. They undergo time-consuming and resource-intensive training. There are very few teams qualified to conduct these missions. The competency required is in part driven by the "no fail" expectation of the mission; they are typically conducted during peacetime so there is almost no political appetite for casualties or a botched mission.

Wartime blockade would be different in several respects. First, there would be many missions occurring, possibly even simultaneously. Second, occurring during war, casualties and failures would likely not break the "noise floor" of political sensitivity. With all the other things going on, few would notice the cost and consequences of opposed boardings as long as they were meeting with a reasonable level of success. Third, the operational problems associated with getting on board and securing a VLCC or giant container vessel are different than what has traditionally been encountered. Fourth, occurring during war,

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The United States and its allies are fighting a protracted war against the PRC. In this scenario, China attempted to unify Taiwan by force. China, assuming U.S. intervention, struck U.S. bases and assets preemptively on mainland Japan, in the Philippines, in Australia, and at sea. China also struck U.S. possessions, refraining from striking the U.S. mainland, Hawaii, or Alaska but has employed cyber effects and sabotage to slow the U.S. force generation and closure. Initial U.S. losses were significant, and partly because of Chinese efforts, the United States was caught flat footed militarily. The war on Taiwan is making slow progress. The Taiwanese fight and the political leadership remain on island and in control. The Taiwanese have prevented the PLA from seizing control of the capital yet will eventually run out of supplies. The United States is unable to reinforce Taiwan due to PLA antiaccess capabilities. Faced with a stalemate, the United States formulates and applies a new theory of victory to compel the PRC to stop fighting on acceptable terms. The United States will interdict the supply of oil coming from the Middle East, across the Indian Ocean, and through the Strait of Malacca. This effort's intent is not to create an immediate warfighting effect. Instead, it seeks to create a shortage of oil inside the PRC, disrupting the productivity of many industries. This will force the migration of global supply chains and undermine Chinese prosperity, destroying a major component of CCP legitimacy. The short-term pain and long-term implications of this strategy have two intended effects: provide something to compel the PRC to stop fighting and weaken the PRC in the long-term.

we could expect a level or resources greater than normally encountered during peacetime, VEO-focused boardings. Ship deployment, forward basing, callup of reserves, national and economic mobilization, additional sources of funding all add up to more and different resources being available. These differences demonstrate the need to pursue different solutions to the sourcing of boarding teams.

Boarding teams for wartime service would be different in several ways. There would have to be more of them. They would not need a wide range of capabilities, instead they could be trained more quickly and thoroughly to execute a single concept of operations. They would have specialized equipment, skills, and enablers and be task organized for the expected mission. Instead of conducting a precise, surgical operation, these boardings, especially once opposition occurred would have more of the characteristic of a street fight or infantry battle as rules of evidence and concerns about evidence, collateral damage, and political sensibilities may not apply. Navy surface combatants staff their own boarding teams qualified to conduct certain types of boardings using the ship's boats and helicopters. These teams represent collateral duties and Navy vessels are manned with a limited degree of redundancy in mind but mainly are manned to achieve 24-hour operations. Taking important people away from their primary duties for extended periods has follow on effects. Permanently losing them as casualties would be worse.

The Marine Corps should be ready to provide boarding teams with the following attributes for service aboard Navy ships. These units should be able to fight as a team. They should employ and integrate unmanned systems at the lowest level. Swimming, small boat handling, and great proficiency with small scale air assault operations is important. These teams would temporarily have to take control of the vessel if the crew were unable or unwilling to do so. The team would also have to effectively control, handle, and process detainees, provide first aid, and communicate effectively. Because a war with the PRC over Taiwan would be aerospace and naval in character, these units could be created from infantry units otherwise unable to be employed.[3]

[3] An infantry battalion because we have lots of them and they have considerable C2 capability built in. There are several transferrable competencies, and they are in general well-led by officers and noncommissioned officers at each level.

To generate boarding teams at scale several related actions must take place. Concepts and tactics, techniques, and procedures (TTPs) would have to be developed. These TTPs would then have to be tested, refined, and taught. This requires someone to perform the intellectual work up front and then another organization, a schoolhouse or developmental unit, to take a minimum viable product and turn it into something "market ready." These units would then have to train realistically. Target vessels and ashore simulators and ranges would be acquired. Decisions would be made on mobility. What kind of boat? Given the glacial pace of most military acquisition, a capability would likely be developed and in the meantime, a bridging solution whose most important attribute would be availability would be acquired. Immediately available options include 7- and 11-meter rigid hull inflatable boats (RHIBs) in service now with the Navy, Marine Corps and Coast Guard, commercial options, and foreign vessels available for immediate purchase. Vertical lift would be provided by U.S. Marine Corps Bell UH-1Y Venoms, U.S. Navy Sikorsky SH-60 Seahawks or U.S. Army Blackhawks, and Bell Boeing V-22 Ospreys. All these platforms have one virtue in common: they are currently in the inventory. Building this capacity would allow the Navy to place a boarding team aboard potentially every surface combatant preventing the manpower and resource drain on the Navy.

Option 2: Land-based Seapower Enabling a Surface Combatant Executed Blockade

A second way the Marine Corps could support a naval blockade is by enabling a traditional sea-based blockade. Hughes' *Fleet Tactics and Naval Operations* talks about how the landward component of a fleet can support at sea fleet operations, such as scouting, security, logistic support, and enabling operations. The Marine Corps, acting as the landward component of the fleet can provide security, domain awareness, and fleet logistic support. In this situation, the only task required of the surface navy is the conduct of boardings performed off surface combatants. This reduces the demand on limited surface combatant inventory, allowing them to be assigned tasks they are better suited to perform, while minimizing their vulnerabilities.

Since the ocean is huge and ships can go nearly anywhere on the open water, it makes sense to conduct a blockade at a natural chokepoint. The Chi-

nese recognize several key maritime chokepoints.[4] A major advantage gained by operating astride a chokepoint is the blockading force must surveil and control a limited, geographically bounded area opposed to the almost limitless ocean. The disadvantage is such an astride blockade site is fixed and boarding operations are predictable, creating vulnerabilities. An afloat naval task force conducting boardings is confined to a restricted geographic area engaging in repeatable, predictable actions. Increasing the risk to surface vessels further, the most lucrative chokepoints are close to the Chinese mainland. In days of sail, a blockading fleet would sit just outside an enemy's port. This is no longer a viable technique, but as global trade gets closer to the Chinese mainland, it becomes more concentrated, meaning a force wanting to intercept has less distance to travel, making the blockade and interception operations more efficient.

Again, there is a trade off as proximity to the Chinese coast is also in proximity of PLA offensive and defensive capabilities. Air-launched cruise missiles (ALCMs), coastal defense cruise missiles (CDCMs), air-launched ballistic missiles (ALBMs), and land-based antiship ballistic missiles (ASBMs) are based on the Chinese mainland or Hainan Island and have finite ranges. As you get closer to the coast, you are in range of more systems that can be complementarily employed, increasing the threat. An additional factor is the Chinese A2/AD regime is largely directed at keeping U.S. carrier strike groups at bay and from operating effectively.[5] It is intended to detect, target, and destroy surface vessels and increasingly U.S. special mission aircraft and tankers. The PLA Navy is also an effective regional force. It has many modern and capable surface combatants, two in-service aircraft carriers, nearly 70 diesel electric submarines, and a small force of nuclear attack submarines.[6] An ideal approach to the problem of implementing an oil blockade of the PRC would be one

[4] Jeffrey Becker, *Securing China's Lifelines across the Indian Ocean*, China Maritime Report no. 11 (Newport, RI: U.S. Naval War College, 2020), 2–6; and Alexander May, "The Mitigation of China's Naval Asymmetry via Control of Critical Maritime Chokepoints and the Centerpiece of Its String of Pearls in the Indian Ocean," *Harvard International Review*, 10 February 2016.

[5] The carrier air wing's range has decreased dramatically with the retirement of the Grumman F-14 Tomcat and A-6 Intruder. The Boeing MQ-25 Stingray will alleviate this to a limited degree but four MQ-25s, the anticipated shipboard detachment, will not be large enough to generate effective long-range strike packages.

[6] A third is being fitted out and a fourth is under construction. Analysts believe the goal is a fleet of six carriers.

maximizing the capabilities of specialized assets like surface combatants while limiting their role to tasks only they can perform, or they are best suited to perform. This frees up as many as possible to perform other roles, while minimizing their vulnerabilities and offsetting adversary strengths.

Land forces, provided in part by the Marine Corps, could perform many of these functions and aligns with the Marine Corps stand-in forces (SIF) concept.[7] Land-based aircraft like the Lockheed MartinF-35B Lightning II could fly combat air patrol defending the surface combatants against attack aircraft and potentially ALCMs. Ground-based radars like the TPS-80 would provide air domain awareness, reducing the vulnerability of the surface combatants.[8] A land-based General Atomics MQ-9 Reaper would provide maritime domain awareness. Long-range unmanned surface vessels (LRUSVs) or a variant of the Navy's Global Autonomous Reconnaissance Craft (GARC) could form an additional antisurface "picket line" and defend against small surface combatants and asymmetric threats like maritime militia.[9] LRUSVs could also provide close-in local security for ashore forces operating in the littorals, preventing attacks from special operations forces, PLA-backed insurgents, or maritime militia. Air defense of the blockade site and critical areas like airfields and aircraft parking areas would be provided by the Medium Range Intercept Capability (MRIC).[10] The ability of the TPS-80 to provide target quality tracks to a surface combatant or large unmanned surface vessel (LUSV) would allow

[7] The Marine Corp's *Concept for Stand-In Forces* defines the stand-in force as "small but lethal, low signature, mobile, relatively simple to maintain and sustain forces designed to operate across the competition continuum within a contested area as the leading edge of a maritime defense-in-depth in order to intentionally disrupt the plans of a potential or actual adversary. Depending on the situation, stand-in forces are composed of elements from the Marine Corps, Navy, Coast Guard, special operations forces, interagency, and allies and partners."

[8] When a ship radiates its powerful air search radar, it becomes what is known as a "cooperative target." Radiation emissions like the ones produced by a radar are easy to detect, increasing greatly the risk a ship could be targeted. Land-based radars also have this vulnerability, but since they are on land they can shut down and move, potentially disappearing "into the clutter." Since a ship stands out conspicuously on the surface of the ocean, once cued to an area, it is easier to maintain custody of a ship.

[9] The LRUSV is a small, unmanned surface vessel under development. Originally conceived as a fires platform, it may also become a sensing platform. Xavier Vavasseur, "Metal Shark Developing Long Range USV for the U.S. Marine Corps," *Naval News*, 26 January 2021. "Global Autonomous Reconnaissance Crafts Operate off of Coronado Ahead of Unmanned Surface Vessel Squadron 3 Standup Ceremony," DVIDS, 15 May 2024.

[10] MRIC is based on the Israeli Iron Dome system, probably the most proven air defense weapon in the world.

the ship's magazine of potent surface-to-air missiles to be used to defend both the landward and the seaward component of the blockade force.[11] An LUSV whose magazine was filled with Maritime Strike Tomahawks (MST) or Tomahawk Land Attack Missiles (TLAMs) could provide additional options making the SIF contribution to the naval battle even more of a wild card for the PLA.[12] The MLR's existing naval strike missile (NSM)-based antisurface warfare (ASuW) capability could prevent PLAN surface combatants from threatening the blockade sites and ships conducting the blockade.

Other nascent Marine Corps SIF capabilities could also provide value. Antisubmarine warfare (ASW) capabilities could mitigate the risk provided by adversary diesel and nuclear attack submarines (SSKs and SSNs). Counterspace capabilities could also limit the effectiveness of PLA kill chains. SIF could also provide forward area refueling points (FARPs) for fixed-wing aviation, especially MPRA.[13] MRIC would be capable of protecting vulnerable MPRA while they are on the ground. Search and rescue could be provided from land-based aircraft in the case of large losses. Land-based forces would also be helpful in disposing of seized ships and their crews. Logistic support could also be provided from land bases enabling the afloat forces to stay on station longer by providing landward depots for supplies, food, fuel, and parts and aiding in the distribution. Marine Corps aircraft could move people, parts, and food from shore to ships.

[11] "The LUSV will be a high-endurance, reconfigurable ship able to accommodate various payloads for unmanned missions to augment the Navy's manned surface force. With a large payload capacity, the LUSV will be designed to conduct a variety of warfare operations independently or in conjunction with manned surface combatants. The LUSV will be semi-autonomous or fully autonomous, with operators in-the-loop (controlling remotely) or on-the-loop (enabled through autonomy)." "Large Unmanned Surface Vessel: No Manning Required Ship (NOMARS)," Global Security, accessed 21 February 2025. One of the most valuable aspects of SIF is to provide targeting to U.S. Navy vessels, allowing them to fire without radiating, reducing their vulnerability to targeting.

[12] David B. Larter, "The US Navy Is Moving to Put More Ship-killer Missiles on Submarines," *Defense News*, 14 December 2020. The Tomahawk Land Attack Missile is a long-range (approximately 1,000 nm range) all-weather, jet-powered, subsonic cruise missile primarily used by the U.S. Navy and British Royal Navy in ship and submarine-based land-attack operations.

[13] SIF support to MPRA is periodically discussed by the Navy and Marine Corps, then put into either the "too hard bucket" or the "we don't want to do it bucket"; but in the author's view, this is so valuable it will become a task whether we want to do it or not. Fuel does not appear to be the issue, torpedoes and sonar buoys are what the MRPA community believe are the limiting factors in P-8 Poseidon operations.

There is a temporal aspect to SIF support to a blockade. Specifically, when do you need SIF to operate as currently envisioned and for how long? SIF as originally intended and currently configured will assist in the defeat of a PLA invasion of Taiwan. If the United States is successful and denies the PLA their objective, SIF have achieved their purpose and may be repositioned to conduct other operations. Simply denying the PLA Taiwan may not be sufficient to end the war. We may be in a scenario where the PLA's invasion has failed but neither side sees capitulating or negotiating as preferable to continued conflict. What then? SIF elements could be repurposed to conduct the above-mentioned tasks supporting a maritime blockade of the PRC.

An additional advantage of using SIF to directly support a naval blockade is their inherent and organic mobility. Littoral forces could be moved into position to support the blockade using amphibious ships, the landing ship, medium (LSM) or a mix of different vessels including civilian ships, U.S. Army watercraft, and auxiliary Navy platforms.[14] Other forms of land power require strategic sealift or airlift to deploy. In the opening stages of a conflict, the demands placed on U.S. Transportation Command (USTRANSCOM) will be significant. Herein lies an advantage of SIF. Possessing its own organic mobility or the ability to move using nontraditional forms of maneuver, SIF avoids reliance on scarce and vulnerable strategic sea and airlift assets.

Option 3: A Primarily Land and Littoral-based Maritime Blockade

A final way the Marine Corps could contribute to a maritime blockade of the PRC would be to conduct almost every aspect of the blockade from the littorals. This would differ from the above scenario, where the Marine Corps and SIF enable surface combatants and is, of the three options presented in this

[14] "The LSM supports day-to-day maneuver of stand-in forces operating in the littoral operations area. It complements L-class amphibious ships and other surface connectors. Utilizing the LAW to transport forces of the surface reduces the impacts of tactical vehicles on the road network, increases deception, and allows for the sustainment of forces during embarkation. The range, endurance, and austere access of LAWs enable the littoral force to deliver personnel, equipment, and sustainment across a widely distributed area. Shallow draft and beaching are keys to providing the volume and agility to maneuver the required capabilities to key maritime terrain." "Report to Congress on Navy Medium Landing Ship," *USNI News*, 29 January 2025. Expeditionary fast transports (T-EPFs), littoral combat ships, the LSM, and expeditionary sea bases (T-ESBs) immediately come to mind.

work, the one requiring the most additional effort to realize. This option would dispense with the need for most if not all surface combatants. Everything done from ships in the second option would be done from the littorals, from land, from afloat forward staging bases (AFSBs), and from small watercraft.

This option has the advantage of presenting the smallest attack surface possible, as large, and valuable surface combatants are not employed. This option minimizes vulnerabilities by presenting a difficult target to find, and once found, is harder to kill with systems the PLA currently fields.[15] This option would use boats driven and helicopters flown directly from land or a nontraditional AFSB. A nontraditional AFSB complicates targeting by disaggregating traditional AFSB capabilities and distributing them across several civilian or disguised vessels. The headquarters could be in a converted offshore support vessel (OSV). The airfield could be several barges manned by Marines who "commute" there in small boats when flight operations are necessary. Air defense missiles could be housed in LUSVs while radars could be on small vessels or ashore. These ships would transit busy waterways to present a random appearance or be moored in congested anchorages. If they were discovered and struck, damage would be limited to the target vessel. This concept seeks to blur the line between afloat and ashore. Actions would be performed from the domain best suited to the operation. This option would rely heavily on watercraft and likely be a Joint Navy/Marine headquarters with perhaps contracted civilian mariners rounding out noncombat roles.

One glaring disadvantage of SIF support to blockade is access. This is a critical requirement of all land forces short of an invasion force. The access and authorities provided by a host nation dictates what can be done from its territory and waters, potentially limiting the options available to the United States. What is unclear is the amount of diplomatic pressure the United States would assert on a country and what level of threat perception would exist in the host nation's mind. Other factors affecting access include how the war started, who was winning, and how long it appears to last. It is unclear what other elements of national power the United States would be willing to

[15] The PLA's A2/AD is built to defeat specific threats, namely aircraft carriers, surface combatants, and high-value aircraft like tankers and large special mission aircraft. If you feed the A2/AD regime a target it was not intended to target, it may not work effectively.

apply, including military force.[16] This could be partially mitigated by relying as much as possible on small, potentially civilian vessels operating in the littorals but outside of territorial waters. Rotorcraft could be operated off barges; headquarters could be run out of small container ships with palletized or containerized command-and-control (C2) spaces secured to the deck. Containerized munitions and even traditionally land-based weapons could be employed from locally procured civilian vessels.[17] What must occur on shore would be austere, distributed, and mobile to reduce risk. When necessary, assets could be defended with surface to air missiles or protected by entrenching or fortifying.

Because blockade may be an attractive policy option, and a Sino-American war might become a drawn-out affair, the Marine Corps should seriously investigate how it could contribute. Developing the ability to provide afloat boarding forces at scale is one option. Enabling a traditional seaborne blockade using SIF is a second. A final option would be to conduct the blockade from the littorals using land-based seapower minimizing the need for surface vessels altogether. While access would be a challenge for the second two options, access is a challenge of any employment of land forces. All three options are feasible and would not require large or unnatural investments. In short, all three options capitalize on current strengths and anticipated changes in the Marine Corps' force structure.

[16] During WWII's Battle of the Atlantic, neutral Ireland declined to allow Britain to use the Irish seacoast. Winston S. Churchill entertained using force to resolve the impasse but ultimately decided against it.

[17] HIMARs have been employed from ships. An MRIC could likely be employed as could containerized SM-6, TLAM, and NMSs. There is almost certainly more to be done with employing land systems from ships. Sam Lagrone, "Army Long Range Missile Launcher Spotted on Navy Littoral Combat Ship," *USNI News*, 13 September 2023.

Chapter 6

Barriers to Implementation

Throughout its existence, the Marine Corps has changed its roles and missions to best serve the American people. From originally serving as guards on Navy vessels, then shifting to fight in a land war during WWI, to becoming an amphibious force during WWII, the Marine Corps has demonstrated a culture of change. This flexibility reflects an organizational culture historically responsive to an ever-changing strategic environment that continues today via the transformations directed by the 38th Commandant of the Marine Corps through *Force Design 2030*.[1]

Despite having a legacy of adaptation, the Marine Corps is facing significant institutional, cultural, and fiscal headwinds. These will likely continue and may also impede efforts to develop a naval blockade force. The Marine Corps and Navy diverged operationally from 2001 to 2020 with the Marine Corps focused on operating ashore in Iraq and Afghanistan and the Navy fo-

[1] The original concept of *Force Design 2030* was published as a formal document by the same title; in the past year, the Marine Corps considers it a whole-of-Service concept that will be referred to generically as Force Design. For the original publication, see *Force Design 2030* (Washington, DC: Headquarters Marine Corps, 2020). The full concept is available at "Force Design," Marines.mil.

cused on its power projection capabilities.[2] The Marine Corps spent the period fighting wars in Iraq and Afghanistan. As the two Services converged back to naval campaigning, the Navy, Marine Corps, and Coast Guard published the 2020 tri-Service maritime strategy entitled *Advantage at Sea*. *Advantage at Sea* attempts to synchronize individual Service operational concepts that should drive integrated naval capability development, doctrinal developments, training, and education.[3] The two Services should collaborate on developing a concept for how to implement blockades; this collaboration stems from a history of developing doctrine together.

The shared naval culture between the Navy and Marine Corps was born from Marines living, working, and fighting alongside sailors aboard ships.[4] After successful operations in the Philippines during the Spanish-American War in 1898, Navy officers began to develop the idea that the best employment of Marines was through ready expeditionary battalions supporting the fleet. Although the Marine Corps resisted this for some time, the idea was officially adopted through Executive Order 969.[5] The spirit of these expeditionary origins remains today, as stated by *Leading Marines* (Marine Corps Warfighting Publication 6-11), "Marines, as they always have, carry on that tradition as a force in readiness, able and willing to go anywhere and do anything."

The operational divergence is rooted in personnel assignment policies paying lip service to naval integration for both Services. According to the Strategic Review of Amphibious Operations, these assignment policies lead to Navy and Marine Corps officers developing an institutionalized "tendency to view their operational responsibilities as separate and distinct, rather than in-

[2] "The Commandant's Posture of the U.S. Marine Corps PB19: Executive Summary," Headquarters Marine Corps, 20 April 2018.
[3] *Advantage at Sea: Prevailing with Integrated All-Domain Naval Power* (Washington, DC: Department of the Navy, 2020).
[4] Victor H. Krulak, *First to Fight: An Inside View of the U.S. Marine Corps* (Annapolis, MD: Naval Institute Press, 1984), 18.
[5] Krulak, *First to Fight*. This order left Marines on Navy vessels and established the beginnings of the expeditionary force the Marine Corps is today. The previous yearslong discussion of the value of the Marines on naval vessels evolved into the Navy understanding how having an expeditionary force would enable advanced base operations in the future. However, these events are the origin of service rivalry and suspicion.

tertwined."[6] The lack of staff integration, even while embarked on shipping, reinforces the cultural divide, and prevents integrated strategic concept development. This is exacerbated by the lack of interoperability with other naval Services, such as the Coast Guard and the U.S. Maritime Administration (MARAD). For example, MARAD was not mentioned in *Advantage at Sea*, despite being the strategic sealift fleet to sustain naval operations around the globe. The Services rely on MARAD to administer the maritime prepositioning forces (MPF) enabling world-wide power projection. Lack of consistent interaction leads to officers having a superficial understanding of other Services' capabilities and requirements and impedes the development of integrated operational amphibious concepts to circumvent China's challenge to U.S. command of the sea.

During the development of amphibious operational concepts in the 1920s and 1930s, the Marine Corps published the *Tentative Landing Manual*, the first attempt by any military organization in the world to describe the conduct of modern amphibious warfare.[7] The experiments the two Services conducted did not just result in a manual, it also generated the momentum for the Marine Corps and the Navy to change their organizational structure and training to accomplish these missions. The Navy and Marine Corps cooperated to develop methods to conduct ship-to-shore movement, secure beachheads, and coordinate logistics support, among a myriad of other details encompassed in an integrated amphibious landing capability. Shared understanding of what an amphibious landing capability should enable the services to eventually acquire the ships and connectors required to conduct amphibious landings. This level of cooperation continued into the prosecution of the Pacific campaign during WWII. The employment concepts outlined earlier in the document consist of three separate types of organizations required to be flexible and responsive. Clear direction should be provided via an integrated effort to develop blockade doctrine to address issues resulting from unimpeded and impeded boardings, search and rescue, and the treatment and evacuation of injured civilian personnel.

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[6] *Commandant's Planning Guidance: 38th Commandant of the Marine Corps* (Washington, DC: Headquarters Marine Corps, 2019), 2.
[7] Jeter A. Isely and Philip A. Crowl, *U.S. Marines and Amphibious War: Its Theory, and Its Practice in the Pacific* (Princeton, NJ: Princeton University Press, 1951), 43–44.

Ineffective doctrinal foundations lead to a stagnation in the evolution of organizations that develop operational concepts.[8] The organizations developing concepts, experimentation, and doctrine are not integrated and rely on relationship-based cooperation and communication that does not foster mutual learning. For example, today's Navy Warfare Development Center (NWDC) in Norfolk, Virginia, is organized within an operational fleet headquarters, Fleet Forces Command, rather than in the Service headquarters like the remainder of the Joint Force. This focuses NWDC's scope on current problems. Their Marine Corps counterpart office, the Concepts Branch of the Marine Corps Warfighting Laboratory in Quantico, maintains formal connections with them and also with Navy headquarters units such as Warfighter Development Directorate (OPNAV N-7) to develop integrated concepts. In the *Strategic Review of Amphibious Operations*, the panel found officers are looking for integration opportunities; but, without a serious commitment to naval staff integration, the Services may continue to diverge in strategic development possibly leading to a misalignment of training and education as well.

The future conduct of blockades in the 2040s will employ unmanned systems and additional smaller littoral connectors further complicating risk decision making and authorities. Without integrated strategic planning and integrated operational concept development, the services cannot achieve synergy in developing the doctrinal documents to drive organizational change, and changes in training and education.

Minimal extra training for Marine infantry could expand their utility as a security or offensive force for boarding, and ongoing obligation to detain and secure seized crew. Transloading at sea and custody or repatriation of the seized crewmembers would be necessary to rapidly return the Marine detachment to their primary duties. Increased rates of seizure could stress the ability to safely crew seized vessels. This could necessitate integration of Merchant Marine, civilian auxiliary, or private military contract personnel. Marine Corps detachments with portable air defense and other defensive equipment could embark on ocean-going U.S. Coast Guard vessels in a blockade to increase deterrence from adversary aggression or prevent the seizure of Coast Guard assets participating in a blockade.

[8] Isely and Crowl, *U.S. Marines and Amphibious War*.

Fiscal constraints affect access to training ranges, access to swimming pools (where Marines develop and maintain basic swimming skills required to serve in amphibious ships), and ship availability.[9] The three potential Marine Corps contributions to a maritime oil blockade will require Marines to be at the edge of littorals on a continuous basis by providing boarding teams to board and secure very large ships. The Service would require access to sufficient ranges and a large cadre of trained personnel to conduct continuous operations. According to a 2017 Government Accountability Office report, the MEUs are the only units prioritized for training at limited facilities, and without a large expansion of ranges and swimming facilities, the Marine Corps will not be able to develop a robust blockade capability.[10] Focusing on critical investments such as ranges both Marines and sailors can use will not only develop a capable blockade force but will also help bring about the convergence of naval culture across both Services.

Fiscal challenges, combined with ship availability, impacts Marine Corps readiness. In a 2017 GAO report, the analysts found all 23 Marine Corps units interviewed cited lack of available amphibious ships as the primary factor for

[9] According to *Stars and Stripes*, more than 50 Marines have drowned since 2000 during training and off-duty activities. Although the Marine Corps requires basic swimming skills in entry-level training for both officers and enlisted personnel, the Marine Corps does not uniformly enforce the minimum standards due to lack of facilities access and swim education. Addressing the degraded swim levels across the force has not been a priority for the Service and will likely be a continuing problem in the future. Blockades will put Marines at higher risk of drowning due to several factors. Hope Hodge Seck's article on swimming problems within the Marine Corps is described as a pernicious, well-known problem across the Marine Corps not being seriously addressed at the highest levels. Hope Hodge Seck, "The Marine Corps Has a Swimming Problem. Is There a Plan to Fix It?," *Marine Corps Times*, 6 October 2022; and Frank Andrews, "Marines Aim to Stem Tide of Drowning Deaths with Ocean-safety Expos in Okinawa, Hawaii," *Stars and Stripes*, 19 May 2022.

[10] Access to ranges is another common shortfall in developing a credible force capable of conducting blockades. The existing ranges are insufficient to conduct amphibious training, and adding another set of missions to an already stressed system is unlikely to yield successful results. As described in the chapter for potential contributions, the three concepts of employment require the development of new training facilities where many units can cycle through to develop and maintain a discrete set of skills. This issue is even more pronounced in the reserves. The development of tasks across the entire force, including the reserves, will be necessary in a protracted conflict. Fiscal constraints limit reserve units' ability to travel to adequate ranges for training and due to their reserve status, the ranges limit access due to prioritization of deploying units. *Navy and Marine Corps Training: Further Planning Needed for Amphibious Operations Training* (Washington, DC: Government Accountability Office, 2017).

limiting training for all its units.[11] Since 2017, the problem of ship availability has continued to worsen as the Navy experiences manpower shortages, maintenance delays, and a myriad of other issues. Blockades will require consistent integrated training, taking years to develop across the existing infantry battalions and amphibious ships. Limiting training with ships will impede experimentation required to incorporate nascent technological advances into future operational concepts feeding doctrinal developments.

[11] Jonathan Geithner, *The ARG/MEU: Is It Still Relevant?* (Alexandria, VA: Center for Naval Analyses, 2015).

Chapter 7

Recommendations

The Marine Corps can do many things, some of them quite easy, to prevent strategic surprise and ensure it is able to contribute effectively to an oil blockade of the PRC. These recommendations can be grouped into three broad areas:

- Intellectual preparation and consensus on the desirability of blockade;
- Proof of concept events, experimentation, and mission rehearsal; and
- Technology solutions.

Efforts to intellectually prepare the force and reach consensus on the suitability of blockade as a strategic approach and how to best contribute should begin immediately. This effort should include discussions within the Service, among the Joint Force, and with partners across the interagency. This effort should focus on military, political, economic, diplomatic, and strategic messaging factors associated with a blockade, with a particular emphasis on unintended consequences. Consensus is important as there is little agreement on the desirability and feasibility of a blockade.

To prepare for blockade, the Marine Corps, working with other appropriate partners, should initiate an economic intelligence preparation of the operating environment. This includes efforts to understand and monitor the

industry. An organization should be tasked with maintaining a repository of information and expertise on the exploration, pumping, movement, storage, and refinement of oil. Mapping of the systems and targeting would be of great benefit. This effort must begin now if the Service is going to seriously consider conducting a blockade. Knowing where to apply pressure is important.

In concert with the above-mentioned analytic effort, the Marine Corps and the Joint Force should continue to expand wargaming efforts to examine the conduct and possible impacts of conducting blockades of various types and in various locations.

The Marine Corps could enhance efforts to educate the force on not only the military history and use case of blockade, but also the economic, diplomatic, and political implications. In addition to classroom work focused on students, research, and professional publications should increase the pool of blockade related knowledge.

Professional journals can contribute to the Service's understanding of blockade. An essay contest could generate new ideas and lead to the sort of lively debate that improves awareness and knowledge. Extended debates in professional journals like the *Marine Corps Gazette*, the *Journal of Advanced Military Studies*, or the U.S. Naval Institute *Proceedings* are particularly valuable because readers will understand both sides of the discussion. If a course of action is adopted, an audience knows why, and they know the strengths of the position adopted. They also understand the weaknesses of the position, pointed out by the detractors. This is important because these weaknesses, in implementation, must be fixed, worked around, or accepted. CMC ONA offers this book as an opening commentary on the Joint Force intellectual engagement with economic warfare; we invite formal and informal responses in the professional literature.

In the same way the Marine Corps has experimented with the Marine Littoral Regiment (MLR) and modernized infantry battalion, the Corps should consider ways to experiment with the forces and structures necessary to conduct a blockade. This should focus on the refinement of TTPs, the integration of new tools and technologies; the identification of gaps in tools, knowledge, and practice; and the development of new ways of operating. Current practice is a good start and there are groups working on this now, but these organizations (Expeditionary Operations Training Groups [EOTGs], formal schools)

have primary missions that neither blockade related nor are they resourced to work on this problem full time.

A single entity should be made responsible for developing tactics and techniques to support Marine Corps contributions to a blockade. This could entail revising the mission of an existing organization; expanding an existing organization by creating a new branch, office, or division; or by creating a new organization. The important point is designating an organization to develop and test blockade-related tactics for Marine Corps forces as their primary responsibility.

Blockade scenarios and events should be inserted into Service-level exercises, especially MEU certifications. This should not be limited to the Service-level exercises as events held at other Service-level venues, like the MAGTF Staff Training Program (MSTP) and could provide significant value. Forcing commanders and leaders at every level to think through how to conduct this mission would be of immense value if the Service had to implement a blockade.

Experimentation conducted by the Marine Corps Warfighting Laboratory (MCWL) would allow the Service to develop innovative and improved tactics and procedures necessary to conduct a blockade. The approach taken with Infantry Battalion Experiment 2030 (IBX-30) could be adopted as an advanced step. If a war came sooner than expected, the Service would have to figure out how to do all this in-stride. As enemy responses would evolve, tactical adaptation and preparing new units as they rotate into theater would be a constant task. The Marine Corps should at a minimum have a playbook guiding the Service through the generation of a force capable of conducting a blockade.

Given the long timelines associated with acquiring new equipment, preliminary efforts to equip the force to conduct blockades should begin now. A first step could be a review of the Marine Corps' littoral mobility and watercraft portfolio. Shortfalls, as they relate to the conduct of blockade, could then be turned into requirements. The requirements do not have to be acted on, they could be "shelved" until needed, reviewed, and rapidly actioned. This effort would benefit from the other efforts to intellectually prepare the force. As with most things, figuring out what to do is hard. Doing it is sometimes easier, especially when you have a clear idea what you want to do and why.

Technological gaps and requirements identified during wargames and experimentation should be addressed to improve the Service's ability to field

forces capable of contributing to a blockade. The generation of TTPs should proceed along with and be complemented by efforts to procure the right tools for the task.

The Marine Corps, along with other DOD departments and agencies, should seek an information advantage as it prepares to conduct an oil, or other type of, blockade of the PRC. The Marine Corps should use any effort, especially playing on Chinese fears about chain reaction warfare and vulnerabilities in the Malacca Dilemma, to gain advantage and deterrent value.

The United States has partnerships and treaties allowing enforcement of maritime law in some allied countries. Integrating U.S. Coast Guard personnel onto naval vessels allows the Navy to conduct Title 14 law enforcement activities on behalf of the U.S. government. For example, Joint Interagency Task Force South (JIATF South) primarily targets narcotics, but could be expanded to address illegal, unreported, and unregulated activities with cooperation from partner countries.[1] This would serve to train, develop, and validate TTPs and serve as shaping in educating the international community on the legality and necessity of maritime intervention before conflict or implementation of a blockade.

The Joint Force should use schools, personnel exchange, and language training to increase the likelihood of access to important places. The Marine Corps can identify important countries and use a variety of tools to improve access. Indonesia is a good example. Does the Marine Corps have personnel fluent in Bahasa? Do Indonesian officers attend The Basic School, Expeditionary Warfare School, Command and Staff College, School of Advanced Warfare, or Marine Corps War College? Is there an exchange officer billet in the Indonesian Navy headquarters? Are there III MEF exercises or events like staff talks to engage the Indonesians? These are examples of ways the Marine Corps could improve the likelihood of wartime access. Other important countries CMC ONA identify include Japan, Australia, and the Philippines, but also Malaysia, Singapore, Vietnam, Oman, Somalia, and the United Arab Emir-

[1] 14 USC § 522: Law enforcement states that "the Coast Guard may make inquiries, examinations, inspections, searches, seizures, and arrests upon the high seas and waters over which the United States has jurisdiction, for the prevention, detection, and suppression of violations of laws of the United States."

ates. Efforts by the Joint Force to improve the likelihood of access to these places could play an important role in a Sino-American war.

CMC ONA recommends the Joint Force consider any number of the recommendations proffered here. Efforts to generate consensus on the desirability and feasibility of blockade should be made and the Marine Corps' leaders should be intellectually prepared to lead during a blockade of the PRC. The Navy and Marine Corps should begin experimenting with live forces to improve the means and methods used in seizing and securing vessels. Aligned with the educational and experimental efforts, the Services should identify and shore up material gaps preventing the best accomplishment of potential missions. Finally, the Joint Force should make efforts to achieve the maximum deterrent effect from all of the above-mentioned endeavors. Any of these concepts by themselves could be moderately effective, but synchronized efforts across these lines of effort would ensure the Marine Corps is in position to aid the Joint Force in rapid response to tasking and achieving the desired effects.

Appendix 1

The Combat Development and Integration, Operations Analysis Directorate's Study

During the SLOC IV wargame, conducted 3–17 November 2023, a group of visit, board, search, and seizure (VBSS) subject matter experts gathered to develop more concrete idea of how a VBSS team might actually execute a VBSS mission given the specific geography and context of the wargame, focusing at the tactical level.[1] The concept of employment the team developed, as well as insights into how VBSS missions could be conducted are captured below. These concepts and insights were then provided to the Marine Corps Combat Development and Integration Division's Operations Analysis Directorate (OAD) for modeling. The goal of this effort was to understand better the Navy and Marine Corps' capacity to conduct VBSS operations at scale. The resulting maritime interception operations (MIO) mathematical formulation research project being conducted by OAD is ongoing.

Preliminary Results

These preliminary results, as well as a very detailed VBSS Breakout Group study's insights and recommendations, are available to authorized individu-

[1] See discussion of SLOC wargame series beginning on page 130.

als on a case-by-case basis. Please coordinate with CMC ONA for access to these preliminary results.

Initial Recommendations

- MIO becomes a standing MEU mission with established and allocated alert postures.
- Increase number of swim-qualified Marines across the MEU; also, invest in more life-saving personal protective equipment for infantry units and other boarding teams.
- Increase breaching capabilities for boarding teams, including the incorporation of scuba gear and rebreathers, and ship-on-land trainers and confined space breaching facilities.
- Expand Reconnaissance Training Company's Methods of Entry Course to include a short one to two-day course targeted at combat engineers to expand MIO breaching capacity across the Fleet Marine Force.
- Expand the EOTG Fast Rope Master Courses to occur throughout the year.
- Invest in small boats intended to be organic to the MEU for VBSS purposes.
- Update *Visit, Board, Search, and Seizure Operations* (Marine Corps Reference Publication 3-05.4) to enable non-Marine reconnaissance force elements to conduct appropriate boardings.[2]
- Develop a Marine Corps order or training manual for the Marine Corps portion of MIO similar to the helicopter/tiltrotor rope suspension techniques (HRST) order.[3]
- Develop a nonstandard MAGTF tailor made to embark on nonamphibious shipping to support MIO on a larger scale, including considerations of land-based MIO.

[2] *Visit, Board, Search, and Seizure Operations*, Marine Corps Reference Publication 3-05.4 (Washington, DC: Headquarters Marine Corps, 2022).
[3] *Marine Corps Order 3500.42C, Marine Corps Helicopter/Tiltrotor Rope Suspension Techniques (HRST) and Cast Operations Policy and Program Administration* (Washington, DC: Headquarters Marine Corps, 18 April 2016).

- Expand the nonlethal means in training and equipment to support MIO.

Preliminary Result Limitations

This estimate makes a few critical assumptions that include:

- Initial identification (detection, surveillance, and query) is layered in to include theater intelligence or other means covering the vessel of interest from point of origin to the interception area as well as local surveillance of the vessel as it enters the interception area, which might include UAS or other crewed or uncrewed platforms. Therefore, this portion of the operation is excluded from the seizure phase estimates.
- Long-term disposition of seized vessels is handled by other organizations and does not limit the ability to conduct interceptions and is also not included in the seizure phase estimates.
- No losses occur during the interception and seizure phase (reconstitution of boarding teams is not currently accounted for in the research), which may limit the sustained rate of seizures per boarding team.

Ongoing Research

The Marine Corps will focus on exploration and development of queuing models to refine steady-state interception rates; exploration of varying levels of training for boarding teams (to increase capacity); as well as refined and expanded subject matter expert estimates for each phase conditioned on team training levels, vessel types, and opposition levels.

Appendix 2

SLOC Deep Dive and Data Cards[1]

The Indian Ocean is the world's third-largest body of water, linking together Asia, Africa, Australia, and the Indian subcontinent. Its waters touch more than 30 countries and thousands of islands and coral atolls. The Indian Ocean contains some of the world's most strategically important sea lines of communication (SLOCs): the Cape of Good Hope, Bab el-Mandeb, Strait of Hormuz, Strait of Malacca, Sunda Strait, Lombok Strait, and Ombai-Wetar Strait.

The Indian Ocean covers an area of more than 70 million square kilometers, with an average depth of 3,890 meters. Its deepest point, the Sunda Trench, southwest of Sumatra, Indonesia, reaches more than four miles below the surface and is a point of increasing tectonic activity during the past 20 years. Earthquakes, tsunamis, and even volcanoes are possible points of acute and lasting impact to the region's shores and maritime chokepoints.

The Indian Ocean is characterized by powerful monsoon-driven currents, such as the Southwest monsoon and the Northeast monsoon. These currents influence the oceanic throughflows, which involves the flow of warm, relative-

[1] This section was originally formatted as a two-sided data card. The information has been maintained, however, the format was adapted to the current layout. The original data cards can be obtained by contacting Nathan Barrick at the Futures Directorate of the Marine Corps Warfighting Laboratory.

ly fresh water from the Pacific Ocean to the Indian Ocean through the complex network of straits between the Indonesian islands. The primary straits involved in the throughflow include the Makassar Strait (between Borneo and Sulawesi), the Lombok Strait, and the Ombai-Wetar Strait. The implications of this network are the environmental consequences resulting from the inadvertent or purposeful sinking of a crude carrier in this area will have fast, wide-ranging, and potentially cascading impacts. These impacts will likely outpace any mitigation or containment measures.

The Indian Ocean's chokepoints and SLOCs play a pivotal role in global trade, geopolitics, and maritime security. Understanding the unique characteristics of the major chokepoints is essential for discussing and predicting changes in maritime traffic through this space and understanding how and where an effective blockade could be implemented. Geopolitical dynamics, environmental conditions, and the constant evolution of global trade patterns all contribute to the complexity of managing and securing these crucial sea routes.

Sea Lines of Communication

Cape of Good Hope

The Cape of Good Hope is not technically a chokepoint but remains a critically important region of the Indian Ocean region. Navigating around the cape is dangerous, and the weather and wind currents become increasingly hazardous the farther south a ship travels. Because of this, maritime traffic tends to stay within a few hundred miles of the coastline. Fierce, shifting winds, rocky outcrops, and heavy traffic have turned the cape area into a ship graveyard. An estimated 2,000 wrecks can be found in South African waters, an average of one for every kilometer of coastline.

A modern study looking at fatigue and stress on ship hulls determined just wind and wave damage alone could take years off the service life of a platform after a single voyage around the Cape of Good Hope as compared to the Suez Canal.[2] However, actions at other locations, such as a blockage of the Suez or

[2] Mohamed Essallamy, Alaa Abdel Bari, and Mohamed Kotb, "Spectral Fatigue Analyses Comparison Study: Suez Canal vs. Cape of Good Hope Arab Academy for Science, Technologies, and Maritime Transport (AASTMT)," *Journal of Marine Engineering & Technology* 19, no. 4 (2020): 257–65, https://doi.org/10.1080/20464177.2019.1572703.

the recent actions by Houthi rebels in the Red Sea, could increase maritime traffic around the Cape of Good Hope. Using the Suez Canal instead of the Cape of Good Hope saves 4,000 miles and approximately 10 days of travel.[3] This area and the associated routes were strategically important before and after the completion of the Suez Canal. As early as the Seven Years' War, the area was important for resupply and sustainment.[4] During WWII, amphibious operations were conducted on Madagascar and Reunion island that, beyond their immediate positional benefits, provided important learning opportunities for later operations.[5] During a conflict involving the Indian Ocean Region, sea control missions for the Navy or Marine Corps related to traffic in the Cape of Good Hope could be required in the Mozambique Channel or in the maritime approaches to the area around Madagascar.

Traffic around the Cape of Good Hope, located at the southern tip of Africa, is not controlled by a specific country but is influenced by several nations in the region and international maritime laws. South Africa has jurisdiction over its territorial waters. The South African Maritime Safety Authority and the South African Navy contribute to the safety and security of maritime traffic around the cape. In coordination with international search and rescue organizations, South Africa is also responsible for responding to maritime emergencies and coordinating search and rescue operations in the waters around the Cape of Good Hope.

Bab el-Mandeb

The Bab el-Mandeb is a narrow and shallow strait connecting the Red Sea to the Gulf of Aden. The maritime chokepoint has strong tidal currents, making navigation challenging, and its deepest point is more than 300 meters. Because the Bab el-Mandeb connects the Red Sea to the Gulf of Aden, it is strategically significant. The traffic through the Bab el-Mandeb is not direct-

[3] Agnes Chang, Pablo Robles, and Keith Bradsher, "How Houthi Attacks Have Upended Global Shipping," *New York Times*, 21 January 2024.
[4] Jane Hooper, *Feeding Globalization: Madagascar and the Provisioning Trade, 1600–1800* (Athens: Ohio University Press, 2017), 19, 114–16, 119–24.
[5] Martin Thomas, "Imperial Backwater or Strategic Outpost?: The British Takeover of Vicky Madagascar, 1942," *Historical Journal* 39, no. 4 (December 1996): 1049–74, https://doi.org/10.1017/S0018246X00024754.

ly controlled by a single country but is influenced by the geopolitical and security interests of the nations in the surrounding region.

The following countries have strategic interests and influence over the area: Djibouti, Yemen, Eritrea, and Saudi Arabia. Djibouti, located on the eastern side of the strait, has strategic importance due to its geographic location and hosting of foreign military bases, including those of the United States, the PRC, France, and others. Djibouti's stability and cooperation with international partners contribute to security in the Bab el-Mandeb area. Yemen, situated on the northern side of the strait, has a coastline along the Bab el-Mandeb. The ongoing conflict in Yemen has implications for the security and stability of the strait.[6] The Houthi rebels control territory on the Yemeni side of the strait, adding a layer of complexity to the geopolitical situation. As a major player in the Arabian Peninsula and the Red Sea region, Saudi Arabia, located north of Yemen on the east side of the Red Sea, also has strategic interests in ensuring the security and stability of the Bab el-Mandeb. The Red Sea, through the Bab el-Mandeb chokepoint, is a key maritime route for Saudi Arabia's oil exports. While Eritrea's direct control over the strait is limited, its geographic proximity to the Bab el-Mandeb, as well as its geopolitical influence in the region is a factor in the overall security dynamics.

It may occasionally prove useful to consider the Bab el-Mandeb, the Red Sea (and its bordering countries), and the Suez Canal as a single SLOC. Despite the ability for discrete actions to occur in any location, it is a linear and interconnected system. Most traffic moving through the Suez travels through the Bab el-Mandeb sometime later and vice versa.

Strait of Hormuz

The Strait of Hormuz is a narrow, shallow strait connecting the Persian Gulf to the Gulf of Oman. Due in part to the shallow depths (approximately 220 meters at its deepest point), the Strait of Hormuz is subject to strong currents and potential turbulence.

The Strait of Hormuz is strategically important because it is located between the Persian Gulf and the Gulf of Oman, through which a significant

[6] As this document is being written, the Houthis are firing ballistic missiles at ships in the Red Sea.

portion of the world's oil and gas shipments pass. While no single country has direct control over the entire strait, several nations in the region have significant influence and play a role in ensuring the security and stability of maritime traffic. Traffic is closely monitored by Iran and Oman. Iran has a substantial coastline along the northern side of the Strait of Hormuz. The Iranian government asserts its authority over its territorial waters, which include parts of the strait. Iran occasionally threatens to close the strait or disrupt traffic in response to geopolitical tensions or perceived threats, and they frequently harass U.S. Navy ships transiting the area. Oman controls the southern coastline of the Strait of Hormuz. The Omanis facilitate the safe passage of vessels through its territorial waters and has historically maintained a cooperative approach to maritime security. The United Arab Emirates (UAE) has coastline along the Gulf of Oman and the Arabian Sea. The UAE, particularly the emirate of Dubai, is a significant player in the maritime industry and contributes to the security and management of the strait.

A significant portion of the world's energy exports come from the Persian Gulf region through the Strait of Hormuz. In 2018, its daily oil flow averaged 21 million barrels per day, representing more than 20 percent of the world's daily consumption.[7] Disruptions to this daily flow have outsized and lasting impacts to the global economy.

Strait of Malacca

The Strait of Malacca is a narrow passage between the Malay Peninsula and the Indonesian island of Sumatra. The sea state is generally calm, but tidal conditions can impact the trafficability of the already shallow waters. Globally, the Strait of Malacca is one of the world's busiest maritime chokepoints, boasting more than 200 vessels transiting per day or 85,000–90,000 per year.[8] The Malacca Strait Traffic Separation Scheme imposes a 3.5-meter under-keel clearance that, combined with the strait's shallow 23-meter depth, can limit the transit of the largest commercial and military vessels.

[7] Justine Barden, "The Strait of Hormuz Is the World's Most Important Oil Transit Chokepoint," U.S. Energy Information Administration, 21 November 2023.
[8] Noraini Zulkifli et al., "Maritime Cooperation in the Straits of Malacca (2016–2020): Challenges and Recommend for a New Framework," *Asian Journal of Research in Education and Social Sciences* 2, no. 2 (2020): 10–32.

The Strait of Malacca is an international waterway, and no single country exercises exclusive control over the entire strait. However, the littoral states surrounding the strait play significant roles in ensuring its safety, security, and the management of maritime traffic. The key countries influencing traffic through the strait are Indonesia, Malaysia, Singapore, and Thailand. Indonesia is the largest archipelagic state in the world, and the northern part of the Strait of Malacca falls under its jurisdiction. The Indonesian Navy and Coast Guard actively patrol the waters to maintain security and safety. Indonesia also participates in international efforts to combat piracy and maritime crime in the strait. Malaysia controls the southern part of the Strait of Malacca, and its navy and maritime authorities play a crucial role in ensuring the safety and security of vessels transiting through this portion. Singapore, located at the southern tip of the Malay Peninsula, is a major maritime hub. While it does not have direct territorial control over the strait, it actively contributes to the security and management of maritime traffic. The Port of Singapore is one of the busiest in the world, and the city-state has a stake in maintaining the smooth flow of vessels through the strait. Thailand, to the north of the Strait of Malacca, is a littoral state with an interest in the security and stability of the strait. While it does not directly control the strait, Thailand participates in regional efforts to enhance maritime security in collaboration with neighboring countries.

Sunda Strait

The Sunda Strait, running northeast to southwest, is a narrow waterway connecting the Java Sea to the Indian Ocean. The strait is 16–70 miles (26–110 km) wide, between the islands of Java and Sumatra, and there are several volcanic islands within the strait, the most famous of which is Krakatoa. Despite more than 35,000 ships passing through annually, the strait's narrowness, shallowness, currents, multiple depth changes, significant crossing traffic, and lack of accurate charting make it unsuitable for many modern large ships.

For example, deep-draft ships of more than 100,000 DWT or of more than 18 meters draft do not transit the strait. In addition to its shallow depth, navigation is also made difficult by the presence of sandbanks, strong tidal currents, other artificial obstructions like oil platforms, and robust crossing traffic between the islands. The Selat Sunda II Bridge, spanning the western

end of the strait, also restricts traffic to a height of 52 meters. With all these constraints in mind, the waterway is less than ideal for larger tankers or naval formations. Restriction of movement through the Strait of Malacca will likely push traffic to the more accommodating Lombok Strait rather than Sunda.

Lombok Strait

The Lombok Strait is a relatively narrow waterway, 12–25 miles wide and 37 miles long, between the islands of Bali and Lombok, linking the Eastern Java Sea, Flores Sea, and the Pacific with the Indian Ocean. The strait is wider, deeper, and less congested than the Strait of Malacca, and it sees less traffic annually than Sunda Strait. The average depth of the Lombok Strait is 820 feet, with a maximum depth of more than 4,000 feet. The bottom of the strait is complex and rough, consisting of two main channels, one shallow and one deep. Because of the variation in water movement due to the complexity of the channels and ocean interface, the tides in the strait have a complex rhythm but tend to combine about every 14 days to create an exceptionally strong tidal flow. It is the combination of rough topography, strong tidal currents, and stratified water from the ocean exchange making the Lombok Strait famous for generation of huge waves. The minimum passage width in the Lombok Strait is 10 nautical miles and the depths are greater than 490 feet. When compared to Sunda, the Lombok Strait is considered the safest route for supertankers.

It is also worth considering the other, numerous waterways through the Indonesian islands link the Indian and Pacific Oceans. If one or more of the larger straits were closed or restricted, many of these smaller straits could also support the passage of warships or commercial vessels. The Alas Strait, between the islands of Lombok and Sumbawa, can handle large commercial vessels if needed. The depth at the northern end of the Alas Strait is approximately 1,300 feet. Along the north-south strait, the water depth decreases slightly from 590 feet to 410 feet, with a sill at 312 feet depth. The Bali Strait, between the islands of Java and Bali, is only 1.5 miles wide at its narrowest point, but still maintains an average depth of 200 feet, enough to support the largest ships. In the event of conflict, the Lombok Strait would be the preferred route for commercial and military traffic, compared to these smaller straits, though all routes connecting the Indian and Pacific Ocean would most likely be used. Regardless of the specific strait chosen on the southern edge

of the Indonesian archipelago, all traffic looking to avoid the zone of conflict in the South China Sea would also have to move through the Makassar Strait or Banda Sea on the northern side of the Indonesian archipelago to connect with the Pacific Ocean.

Ombai-Wetar Strait

The Ombai-Wetar Straits lie east of the Sunda and Lombok straits and separates the islands of Alor, Atauro, and Wetar from the island of Timor. They lie between the nations of Indonesia to the north and East Timor to the south. At their narrowest points, the Ombai Strait's navigable waters are 26 km (16 miles) across and Wetar is 42.6 km (26.5 miles) across. Most traffic in the strait is headed northeast or southwest, passing between the islands of Alor and Atauro. The channel's navigable waters are 34 km (21miles) across.

The Ombai-Wetar Straits are narrow and deep. They have complex and extreme bathymetry, ranging from narrow and shallow reef flats partly covered with seagrass and coral, to 3,000-meter depths within 20 km of the coast. The depth of the channels has made the straits attractive to the PRC, they have made offers seeking offshore oil rights and permission to set up radar arrays, ostensibly to counter illegal fishing. East Timor has so far refused these advances, and the two straits provide a route for undetected access by nuclear-powered submarines between the Pacific and Indian Oceans. U.S. submarines moving between Guam and stations in the Indian Ocean often travel via the Molucca Passage, which separates Sulawesi from Halmahera, through Ombai-Wetar. Although the Ombai-Wetar route is a less direct link between Guam and the Indian Ocean than the alternative Lombok-Makassar route, it has limited traffic and very little surveillance. Due to surveillance and shallow water depths near the other maritime chokepoints, Ombai-Wetar represents the only passage through which a submarine can pass completely undetected between the Pacific and Indian Oceans.

The two straits are critical for East Timor, both in relation to its own international trade and as routes for internal transport. If there were any disruption in the flow of commercial shipping on the Malacca-Singapore route, the Ombai-Wetar route would also have a crucial role to play in global trade, especially for the Asia-Pacific region. The Ombai-Wetar route is longer than the Strait of Malacca route. The former is therefore not a preferred alterna-

tive for west-to-east commercial traffic. However, Ombai-Wetar is considered the safest route for the largest oil tankers transiting between the Persian Gulf and Japan, and it is also used by vessels transiting between Australia and the Java Sea or East Asia.

Relationships and Considerations

While geographically distant, the Indian Ocean SLOCs are linked through their roles in facilitating maritime traffic through the Indian Ocean, the larger Indonesian archipelago, and the Red Sea. Shifts in global shipping patterns or geopolitical developments affecting one SLOC may indirectly influence considerations for vessels navigating through the other, particularly in terms of route planning, risk assessment, and cost. Understanding these interconnected dynamics is crucial for policymakers, maritime authorities, and shipping companies to anticipate and manage potential challenges in the Indian Ocean region. Geopolitical events, changes in energy markets, and environmental factors all contribute to the changing dynamic in the Indian Ocean.

The opening of the Arctic (Northwest Passage), caused by climate change, can have several implications for global maritime traffic patterns, including those in the Indian Ocean. The Arctic passage provides a more direct route between Asia and Europe compared to routes through the Indian Ocean, Suez Canal, and Mediterranean Sea. If the Arctic route becomes economically viable, it could attract traffic away from the Indian Ocean, affecting shipping patterns in Indian Ocean SLOCs. The opening of the Arctic passage may also drive infrastructure development in the Arctic region, including the construction of ports, navigational aids, and support facilities. This development could have implications for global maritime logistics and may influence decisions related to port investments and upgrades in the Indian Ocean.

Data Card: Cape of Good Hope

Key Takeaways

- The Cape of Good Hope is not technically a chokepoint. However, weather, currents, and ice patterns produce a natural channelizing effect on maritime traffic, forcing it close to the coastline.
- Relatively little commercial maritime traffic transits the Cape of Good Hope because the Suez is far preferable. Closure of the Suez

(or transit through the Red Sea) would increase the strategic value of the Cape.

- Actions at other locations around the globe could make maritime trafficability around the Cape of Good Hope of national interest.
- **In a conflict involving the Indian Ocean Region, sea control missions for the Navy or Marine Corps could be required in the Mozambique Channel or in the maritime approaches to the area around Madagascar.**

Geography and History

- The Cape of Good Hope lies roughly 2, 000 nautical miles north of Antarctica at a latitude of roughly 34° S. A flight from Cape Town to Antarctica would take roughly five hours.
- The Suez is preferable because it is a far shorter/faster route between the Mid-Atlantic and Indian Ocean, and it is much safer. Fierce, shifting winds, rocky outcrops, and heavy traffic have turned the Cape area into a ship graveyard. An estimated 2,000 wrecks can be found in South African waters, an average of one for every kilometer of coastline.
- Navigating around the cape is inherently treacherous, and the weather and wind currents become increasingly hazardous the farther south a ship travels. Due to this effect, maritime traffic tends to stay within a few hundred miles of the coastline.
- Sea ice around Antarctica usually peaks at the end of September and is at its minimal extent in February. This ice further constrains the space between Antarctica and Africa, reducing the sea space between the two continents by as much as 750 nautical miles.
- A modern study looking at fatigue and stress on ship hulls determined that just wind and wave damage alone could take years off the service life of a platform after a single voyage around the Cape of Good Hope as compared to the Suez Canal.
- This area and the associated routes were strategically important before and after the completion of the Suez Canal. During the Seven Years' War, the area was important for resupply and maintenance before projecting further into the Indian Ocean. During

WWII, several significant amphibious operations were conducted on Madagascar and Reunion island that, beyond their immediate positional benefits, provided important learning opportunities for later operations.

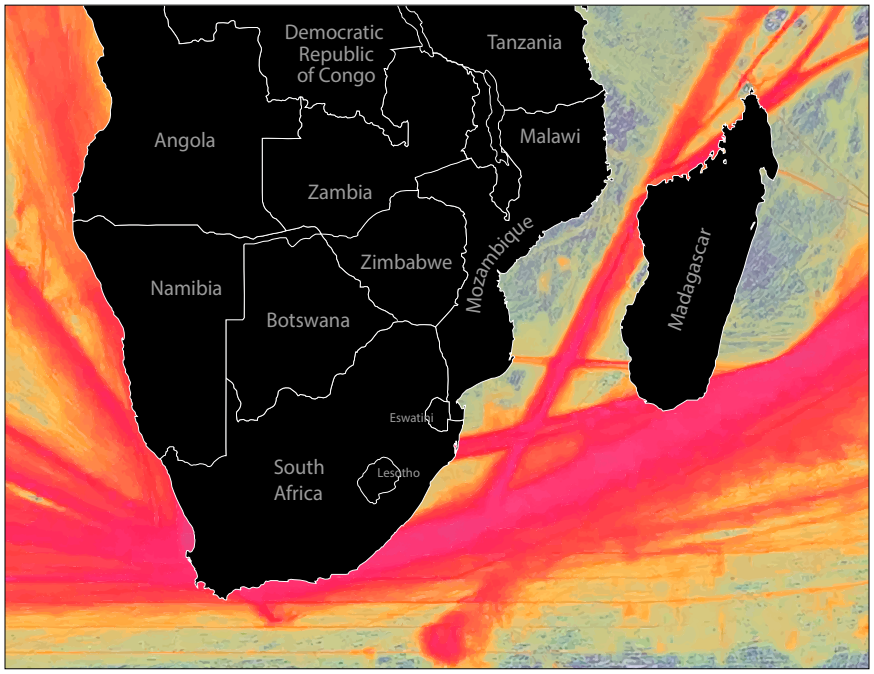
Global Closure Considerations

- As of 2019, the Suez sees 17,000 ships carrying 983 million metric tons of cargo valued at $2.1 trillion per year. Closures at key maritime chokepoints such as the Suez Canal could increase global shipping transit times by two weeks. If this were to occur coincident with another crisis, the effect could be compounded.
- Only 5 percent and 8 percent of the global trade in crude oil and liquid natural gas (LNG), respectively, goes through the Suez Canal, suggesting that a closure of the maritime chokepoints at either end of the Red Sea is not likely to be overly disruptive to global trade, but may cause a temporary price spike.
- Additionally, closure of the Suez would cause a shift in container movements globally, likely leading to capacity issues in other major ports around the world.

Implications

- If the Suez Canal were closed, there is relatively little global traffic that would shift to transiting around the Cape of Good Hope. Only single-digit percentages of oil and LNG flow through these chokepoints.
- Both before and after the Suez was completed, the Cape of Good hope was important because of resupply and control. **In modern terms, force closure and logistic routes, not commerce, are the primary vulnerability.** While some commerce could certainly be put at risk, the limited quantities would make it of little strategic consequence.
- Due to the additional hazards of sea state and weather, **the actual maritime traffic routes would make Mozambique, Madagascar, or the French islands of Reunion and Mayotte far more practical positions than those directly near the cape.** In fact, the Mozam-

Figure 3. Comprehensive maritime traffic in the vicinity of the Cape of Good Hope



Note: This image depicts total maritime traffic near the Cape of Good Hope in the early 2020s. While some traffic (e.g., container vessels versus crude carriers) depicts slightly different patterns of movement, the positional advantage conferred by the southern tip of Madagascar, the Mozambique Channel, and Reunion Island remain constant.
Source: Marine Traffic, adapted by MCUP.

bique channel has been an area of concern for piracy to the present. Control of the Cape of Good Hope is a misnomer, but there are positional advantages in the area that could be realized and enhanced in competition and conflict.

Data Card: Bab el-Mandeb

Key Takeaways

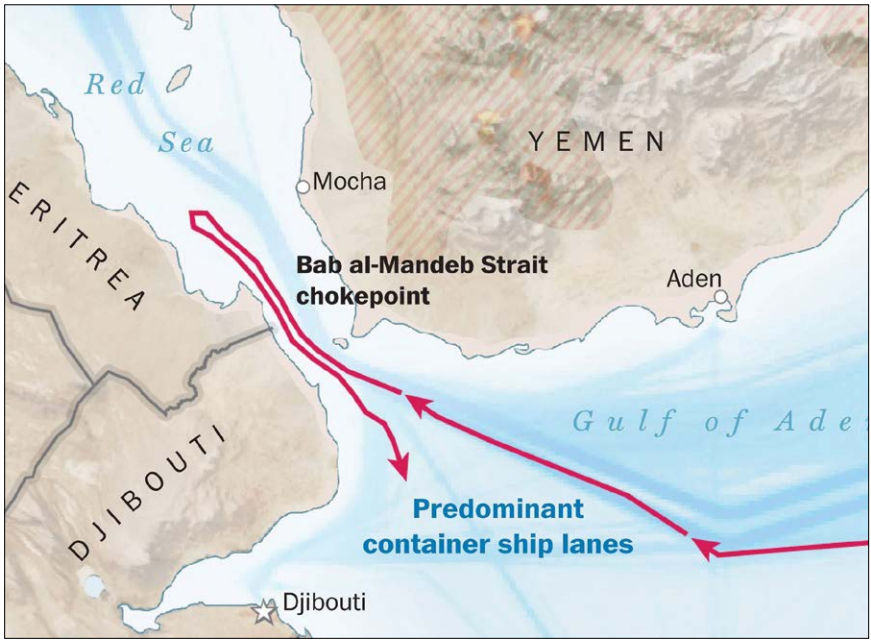
- The Bab el-Mandeb links the Arabian Peninsula to the Horn of Africa at the southern end of the Red Sea.
- The strait is relatively narrow, with only 16 nautical miles separating the two continents at its narrowest point.

- The Bab el-Mandeb should be considered in concert with the Suez Canal, particularly when examining force closure concerns related to the Middle East and the Indian Ocean.

Geography and History

- The Bab el-Mandeb is a narrow and shallow strait at the southern end of the Red Sea connected to the Gulf of Aden. Only 32 kilometers separate the Arabian Peninsula from the Horn of Africa at its narrowest point. The maritime chokepoint is also prone to strong tidal currents, making navigation challenging, and its deepest point is more than 300 meters.
- Because the Bab el-Mandeb connects the Red Sea to the Gulf of Aden, it is strategically significant for maritime traffic. The traffic through the Bab el-Mandeb is not directly controlled by a single country but is influenced by the geopolitical and security interests of regional nations. The key countries with strategic interests and influence over the Bab el-Mandeb strait include Djibouti, Yemen, Eritrea, and Saudi Arabia. Djibouti, located on the eastern side of the strait, has strategic importance due to its geographic location and hosting of foreign military bases, including the United States, the PRC, France, and others. Djibouti's stability and international cooperation contribute to security in the Bab el-Mandeb area.
- Yemen is situated on the northern coastline along the Bab el-Mandeb. The conflict in Yemen has implications for the security and stability of the strait. The Houthi rebels control territory on the Yemeni side of the strait, adding a layer of complexity to the geopolitical situation. As a major player in the Arabian Peninsula and the Red Sea region, Saudi Arabia, located north of Yemen on the east side of the Red Sea, also has strategic interests in ensuring the security and stability of the Bab el-Mandeb. The Red Sea, through the Bab el-Mandeb chokepoint, is a key maritime route for Saudi Arabia's oil exports. While Eritrea's direct control over the strait is limited, its geographic proximity to the Bab el-Mandeb, as well as its geopolitical influence in the region is a factor in the overall security dynamics.

Map 4. Bab el-Mandeb maritime traffic

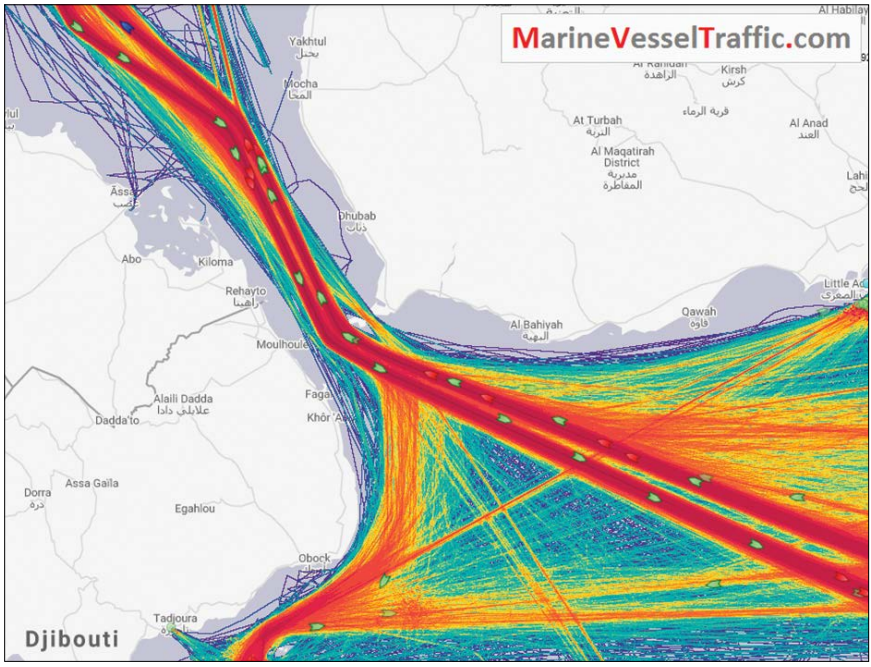


Source: CIMIC, adapted by MCUP.

Implications

- It may occasionally prove useful to consider the Bab el-Mandeb, the Red Sea (and its bordering countries), and the Suez Canal as a single SLOC. Despite the ability for discrete actions to occur in any location, it remains a linear system. Most traffic moving through the Suez travels through the Bab el-Mandeb sometime later and vice versa.
- The strait is characterized by a diverse marine ecosystem. The mixing of Red Sea and Indian Ocean waters contributes to rich biodiversity, making it an area of interest for marine researchers. Any environmental consequences of a conflict in the region would be magnified.
- The proximity to the Horn of Africa has historically raised concerns about piracy in the waters surrounding the Bab el-Mandeb. Interna-

Figure 4. Bab el-Mandeb Strait vessel traffic



Source: MarineVesselTraffic.com, adapted by MCUP.

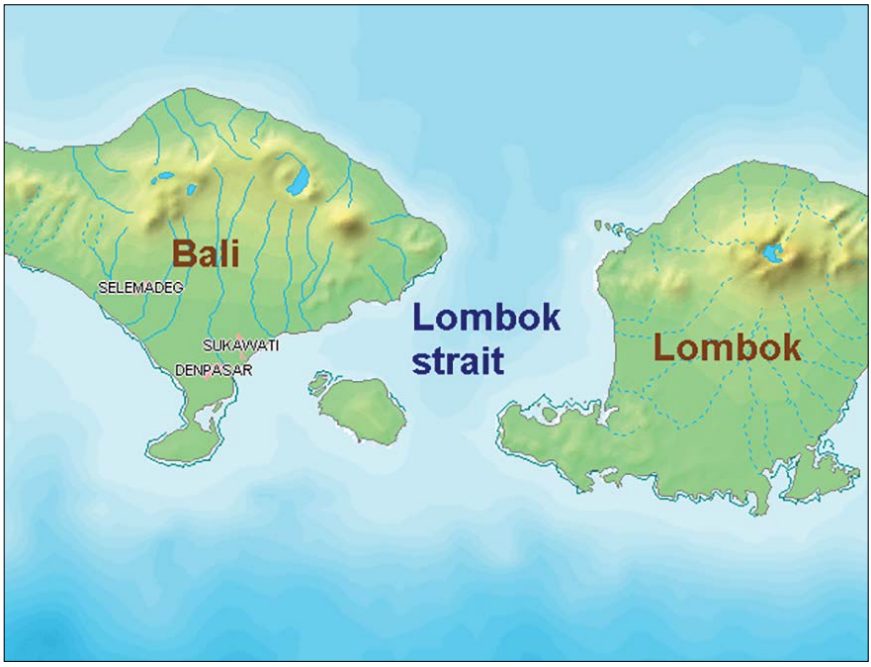
tional naval forces, including those participating in antipiracy operations, monitor and regularly patrol the waterway.

Data Card: Lombok Strait

Key Takeaways

- The Lombok Strait is wider, deeper, and less congested than the Straits of Malacca, though it annually sees less traffic than Sunda Strait.
- With an average depth of 820 feet, the safest route for the largest vessels transiting between the Pacific and Indian Oceans is the Lombok Strait.
- The Lombok Strait remains in high use because of its position relative to the Makassar Strait to the north. However, other routes exist through Indonesian waters that can support larger vessels, including warships and submarines.

Map 5. The Lombok Strait



Source: official image from the Netherlands, adapted by MCUP.

Geography and History

- The Lombok Strait is a narrow waterway, 12–25 miles wide and 37 miles long, between the islands of Bali and Lombok, and links the Eastern Java Sea and Flores Sea with the Indian Ocean. The average depth of the strait is 820 feet with a maximum depth of more than 4,000 feet.
- Water and heat exchange between the Pacific Ocean and the Indian Ocean takes place through the Lombok Strait. The Indonesian throughflow is a major ocean current flowing through this strait that allows transport of warm, fresh water from the Pacific to the Indian Ocean. This water movement has an important role in shaping global climate. The currents in the strait vary between 0.286 meters per second (m/s) (0.6 mph) eastward to 0.67 m/s westward and average 0.25 m/s westward.

- The bottom of the strait is complex and rough, consisting of two main channels, one shallow and one deep. Because of the variation in water movement due to the complexity of the channels and ocean interface, the tides in the strait have a complex rhythm but tend to combine about every 14 days to create an exceptionally strong tidal flow. It is the combination of rough topography, strong tidal currents, and stratified water from the ocean exchange that makes the Lombok Strait famous for generation of intensive internal waves. The Lombok Strait is important for vessels moving between Australia and Singapore and elsewherein East Asia. Fully laden tankers of the size of about 230,000 deadweight tons and above traversing from the Indian Ocean also use the deeper Lombok-Makassar Straits route due to the limitations of the 3.5-meter under-keel clearance imposed by the Malacca Straits Traffic Separation Scheme as well as the limits of a shallow, 23 meter, depth. The minimum passage width in the Lombok Strait is 10 nautical miles and the depths are greater than 490 feet. The Lombok Strait is therefore considered the safest route for supertankers.
- For Australia, the Lombok Strait serves as an invaluable maritime corridor for the nation's export goods—namely resources, energy, and agricultural produce—combined with critical energy supplies and consumer goods from Asia and Europe, meaning that Lombok is one of three economic and strategically critical waterways intrinsically linked to Australia's long-term economic and strategic national security.
- There are numerous pathways between the islands in Indonesian waters. The Alas Strait, between the islands of Lombok and Sumbawa, can still handle large commercial vessels if needed. The depth at the northern end of the Alas Strait is approximately 1,300 feet. Along the north-south strait, the water depth decreases slightly from 590 feet to 410 feet, with a sill at 312 feet depth. The Bali Strait, between the islands of Java and Bali, is only 1.5 miles wide at its narrowest point, but still maintains an average depth of 200 feet, enough to support larger ships.

Implications

- In the event of open conflict, the Lombok Strait would become a preferred route for commercial and military traffic. However, much of this traffic would also be making use of the Makassar Strait to the north due to the geography of Borneo and the South China Sea. It is also worth considering the other waterways through the Indonesian islands. In the event of economic warfare, many of these straits could also support the passage of warships or commercial vessels.

Data Card: Ombai-Wetar Strait

Key Takeaways

- The Ombai-Wetar Straits are deep, providing a strategically important avenue for nuclear-powered submarines to pass undetected.
- There is no current evidence of PRC underwater surveys in the area, and PRC advances for access to resources and permission to emplace underwater sensors have been continually rebuffed by East Timor.
- With the closure of the Strait of Malacca, larger ships are more likely to move through the Lombok-Makassar route or, depending on destination, through the Ombai-Wetar Straits into the Banda and Molucca Seas. Of the two, Ombai-Wetar is considered the safer route.

Geography and History

- The Ombai-Wetar Straits lie east of the Sunda and Lombok straits and separate the islands of Alor, Atauro, and Wetar from the island of Timor. They lie between the nations of Indonesia to the north and East Timor to the south. At their narrowest points, the Ombai Strait's navigable waters are 26 km (16 miles) across and Wetar is 42.6 km (26.5 miles) across. Most traffic in the strait is headed northeast or southwest, passing between the islands of Alor and Atauro, a navigable channel 34 km (21 miles) across.
- The straits are the primary deep-water passages in the Indonesian archipelago that link the waters of the Pacific and Indian Oceans. The archipelago is the only interocean connection on Earth at low lati-

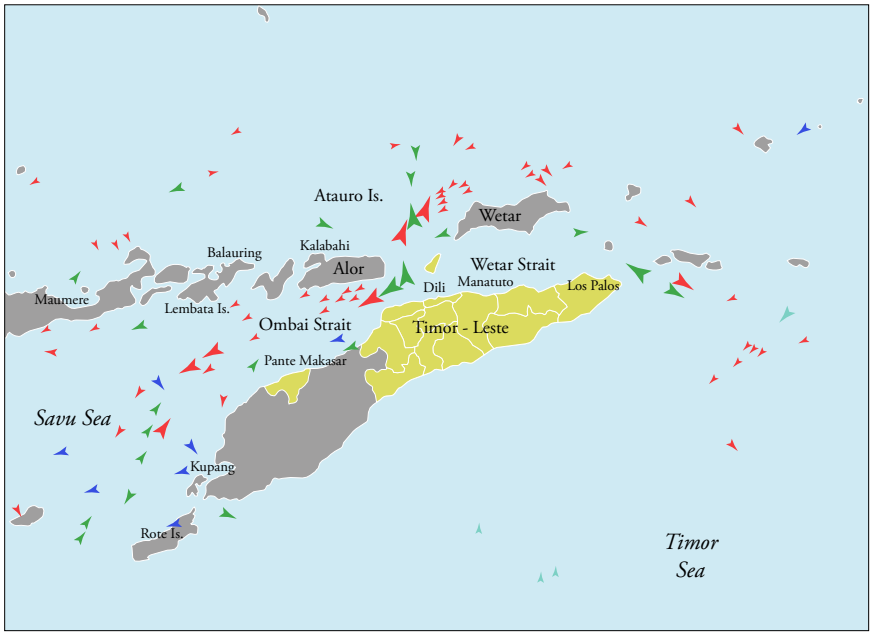
Map 6. The Ombai-Wetar Straits

Source: World Map, adapted by MCUP.

tudes, and the exchange of water between the two oceans is known as the Indonesian throughflow.

- The Ombai-Wetar Straits are narrow and deep. They have complex and extreme bathymetry, ranging from narrow and shallow reef flats partly covered with seagrass and coral, to 3,000-meter depths within 20 km of the coast. The deep nature of the channels has made the straits attractive to the PRC in the form of offers seeking offshore oil rights and permission to set up radar arrays, ostensibly to counter illegal fishing. East Timor has so far refused these advances, and the two straits therefore continue to provide a route for undetected access by nuclear-powered submarines between the Pacific and Indian Oceans.
- Although the Ombai-Wetar route is a less direct link between Guam and the Indian Ocean than the alternative Lombok-Makassar route, it has limited traffic and very little surveillance.
- The two straits are critical for East Timor, both in relation to its own international trade and as routes for internal transport. If there were any disruption in the flow of commercial shipping on the Malacca-

Map 7. The Ombai-Wetar route



Source: World Map, adapted by MCUP.

Singapore route, the Ombai-Wetar route would also have a crucial role to play in global trade, especially for the Asia-Pacific region.

- The Ombai-Wetar route is longer than its Strait of Malacca counterpart. The former route is therefore not really a preferred alternative path for west to east-bound commercial traffic. However, Ombai-Wetar is considered the safest route, for the largest oil tankers transiting between the Persian Gulf and Japan, and it is also used by vessels transiting between Australia and the Java Sea or East Asia.

Implications

- The PRC is interested in the Ombai-Wetar Straits, recognizing its value both in terms of depth and its use by U.S. undersea traffic.
- Evidence of PRC underwater surveys in the area could signal their intent to move their nuclear-powered submarines through the straits.

Data Card: Strait of Hormuz

Key Takeaways

- The Strait of Hormuz is a critical maritime passage bordered by Iran, Oman, and the UAE, lending geopolitical significance to the strait's maritime traffic.
- The strait is a lifeline for global energy trade. A substantial percentage of the world's oil exports pass through this chokepoint, making it a linchpin for the global economy. The flow of oil and gas through the strait has substantial implications for international markets.

Geography and History

- The Strait of Hormuz is a narrow, shallow strait connecting the Persian Gulf to the Gulf of Oman. Due in part to the shallow depths (approximately 220 meters at its deepest point), the Strait of Hormuz is subject to strong currents and potential turbulence. The strait ranges from 34 to 63 kilometers in width and is dotted by numerous islands.
- The Strait of Hormuz is a strategically crucial maritime chokepoint located between the Persian Gulf and the Gulf of Oman, through which a significant portion of the world's oil and gas shipments pass. While no single country has direct control over the entire strait, several nations in the region have significant influence and play a role in ensuring the security and stability of maritime traffic. Maritime traffic is closely monitored by Iran and Oman as the primary shipping lanes pass through both countries' territorial waters.
- Iran has a substantial coastline along the northern side of the Strait of Hormuz. The Iranian government asserts its authority over its territorial waters, which include parts of the strait. Iran has occasionally threatened to close the strait or take actions that could disrupt maritime traffic in response to geopolitical tensions or perceived threats, and they frequently conduct harassing actions with U.S. military vessels transiting the area.
- Oman controls the southern coastline of the Strait of Hormuz. The Omani government plays a role in facilitating the safe passage of

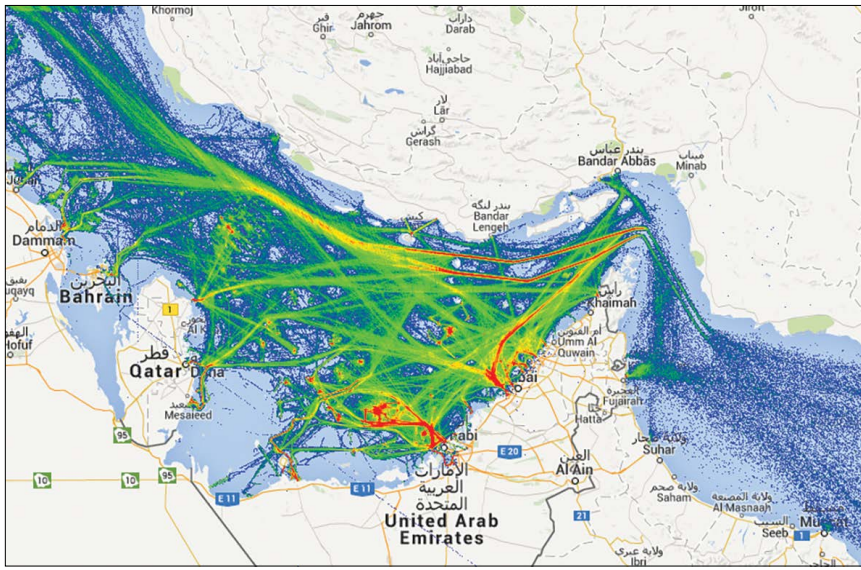
Map 8. The Strait of Hormuz

Source: Encyclopeadia Britannica, adapted by MCUP.

vessels through its territorial waters and has historically maintained a cooperative approach to maritime security.

- Both Iran and Oman have collaborated in recent years on joint rescue exercises and drills in the northern Indian Ocean.
- The UAE, situated to the southeast of the Strait of Hormuz, has several emirates with coastlines along the Gulf of Oman and the Arabian Sea. The UAE, particularly the emirate of Dubai, is a significant player in the maritime industry and contributes to the security and management of the strait.

Figure 5. Strait of Hormuz maritime routes



Source: World Economic Forum, adapted by MCUP.

Implications

- A significant portion of the world's energy exports come from the Persian Gulf region through the Strait of Hormuz. In 2018, its daily oil flow averaged 21 million barrels per day, representing more than 20 percent of the world's daily consumption. Disruptions to this daily flow can have outsized and lasting impacts on the global economy.
- The Strait of Hormuz is regularly patrolled by international naval forces, though Iranian forces have the most public and persistent presence in the narrow waterway.

Data Card: Strait of Malacca

Key Takeaways

- The Strait of Malacca is is a critical chokepoint for maritime traffic, particularly for vessels traveling between the Indian Ocean and the Pacific Ocean. It is one of the world's primary shipping channels.

Map 9. The Strait of Malacca

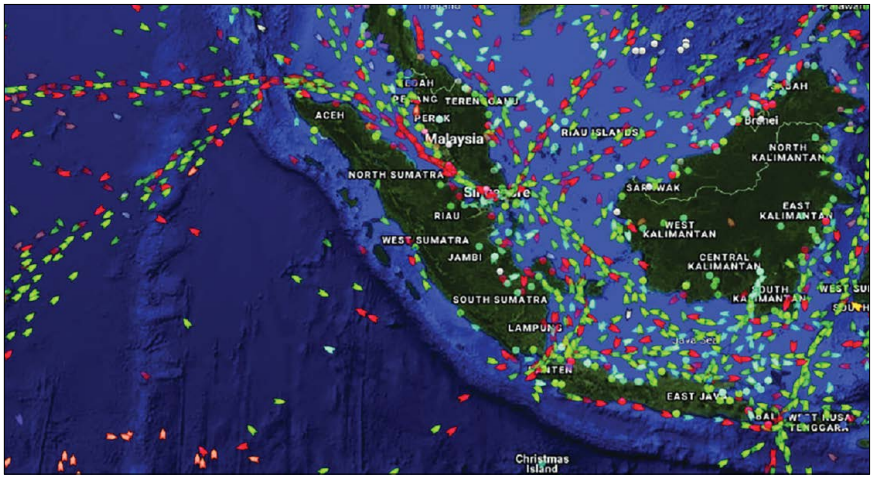
Source: CIA Factbook, adapted by MCUP.

- The Strait of Malacca is a strategically vital waterway with immense economic significance and complex maritime dynamics. Its narrow passage and high traffic volume make it a critical focus for international trade and cooperation among the littoral states.

Geography and History

- The Strait of Malacca is a long, narrow, and natural waterway located between the Malay Peninsula and the Indonesian island of Sumatra. It connects the Andaman Sea to the northeast with the South China Sea to the southwest.
- The strait is one of the world's most important and busiest waterways, with a width that varies along its length but averages around 1.7 miles (2.7 kilometers). The narrowest point, the Phillips Channel, is about 1.5 miles (2.4 kilometers) wide.
- Nearly 100,000 ships pass through the strait annually. The Strait of Malacca is governed by international maritime law, particularly the

Figure 6. Shipping traffic density in the Strait of Malacca



Source: "The Challenges of Constructing the Connectivity between Indonesia and Malaysia in the Malacca Strait," ResearchGate, adapted by MCUP.

United Nations Convention on the Law of the Sea (UNCLOS). UNCLOS ensures the right of innocent passage through the strait, allowing vessels to navigate freely as long as they do not pose a threat to the coastal states' security.

- Traffic within the strait is managed by a traffic separation scheme supported by coastal surveillance radars and communication networks. The nations surrounding the strait—Indonesia, Malaysia, and Singapore—have established the Malacca Straits Patrol is a set of practical cooperative measures undertaken by the coastal nations to ensure the strait's security. It comprises the Malacca Straits Sea Patrol, the "Eyes-in-the-Sky" Combined Maritime Air Patrols, as well as the Intelligence Exchange Group.

Implications

- The strait is a key conduit for the transportation of goods, including a significant portion of the world's oil and LNG. Its econom-

ic importance is underscored by the large volume of international trade passing through its waters.
- Any closure of the strait, accidental or purposeful, would pressurize other straits in the Indonesian archipelago, particularly Sunda and Lombok, with the largest vessels diverting to Lombok.

Data Card: Sunda Strait

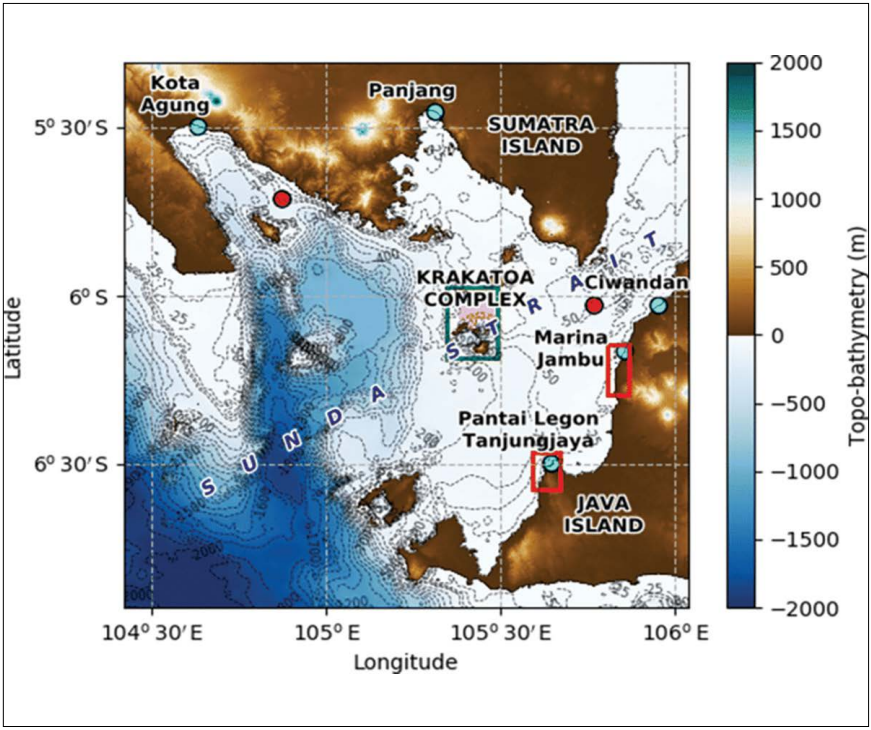
Key Takeaways

- The Sunda Strait is a narrow and dynamic waterway. Despite more than 35,000 ships passing through annually, the strait's narrowness, shallowness, and lack of accurate charting make it unsuitable for many modern larger ships.
- The strait is somewhat restrictive due to currents, depth changes, and significant crossing traffic. The Selat Sunda II Bridge, spanning the western end of the strait, also restricts traffic to a height of 52 meters.
- Large military vessels, such as aircraft carriers, are more likely to use wider, deeper waterways better suited to their size and maneuverability.

Geography and History

- The Sunda Strait is a narrow waterway, 16–70 miles (26–110 km) wide, between the islands of Java and Sumatra, and links the Java Sea with the Indian Ocean. There are several volcanic islands within the strait, the most famous of which is Krakatoa.
- The strait runs roughly northeast and southwest. The Sunda Strait has a minimum depth of about 20 meters, though there is a deep-water channel. The narrowest portion of the Sunda Strait is situated at its northeastern edge between Cape Pujat on Java Island and Cape Tua on Sumatra Island. At the southern end of the strait, the eastern side is comparatively much shallower than its western part which is the deepest. However, at the northern end of the strait (at its narrowest point) the deeper channel is on the eastern side, which you can see in the picture, opposite.

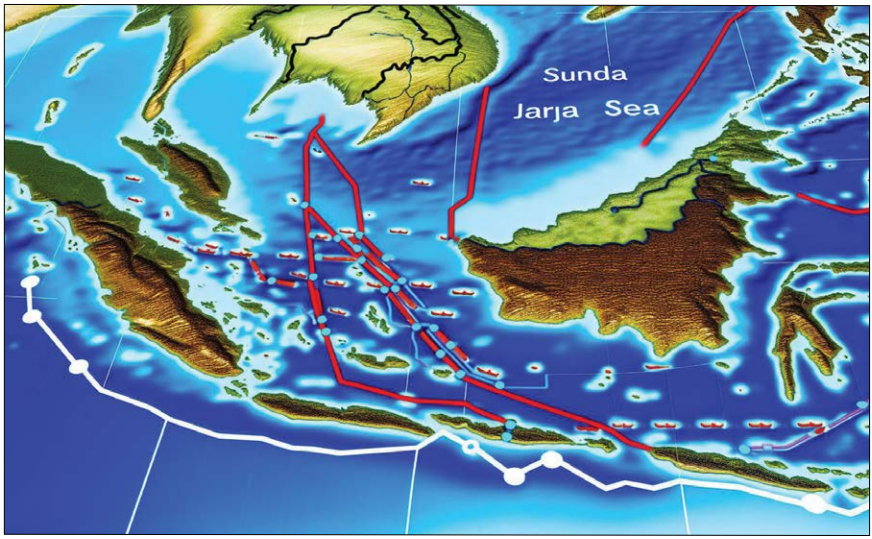
Figure 7. Topobathymetrical image of the Sunda Strait



Source: "Modelling 2018 Anak Krakatoa Flank Collapse and Tsunami: Effect of Landslide Failure Mechanism and Dynamics on Tsunami Generation," ResearchGate, adapted by MCUP.

- The Sunda Strait is overall very shallow and therefore it is extremely difficult to navigate in the waters of the strait, particularly for larger vessels. For example, deep-draught ships of more than 100,000 DWT or of more than 18 meters draught do not transit the strait. In addition to its shallow depth, navigation is also made difficult by the presence of sandbanks, strong tidal currents, other artificial obstructions like oil platforms, and robust crossing traffic between the islands.
- The strait's shallowness and inaccurate charting make it highly unsuitable for several modern ships. Likewise, with the crossing traffic, moving larger naval formations through the strait is not ideal.

Figure 8. Maritime traffic in the Sunda Strait



Source: Dryad Global, adapted by MCUP.

- The Sunda Strait has been the site of several naval battles throughout history, including the Battle of Sunda Strait in 1942, when a Japanese naval force defeated a combined British, Dutch, and American fleet. The strait has also been a site of piracy and smuggling in recent years, with Indonesian authorities working to improve security.

Implications

- However, it is possible that one of the major complexities of the strait, the crossing traffic, would be lessened in the event of regional conflict.
- While the Sunda Strait would be unattractive as a route option for large task forces, it could remain useful for smaller units like amphibious ready groups or single ships. The uneven depth, uncertain currents and lack of maneuverability make the strait less useful for large combatants like nuclear-powered aircraft carriers (CVNs), submarines, and large cargo ships.

- With the closure of the Strait of Malacca, larger ships are more likely to move through the Lombok-Makassar-Celebes-Sulu route or, depending on destination, through the Ombai-Wetar Straits into the Banda and Molucca Seas.

Appendix 3

Oil Industry Basics

CMC ONA researched the oil industry as part of preparation for the SLOC IV wargame, hoping to better understand how an oil blockade against the PRC could be implemented. This appendix provides a portion of that research for readers who may not be familiar with the production of petroleum products. It also describes how oil is created and classified, found, extracted, pumped, transported, and refined.

The animals and plants eventually producing petroleum products lived 300–400 million years ago during the Paleozoic Era[1]. Organic material was buried by layers of silt and sand, and over time, compressed under enormous pressure. Due to a lack of oxygen, the remains turned into kerogen, a waxy substance found within rocks. The application of time, heat, and pressure, through a process called catagenesis, transforms kerogens into hydrocarbons. Hydrocarbons come in many forms including coal, peat, natural gas, crude oil, and other types of petroleum.[2]

Crude oils, the more common types of hydrocarbons, are composed of 13 percent hydrogen, 85 percent carbon, and 2 percent other elements includ-

[1] "Oil and Petroleum Products Explained," U.S. Energy Information Administration, 12 June 2023.
[2] Elizabeth Morse and Andrew Turgeon, "Petroleum," *National Geographic*, 19 October 2023.

ing nitrogen, sulfur, oxygen, and metals such as iron, nickel, and copper. The number of impurities in crude oil varies. The American Petroleum Institute uses the terms *light* and *heavy* to compare the oil's density compared to water. Light oil is purer, composed of approximately 97 percent hydrocarbons. It is less dense than water, so it floats. In contrast, heavy oil is 50 percent hydrocarbon and 50 percent impurities. Its density is greater than water, so it sinks. Light oil is more desirable because it is cheaper and easier to refine. Oil is further classified based on where it was drilled. Examples include West Texas Intermediate, Brent Blend, and Dubai-Oman. Finally, oil is considered *sweet* if it contains low amounts of sulfur and *sour* if it contains high amounts of sulfur.[3]

Finding and extracting oil is a major industry. While some oil bubbles to the surface (bitumen), most petroleum is found in underground reservoirs known as reserves. Reserves are located by measuring variances in seismic returns. After promising seismic returns are observed, exploratory drilling is required to confirm the existence of a reserve. If oil is found, developmental drilling occurs to develop the site and begin pumping the reserve. Due to geological complexities, the depths associated with the reserves, and environmental concerns, not all oil can be easily pumped out.

Newer drilling methods include directional drilling, a method of drilling down into a reserve and then angling the drill to access previously untapped portions of the reserve. Directional drilling can extend a reserve's useful life. Directional drilling is partially credited with starting the first Gulf War, when Iraq accused Kuwait of using the method to tap into Iraqi reserves, subsequently flooding the market with Kuwaiti oil. More recently, secondary drilling methods have increased the yield of older reserves. Techniques including vacuuming, fracking, and reserve flooding with water or gas have increased the amount of global proven reserves.[4]

Proven global reserves contain more than 285 billion barrels of oil. Adding in estimates of what is likely to exist, the total comes to 1624 billion barrels.

After oil is pumped from reserves, it must be transported to refineries or storage locations. Some oil is pumped overland in pipes, but most oil is shipped overseas in oil tankers.

[3] Morse and Turgeon, "Petroleum."
[4] Morse and Turgeon, "Petroleum."

Table 6. Proven and probable oil reserves, in billions of barrels

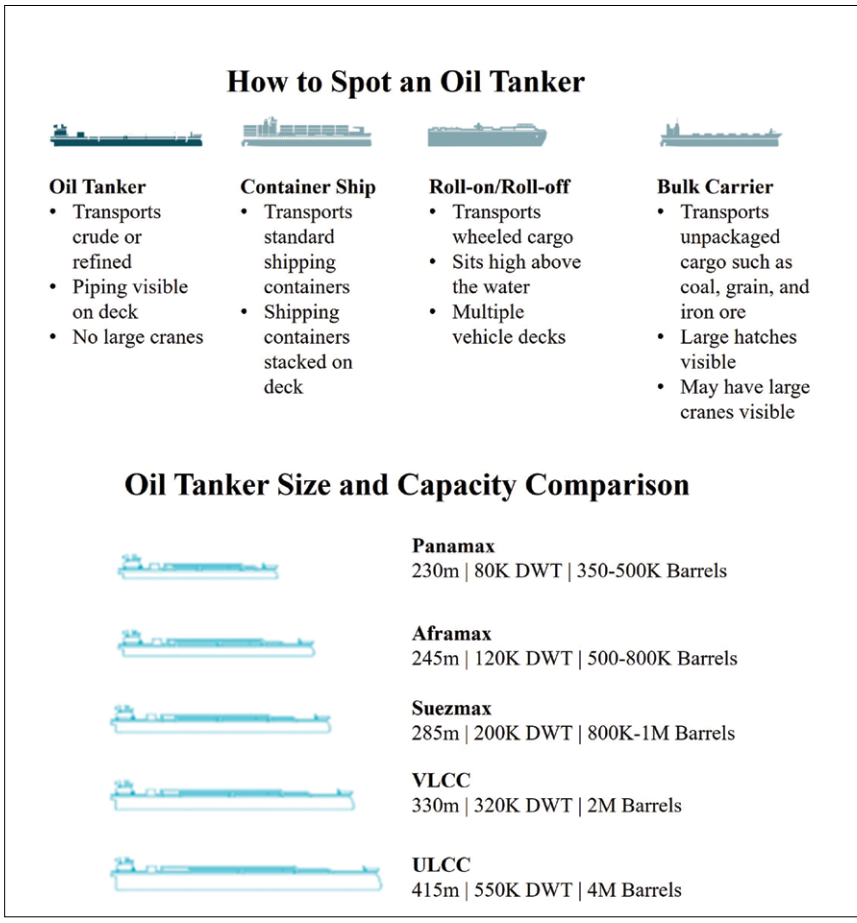
Country	1P	2P	2PC	2PCX	Mb-bl/d*	1P life	2PCX life	Upstream emissions $kgCO_2$/bbl
Non-OPEC	183	306	646	928	52.4	9.6	48.5	22
United States	41	55	122	192	12.9	8.8	40.6	13
Russia	43	65	126	143	10.6	11.2	37.2	23
Canada	35	49	114	127	4.7	20.5	73.8	53
China	12	29	58	75	4.1	7.9	50.0	17
Brazil	7	23	41	65	3.4	5.9	52.2	16
Qatar	5	12	33	36	1.3	11.2	74.3	18
Kazakhstan	10	16	27	33	1.9	15.1	47.4	17
Mexico	3	7	16	23	2.0	4.4	32.4	25
Australia	1	1	3	22	0.3	4.9	209.4	35
Argentina	2	3	7	19	0.7	7.8	76.0	31
Norway	4	8	11	16	1.9	5.9	23.0	9
United Kingdom	1	3	7	9	0.7	4.7	32.3	27
Other non-OPEC	16	32	71	153	7	6	57	25
OPEC	102	199	638	696	30.5	9.2	62.6	23
Saudi Arabia	33	62	257	271	10.4	8.6	71.2	9

Iraq	17	37	100	107	4.5	10.4	65.3	26
Iran	15	28	80	88	3.3	12.7	73.4	37
United Arab Emirates	14	25	69	72	3.2	11.5	61.2	10
Kuwait	6	14	48	51	2.4	6.7	57.2	12
Venezuela	2	5	23	27	0.8	6.7	94.2	98
Libya	4	8	15	20	1.3	8.6	42.9	70
Nigeria	3	6	17	19	1.5	6.1	36.0	38
Algeria	4	6	8	13	1.1	8.6	31.9	50
Angola	3	4	8	13	1.1	6.7	32.4	21
Congo	1	1	3	5	0.3	6.5	51.3	48
Gabon	0	1	1	3	0.2	5.9	41.4	51
Equatorial Guinea	0	0	1	1	0.1	4.5	16.5	35
World total oil	285	505	1,283	1,624	82.9	9.4	53.7	

Natural gas liquids, 12.0
Other liquids, 6.3
World total liquids production, 2023, 101.2
* = Global oil production 2023, excludes natural gas liquids, biofuel, and refinery gains; 1P = proved oil reserves (as of 1 January 2023), conservative estimate in existing fields; 2P = proved + probable oil reserves, most likely estimate in existing fields; 2PC = proved + probable oil reserves plus mean contingent recoverable oil resources in yet undecided projects/discoveries, including noncommercial volumes; 2PCX = most likely estimate for existing fields, plus contingent resources in discoveries, plus risked prospective resources in yet undiscovered fields. The above classification scheme is aligned with the PRMS standard from the Society of Petroleum Engineers. Oil refers to crude oil + lease condensate.
Source: "Recoverable Oil Reserves Top 1,600 Billion Barrels, Capable of Warming the Planet an Extra 0.2°C by 2100," Rystad Energy, 28 June 2023.

In 2022, there were more than 8,700 crude and petroleum product tankers weighing more than 10,000 dead weight tons (DWT). Of those, 860 were very large crude carriers (VLCCs), which only carry crude oil. Crude and refined products cannot share the same shipping holds without contamination,

Figure 9. Oil tankers

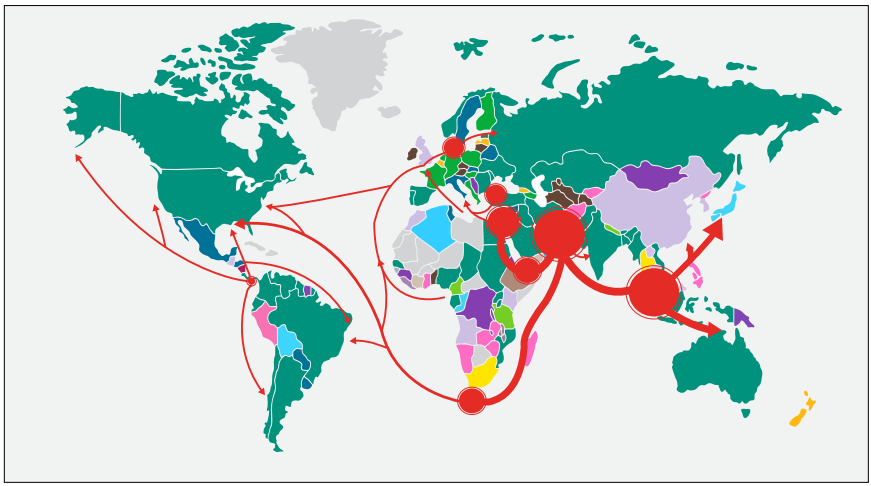


Source: courtesy of the Office of Net Assessment, adapted by MCUP.

and it is too costly to clean VLCC holds to transition between carrying crude and refined products. This drives suboptimal usage of the ships. They first load up with crude, transit to a refinery, and download the crude. The ships then transit back to their origins empty to restart the process.[5]

[5] Shasni N. Kumar, "Tanker Transportation," in Cutler J. Cleveland and Robert U. Ayres, *Encyclopedia of Energy* (Amsterdam: Elsevier Academic Press, 2004).

Map 10. SLOCs and passage of Oil



Source: "World Oil Transit Chokepoints," U.S. Energy Information Administration, 25 July 2017, adapted by MCUP.

Refined petroleum ships are much smaller and carry multiple types of products simultaneously in separate holds. They also tend to onload and offload cargo at multiple locations during a single voyage.[6]

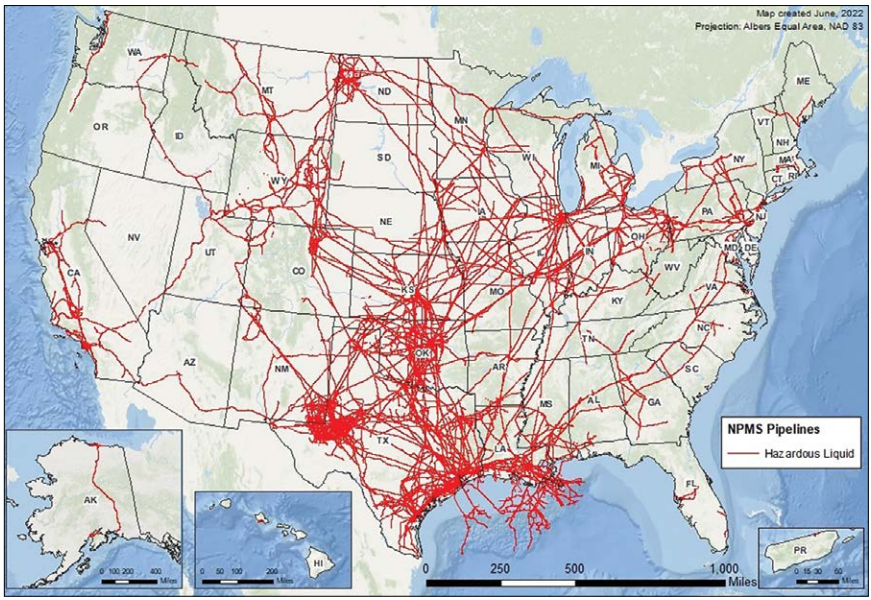
The U.S. Energy Information Administration mapped out the primary oil shipping lanes across the world. These lanes pass through extremely important areas, channels, canals, and chokepoints.

As an alternative to maritime shipping, many countries use pipelines to carry oil long distances over land. The United States uses 85,000 miles of pipeline for crude oil and another 64,000 miles of pipeline for refined products. The PRC also uses a large array of pipelines. Most pipelines originate near VLCC offloading ports or oil reserves and terminate near refineries.[7]

Refining is the process of converting and separating crude oil into useful petroleum products. Refineries take specific types of crude and convert them into specific products such as gasoline, diesel fuel, and jet fuel. A refin-

[6] "Global Tanker Fleet Struggles to Break Even," Lloyd's Register, 28 March 2022.
[7] "Where Are Liquid Pipelines Located?," Pipeline101, accessed 31 January 2024.

Figure 10. The U.S. petroleum pipelines



Source: "Where Are Liquid Pipelines Located?," Pipeline101, accessed 31 January 2024.

Figure 11. China's petroleum pipelines

Source: "China Energy Map v. 2023," Rice University's Baker Institute, accessed 31 January 2024.

ery complex is optimized for a single type of feedstock. Changing the type of crude requires expensive and time-consuming modifications to the physical plant of a refinery. Refining can take multiple iterations until the final products are produced. Some petroleum may even need to be transported to other refineries for subsequent refinement before the end product is produced.[8]

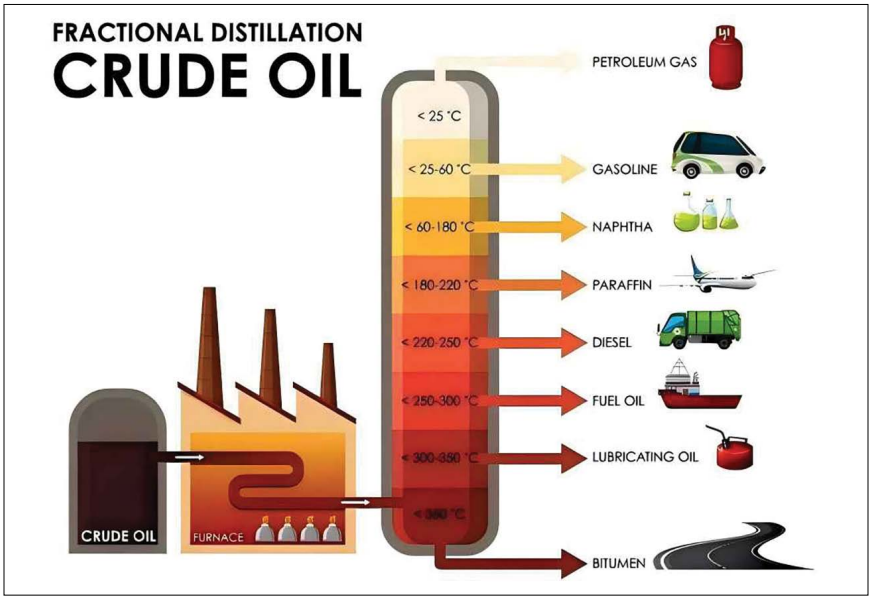
During refinement, sulfur, metals, sand, and other gases are removed from crude oil through filtering and distillation. The crude oil is heated at different temperatures which causes the different hydrocarbons found in the crude to boil and separate.[9] During this process, the crude's density is decreased, which increases its volume. For every standard U.S. 42-gallon barrel of crude oil refined, approximately 45 gallons of products are produced. Gasoline, diesel, and jet fuel make up most refined products.[10]

Many countries hedge against supply interruptions by setting aside a Strategic Petroleum Reserve (SPR). In the United States, four salt caverns in Texas and Louisiana are used to store crude oil. On 26 January 2024, the U.S. SPR contained 357 million barrels of crude oil. This is down from the historic maximum of 727 million barrels in December 2009. One estimate from 2021 said the then-current inventory of 594 million barrels of crude would provide 1,206 days of supply. Accessing the reserves is not immediate. The U.S. Energy Information Administration estimates it will take 13 days from the president's decision to tap into the SPR for oil to reach market. The Energy Information Administration also estimates only 4.4 million barrels of oil can be tapped from the SPR each day.[11]

The PRC also has a SPR. The PRC primarily stores its reserves above ground in large tanks. This method is more expensive than storing it in salt caverns, and the PRC has announced its desire to transition to salt cavern storage soon. While the PRC does not publicly release its SPR numbers, it has messaged a goal of storing 90–100 days' worth of crude oil demand, or approximately 730 million barrels.[12] Currently, the PRC has eight oil reserve bases.

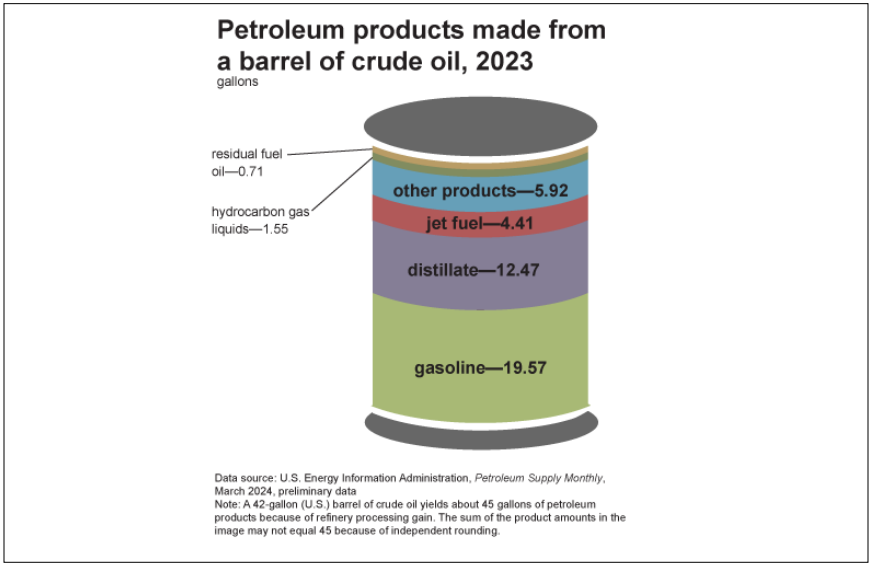
[8] John E. Carruthers and Lee H. Solomon, "Petroleum Refining," Britannica, accessed 29 January 2024.
[9] Morse and Turgeon, "Petroleum."
[10] "Oil and Petroleum Products Explained," U.S. Energy Information Administration, 12 June 2023.
[11] "SPR Quick Facts," Office of Cybersecurity, Energy Security, and Emergency Response, accessed 31 January 2024.
[12] "China: Oil Stockpiling and Energy Security," Stratfor Analysis, 1 June 2009.

Figure 12. Refinement example



Source: John E. Carruthers and Lee H. Solomon, "Petroleum Refining," Britannica, accessed 29 January 2024.

Figure 13. Proportions of finished products from a barrel of crude oil

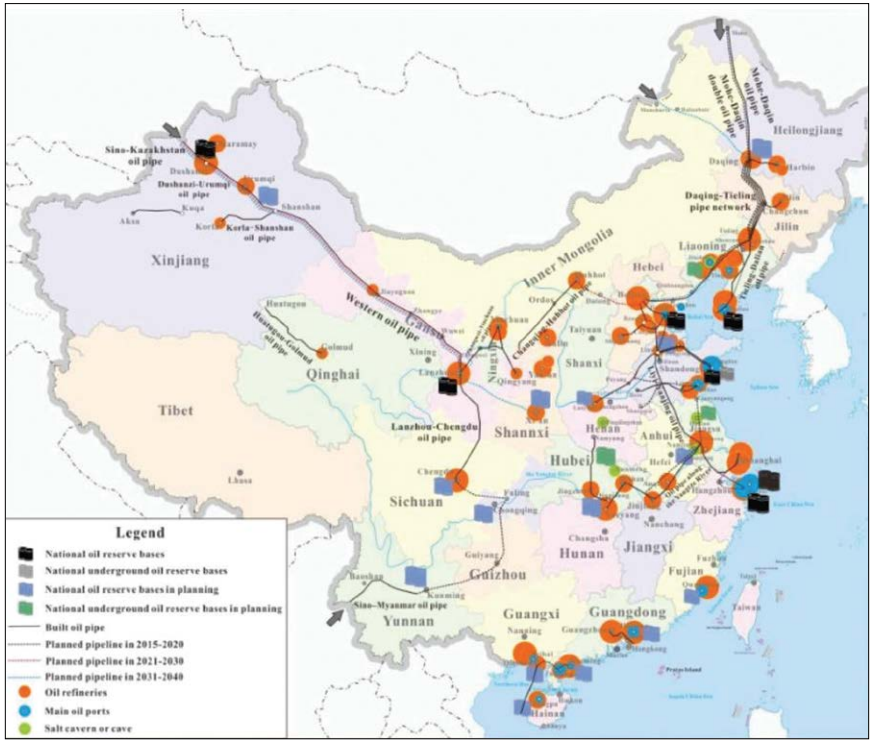


Source: "Oil and Petroleum Products Explained," U.S. Energy Information Administration, 12 June 2023.

Figure 14. The United States' strategic petroleum reserve locations

Source: "SPR Storage Sites," Office of Cybersecurity, Energy Security, and Emergency Response, accessed 31 January 2024.

Figure 15. China's SPR sites, refineries, and pipelines



Source: Huiqing Lan and Zhijie Zhang, "Analyzing the Layout of China's Strategic Petroleum Reserve Base" *AIP Conference Proceedings* (2017), https://doi.org/10.1063/1.4992936.

Table 7. Top 10 oil producers

Country	Million barrels per day	Share of world total
United States	20.30	21%
Saudi Arabia	12.44	13%
Russia	10.13	10%
Canada	5.83	6%
Iraq	4.61	5%
China	4.45	5%
United Arab Emirates	4.23	4%
Iran	3.67	4%
Brazil	3.17	3%
Kuwait	3.01	3%
Total top 10	71.83	74%
World total	97.70	

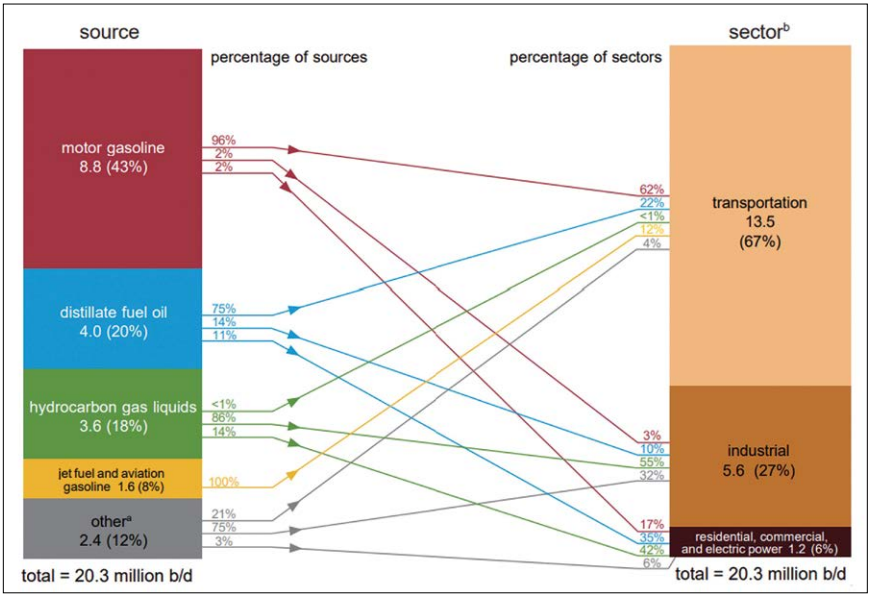
Source: "What Countries Are the Top Producers and Consumers of Oil?," U.S. Energy Information Administration, 22 September 2023.

Table 8. Top 10 oil consumers

Country	Million barrels per day	Share of world total
United States	19.89	20%
China	15.27	16%
India	4.68	5%
Russia	3.67	4%
Japan	3.41	4%
Saudi Arabia	3.35	3%
Brazil	2.89	3%
South Korea	2.56	3%
Canada	2.26	2%
Germany	2.23	2%
Total top 10	60.20	62%
World total	97.26	

Source: "What Countries Are the Top Producers and Consumers of Oil?," U.S. Energy Information Administration, 22 September 2023.

Figure 16. U.S. petroleum product consumption, by source and sector



Source: "Oil and Petroleum Products Explained," U.S. Energy Information Administration, 22 August 2023.

Table 9. Types and amounts of petroleum products consumed by the United States, 2022

Product	Annual consumption (million barrels per day)
Finished motor gasoline	8.777
Distillate fuel (diesel fuel and heating oil)	3.962
Hydrocarbon gas liquids (HGLs)	3.588
Kerosene-type jet fuel	1.558
Still gas	0.661
Asphalt and road oil	0.373
Residual fuel oil	0.343
Petroleum coke	0.255
Petrochemical feedstocks	0.237

Biofuels	0.164
Lubricants	0.112
Unfinished oils	0.094
Miscellaneous other products	0.087
Special naphthas	0.046
Aviation gasoline	0.012
Waxes	0.006
Kerosene	0.004
Total petroleum products	20.279

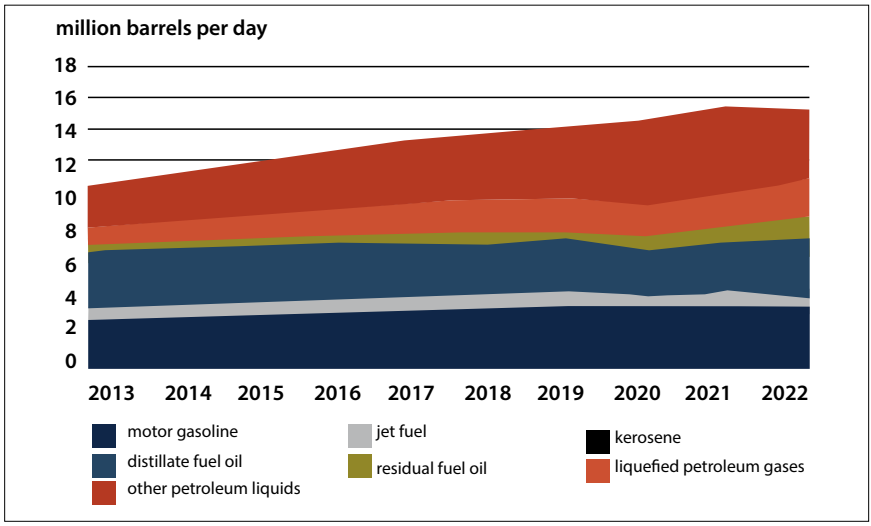
Source: "Oil and Petroleum Products Explained," U.S. Energy Information Administration, 22 August 2023.

Table 10. China's total refined petroleum product consumption, by type

Fuel type	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Other petroleum liquids	2.82	3.16	3.36	3.54	3.81	4.06	4.44	5.31	5.34	4.45
Distillate fuel oil	3.50	3.51	3.54	3.42	3.44	3.39	3.10	2.87	3.00	3.70
Liquified petroleum gases	0.95	1.07	1.24	1.60	1.73	1.82	1.93	2.01	2.26	2.39
Motor gasoline	2.46	2.61	2.71	2.82	2.96	3.06	3.19	2.98	3.15	3.11
Residual fuel oil	0.58	0.55	0.53	0.53	0.53	0.50	0.52	0.56	0.68	0.99
Jet fuel	0.43	0.48	0.54	0.61	0.69	0.75	0.80	0.67	0.80	0.41
Kerosene	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Total	10.78	11.42	11.96	12.56	13.20	13.61	14.01	14.43	15.27	15.08

Source: Jonathan Russo and Lejla Villar, U.S. Energy Information Administration, 14 February 2024.

Figure 17. China's refined petroleum product consumption, 2013–22



Source: Jonathan Russo and Lejla Villar, U.S. Energy Information Administration, 14 February 2024.

Seven are above ground and one is stored underground in a large, watertight tank. Many of China's sites are located along their eastern coast with one located in the northwest corner near their major overland pipelines.[13]

The Energy Information Administration tracks each country's oil production and consumption. The United States produces the most total oil in the world at 20 million barrels per day, or 21 percent of the world's market. In comparison, the PRC produces 4.45 million barrels per day. The United States also consumes the most oil in the world at 19.89 million barrels per day, with the PRC coming in second at 15.27 million barrels per day.[14]

Refined petroleum products have many uses. The Energy Information Administration has estimated the United States' consumption by source and which sector the petroleum supports. Gasoline and diesel fuels make up the preponderance of use with liquid natural gas and jet/aviation fuels next in

[13] Huiqing Lan and Zhijie Zhang, "Analyzing the Layout of China's Strategic Petroleum Reserve Base," *AIP Conference Proceedings* (2017), https://doi.org/10.1063/1.4992936.
[14] "What Countries Are the Top Producers and Consumers of Oil?," U.S. Energy Information Administration, 22 September 2023.

rank. The transportation sector makes up 67 percent of all use, followed by industrial uses, and finally home heating and power generation.[15]

With approximately 20 million barrels of oil used per day in the United States alone, how long will the world's oil supply meet demand? According to the Energy Information Administration, the global supply of crude oil, other liquid hydrocarbons, and biofuels is expected to be adequate to meet the world's demand through at least 2050. While some markets, like the United States, may shift to renewable energy sources, most countries will continue to demand petroleum products to meet their energy demands.[16]

[15] "Oil and Petroleum Products Explained," U.S. Energy Information Administration, 22 August 2023.
[16] "Annual Energy Outlook, 2023," U.S. Energy Information Administration, 16 March 2023.

Appendix 4

SLOC Series of Wargames

CMC ONA wargamed how the Marine Corps could contribute to an oil blockade of the PRC. Six events were conducted.[1] These included a seminar-style SLOC access and basing wargame, three Marine Corps SLOC control access and basing wargames, a Center for Naval Analyses (CNA)-led economic warfare and blockade expert panel, and an Indonesia access and basing tabletop exercise. The wargames had five enduring research questions.

1. How could the Marine Corps use land-based seapower to control key maritime terrain?
2. What is the role of stand-in forces (SIF) in economic warfare?
3. What level of effort is required to close an SLOC?
4. What support is necessary from the Navy and Joint Force?
5. What special skills or competencies does the Marine Corps provide in this situation?

[1] These wargame reports are available on request.

The games led to several insights, many of which have informed this document. SLOC I focused on the impact of SLOCs and access on strategy in competition. Key insights included:

- U.S. strategy during competition is Western Pacific focused and is largely unaffected by PRC actions outside the region.
- Securing and maintaining access to the region, especially in-theater resupply points (Class V and vertical launching system cells) should be a major focus of peacetime campaigning.
- The overall effectiveness of economic warfare is unknown making it difficult to allocate forces for missions on the periphery vs missions in the first island chain.
- Winning or losing on Taiwan or the first island chain may not lead to the end of the war.

The access and basing tabletop exercise explored what factors could be important in securing access to the landward component of an SLOC chokepoint. The specific question asked was: Under what conditions would Indonesia allow the United States access to its sovereign territory, airspace, and territorial waters to conduct lethal military operations and wage economic warfare? Bottom line, access was unlikely but possible, and depended largely on how the war started, who was winning, and how the war was being fought. One important output of the tabletop exercise was an internal team framework for considering the question of access.

The expert panel conducted at CNA headquarters was intended to intellectually "prime the pump" ahead of the SLOC control wargames. All assembled panel members expressed a belief in the effectiveness of economic warfare.[2]

- The panel had little confidence that the Navy is conducting or would conduct the necessary analysis and planning necessary to make a blockade effective at the onset of hostilities.

[2] This could be because only people who think this way would agree to participate in an economic warfare expert panel. There are several voices in academia and the community of practice who believe it is a flawed approach. Consult the annotated bibliography for these divergent views.

- Historically, navies spent a lot of effort during war on blockades and economic warfare.
- A global view of economic warfare must be taken.
- The PLA will never run out of fuel, everything else would be economized first.
- Current access is a weak signal and unreliable indicator of wartime access. What is acceptable in peace is very different from what could happen during war.

SLOC II focused on how the Marine Corps could contribute to blockade during war at the tactical level. A major goal was better understanding of the Marine Corps' capacity to conduct such operations.

- The seizure of undefended or lightly defended terrain at the immediate onset of hostilities is one potential role of Marine Corps forces.
- SIF could enable traditional maritime blockade operations by screening and defending surface combatants against enemy submarines, surface combatants, and aircraft—tasks normally assigned to other surface combatants.
- Specific Joint and naval assets are required to enable Marine Corps blockade actions. These include external defense; intelligence, surveillance, and reconnaissance (specifically early warning of impending attack and custody of the contact of interest); logistics; and strategic mobility.
- The ARG/MEU's organic mobility is an important advantage.
- Specific conditions are necessary for a blockade to be operationally effective, namely protraction on Taiwan, a favorable military situation in the South China Sea, access to land and territorial water astride key SLOCs, and a comprehensive approach taken to the blockade.
- An effective blockade would probably look like a series of "leaky nets" deployed globally to stop the flow of oil and degrade the PRC's ability to refine and transport it.
- All SLOCs are different, some significantly requiring a tailored approach to closing each one.

- Untangling the economic impact of a blockade from the economic impact of fighting a war over Taiwan would be difficult.
- Surface combatant use in blockades presents a dilemma. They could be more useful elsewhere and are vulnerable, meaning their use potentially has more down than upside.
- Boarding and seizing a VLCC is challenging. The PLA can make it nearly impossible, or not worth the cost, but they have limited ability to put these measures into place.
- Red's military response to a blockade would likely be patient, coming at the time of their choosing. Red's blockade responses might not be symmetrical or proportional either.
- Red did have several very effective political, diplomatic, and informational responses available.

SLOC III was similar to SLOC II although participants were different, providing a fresh look at the problem. Several findings from the game overlapped with those from SLOC II and are omitted.

- A focus on tankers may be more effective than a focus on oil.
- Conducting a blockade, whether effective or not, will influence global oil prices.
- Blockading the PRC is a global challenge, encompassing all aspects of national power.
- The blockade demonstrated aspects of a competitive strategy.[3] Red's strategic response was exactly the effect the blockade was intended to have.
- Land forces are vulnerable to PLA long range fires, but less vulnerable than ships.
- Tactical implementation of a blockade is difficult, and the PLA has many counters to U.S. efforts, some of which are asymmetric, posing unique challenges.

[3] The best definition found for *competitive strategies* comes from Stephen Rosen. "Competitive strategies try to get competitors to play our game, a game we are likely to win. This is done by getting them to make the kind of mistakes they are inclined to make, by getting them to do that which is in their nature, despite the fact they should not do so, given their resources." Quoted in Thomas G. Mahnken, *Competitive Strategies for the 21st Century: Theory, History, and Practice* (Redwood City, CA: Stanford University Press, 2012).

SLOC IV, the final blockade related wargame conducted by CMC ONA prior to the completion of this net assessment sought to examine the long-term and global effects of a maritime oil blockade of the PRC against the backdrop of a Sino-American war caused by a PRC invasion of Taiwan. Two small operational planning teams were convened by each side ahead of the game to develop the strategies and intellectual frameworks used during the game. The game included six move periods spanning two years of conflict, after which the game culminated. The following insights were derived from the game:

- SLOC IV found a maritime oil blockade had the potential to seriously degrade the PRC's oil supply during a conflict with Taiwan, but also had far-reaching and potentially negative global economic consequences.
- In the context of this game, targeting VLCCs and other oil tankers via MIO was feasible and sustainable, provided measures were taken for keeping seized VLCCs off the market.
- Units conducting MIO need an entity to hand off seized tankers for disposition.
- The seizure of tankers had significant effects on the global energy market, causing diplomatic and economic pressure on the United States.
- MIO were most survivable when conducted outside PRC antiship missile ranges but access to tankers suffered.
- Blue concluded an approach more likely to have operational effects was targeting jet fuel and began striking refineries and other critical nodes in the jet fuel supply chain on the PRC mainland.
- Blue attacks on the Chinese mainland created risks of "tit-for-tat" escalation between the United States and the PRC, especially once more capable Chinese weapons come online. Once the PRC exhausted its conventional response, the likelihood of an escalatory spiral increases.
- The blockade created two markets and prices for oil: the mainland China and theater of conflict price and the rest of world price. China's price was much higher.

- China's dominant position in shipbuilding meant they could quickly rebuild their merchant fleet or build the type of combatants necessary to nullify blue global advantages. This could have far-reaching postwar consequences.

Appendix 5

Historical Context

Blockade and economic warfare have been prominent features of nearly every great power conflict. They are frequently part of a nation's strategy from the outset and are expedients adopted after an initial gambit fails or when unable to create conditions necessary for negotiated settlement. A survey of the history of blockades indicates the existence of some "iron laws" of blockade:

- A nation or coalition implementing a blockade should first assess their ability to impose one and their adversary's susceptibility to blockade.
- Blockades have a cost, usually paid in part by the blockading power's allies and partners.
- Blockades have variable windows of effectiveness caused by an adversary's adaptation, expedients, and substitution.
- Blockades often seen as low risk approaches also drive adversaries to high-risk strategies.
- The slow-moving economic effects of blockades translate very slowly into battlefield advantage, but also eventually yield decisive, long-term strategic effects enduring even after the conflict's end.

The first naval blockade recorded in history was conducted by the Athenians in 425 BCE during the Peloponnesian Wars. The Athenian fleet destroyed the Spartan fleet at the island of Sphacteria after a major land battle, and the Athenians proceeded to conduct a 72-day blockade of the island to force the Spartans to negotiate a truce. The Athenians knew 420 Spartans were trapped on the island and Sparta would negotiate to save their soldiers. Although the Athenian win at sea extended the Peloponnesian War, which ultimately led to Athenian demise, the conduct of the naval blockade at Sphacteria encircled the Spartans and forced them to negotiate.[1] It should be noted a precondition of the blockade was the destruction of the Spartan fleet. Blockades, at the operational level, work best when implemented by powers with strong navies against powers with weak ones and how a successful blockade can still lead to a nation's defeat.

However, beyond Sphacteria, blockade and the threat of blockade figure prominently in Thucydides' *The History of the Peloponnesian War*, including the eventual decisive defeat of Athens after the Battle of Aegospotami (405 BCE) when the loss of their fleet and control of the sea resulted in the threat of cut off grain imports. However, this history also reveals uncomfortable truths about the conduct of blockades. Blockades take time to have effects; are not completely effective; generate costs for the imposer, as well as the victim; lead to escalatory activities to accelerate achievement of desired objectives; and have unforeseen, long-term consequences. In Athens' case, the slow progress and cost of maintaining the blockade caused strategic concerns about raising the blockade for winter, thus leading to a direct, amphibious assault. After winning the assault, the taking of Spartan prisoners gave Athens false hopes about the possibility to eventually defeat Sparta and false confidence in their naval mastery and economic dominance.[2]

Following the first recorded blockade, naval blockades evolved, applying economic pressure to support land wars and diplomatic coercion efforts. Alfred Thayer Mahan was one of the first theorists to link the nation's economic health to its ability to protect maritime commerce. Thayer proclaimed no matter how "great the wealth product of the land, nothing facilitates the nec-

[1] J. Rickard, "Battle of Sphacteria (425 BC)," HistoryofWar.org, 15 June 2011.
[2] Robert B. Strassler, *The Landmark Thucydides: A Comprehensive Guide to the Peloponnesian War* (New York: Touchstone Publishing, 1996), 237–44.

essary exchange as does the sea."[3] This idea originated from the conventional application of naval power in the mid-1800s. Maritime thinkers of the time had a bifurcated view of naval operations: fleet operations and attacks on commerce. The evolution of *guerre de course* occurred as an operational and strategic concept in parallel with the development of fleet operations. While many admirals and maritime thinkers downplayed the commerce raiding and privateering of *guerre de course*, another noted maritime theorist, Julian S. Corbett, emphasized how naval power was the ability to ensure a nation's commercial activities through sea control.

Both Mahan and Corbett considered the influence of naval power from ancient times through Renaissance eras, especially in the naval history of the Mediterranean Sea. However, they both emphasized global fleet operations, blockades, and naval power in the modern era with the Seven Years' War. The Seven Years' War, a conflict between France and Great Britain, began in 1754 as a dispute over North American land claims around what is now Pittsburgh, Pennsylvania. The conflict eventually spread into other parts of the world, including Europe, Africa, and Asia. As the war expanded, the British blockaded all the important harbors along the Dutch, French and Spanish coasts, and as a result, the trade of those countries was substantially reduced. In addition to conducting close blockades of important harbors, the British Royal Navy also searched neutral vessels for contraband, otherwise known as commerce raiding.[4] This cohesive naval strategy was integral to British Prime Minister William Pitt's overall national strategy which included:

- A blockade of the enemy's fleet and attempts to destroy it when it attempted to evade.
- Holding enemy troops away from their allies by conducting raids on the enemy's coastline.
- Providing support to the army that was to be used in seizing enemy colonies and maritime trade.[5]

[3] Barry M. Gough, "Maritime Strategy: The Legacies of Mahan and Corbett as Philosophers of Sea Power," *RUSI Journal* 133, no. 4 (1988): 56–57, https://doi.org/10.1080/03071848808445330.
[4] David Syrett, *Shipping and Military Power in the Seven Year War, 1756–1763: The Sails of Victory* (Liverpool, UK: Liverpool University Press, 2008).
[5] "William Pitt Family Papers, 1757–1804, DAR.1925.08," Darlington Collection, Archives & Special Collections, University of Pittsburgh Library System.

This strategy proved successful because Pitt knew Britain's small army would not be effective on land. He also knew Britain's strong navy could bottle up the French ports by blockade, which would keep the enemy fleet divided between ports in the Mediterranean and the Atlantic. Pitt reasoned he could then use his remaining naval forces to support operations at any point around the world. The naval blockade would cut off French support to its colonies. After Britain prevailed, it emerged as the world's dominant colonial power, primarily due to its naval seapower.

One of the British Royal Navy's imperatives was to never lose sight of the French fleet.[6] The British relied on frigates to obtain enemy information, and the effectiveness of the blockade depended on their ability to communicate this intelligence to the main body.[7] One of the key aspects that made blockades effective was the ability of the blockading fleet to receive timely intelligence on the movements of enemy ships in the harbor. Only with this intelligence could the main body of the fleet be positioned to effectively engage the enemy fleet as it attempted to leave port. Alfred T. Mahan noted the importance of these frigates: "The scouting force of the fleet—its eyes, its cavalry—must be so multiplied, organized, and drilled that it can at one and the same time keep track of an enemy and go back and forth to its own main body. This being effectively done; the superiority of the latter comes into play."[8]

During the period between 1713 and 1756, many nations agreed, through treaties, that neutral shipping could transport noncontraband goods to belligerent ports not under an effective blockade.[9] Additionally, through the Paris Declaration of 1856, most nations agreed a blockade had to consist of a patrol by an armed naval force and be enforced, rather just declared to be considered a lawful action could be recognized by the international community.

These treaties enabled the British to make the legal leap to conduct search and seizure of goods from neutral countries. During the Seven Years' War, the British enacted the Rule of 1756 to expand the impact of blockades by autho-

[6] Anderson Bern, *By Sea and by River: The Naval History of the Civil War* (New York: Da Capo Press, an imprint of Hachette, 1989).
[7] Capt A. T. Mahan, USN, "Blockade in Relation to Naval Strategy," U.S. Naval Institute *Proceedings* 21, no. 4 (October 1895).
[8] LCdr David T. Cunningham, "The Naval Blockade: A Study of Factors Necessary for Effective Utilization" (thesis, U.S. Army Command and General Staff College, 1975).
[9] Mahan, "Blockade in Relation to Naval Strategy."

rizing naval vessels to stop and search neutral vessels trading with its rivals.[10] The effect of this act was to further expand the legal rights of nations to not just blockade ports of rival nations, but to prevent neutral nations from providing succor to its rivals.

The role and importance of protecting commerce and permitting naval interdiction helped shape the development of commonly recognized international law. In fact, large amounts of relevant concepts in international law are made to govern the "legitimate" use of force during wartime and are thus promulgated during conflicts. An important consideration regarding a turn toward economic warfare during a future conflict is the need to familiarize military professionals and decision-makers with the finer intricacies of this rich body of law.[11] Following or violating international law will affect legitimacy, making it easier or harder to attract and keep allies and partners.

Mahan ended his analysis on seapower at the midpoint of the Napoleonic wars with the Battle of Trafalgar in 1805, noting the rest of the war involved commercial aspects considered secondary fleet operations. Of note, economic warfare was essential to the eventual defeat of Napoléon in 1815, nearly 10 years after the endpoint of Mahan's analysis. This interesting but unfortunate choice has led to decades of professional debate about whether a navy's primary purpose is to protect shipping or defeat other fleets in battle.

During the mid-nineteenth century U.S. Civil War, the Union Navy was vastly superior to the Confederate Navy. The lack of a strong Confederate Navy permitted the Union Navy to scatter ships all along the southern coasts, singly or in small detachments, to create a long blockade across the Atlantic coast. This strength was applied toward two key Confederate disadvantages: their reliance on overseas trade in cotton and an agrarian economy lacking manufacturing capacity at scale—the tools and implements necessary to wage war. The blockade was porous, but when combined with the seizure of key harbors and ports, was effective enough to erode Confederate military strength, enabling

[10] Wolff Heintschel von Heinneg, "Naval Blockade," *International Law Studies* 75 (2000).
[11] Some examples of this include exclusion zones and unrestricted submarine warfare, both addressed by international law and routinely used by great powers during war, including the United States.

the war-winning Northern invasions of the South.[12] The ability of the Union to employ a blockade across a vast southern coastline is an example of the application of overwhelming seapower to conduct a blockade.

Blockades can incentivize adaptation and innovation in war. The 1860s was an era of invention and rapid advancements in engineering and weaponry leading to many changes in how wars were fought, including the development and fielding of ironclad warships.[13] The South used ironclads to ward off the blockading Union fleet, but could not build enough ships to break the blockade. Steam-powered and armor-protected ironclads heralded a new era of naval warfare.[14]

Beyond shipbuilding, the history of eighteenth and nineteenth-century blockades illustrate the first law of blockade: "the possession of strategic bases, by the blockading nation, near the blockade was important to the successful outcome of the blockade."[15] During the Seven Years' War, the British blockade of the French was successful due to its extensive basing options. This gave the blockading force access to resupply. Disadvantages in terrain were overcome by employing ground forces from the sea to capture enemy ports and control inland waterways from the land. During the Civil War, the Union conducted multiple port seizures to tighten the noose of the blockade.

The analysis of terrain must also include understanding a nation's economy, especially its industrial base. If, like the Confederacy, the industrial base is not postured to provide warmaking potential and the generation of combat power, a successful strategic outcome will be in question. A nation's economy is vulnerable to if reliant on maritime import of critical resources or the ability to export its produce.

Industrialization and technological advancement changed the character of blockades starting in the late nineteenth century and culminating at the end of WWII. Industrialization and mechanization required three critical resources: oil, coal, and steel. All nations were quick to grasp the implications

[12] This is a good illustration of J. C. Wylie's cumulative and sequential strategies and how they can work together to achieve a result. J. C. Wylie, *Military Strategy: A General Theory of Power Control* (Annapolis, MD: Naval Institute Press, 1989).
[13] Syrett, *Shipping and Military Power in the Seven Year War, 1756–1763.*
[14] This was not an innovation solely adopted by the South, the North also built ironclad vessels.
[15] Anand Tropani, *Oil & the Great Powers: Britain & Germany, 1914–1945* (Oxford, UK: Oxford University Press, 2019), 2.

of these dependencies but slow to do anything about it. Technology changed how blockades were implemented. Sea mines, submarines, surface, and subsurface torpedoes, and most importantly, aircraft all matured during this period. The introduction of aircraft made the close blockade virtually impossible to implement, changing the blockade into a long-range operation relying increasingly on submarines. These technological changes coupled with the dependencies brought about by industrialization drove blockading powers to focus on oil. After WWI, and especially during WWII, oil became the key commodity targeted by blockade.

The Allies employed blockade against both the Germans and Japanese during WWII. According to John Mearsheimer, the only effective modern blockade was the one conducted by the United States against Japan during WWII.[16] Prewar British planning showed and appreciation for their ability to employ blockade against Germany, a power vulnerable to blockade, as it depended almost entirely on imported oil to fuel its military and economy. At the start of the war, Britain implemented her blockade in the North and Baltic Seas according to the prewar plan. Germany's invasion of Poland preempted the effects of the blockade as they had access to Polish resources including oil fields in Galicia. This also gave the Germans ground lines of communication into the Soviet Union, further mitigating the effects of the British blockade.

Before the war, awareness of the vulnerability created by Germany's dependence on imported oil led to the development of a method to convert carbon monoxide and hydrogen found in coal, into liquid hydrocarbons.[17] This expedient mitigated Germany's dependence on foreign oil and reduced the effectiveness of an oil blockade. The effects of the blockade and Germany's constant need for more oil drove operational planning. The relentless quest to capture additional oil resources is what eventually contributed to its demise.[18] What this shows is how adversaries can mitigate their vulnerabilities and how blockades have follow-on effects and counters.

[16] Robert Goralski and Russell W. Freeburg, *Oil and War: How the Deadly Struggle for Fuel in World War II Meant Victory or Defeat* (New York: Morrow, 1987), 3. This work has since been reprinted and is available at Marine Corps University Press.
[17] Known as the Fisher-Tropsch process, this allowed the mass production of synthetic gasoline by the early 1930s. Maj Shawn P. Keller, USAF, "Turning Point: A History of German Petroleum in WWII and Its Lessons for the Role of Oil in Modern Air Warfare" (thesis, Air Command and Staff College, Air University, 2011).
[18] Keller, "Turning Point."

Germany also waged an offensive blockade in WWII. From the very start of the war, German U-boats operating in the Atlantic immediately began commerce raiding and minelaying. This German tactic eventually became known as "zone blockade." It was initially successful in disrupting cargo traversing the Atlantic for several reasons including Allied incompetence, unpreparedness, and an at times inexcusable refusal to take even the most basic preventative measures. The Germans sank approximately 14.5 million gross tons of cargo along with 175 Allied warships.[19] The Battle for the Atlantic lasted almost the entire war but by mid-1943, the Allies developed successful tactics and employed new technologies *en masse*, breaking the German blockade and winning the Battle of the Atlantic. These combined operations enabled the continued movement of shipping across the Atlantic, preventing the isolation of Britain.[20]

While not a blockade, the U.S. scrap iron and oil embargo of the Japanese right before WWII drove the Japanese to adopt a policy of offensive war, attacking Pearl Harbor and seizing the Dutch East Indies. Pearl Harbor was meant to prevent the United States from intervening, as the Dutch East Indies were resource rich, providing the Japanese with oil and rubber. The United States almost immediately blockaded Japan, a campaign waged largely by the American submarine fleet. During a period of several years, U.S. submarines destroyed the Japanese merchant fleet. This has been identified as one of Japan's most important strategic mistakes in WWII.[21] The United States made specific efforts to destroy oil tankers. Later in the war, aircraft were used for this purpose. Submarines laid mines in the inland sea and starting in April 1945, the U.S. Army Air Corps began using Boeing B-29 Superfortresses to mine Japanese ports and harbors destroying not only merchant vessels but the fishing fleet as well, compounding the misery created by strategic bombing of cities. The mining and commerce raiding coupled with U.S. advances across the central and southern Pacific Oceans completely severed Japan's access to resources while destroying the ability to produce nearly anything on the home islands. This led to a near complete collapse of Japanese offensive war capabil-

[19] Tropani, *Oil & the Great Powers Britain & Germany*, 137–38.
[20] C. H. Spillman, "The German Submarine War," U.S. Naval Institute *Proceedings* 73, no. 6 (June 1947).
[21] James B. Wood, *Japanese Military Strategy in the Pacific War: Was Defeat Inevitable?* (New York: Rowman & Littlefield, 2007).

ities and greatly hampered their ability to wage defensive war as the Allies advanced closer to the home islands.

Blockades can be strategically effective when the right conditions exist and will fail when these conditions do not exist. They work best when implemented by strong powers who control the air and sea against diplomatically isolated weak powers who are susceptible to blockade. The U.S. blockade of Japan illustrates this well, the blockade worked. A blockade imposed by a weaker state against another strong state with contested air and sea domains would be more challenging, especially if the state had considerable internal resources or access to a land empire or strong allies. In most every case identified, the blockaded nation was able to adapt their industries to their reality and worked hard to operationally counter the blockade. Blockades also tend to force escalatory behavior, as illustrated by U.S. and Japanese experience during the Pacific War. Blockades and their primarily economic effect work slowly and best when employed in coordination with a military campaign whose goal is a political end.[22]

A common misperception encountered in CMC ONA literature review was the view of WWII as the last blockade-relevant conflict. This elides the broader concept of economic warfare and the implications of disrupted trade which have more modern occurrences, such as the Suez Canal closures during a series of conflicts between Israel and Egypt and actions in the Strait of Hormuz and Bab el-Mandeb.

During what is now known as the Arab-Israeli wars, Suez Canal closures significantly disrupted global trade and, in fact, remained closed from 1967 to 1975. The Suez Canal is an important waterway connecting Europe and Asia and facilitates about 12 percent of all global trade. The canal was constructed in the mid-1800s to facilitate a direct trade route between the North Atlantic and the northern Indian Oceans. The importance of this trade route was the impetus for Britain's occupation of Egypt in 1882 and Britain's continued military presence in the region.

The first relevant closure occurred in 1956, during the Suez Crisis. At the onset of the Suez Crisis, the canal was owned by the Egyptian government, but European shareholders (mostly British and French) operated the canal through

[22] Classic J. C. Wylie.

a concessionary company. Approximately 66 percent of all oil Europe consumed came through the canal. On 26 July 1956, Egyptian president Gamal Abdel Nasser announced the nationalization of the Suez Canal. This came amid a deteriorating Egyptian relationship with Israel, the United Kingdom, France, and the United States.[23] Nasser's decision brought extreme tension, as Britain, France, and Israel feared they would lose access to the waterway.

Following Nasser's declaration, the United States worked to establish a coalition to facilitate the international operation of the canal. Initial discussions failed, and Britain and France remained skeptical any advisory association would be able to provide the necessary form of international control.[24] While the U.S.-led discussions were still taking place, Britain and France, recognizing the impact to their economic interests, collaborated in secret with Israel to retake control of the canal by force. These actions sparked a military crisis and the closure of the canal from October 1956 to March 1957, mostly the result of ships sunk by the Egyptians during the early fighting.

The Suez Crisis had several impacts. From an economic perspective, the impact to Britain was the greatest. Having little time to establish protections, Britain struggled to maintain its oil supply. By December 1956, UK petrol had to be rationed, and several factories were temporarily closed. Trade disruptions were minor, but the crisis did spark speculation and a devaluation of the pound. Unable to receive assistance from the International Monetary Fund, Britain's ability to serve as a reserve currency was challenged. Politically, the United States was positioned to take on a much more powerful role in global affairs after Suez. Britain (and France)—once the seat of vast colonial empires—found their influence weakened as the United States and the Soviet Union took on more active roles.[25]

On 6 June 1967, Egypt again closed the Suez Canal, this time following the Six-Day War or the third Arab-Israeli war. Tensions between Israel and Egypt had remained high since 1956. In March 1967, Egypt expelled the United Nations Emergency Force, originally deployed to reinforce the armistice fol-

[23] Robert O. Matthews, "The Suez Canal Dispute: A Case Study in Peaceful Settlement," *International Organization* 21, no. 1 (Winter 1967): 79–101, https://doi.org/10.1017/S002081830001314X.
[24] Matthews, "The Suez Canal Dispute."
[25] Charles William, *Harold Macmillan* (London: Phoenix, an imprint of Orion Books, 2010), 264.

lowing the earlier Suez Crisis. Israel launched surprise attacks in June, and as a result, Egypt closed the canal. This time, the canal remained closed until 1975.

In response to the closure, European and Asian trade flows adjusted, taking a longer path around West Africa and the Cape of Good Hope. From London to Mumbai, the difference in distance is significant. The Suez route is approximately 6,200 nautical miles, while the route around the Cape of Good Hope is approximately 10,800 nautical miles. Later research would show for country pairs increased trade distance by more than 50 percent due to the Suez closure, there was an average fall in trade of more than 20 percent. Put another way, the impacts of the Suez Canal closure could be compared to restrictive policies such as tariffs.[26] However, the effects on trade were not equal among all countries.

For Britain, the costs of rerouting tankers and logistics problems associated with the closure were relatively small.[27] This time, the UK was able to implement oil rationing plans and introduce surcharges to support increased freight costs. This preparation, combined with the move from smaller tankers to "super tankers" supported an increased transit load, greatly reduced the impact of potential canal closures. Britain did face a potential oil embargo from Arab States during this time due to the perception of their support to Israel. The impact of this would have been much greater and fear of embargo drove Britain's Middle East policy to one of nonintervention.[28]

This case study highlights several lessons. First, maritime trade disruptions (like those created by economic warfare) can have significant impacts on how countries trade with one another and which partners countries trade with. While this can affect a country's GDP, measuring how individual countries will be affected is difficult. Impacts are variable, and states are sometimes able to adopt successful coping measures to minimize these impacts. Second, countries respond when faced with policies or events threatening their trade and GDP. Economic warfare actions, if successful, will be interpreted as a nation-

[26] James Feyrer, "Distance, Trade, and Income–The 1967 to 1975 Closing of the Suez Canal as a Natural Experiment," *Journal of Development Economics* 153 (November 2021), https://doi.org/10.1016/j.jdeveco.2021.102708.
[27] Gernot Klantschnig, "Oil, the Suez Canal, and Sterling Reserves: Economic Factors Determining British Decision-making during the 1967 Arab-Israeli Crisis," *Diplomacy & Statecraft* 14, no. 3 (September 2003): 131–50, https://doi.org/10.1080/09592290312331295606.
[28] Klantschnig, "Oil, the Suez Canal, and Sterling Reserves."

al security threat. Responses may not always be rational or take into consideration how the international community might react (e.g., Britain and France's actions in 1956). Finally, even actions that appear carefully targeted can have unanticipated impacts and unintended consequences. This was evident in how the international community turned against France and Britain during 1956, and how their actions contributed to a reshaping of the world order.

Before leaving this case study of the Suez Canal to turn to the Strait of Hormuz and Bab el-Mandeb, there were major Suez closures during peacetime as well. The insights derived here highlight national vulnerabilities with limited or no opportunity to establish safeguard mechanisms. On 23 March 2021, the *EverGiven*, a container ship traveling from Malaysia to the Netherlands ran aground in the Suez Canal, blocking all traffic through the canal for six days. Though the blockage was shorter than previous blockages, the impacts were significant.

After the canal's reopening in 1975, following the Arab-Israeli wars, no major canal disruptions occurred until 2004. In 2004, the *Tropical Brilliance*, a Russian oil tanker, was lodged in the waterway and blocked traffic for three days.[29] In 2006, the *Okal King Dor*, a 93,000-ton cargo ship, was lodged in the canal for eight hours. In 2017, the *OOCL Japan* was stuck, this time only blocking the canal for a few hours before being dislodged. The *EverGiven* would be the fourth blockage since 1975.

The effects of the *EverGiven* stoppage were exacerbated by shipping shortages following the onset of the COVID-19 pandemic and changes in global manufacturing trends. Much of the world's nonpetroleum trade is in intermediate goods. This means components made all over the world are moved from one location to another location for final assembly. This, when combined with just-in-time manufacturing and attempts to efficiently match production to demand made the 2021 blockage very expensive.[30] The hyper-efficient global shipping processes is vulnerable to outside disruption. The six-day blockage of the Suez Canal resulted in massive shipping delays and losses in revenue by producers and shipping companies.

[29] Yelena Dzhanova, "The Suez Canal Has a Contentious History and Has been Blocked and Closed Several Times Since Its Opening," *Business Insider*, 28 March 2021.
[30] Ken Roberts, "U.S. Impact from Suez Blockage Will Be Minimal, Largely on East Coast," *Forbes*, 28 March 2021.

The *EverGiven* blockage shows how the impacts of maritime trade disruptions vary significantly among countries. Even though the global impacts of the *EverGiven* blockage were significant, the United States (the largest economy in the world) was mostly unaffected.[31] Interestingly, the biggest impacts were in industries with existing shortages, or those already at risk of collapsing, raising questions about the resiliency of healthy trade sectors. Without drawing too-strong conclusions (the blockage was very short), one can see how shifts in the international order can easily occur following a major incident. Many shipping companies immediately began examining alternative means of transportation and routes. While the best option is the route around Africa and the Cape of Good Hope, Russia began to promote its Arctic route as a better alternative. This did not catch on in time, but had the blockage lasted longer, it would have been interesting to examine the outcome.[32]

The final case studies examine the effects of economic warfare during low-level conflicts. The lessons from this study have greater tactical utility but must be carefully considered.

The Tanker War in the Strait of Hormuz was a drawn-out series of skirmishes between Iran and Iraq targeting merchant vessels in the Persian Gulf and Strait of Hormuz. These skirmishes occurred during the Iran-Iraq War (1980–88) and started when Iraq began attacking Iranian oil tankers to horizontally escalate the conflict. Iran, unable to respond in kind (Iraq moved its oil via pipelines), began attacking the shipping of Iraq's supporters, primarily Kuwait. The United States then entered the conflict.

When the United States entered the conflict, the objective was to prevent attacks on neutral vessels and stop Iranian minelaying and small boat attacks. To achieve this, U.S. Navy surface ships escorted commercial vessels through the Strait of Hormuz and onward to Kuwait. These escort operations generally involved two or three U.S. warships with additional vessels stationed at either end of the Strait of Hormuz. These escort operations were supported by Saudi-based Boeing E3 Sentry airborne warning and control system (AWACS) and a nearby carrier battlegroup. As U.S. operations went on, the

[31] Less than one-half of all U.S. imports arrive by ship. Much of what does arrive by ship, comes via the Pacific Ocean.

[32] Nastassia Astrasheuskaya, "Russia Seizes on Suez Blockage to Promote Merits of Arctic Route," *Financial Times*, 30 March 2021.

United States became more aggressive, eventually shadowing Iranian ships to dissuade them from attacking commercial shipping. During two operations, the United States targeted Iranian oil platforms and naval assets used to attack commercial shipping.

The Tanker War has provided some insight into SLOC control operations. First, the PRC possesses A2/AD capabilities that did not exist at the time. Second, the Tanker War was a part of a regional war between weak (when compared to the United States and the PRC) nations. Because the United States was not at war, it could devote significant effort to its intervention. Nevertheless, several lessons from the Tanker War can be drawn. Consistent and significant coordination across all elements of the Joint Force is necessary to conduct any effective sea control operation. Regional partners can decline to provide basing and access during operations. Without access, it is unclear how the United States could have intervened effectively.[33] During the Tanker War, the United States had to employ oil construction platforms after Kuwait and Saudi Arabia refused to provide U.S. Central Command access to land bases necessary to stage offensive operations.

These operations were not without risk. In May 1987, an Iraqi aircraft attacked and nearly sunk the guided-missile frigate USS *Stark* (FFG 31). Because the attack was believed to be an accident, and the United States supported Iraq over Iran, the United States took no action.

In the Bab el-Mandeb and Horn of Africa, the issue of Somali piracy highlighted in the seizure of the Maersk *Alabama* led to an international coalition of warships cooperating to facilitate commercial traffic through the region. The level of violence Somali pirates were able to deliver caused shipping companies to ramp up the defenses on commercial vessels headed through the region, particularly non-lethal countermeasures to discourage boarding attempts. There are multiple relevant issues for VBSS consideration as tactical techniques and procedures are improved.

As of publication of this work, Houthi rebels in Yemen are launching multiple types of drone attacks and antiship cruise missile attacks against com-

[33] Based on Center for Naval Analyses' Research Memorandum Prepared for the CMC's Office of Net Assessment. Extracted material is unclassified and taken from Stephen Andrew Kelly, "Better Lucky than Good: Operation Earnest Will as Gunboat Diplomacy" (thesis, Naval Postgraduate School, 2007), 8.

mercial shipping. These efforts are being actively countered by U.S. and other partner country warships, including conducting strikes into the littoral region to disrupt Houthi abilities. The persistence of Houthi abilities to disrupt commerce has been so effective, there are online memes suggesting the presumed future effectiveness of U.S. Marine Corps stand-in forces in the Western Pacific was actually stolen from the Houthis.

Annotated Bibliography

Collins, Gabriel. "A Maritime Oil Blockade against China–Tactically Tempting but Strategically Flawed." *Naval War College Review* 71, no. 2 (Spring 2018): 49–78.

In this 2018 article, Collins follows up his 2008 "No Oil for the Lamps of China?" with potential Chinese strategies to counter a U.S. oil blockade and highlights the strategic risks and adverse consequences the United States may face if electing to conduct a distant oil blockade. Collins begins with tools the United States could use to enact a blockade such as a modern-day "navicert" as well as military actions like sinking blockade runners. He also highlights locations where a U.S. blockade might be most effective. He then transitions to ways the PRC could counter blockades. Primarily, the PRC could use national oil rationing, use internally produced methane to "extend" its on-hand supply of petroleum products, and overland pipelines to slow the depletion of its strategic and commercial reserves. Collins provides import statistics and daily requirements to estimate China's blockade responses could extend its reserves anywhere from 7 months with little effort to up to 8 years with a more concerted effort if required to counter an extended blockade. Ultimately, he concludes China's responses

would likely outlast the United States' domestic and global political backing to continue a blockade long enough to produce its intended effects.

Collins, Gabriel B., and Andrew S. Erickson. "Chinese Efforts to Create a National Tanker Fleet." In Gabriel B. Collins, Andrew S. Erickson, William S. Murray, and Lyle J. Goldstein. *China's Energy Strategy: The Impact on Beijing's Maritime Policies*, Study no. 2 (Annapolis, MD: China Maritime Studies Institute, U.S. Naval War College, Naval Institute Press, 2008), 81–114.

In this chapter, Collins and Erickson argue that China's aggressive expansion of their oil tanker fleet demonstrates a recognition China will continue to rely on maritime transport for its increasing oil imports and a growing concern for energy security. The authors argue China is hedging, creating a large tanker fleet capable of supporting Chinese efforts while at the same time relying on commercial market conditions. China's actions to expand and ensure their access to energy could provide insights to where the PLA Navy is heading.

Collins, Gabriel B., Andrew S. Erickson, and Lyle J. Goldstein, "Chinese Naval Analysts Consider the Energy Question." In *China's Energy Strategy*, 326.

In their chapter "Chinese Naval Analysts Consider the Energy Question," Collins, Erickson, and Goldstein examine Chinese writings on energy security and argue the literature suggests a perception of naval threat to China's long energy supply line, primarily by the United States but also by India. They argue this pervasive fear drives a lot of Chinese military capability development. In fact, they argue some scholars have looked at China's sea-denial capabilities as a tool for counterintervention in a Taiwan contingency, but PLA literature highlights these growing capabilities as a means to provide energy security.

Collins, Gabriel B., and William S. Murray. "No Oil for the Lamps of China?" *Naval War College Review* 61, no. 2 (Spring 2008): 79–95.

Collins and Murray outline the myriad operational and tactical challenges to the United States enacting a blockade against China. They analyze the feasibility and projected efficacy of a distant blockade, a supply-side blockade, a close blockade, blockade by convoy, and more direct energy-denial attacks via kinetic means. The authors conclude an energy blockade against China would be ineffective and economically and politically destabilizing.

This analysis provides a valuable tactical assessment but should be read in the context of 2008, when it was published. While it is very possible the authors' conclusions might remain the same today, the mechanics of intervention have additional considerations in 2024. This is especially true given China's military modernization in 2016 and the United States' own developments in ship capacity.

Cunningham, Fiona. "The Maritime Rung on the Escalation Ladder: Naval Blockades in a U.S.-China Conflict." *Security Studies* 29, no. 4 (2020): 730–68. https://doi.org/10.1080/09636412.2020.1811462.

The author considers U.S. naval blockade to coerce China in a future conflict scenario. Cunningham suggests this is an attractive option for U.S. policymakers because it is less likely to provoke nuclear escalation, but the literature does not evaluate this possibility in detail. Importantly, it does not consider China's possible responses to such a scenario. The author's analysis supports the feasibility of an interception-style blockade, but the effort would require exceptional resourcing by the United States. Cunningham approaches this from her perspective as a political science professor at George Washington University and draws on the work of her frequent coauthor M. Taylor Fravel from MIT.

Davis, Lance E., and Stanley L. Engerman. *Naval Blockades in Peace and War: An Economic History since 1750*. Cambridge, UK: Cambridge University Press, 2006. https://doi.org/10.1017/CBO9780511511974.

Davis and Engerman argue that blockades have been used throughout history to either reduce the military power of an adversary during wartime or as a substitute for war altogether. Their success has historically been low, with a greater chance of success when a blockading power attempts to implement a blockade against a much weaker adversary. The nature of blockades has changed throughout history as technologies of warfare have evolved. Early on, close blockades gave way to more distant blockades. We should expect changes to the nature of blockades with the changing character of war. However, we should not expect blockades to be more successful.

Elleman, Bruce A., and S. C. M. Paine. "Conclusions: Naval Blockades and the Future of Seapower." In *Naval Blockades and Seapower: Strategies and Counter-Strategies, 1805–2005*. Edited by Bruce A. Elleman and S. C. M. Paine. London: Routledge, 2006, 252–54, 262–66.

In their book *Naval Blockades and Seapower: Strategies and Counter-Strategies, 1805–2005*, Elleman and Paine assemble a series of 18 case studies exploring historical uses of blockades as part of a naval strategy and their effectiveness. In their concluding chapter, the editors argue naval blockades have varied in their implementation and effectiveness throughout history. However, a blockades' effectiveness appears to be largely a function of the size of the blockaded area, the availability of alternative land lines of communication, the ease at which sea lines of communication can be cut, and the interest of other powers intervening. Blockades tend to be more effective in smaller theaters, and those taking place in large theaters typically afford the blockaded country time to create alternative routes. Blockades work best when the blockaded country relies primarily on sea lines of communication and has limited access to land lines. Blockades work best when implemented by strong naval powers against land powers with weak navies. Finally, blockade strategies can be upended if neighboring countries decide to intervene. The authors conclude by arguing the complexity of the international trading system will probably cause naval blockades by individual countries to decline, while coalitions of the willing or United Nations-sponsored interdiction programs will probably increase.

———. *Commerce Raiding: Historical Case Studies, 1755–2009*, Naval War College Newport Papers no. 40. Newport, RI: Naval War College Press, 2013.

In their book, Elleman and Paine assemble a series of 16 case studies exploring historical uses of commerce raiding as part of a naval strategy and its effectiveness. By using case studies, the authors ultimately argue commerce raiding can be an effective strategy. It is a relatively inexpensive way to impose costs on an adversary, and it is generally cheaper to implement than to eradicate. However, the strategy is one typically employed by weaker powers. Theoretically stronger powers can implement the more effective strategy of blockade. In the future, the authors argue commerce raiding by developed countries will probably decline since these nations have significant stakes in the global economy while commerce raiding by pariah states will likely increase.

Hammes, T. X. "Offshore Control: A Proposed Strategy for an Unlikely Conflict." *INSS Strategic Forum* 278 (June 2012): 1–16.

Hammes addresses growing strategic competition between the United States and China by proposing a strategy of offshore control, which is described as "ensure[ing] that the United States can interdict China's energy and raw material imports and industrial exports, while protecting our partners." This concept is presented as a reasonable strategy for the Department of Defense to consider because it is transparent (i.e. takes place in the open and not through vulnerable domains such as space and cyber) and thus less likely to provoke an escalatory response from China than other strategies, such as the air-sea battle (which was revealed by the DOD just prior to this article's release). The author argues a strategy of offshore control reduces the need for states to react too quickly to crises and prevents China from feeling as if it is backed into a corner and must respond with force.

Hughes, Llewelyn, and Austin Long. "Is There an Oil Weapon?: Security Implications of Changes in the Structure of the International Oil Market." *International Security* 39, no. 3 (Winter 2014/15): 178–80.

Hughes and Long examine if an actor, or group of actors, can use oil as a coercive tool to impose significant costs on other states by reducing the supply of oil. They examine the potential across each segment (production, transportation, refining, and distribution) of the oil market by determining if control of any segment is substantially concentrated. The authors determine the potential for coercion varies significantly across each stage of the market. The production, refinement, and distribution segments are all less concentrated and therefore less susceptible to manipulation. However, the United States can influence the transportation segment through seapower and sea control. Hughes and Long then provide a few, broad ways the United States could successfully employ an oil blockade against China and how the United States' naval and airpower provides advantages previous blockaders did not possess. This article highlights, if called on to influence an oil market, the United States should leverage its naval power to affect the maritime shipping segment.

Lind, Jennifer, and Daryl G. Press. "Markets or Mercantilism?: How China Secures Its Energy Supplies." *International Security* 42, no. 4 (Spring 2018): 202–3.

Lind and Press discuss why China's recent move into securing rights to overseas oil markets, while controversial, is viable to securing access to en-

ergy resources. They provide three key arguments. The suppliers of oil are all susceptible to coercion or external risks. By owning a portion of the foreign companies, China can mitigate some of the risks of foreign production and the need to import oil. They then highlight similarities between China's current strategy to secure energy resources to those of large corporations and firms when reducing marketplace risks, indicating China is currently using good strategies. Finally, they highlight how China's mercantilist policies insulate them from potential coercive measures the United States may attempt to leverage against them. Finally, the article concludes the strategies China is using to further secure energy resources is similar to what the United States has already done and should not be seen as overly escalatory. Still, China's efforts have mitigated much of the United States' ability to use oil as a weapon leaving the United States with few good options.

Mirski, Sean. "Stranglehold: The Context, Conduct and Consequences of an American Naval Blockade of China." *Journal of Strategic Studies* 36, no. 3 (June 2013): 385–421.

Mirski assesses the viability of a U.S. blockade strategy in a conflict with China. He identifies specific conditions that must be met for a blockade to be effective, including the United States having the support of key regional partners (Russia, India, and Japan) and a mixed strategy incorporating the use of both close and distance blockades. Mirski highlights the risk of regional instability possibly resulting from a U.S. blockade and identifies China's most likely countermeasures would involve economic warfare and a defensive convoy system. He also makes the point "even if a blockade is never executed, its viability would still impact American and Chinese policies for deterrence reasons." Mirski concludes a blockade is operationally and strategically possible, but only under certain conditions and with significant political implications. The author is an appellate lawyer with expertise in international affairs and the law of armed conflict.

Montgomery, Evan Braden. "Reconsidering a Naval Blockade of China: A Response to Mirski." *Journal of Strategic Studies* 36, no. 4 (August 2013): 615–23.

This article responds to Mirski's 2013 paper, also included in this review. Montgomery lauds Mirski for elements of his contribution but identifies areas where he believes Mirski's analysis is insufficient. The author ob-

serves Mirski's grouping of close and distant blockade strategies does not allow one to assess the different effects each type of blockade can have. Montgomery assesses there are certain circumstances of blockade implementation which can cause escalation rather than avoid it. The author also contextualizes the blockade discussion within adjacent considerations of counterforce or countervalue operations, suggests other means of economic coercion might be more effective, and emphasizes the military balance of power will be important to the outcome of any blockade strategy. Montgomery is a senior fellow and the director of research and studies at the Center for Strategic and Budgetary Assessments.

Sand, Erik. "Desperate Measures: The Effects of Economic Isolation on Warring Powers." *Texas National Security Review* 3, no. 2 (Spring 2020): 37. Sand's main argument is economic isolation, such as induced by blockade, results in target states being more likely to pursue risky strategies. Sand explores the German situation in World War I, where a previously well-integrated economic power became isolated because of British blockade. The resulting domestic circumstances prompted German decision-makers to pursue a "shoot the moon" strategy of unrestricted submarine warfare, which was highly risky and required total victory to have its intended strategic effects. This resulted in Germany's ultimate defeat when the United States predictably entered the war. Leading up to World War II, Adolf Hitler attempted to reduce Germany's reliance on foreign supplies, including raw materials and food, both of which were only partially effective. While the German Army quickly conquered much of Europe, it still found itself short on raw materials and oil that, in part, led Hitler to invade the Soviet Union to secure oil reserves leading to Hitler's downfall. Ultimately, Sand concludes a state's attempt at self-sufficiency and avoiding foreign trade to avoid supply interruptions during war counter intuitively increases the state's risks when it finds itself cutoff from foreign aid and supplies from economic allies and partners.

Index

PLAN Ƀ

The Department of Defense has begun to look at protracted war and its implications. The U.S. Marine Corps must consider how protraction will affect maritime strategy, amphibious forces, and the use of landpower to control the sea, especially important sea lines of communication (SLOCs) and chokepoints for military and economic purposes. The Marine Corps believes blockade, or countering a blockade, is a likely and viable mission for the Joint Force. This could occur as a result of a People's Republic of China (PRC) blockade of Taiwan or other nations, or as the result of economic sanctions escalating, or because—whether Plan A fails or succeeds—neither party sees settling as a better outcome than continuing to fight a protracted war. The PRC has a major vulnerability in their reliance on imported oil and other aspects of their trade-based economy. This book examines how the Marine Corps can contribute to this Joint Force mission and makes Service-level recommendations to enhance preparing the Corps, the Joint Force, and interagency and international partners for Plan B: economic warfare.

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