# SHAPING A PORCUPINE DEFENSE STRATEGY FOR THE PHILLIPINES

## THE ROLE OF MARITIME AUTONOMOUS SYSTEMS

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# CONTENTS

*Dedicated to my late father who fight in the Pacific theater in World War II and was part of the American force which liberated the Philippines from the Empire of Japan.*

# INTRODUCTION

This report analyzes the Philippines' "porcupine defense strategy," emphasizing its reliance on maritime autonomous systems (MAS) and distributed lethality to deter aggression in the South China Sea.

It highlights the Taiwan-Philippines-Japan strategic triangle and the critical importance of the First Island Chain and Luzon Strait for regional security and global trade.

The report details how U.S.-Philippines military cooperation, including fast boat bases and the deployment of unmanned surface vessels (USVs), is transforming naval operations through a "kill web" paradigm and mesh fleet concept.

Ultimately, the strategy aims to make the Philippines a formidable barrier by distributing defensive assets and leveraging technology, offering a blueprint for smaller nations facing similar geopolitical challenges.

Maritime autonomous systems (MAS) play a pivotal role in transforming naval warfare and enhancing deterrence by shifting away from traditional, capital ship-centric operations towards distributed, networked approaches. This fundamental reimagining of naval strategy allows for greater resilience, flexibility, and cost-effectiveness in contested environments.

## HERE'S HOW MAS CONTRIBUTE TO THIS TRANSFORMATION:

**Shifting Paradigms in Naval Operations**

From Linear Kill Chains to Maritime Kill Webs:

Traditional naval operations relied on a linear "kill chain" (find, fix, target, engage, assess), which is vulnerable to sophisticated anti-access/area-denial capabilities. The "kill web" paradigm, enabled by MAS, shifts to distributed, networked warfare, where sensing, decision-making, and strike capabilities are spread across multiple platforms operating as an integrated network. The loss of a single element in a kill web does not compromise the entire operation.

Mesh Fleets for Distributed Awareness:

The "mesh fleet" concept involves scalable networks of autonomous surface vessels (USVs) that operate both independently and collaboratively. Companies like MARTAC have pioneered this with systems like the MANTAS T-12 and Devil Ray platforms. This approach shifts from "large blue water boats providing concentrated awareness to distributed awareness" through swarms of unmanned vessels.

Distributed Maritime Effects (DME):

The transformation involves moving away from concentrating power in capital ships to distributing capabilities across a network of assets. DME are the effects created by this distributed force, often supplementing or operating independently of traditional capital ship operations. MAS, coupled with manned air assets, can generate "combat clusters" to deliver DME.

Re-thinking Maritime Strategy:

The report argues for a rethinking of maritime strategy that embraces autonomous technologies, distributed forces, and innovative acquisition models.

**Enhancing Deterrence through "Porcupine Defense"**

"Small, Cheap, and Independent" Capabilities:

The Philippines has adopted a "porcupine defense strategy," which fundamentally disrupts traditional attack calculations

through innovative use of MAS. This strategy focuses on acquiring "small, cheap, and independent" means to execute enhanced defense.

Multiple Axis Points for Disruption:

The Philippines is in the process of shaping an approach built on deploying networks of USVs, UAVs, and land-based missile systems to create a new defense geometry with multiple axis points from which to launch disruptive capabilities. This approach makes it increasingly difficult for an adversary to execute a well-planned, timely defeat strategy.

Altering Cost-Benefit Calculations:

The porcupine defense alters the cost-benefit calculation for aggressors. Each autonomous platform is relatively inexpensive but can pose significant threats to much more valuable manned vessels. As Secretary Wynne noted, aggressors would need to "buy more quills" than they can quickly grow for the defending porcupine.

Asymmetric Advantages:

MAS offer an asymmetric advantage, as they can operate in contested environments where human-crewed vessels would face unacceptable risks. They can maintain persistent presence, operate in swarms, and are more rapidly replaced if destroyed than legacy capital ships. This allows smaller nations to create credible deterrence without bankrupting their defense budgets.

Complicating Attack Plans:

The porcupine defense is designed to complicate and disrupt potential Chinese maritime attack plans by creating multi-axial complexity and enabling rapid response deterrence and unpredictable counter-attacks from distributed, missile-equipped fast boats and drone swarms.

**Key Operational and Technological Contributions of MAS**

Enhanced Intelligence, Surveillance, and Reconnaissance (ISR) and Maritime Domain Awareness (MDA):

Uncrewed vessels (USVs) significantly expand ISR coverage in archipelagic territories. The Philippine Navy's USV Unit, for

instance, focuses on improving ISR capabilities and MDA. The distributed network of sensor-equipped platforms creates comprehensive surveillance, making it difficult for hostile forces to mask movements or conduct covert operations.

Rapid Deployment and Shortened Acquisition Cycles:

MAS offer much shorter routes for credible defense by combining land-based missiles with maritime ISR and counter-ISR from USVs, UAVs, and future UUVs. The acquisition of MAS represents a "credible 3–5-year program of rapidly enhancing Filipino defense," in stark contrast to decades-long traditional defense procurement cycles.

Payload Agnosticism and Scalable Deployment:

Mesh fleet platforms are flexible carriers for diverse payloads, including sensors, communications equipment, and weapons, allowing for rapid reconfiguration. Larger vessels can deploy smaller ones (e.g., Devil Ray T-38 carrying MANTAS T12s), extending operational reach without additional infrastructure.

Distributed Launch Points:

Unlike traditional naval operations dependent on major ports, mesh fleet vessels can launch from virtually anywhere, eliminating concentrated vulnerabilities.

Crisis Management and Escalation Control:

MAS enhance the kill web's role in crisis management by enabling graduated responses, from passive ISR to active weapons carriers. This provides military commanders with precise, scalable options tailored to specific threat levels, crucial for "controlled war".

Affordability and Attritable Platforms:

MAS offer an affordable, capable, and persistent addition to naval forces. The introduction of "attritable" platforms, like MARTAC's M18 "MUSKIE," which are designed for one-way missions and can overwhelm enemy defenses through sheer numbers, showcases a move toward "$50,000 weapons, not just million-dollar weapons".

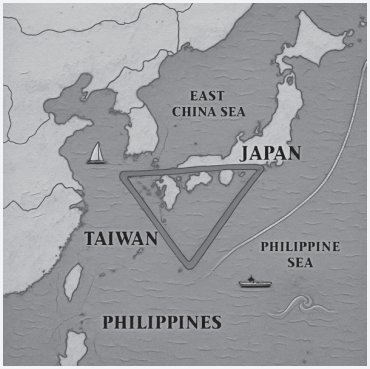
**U.S.-Philippines Cooperation as a Blueprint:**

The U.S. is investing in new infrastructure (like fast boat bases) and providing cutting-edge unmanned systems and training to the Philippines. This "Maritime Security Consortium" provides significant annual funding for unmanned systems, demonstrating a new model for rapidly deploying advanced military technology to allies.

This cooperation supports the Philippine "porcupine defense" and could serve as a blueprint for similar partnerships across the Indo-Pacific, emphasizing capability delivery over traditional arms sales.

In essence, MAS are driving a "mind blowing" shift in maritime power dynamics by democratizing advanced naval capabilities, making it possible for nations to create formidable defensive networks that are resilient, cost-effective, and capable of holding much larger adversaries' assets at risk, fundamentally reshaping deterrence and the future of naval warfare.

# CHAPTER 1
# THE TAIWAN-PHILLIPINES-JAPAN STRATEGIC TRIANGLE



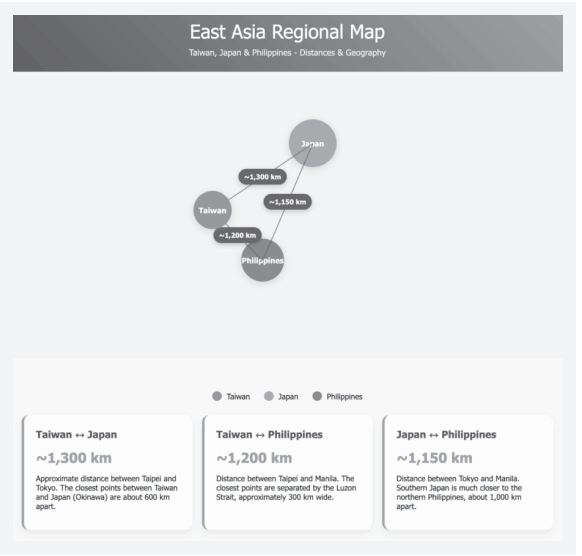

JUNE 22, 2025

While Taiwan tensions are often viewed through a U.S.-China lens, the gravest strategic consequences would fall on Japan and the Philippines. Chinese control of Taiwan would fundamentally alter the regional balance, potentially isolating both nations and forcing them into accommodation with Chinese regional dominance regardless of U.S. positions.

Taiwan's location at the center of the "First Island Chain" makes it a natural geographic chokepoint. The island sits at the midpoint between Japan's Southwest Islands to the north and the Philippines' Luzon archipelago to the south, creating what

military strategists call the First Island Chain — a natural barrier that currently contains Chinese naval power within the South and East China Seas. This geographic position gives Taiwan outsized strategic importance far beyond its size.

Located opposite Fujian Province off the Asian continent, Taiwan is nearly the same size as Kyushu, measuring almost 36,000 square kilometers. It sits at the midpoint of the first island chain, the transnational archipelago running south from Japan through Taiwan to the Philippines. The loss of this central link would fundamentally reshape regional security dynamics.




## JAPAN'S CRITICAL VULNERABILITIES

Japan's dependence on Taiwan Strait shipping routes creates an acute vulnerability that Chinese control would immediately exploit. CSIS estimates that 32 percent of Japan's imports and 25 percent of its exports transit the Taiwan Strait, with over 95% of Japan's crude oil coming from Middle Eastern countries and much of it transported through this route.

About 6 trillion cubic feet of liquefied natural gas, or more than half of global LNG trade, passed through the South China Sea in 2011. Half of this amount continued on to Japan, with the rest going to South Korea, China, Taiwan, and other regional countries. The geographic reality means that for Japan, roughly $13 billion of its imports also pass through the Luzon Strait, yet this is just a fraction of its imports through the Taiwan Strait.

The PRC views the Senkaku/Diaoyu Islands as part of "Taiwan province" and may seek to take the islands during a conflict. If the PLA Navy were to occupy Taiwan, Japan would struggle to defend its westernmost islands, as well as the Senkaku/Diaoyu Islands, and even Okinawa. This connection transforms Taiwan from a distant concern into an immediate threat to Japanese territory.

The PLA's shortest passages from China's mainland to the Pacific Ocean are on the north and south sides of Taiwan. The former is through Japan's Southwest Islands between Japan's mainland and Taiwan, and the latter is through the Luzon Strait between Taiwan and the Philippines. Chinese control of Taiwan would breach this natural defensive barrier, fundamentally altering Japan's strategic environment.

## THE PHILIPPINES' DILEMMA

Any major armed contingency on or around Taiwan would present an economic and humanitarian crisis for the Philippines. As the nearest potential safe harbor, the volume of refugees escaping the conflict would be likely to quickly overwhelm Philippine capacity. The Marcos administration has acknowledged this reality, with the president noting that Taiwan's proximity to Luzon makes it "hard to imagine" that the country could avoid conflict.

The strategic importance of the Luzon Strait cannot be overstated. Other straits bordering the South China Sea like the Malacca, Sunda and Balabac Straits are too narrow and shallow

for submarines to pass through undetected. The Taiwan Strait is adjacent to and heavily monitored by China as well as by Taipei and the US. This makes Luzon Strait critical in all-out war because the nuclear submarines of both China and the US have a better chance of passing through it undetected.

The Luzon Strait is a choke point for access between the South China Sea and the Philippine Sea, and China's navy uses it to move carrier strike groups and destroyers out to the open Pacific. Access to the strait is necessary for Chinese interests in the event of a Taiwan Strait conflict.

Chinese control of Taiwan would essentially bracket the Philippines between Chinese-dominated waters. The Philippines depends on the strait to transport about one-fifth of its global imports and one-seventh of its exports, but its geography allows it to send much of its trade through the Luzon Strait and Western Pacific Ocean. However, Chinese control of Taiwan would compromise even these alternative routes.

## THE PRC PERSPECTIVE

Chinese strategic thinkers explicitly view Taiwan as key to regional domination. Control over Taiwan would transform the Taiwan Strait into China's "strategic inner lake." Conversely, so long as the island remained out of China's hands, it would expose the mainland's coastal metropolises, seaborne commercial traffic, and the movement of air and naval forces to hostile forces located on Taiwan.

Beijing has long feared that a maritime coalition led by Washington might seek to choke off Chinese access to the seas in a war over Taiwan. Control of the island would thus "shatter the semi-sealed predicament of China's sea areas" while transforming Taiwan, the central segment of the first island chain, from a barrier into a "portal" to the Pacific.

Chinese forces on the island would be able to radiate power along the first island chain and beyond. From air bases and

airports on Taiwan, Chinese aircraft with combat radii of 2,000 kilometers would be able to cover the Yellow and East China Seas, the various straits from Bohai to the north to Bashi to the south, and the Ryukyus, Kyushu, Shikoku, and much of the Philippine archipelago.

## ECONOMIC AND TRADE IMPLICATIONS

The Taiwan Strait is the primary route for ships passing from China, Japan, South Korea and Taiwan to points west, carrying goods from Asian factory hubs to markets in Europe, the US and all points in between. Almost half of the global container fleet and 88% of the world's largest ships by tonnage passed through the waterway.

If cross-strait tensions become especially dire, cautious shipping companies may avoid routes near Taiwan altogether. That same vessel departing from Singapore may choose to sail south of the Philippines before heading north through the Miyako Strait to reach South Korea. This would extend the journey by roughly 1,000 miles, adding significant costs and delays.

Even alternative shipping routes would face Chinese pressure. Many countries would feel the effects of these disruptions, but two key U.S. allies, Japan and South Korea, would be among those most impacted. It would also likely make it infeasible to stop at Chinese ports while en route, which could have significant ripple effects on supply chains given China's central role in maritime shipping.

## JAPAN'S EVOLVING POSITION

Recent remarks from Japanese leaders do not mean Tokyo has pledged to defend Taiwan if China attacks, or that it necessarily commits to supporting the United States militarily if Washington chooses to get involved. Tokyo's answer would ultimately depend on top-level political judgments about the conflict's

cause, specific nature, and implications for Japan's peace and security.

However, Current Japanese Prime Minister Kishida Fumio has pledged to double Japan's defense spending in response to the tense security climate, indicating growing recognition of the stakes involved.

## PHILIPPINES' STRATEGIC BALANCING

The Philippines has a special economic relationship with Taiwan, but acknowledges the People's Republic of China (PRC), rather than the Republic of China (Taiwan), as the sole political government of China, and has consistently affirmed the "One China Policy". However, the Philippine government is now paying more attention to developments in the Taiwan Strait. With the Marcos Jr. Administration, a China policy will likely always be two-pronged: with one prong oriented to Beijing, and another toward Taipei.

Philippine Defense Secretary Gilberto Teodoro said that the region is the "spearhead of the Philippines as far as the northern baseline is concerned," and that its garrison would be strengthened, reflecting growing awareness of the Luzon Strait's strategic importance.

Both countries are deepening security ties with the United States. U.S. Marine Corps anti-ship missiles will deploy to the Luzon Strait, a strategic first island chain chokepoint between the Philippines and Taiwan, during Balikatan 2025. The 3rd Marine Littoral Regiment's Medium-Range Missile Battery will send Naval Strike Missile-equipped systems to the Luzon Strait.

The fourth Taiwan Strait crisis also further motivated Washington to strengthen its alliance with regional powers such as Japan, Australia, and the Philippines.

## THE MULTI-POLAR AUTHORITARIAN WORLD ON THE MARCH

Beyond the strategic calculations, the fundamental issue is a question of values. Taiwan is a democratic state and has proven that Chinese culture can embrace democratic values. This is an affront to President Xi and his ideology of authoritarian control and global expansion.

Without any question to assault of Putin and Xi would have a similar motivation, namely, to expand their empires and to recover what is "rightfully theirs." This is of course true if you are working to create a new global order where middle power democratic states like Australia and Brazil are consider merely commodity providers to the expanding Chinese empire.

In short, while U.S.-China competition dominates headlines about Taiwan, the most profound strategic consequences would fall on Japan and the Philippines. Both nations face the prospect of being isolated from each other and from broader alliance networks, potentially forcing accommodation with Chinese regional dominance regardless of US positions.

China is engaged in a geopolitical competition with the United States and a widening array of allies and partners — Japan and the Philippines most of all — who see their national interests directly threatened by Beijing's choices. The geographic reality of Taiwan's central position in the First Island Chain means that its fate will determine whether Japan and the Philippines remain sovereign actors in an open regional order or become subordinated to Chinese regional hegemony.

Understanding Taiwan through this regional lens — rather than purely as a U.S.-China issue —reveals why both Japan and the Philippines are quietly but significantly building defensive capabilities and strengthening security partnerships. For them, Taiwan is not just about U.S-Chinese competition; it is about their fundamental security and sovereignty in the decades ahead.

# CHAPTER 2
# THE PHILIPPINE DEFENSE STRATEGIC OPPORTUNITY: ENABLING ALLIED AND PARTNER INNOVATION

OCTOBER 3, 2024


As China expands its reach in the first island chain and aggressively goes after Philippine naval assets and contested territory, the Philippines have responded by setting in motion a Comprehensive Archipelagic Defense Concept, which emphasizes maritime security.

But to do so, the Philippines need to innovate beyond legacy concepts of defense and traditional means of doing so, such as solely having a large capital ship navy to contest the Chinese.

And as the Filipinos innovate, they are taking note of lessons learned around the world and providing options for their coastal defense which interact more effectively with allies and partners in regional defense efforts.

Most notably, the intersection between the strategic direction of archipelagic defense intersects well with ways the U.S. Marines are innovating to deliver a more lethal and survivable littoral defense capability.

For example, in this year's Balikatan exercise, the U.S. and the Philippines worked on ways to defend an island chain near Taiwan.

As noted in a USNI News article published on May 9, 2024:

*A combined Marine Corps and Army force, composed of a company from the Littoral Combat Team of the 3d Marine Littoral Regiment and elements from the 25th Infantry Division and the Philippines' 4th Marine Brigade, deployed to the Province of Batanes in Manila's largest annual military drills. The deployment to the region during Balikatan was under "a scenario designed to preserve and protect Philippine territorial integrity," 1st Lt. Anne Pentaleri, 3rd MLR public affairs officer, told USNI News.*

And in an article by 1st Lt. John Fischer, 13th Marine Expeditionary Unit, published on June 2, 2024, the focus on Philippine coastal defense was highlighted:

*Elements of I and III Marine Expeditionary Forces (MEF) concluded the latest iteration of the Archipelagic Coastal Defense Continuum (ACDC) bilateral training with units from across the Philippine Marine Corps, including the Philippine Coastal Defense Regiment on May 31, 2024. The training took place from the diverse landscapes of Paredes in the north to the mountainous jungles of Barira in the southern Philippines….*

*This series of ACDC training events began following Exercise Balikatan 24, with I MEF (Forward), commanded by Col. Stuart Glenn, assuming command and control of all Marine Forces within the Philippines. The Philippine Marine Corps welcomed the U.S. Marines with the 13th MEU CE to Fort Bonifacio to begin this continuation of*

*training and command integration. The 13th MEU coordinated and oversaw the training of various units, including the 3rd Marine Littoral Regiment in Luzon, Marine Wing Support Squadron (MWSS) 371, Marine Air Control Group 38, 3rd Marine Aircraft Wing at Clark Air Base and Fort Bonifacio, 1st Air Naval Gunfire Liaison Company (ANGLICO), I MEF Information Group, the 15th MEU in Palawan, and 1st Battalion, 7th Marine Regiment, 1st Marine Division (V 1/7) in Mindanao, alongside their Philippine counterparts through daily meetings, working groups, and collaborative exchanges…*

What has been at the heart of Filipino innovation is shifting from internal security issues (fighting domestic terrorists) to providing for the defense of the nation, which is very challenging as it is a littoral nation with more than 7,000 islands. They have formed a new Marine Coastal Defense Regiment to specifically address outward looking littoral operations.

The United States, Japan and the Philippines are in the beginning stages of building a trilateral framework for regional security. Because of recent PRC incursions and aggressive activities, a large focus will be on the ability of the Philippines to defend its territory.

The framework is crucial for them to do so in a way that is interactive with their regional neighbors, the US, and even European countries. In recent months, the Italian Carrier ITS Cavour visited the Philippines. For the first time in 20 years, Germany visited the Philippines with the FGS Baden-Württemberg and FGS Frankfurt am Main.

This comes at a time where the United States is no longer in the position to spread thin its forces in the Pacific, but rather needs to be able to be interactive with allies and partners who are increasingly seeing the pressure away from "rules-based" order. Naval forces around the world are also seeking ways to assert themselves with maritime innovations to create asymmetric naval power advantages for persistent presence and deterrence.

In this regard, the Philippines is moving out on a concept that

combines land-based strike missiles against sea-based targets, UAV and USVs to generate the ISR needed for targeting, and designing a force that can sustain itself with autonomy. A two-sided sword of UAVs and USVs provides a significant shield for Philippine defense and intersects with the U.S. and allied operational forces in the region. In other words, it meets the needs for the Philippines and adds significant capability which her allies can leverage.

It is no longer about seeking to solely buy legacy defense capabilities – capital ships and airplanes to provide for defense over a long acquisition cycle. Much shorter routes for credible defense are provided by combining land-based missiles with maritime ISR and counter-ISR provided by a combined capability from USVs and UAVs, reinforced as UUVs come on line as well. The Philippines have already started down this path.

To discuss this approach, I recently interviewed LtGen "Stick" Rudder (Retired) whose last post was as the MARFORPAC Commander. He is a frequent visitor to the nations in the first island chain, and most recently returned from the Philippines.

According to Rudder: *When thinking about Philippine defense you are talking about a country with over 7000 islands with the northern island less than 80 miles from Taiwan. The northern area encompasses the Luzon Straits which are critical for regional and global trade. This important area of islands and maritime choke points must be protected by ground, air, and maritime capabilities. The Philippines and the region depend on its access for shipping, island sustainment, and freedom of access to fisheries. It is but one area that frames the Comprehensive Archipelago Defense Concept (CADC).*

As the Chinese have aggressively operated in the first island chain, Rudder notes that *we have seen enhanced trilateral cooperation among Japan, the Philippines and the United States. There has been comprehensive work to move forward with several agreements, notably in terms of force access. Regional partnerships are key in countering Chinese actions in the gray zone. Any air or maritime miscalcu-*

*lation could activate collective defense agreements. In other words, we need to work on integrated deterrence in the gray zone and our ability to counter Chinese actions without generating escalation we collectively do not want to see.*

We then discussed his assessment of credible force development for the Philippines.

*Given the size of the Philippine Navy and the wide expanse of coverage required, conventional Navy and Coast Guard ships must be augmented with unmanned capabilities. In conjunction with the Air Force, the Philippines are focusing on the Philippine Navy and Marine Corps Coastal Defense Regiment (CDR) and acquiring long-range anti-ship missiles and accompanying ISR to create the desired coverage and reach within their maritime domain.*

*They are also adding the HIMARS system with integrated ISR employing a combination of manned and unmanned systems. Growing a maritime ISR capability will be critical to identify and potentially target anything threatening inside the Philippine EEZ. Maritime and air unmanned systems offer an affordable, capable, and persistent Navy and Marine Corps addition to deliver the kind of ISR needed.*

He added that he believed their desire to field USVs is another capability which makes sense for the Philippines as it does for Navies around the world.

*Uncrewed vessels can provide them with an ability to maneuver at speed to intercept, identify, and escort. Having "clusters" of these capabilities in critical areas significantly expands the ISR coverage in their archipelagic territory.*

*I applaud the Philippine strategic and operational planners; they are on the right path. The pursuit of unmanned capabilities will be the beginning elements of an unmanned network that I would consider to be a credible 3–5-year program of rapidly enhancing Filipino defense. This combined with the increased network of allies and partners will be important aspects to defend the Philippines.*

Credit: Graphic: ID 247726796 | Phillipines Map © Fluffthecat | Dreamstime.com

CHAPTER 3

# U.S.-PHILIPPINES MILITARY COOPERATION: FAST BOAT BASES AND UNMANNED SYSTEMS CONTRIBUTE TO SOUTH CHINA SEA STRATEGY

JULY 16, 2025

As tensions in the South China Sea reach new heights, the United States and Philippines are dramatically expanding their military cooperation through a combination of new infrastructure projects and cutting-edge unmanned systems.

The United States plans to fund and construct a facility capable of hosting watercraft and assault boats on the western coast of Palawan, strategically positioned to support Manila's

operations in the disputed South China Sea. The base, located in the municipality of Quezon just 160 miles east of the flashpoint Second Thomas Shoal, represents a significant escalation in U.S.-Philippine military cooperation.

The facility is designed to support at least five vessels, including rigid-hulled inflatable boats (RHIBs) and assault boats manufactured by Oregon-based Reconcraft, a company specializing in military and law enforcement small boats. The strategic positioning allows for rapid deployment, with plans requiring watercraft to be launched within 15 minutes to meet "rapid deployment readiness" objectives.

This development is crucial for the Armed Forces of the Philippines, which has predominantly relied on Naval Detachment Oyster Bay to stage patrols and resupply missions to scattered outposts in the disputed waters. The new western coast facility will provide faster access to Manila's Spratly Islands outposts compared to more developed eastern ports.

The fast boat base is part of a larger pattern of U.S. military infrastructure investments in the Philippines. Simultaneously, the U.S. is upgrading Naval Detachment Oyster Bay with a $1-5 million boat repair facility specifically designed to support both manned and unmanned surface vessels. This facility will include maintenance capabilities for 11.6-meter (38-foot) vessels, equipped with electrical, air conditioning, and support systems suitable for unmanned platforms.

The expansion occurs within the framework of the Enhanced Defense Cooperation Agreement (EDCA), which has grown from five to nine Philippine military bases accessible to U.S. forces. The new bases are strategically located in northern Philippines (facing Taiwan), southern areas, and Palawan near the South China Sea.

A cornerstone of the expanded cooperation is the Maritime Security Consortium, launched in November 2024 as a public-private initiative managed by the Defense Innovation Unit, Defense Security Cooperation Agency, and U.S. Indo-Pacific

Command. The program provides up to $95 million annually in funding for unmanned systems to Southeast Asian countries, with the Philippines as a key recipient.

The Consortium uses joint exercises like Balikatan to demonstrate and deliver systems to partner countries, representing a new model for rapidly deploying advanced military technology to allied nations facing maritime security challenges.

Philippine Unmanned Surface Vessel Capabilities

The Philippines has received several unmanned surface vessels from the U.S., marking a significant technological advancement for the Philippine Navy:

- MANTAS T-12 Systems: Four 12-foot (3.6-meter) all-electric systems capable of carrying up to 140 pounds (64 kg) of payload and achieving burst speeds of 30+ knots. These represent MARTAC's most popular system, equipped with advanced propulsion and designed for long duty cycles performing "dull, dirty and dangerous" missions.
- Devil Ray T-38 System: One 38-foot (11.1-meter) medium USV with a maximum payload capacity of 4,000 pounds (1,814 kg). The T-38 can achieve burst speeds of 70-100+ knots and is based on a high-performance dual sponson platform with multiple world records for speed and stability.
- Philippine Navy USV Unit: The Philippine Navy formally established an Unmanned Surface Vessel Unit in 2024, with Vice Admiral Toribio Adaci stating its primary role is to improve Intelligence, Surveillance, and Reconnaissance (ISR) capabilities and maritime domain awareness. The unit is based in Subic Bay and was first revealed during the Asia Defense and Security Exhibition.

During a November 2024 demonstration observed by

Defense Secretary Lloyd Austin, Philippine Navy USVs were shown equipped with autonomous navigation, ISR payloads, and communication systems with over-the-horizon and line-of-sight capabilities. The USVs use Starlink terminals provided by SpaceX for real-time data transfer and remote operation.

U.S. Defense Secretary Lloyd Austin discussed the existence of "Task Force Ayungin" which is a U.S. military unit stationed in the Philippines. Named after the Philippine designation for Second Thomas Shoal, the task force was officially established in mid-2024 following the June 17 violent clash between Chinese and Philippine forces.

The task force provides technical assistance for Philippine USV operations and is based in Palawan, operating within the Command and Control Fusion Center at Western Command. According to AFP officials, "US troops in Palawan provide technical assistance through the information-sharing group within the Command and Control Fusion Center in Western Command. This support enhances our capability in maritime domain awareness."

Importantly, U.S. officials have clarified that while the task force provides training and intelligence support, actual missions in the West Philippine Sea remain "purely Philippine operations."

The military cooperation expansion comes amid severely deteriorating China-Philippines relations. The June 17, 2024 incident at Second Thomas Shoal was particularly serious, with Chinese Coast Guard vessels ramming Philippine boats, resulting in a Filipino sailor losing his finger.

Chinese tactics shifted in 2024 toward more aggressive "use of force," including physical contact between ships and deployment of water cannons, lasers, and handheld tools against Philippine vessels and personnel. Tensions have continued into 2025, with China deploying its massive "monster ship" (165-meter vessel 5901) to Scarborough Shoal in January.

The developments represent a significant escalation in U.S.-

Philippine military cooperation, directly responding to China's increasingly aggressive actions in the South China Sea.

The combination of new infrastructure, advanced unmanned systems, and embedded U.S. training personnel creates a comprehensive framework for enhanced maritime domain awareness and rapid response capabilities.

Defense Secretary Pete Hegseth highlighted unmanned surface vessel operations during his 2025 visit to Manila, and the Philippines is expected to receive many more platforms through the $500 million Foreign Military Financing program announced in July 2024. The 2025 Joint Vision Statement on U.S.-Philippine Defense Industrial Cooperation identified unmanned systems, ship maintenance, and logistics as priority areas for collaboration, aligned with the Philippines' Self-Reliant Defense Posture (SRDP) Revitalization Act.

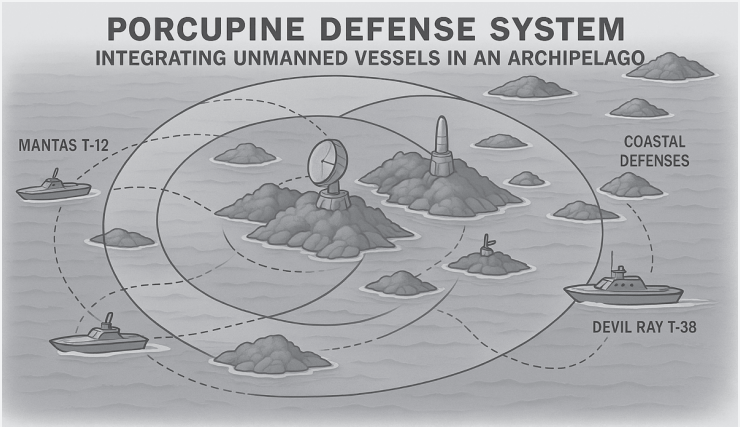
The U.S.-Philippines military cooperation represents a paradigm shift in how allied nations can rapidly deploy advanced military capabilities to address emerging security challenges.

The combination of strategically positioned infrastructure, cutting-edge unmanned systems, and embedded training support creates a comprehensive deterrent framework while maintaining the Philippines' operational sovereignty.

As China continues its assertive maritime campaign, these developments signal a new phase in South China Sea dynamics, where technological advantages and allied cooperation may prove more decisive than traditional force-on-force confrontations.

The success of this model could serve as a blueprint for similar partnerships throughout the Indo-Pacific region.

# CHAPTER 4
# PORCUPINE DEFENSE: HOW MARITIME AUTONOMOUS SYSTEMS CAN ENHANCE DETERRENCE IN THE PACIFIC




OVERLAPPING COLORED ZONES REPRESENT LAYERED DEFENSE COVERAGE. DOTTED LINES SHOW PATROL PATHS OF UNMANNED SURFACE VESSELS, WITH LAYERS OF OVERLAPPING COVERAGE.

AUGUST 4, 2025

In a recent article about how the Philippines are enhancing their defense capabilities, I focused on innovative ways they

were using maritime autonomous systems integrated into their overall defense approach.

That article was entitled, "U.S.-Philippines Military Cooperation: Fast Boat Bases and Unmanned Systems Contribute to South China Sea Strategy." The article looked at the expansion of U.S.-Philippines military cooperation in response to heightened tensions in the South China Sea, highlighted by new fast boat bases, upgrades to naval facilities, and the deployment of advanced unmanned surface vessels to the Philippine Navy. These efforts, enabled by U.S. funding and embedded training personnel, are designed to enhance maritime domain awareness and rapid response capabilities, strengthening deterrence against increasingly aggressive Chinese maritime actions.

In effect, the emphasis is upon a porcupine defense strategy one which is built around crafting defense geometries with various axis of operations enabling them to complicate the attack profiles of an adversary. By so doing, these new approaches can provide the defender with a range of axis points from which to launch capabilities to disrupt the attacker and make it increasingly difficult for him to have a well-planned, timely defeat strategy.

I received very interesting responses from both Secretary Michael Wynne and Chris Morton of IFS. And based on those reactions, and what I wrote in the initial article, I decided to revisit the subject introduced in that article.

Now let me revisit my argument and incorporate their insights.

The Philippines has embarked on a porcupine defense strategy or one that fundamentally disrupts traditional attack calculations through innovative use of maritime autonomous systems. This approach, as Secretary Wynne aptly characterized it, focuses on acquiring "small, cheap, and independent" means to execute enhanced defense.

The Philippines is deploying networks of unmanned surface vessels (USVs), unmanned aerial vehicles (UAVs), and land-

based missile systems that create a new defense geometry which provides them with multiple axis points from which to launch disruptive capabilities.

As Chris Morton of IFS observed: "Simply the fact that we can hold at risk Chinese manned vessels with USVs and Starlink is mind blowing—and I think we'd characterize it as an 'economy of force' mission."

The Philippines' approach is particularly suited to their unique geographic challenges. With over 7,000 islands and vast maritime domains to defend, traditional naval strategies would require prohibitively expensive fleets. Instead, their Comprehensive Archipelagic Defense Concept (CADC) leverages autonomous systems to create persistent surveillance and response capabilities across their territorial waters.

Lieutenant General "Stick" Rudder, former MARFORPAC Commander, explains the strategic logic: "Given the size of the Philippine Navy and the wide expanse of coverage required, conventional Navy and Coast Guard ships must be augmented with unmanned capabilities." These systems provide "an affordable, capable, and persistent Navy and Marine Corps addition to deliver the kind of ISR needed."

The integration of land-based anti-ship missiles with maritime ISR capabilities creates what Rudder describes as a "credible 3-5 year program of rapidly enhancing Filipino defense." This timeline stands in stark contrast to traditional defense procurement cycles that often span decades.

The porcupine defense strategy succeeds because it fundamentally alters the cost-benefit calculation for potential aggressors. As Secretary Wynne noted, "You need to buy more quills, and you can't grow them fast enough for the porcupine defending itself." Each autonomous platform represents a relatively inexpensive asset that can nonetheless pose significant threats to much more valuable manned vessels.

This asymmetric advantage extends beyond mere economics.

Autonomous systems can operate in contested environments where human-crewed vessels would face unacceptable risks. They can maintain persistent presence, operate in swarms that overwhelm traditional defensive systems, and be much more rapidly replaced if destroyed than legacy capital ships.

The Philippine approach offers valuable lessons for U.S. allies facing similar challenges. Rather than attempting to match adversaries ship-for-ship or missile-for-missile, nations can leverage autonomous systems to create defensive networks that are both more resilient and more cost-effective than traditional approaches.

The Philippines' approach succeeds because it integrates cutting-edge technology with tactical innovation. The Maritime Security Consortium, providing up to $95 million annually through U.S. Indo-Pacific Command, enables rapid deployment of advanced systems without the decades-long acquisition cycles typical of traditional naval procurement.

Key technological enablers include:

- Starlink Communications: Real-time data transfer and remote operation capabilities allow operators to control platforms beyond line-of-sight, extending the operational reach of defensive networks.
- Autonomous Navigation: Advanced AI systems enable platforms to operate independently while maintaining network connectivity, creating persistent presence without constant human oversight.
- Modular Payloads: Systems like the Devil Ray T-38, capable of carrying 4,000 pounds of payload at speeds exceeding 70 knots, can be rapidly reconfigured for different mission requirements.

## OPERATIONAL IMPLEMENTATION: TASK FORCE AYUNGIN

The establishment of Task Force Ayungin named after the Philippine designation for Second Thomas Shoal demonstrates how this strategy translates into operational capability. Based in Palawan and operating within the Command and Control Fusion Center at Western Command, the task force provides technical assistance for Philippine USV operations while maintaining Philippine operational sovereignty.

This model addresses a critical challenge in modern alliance relationships: how to provide advanced capabilities while respecting partner nation autonomy. U.S. officials have clarified that while the task force provides training and intelligence support, actual missions remain "purely Philippine operations."

The Philippines' strategy succeeds because it's supported by strategically positioned infrastructure designed for rapid deployment. The new fast boat base in Quezon, just 160 miles from Second Thomas Shoal, exemplifies this approach. Designed to launch watercraft within 15 minutes, the facility supports distributed operations while maintaining the flexibility to respond to emerging threats.

Similarly, the upgraded Naval Detachment Oyster Bay includes maintenance capabilities specifically designed for unmanned platforms, ensuring sustained operations without dependence on major naval bases that present attractive targets for adversaries.

The porcupine defense strategy represents more than just a cost-effective alternative to traditional naval power. It fundamentally changes the nature of maritime deterrence. By creating defensive networks that are difficult to target comprehensively, the Philippines makes the cost of successful attack extremely high while keeping their own investment relatively modest.

The Philippine model is attracting attention from allies and partners worldwide. Recent visits by Italian and German naval forces demonstrate growing international interest in this

approach, while the trilateral framework developing between the United States, Japan, and Philippines suggests broader adoption of distributed defense concepts.

This strategy also aligns with evolving U.S. military doctrine emphasizing distributed operations and allied innovation. Rather than depending solely on American platforms and presence, the Philippine approach creates indigenous capabilities that complement rather than compete with traditional allied assets.

Perhaps most significantly, the porcupine defense demonstrates that technological innovation can overcome resource disparities. The Philippines cannot match China's naval shipbuilding capacity or defense spending, but they can deploy systems that hold Chinese assets at risk while operating within sustainable budget constraints.

The Maritime Security Consortium model, using joint exercises like Balikatan to demonstrate and deliver systems rapidly, represents a new paradigm for defense cooperation that emphasizes capability delivery over traditional arms sales.

The Philippine experience offers a blueprint for other nations facing similar strategic challenges. By focusing on "small, cheap, and independent" capabilities integrated into coherent defensive networks, smaller nations can create credible deterrence without bankrupting their defense budgets.

This approach may prove particularly relevant as maritime tensions increase globally and traditional naval platforms become increasingly expensive and vulnerable to emerging threats.

The porcupine defense strategy emerging in the Philippines represents more than tactical innovation. It's a fundamental reimagining of how smaller nations can maintain sovereignty in an era of great power competition. By growing more quills faster than adversaries can plan to remove them, the Philippines is proving that strategic creativity can overcome material disadvantages.

As Chris Morton's observation suggests, the ability to hold major naval assets at risk using relatively inexpensive autonomous systems represents a "mind blowing" shift in maritime power dynamics and is one that may define the future of naval warfare in contested waters worldwide.

# CHAPTER 5
# THE PHILIPPINES' PORCUPINE DEFENSE: A NEW PARADIGM FOR SOUTH CHINA SEA SECURITY


AUGUST 11, 2025

As tensions in the South China Sea continue to escalate, the Philippines has adopted an innovative military strategy that

could fundamentally reshape the balance of power in one of the world's most contested waterways.

The "porcupine defense strategy" represents a paradigm shift from traditional centralized naval defense to a distributed, multi-layered approach that promises to make the Philippine archipelago a formidable barrier against potential aggression.

The porcupine defense strategy takes its name from the defensive posture of its namesake animal, presenting numerous sharp quills in all directions to deter predators. In military terms, this translates to establishing multiple defensive positions across the Philippine archipelago, each capable of delivering swift, targeted responses to threats from any direction.

Unlike conventional naval strategies that concentrate forces at major bases, the porcupine approach distributes defensive assets across numerous geographic locations. This creates overlapping layers of defense that ensure no single attack vector remains undefended while forcing potential adversaries to plan for threats along multiple axes simultaneously.

Central to this strategy is the integration of advanced unmanned systems and rapid-response platforms. The Philippine Navy has established a dedicated Unmanned Surface Vessel Unit equipped with sophisticated platforms like the MANTAS T-12 and Devil Ray T-38. These unmanned vessels enable persistent surveillance and can execute rapid, unpredictable disruptions of hostile actions.

The strategy is further enhanced by the construction of fast boat bases throughout the archipelago, particularly along strategically important coastlines like Palawan's western shores. These facilities enable the rapid deployment of maritime assets and significantly reduce response times to threats, especially near critical flashpoints such as Second Thomas Shoal.

One of the most significant advantages of the porcupine defense geometry is its dramatic improvement in maritime domain awareness (MDA). The distributed network of sensor-equipped platforms creates comprehensive surveillance

coverage across vast areas of Philippine territorial waters and beyond.

This sensor-rich environment transforms the maritime domain into a continuously monitored space where real-time data gathering and sharing provide decision-makers with actionable intelligence. The integration of traditional maritime patrols with unmanned assets and allied intelligence resources creates a fused operational picture that makes it extremely difficult for hostile forces to mask their movements or conduct covert operations.

The early warning capabilities inherent in this system narrow adversaries' windows of opportunity for surprise actions while deterring gray zone tactics—the ambiguous military activities that fall short of open warfare but challenge territorial sovereignty.

The porcupine defense strategy is specifically designed to complicate and disrupt potential Chinese maritime attack plans through several mechanisms:

- Multi-Axial Complexity: By creating overlapping defensive layers throughout the archipelago, the strategy forces potential aggressors to plan for threats from multiple directions simultaneously, dramatically increasing operational complexity and resource requirements.
- Rapid Response Deterrence: Fast boats and unmanned vessels can quickly respond to incursions anywhere within Philippine waters, disrupting the careful timing and coordination necessary for successful maritime operations.
- Distributed Lethality: Rather than concentrating defensive assets in easily targeted locations, the strategy spreads missile-equipped fast boats and drone swarms across numerous positions, making them difficult to neutralize with single strikes.

- Unpredictable Counter-Attacks: The ability to launch responses from multiple unexpected directions forces adversaries to prepare for a wider range of contingencies, slowing decision cycles and increasing the likelihood of operational mistakes.

The evolution and effectiveness of the porcupine defense strategy are significantly enhanced by deepening U.S.-Philippines military cooperation. American support has been instrumental in several key areas:

- Infrastructure Development: The U.S. is funding and constructing new fast boat and unmanned vessel bases, including dedicated repair and maintenance facilities that increase operational resilience and readiness.
- Technology Transfer: The U.S.-backed Maritime Security Consortium, introduced in 2024, provides up to $95 million annually for unmanned systems, delivering advanced technology through joint exercises and innovative public-private partnerships.
- Enhanced Interoperability: Military exercises like Balikatan and Cope Thunder now feature complex scenarios involving high-end assets, including fifth-generation U.S. aircraft and advanced missile systems such as Typhon launchers. This "jointness" enables Philippine forces to seamlessly integrate with broader U.S. and allied command networks.
- Expanded Access: With U.S. access now extended to nine bases under the Enhanced Defense Cooperation Agreement (EDCA), the distributed deterrence posture continues to intensify.

Importantly, the porcupine strategy aligns with the Philippines' Self-Reliant Defense Posture Revitalization Act, which

seeks to bolster local defense industries and logistics chains. Investments in domestic capacity for maintenance, support, manufacturing, and training are designed to make Philippine defenses more resilient and less dependent on foreign intervention during conflicts.

This focus on self-reliance ensures that the defensive "quills" of the porcupine strategy become sharper and more sustainable over time, even under challenging operational conditions.

The Philippines is expanding its defensive cooperation beyond its traditional U.S. alliance, engaging in joint maritime activities with partners including India, Japan, and Australia. This multilateral approach integrates the porcupine defense into a broader regional security network, making potential aggression both tactically and diplomatically more dangerous for adversaries.

These partnerships multiply the strategy's effectiveness by adding additional layers of deterrence and response capability while demonstrating regional commitment to maintaining maritime security and freedom of navigation.

As U.S.-Philippines military cooperation continues to deepen, the porcupine defense strategy is poised for further evolution. Key developments on the horizon include:

- Continued expansion and modernization of infrastructure supporting rapid deployment capabilities.
- Integration of more sophisticated unmanned systems with enhanced AI-driven intelligence fusion.
- Greater emphasis on technology-driven awareness and decision superiority.
- Strengthened multilateral defense partnerships across the Indo-Pacific region.

The porcupine defense strategy represents more than a tactical innovation. It embodies a fundamental shift in how

middle powers can defend their maritime interests against larger adversaries. By leveraging technology, geography, and international partnerships, the is in the process of creating a defensive posture that makes the archipelago an increasingly formidable barrier to aggression in the South China Sea.

The strategy's success lies not just in its military capabilities, but in its ability to raise the costs and uncertainty of potential aggression while maintaining the flexibility to respond to evolving threats. As regional tensions continue to evolve, the porcupine defense may well serve as a model for other nations seeking to protect their maritime sovereignty in an increasingly complex security environment.

For China, the implications are clear: any maritime adventure in Philippine waters would face not a single defensive line to breach, but a network of interconnected defensive positions capable of responding swiftly and unpredictably from multiple directions. In the high-stakes chess game of South China Sea geopolitics, the Philippines has transformed itself from a potentially vulnerable archipelago into a maritime fortress—one quill at a time.

# CHAPTER 6
# MESH FLEETS AND MARITIME KILL WEBS: TRANSFORMING NAVAL OPERATIONS FOR THE 21ST CENTURY

THE MARITIME DOMAIN is experiencing a fundamental transformation in how naval forces conceptualize and execute operations.

At the heart of this evolution lies the integration of two revolutionary concepts: the mesh fleet approach to autonomous

maritime systems and the kill web paradigm for distributed naval warfare.

Together, these concepts are reshaping how navies think about force projection, survivability, and combat effectiveness in contested environments.

## BEYOND THE LINEAR KILL CHAIN: THE MARITIME KILL WEB

Traditional naval operations have long relied on what strategists call the "kill chain" - a linear sequence of finding, fixing, targeting, engaging, and assessing targets.

This approach worked well in environments where naval forces enjoyed air and sea superiority.

However, the rise of peer competitors with sophisticated anti-access/area-denial capabilities has exposed critical vulnerabilities in this centralized, sequential approach.

The kill web represents a paradigm shift from linear operations to distributed, networked warfare. As Australian strategist John Conway describes it through his "triangle of tradeoffs," modern naval forces must balance lethality, survivability, and affordability in an environment where adversaries are forcing ever-greater investments in survivability at the expense of offensive capability.

The kill web addresses this challenge by distributing sensing, decision-making, and strike capabilities across multiple platforms operating as an integrated network rather than a hierarchical system.

This approach transforms isolated platforms into nodes within a broader combat ecosystem, where the loss of any single element doesn't compromise the entire operation.

## THE MESH FLEET AND THE KILL WEB

Enter the mesh fleet concept - a scalable network of autonomous surface vessels designed to operate both independently and

collaboratively. Companies like MARTAC have pioneered this approach with their family of unmanned surface vehicles (USVs), ranging from the compact 12-foot MANTAS T12 to the larger Devil Ray platforms capable of open-ocean operations.

What makes the mesh fleet revolutionary isn't just the autonomous technology, but the operational philosophy behind it. Bruce Hanson, CEO of MARTAC, explains that from their company's inception, the focus was "always upon swarms of unmanned vessels" designed to work together in operations. This represents what Hanson calls a paradigm shift "from large blue water boats providing concentrated awareness to distributed awareness."

The mesh fleet operates on several key principles that make it ideally suited for kill web operations:

- **Payload Agnosticism**: Rather than designing vessels for specific missions, mesh fleet platforms serve as flexible carriers for diverse payloads - from sensors and communications equipment to weapons and other autonomous systems. This flexibility allows rapid reconfiguration based on evolving mission requirements.
- **Scalable Deployment**: The nested-doll approach allows larger vessels to carry and deploy smaller ones, extending operational reach without requiring additional support infrastructure. A Devil Ray T38 can transport and launch MANTAS T12s, while the smaller vessels can host their own payloads or even deploy unmanned underwater vehicles.
- **Distributed Launch Points**: Unlike traditional naval operations that depend on major port facilities, mesh fleet vessels can launch from virtually anywhere - commercial ships, shore facilities, or improvised locations. This eliminates the concentrated vulnerabilities that adversaries can target.

- **Integration Within the Kill Web Ecosystem**
- The mesh fleet's true power emerges when integrated within the broader kill web framework. This integration occurs across multiple dimensions:
- **Distributed Sensing Networks**
- Traditional naval ISR has relied heavily on expensive, high-value platforms like destroyers or aircraft carriers. The mesh fleet extends sensing capabilities across vast maritime areas using multiple, lower-cost platforms. As one naval officer noted, this shifts focus to "the left side of the kill chain" - the critical find, fix, and track functions that enable everything else. These distributed sensors create what military planners call "engagement density" - the ability to maintain persistent awareness across extended areas without concentrating valuable assets in vulnerable positions. Multiple mesh fleet platforms can create overlapping sensor coverage, ensuring mission continuity even when individual platforms are lost or compromised.

## MODULAR TASK FORCE OPERATIONS

The kill web concept emphasizes modular task forces capable of operating independently while maintaining the ability to integrate with other force elements.

Mesh fleets embody this principle by providing scalable, mission-tailored capabilities that can support everything from routine maritime domain awareness to high-intensity combat operations.

Recent exercises have demonstrated this versatility. Mesh fleet platforms have successfully executed complex scenarios including target identification and engagement, special forces extraction, and search and rescue operations - all while maintaining autonomous operation and network connectivity with other kill web elements.

Modern naval warfare increasingly requires seamless integration across air, surface, subsurface, space, and cyber domains. The mesh fleet's payload flexibility enables this multi-domain approach by hosting sensors, communications relays, air defense systems, or launch platforms for aerial drones - effectively turning each vessel into a multi-domain node within the broader kill web.

The mesh fleet concept has moved beyond theoretical frameworks to practical implementation. The Philippines' acquisition of MANTAS T12 vessels through U.S. foreign military financing demonstrates how smaller nations can leverage mesh fleet capabilities to enhance maritime domain awareness in contested areas like the South China Sea.

This development illustrates a crucial strategic advantage of the mesh fleet approach: it democratizes advanced naval capabilities. Nations that cannot afford large, sophisticated warships can still deploy effective maritime networks capable of deterring larger adversaries or supporting alliance operations.

The introduction of attritable platforms like MARTAC's M18 "MUSKIE" further expands these possibilities. Designed for one-way missions with burst speeds exceeding 50 knots and payload capacities up to 1,000 pounds, these systems can serve as low-cost weapons carriers that overwhelm enemy defenses through sheer numbers - what one weapons expert called moving beyond "golden BB solutions" to include "$50,000 weapons, not just million-dollar weapons."

## CRISIS MANAGEMENT AND ESCALATION CONTROL

Perhaps most importantly, mesh fleets enhance the kill web's role in crisis management and escalation control. The ability to deploy graduated responses - from passive ISR platforms to active weapons carriers - provides military commanders with options that don't exist in traditional naval architectures.

This graduated capability is crucial in an era of great power

competition where, as nuclear strategist Paul Bracken notes, the challenge isn't simply defending specific territories but "doing it in such a way that doesn't lead to crazy escalations." Mesh fleets enable what Bracken calls "controlled war" by providing precise, scalable responses that can be tailored to specific threat levels and political objectives.

The integration of mesh fleets within maritime kill webs represents more than a technological advancement - it's a fundamental reimagining of naval warfare for the 21st century. By distributing capabilities across networks of autonomous platforms, navies can achieve greater resilience, flexibility, and cost-effectiveness than traditional force structures allow.

As authoritarian powers continue to challenge the liberal international order, the ability to project power while managing escalation risks becomes increasingly critical. The mesh fleet approach within kill web operations provides democratic navies with asymmetric advantages that leverage technological superiority and alliance networks to offset numerical disadvantages.

The future of naval warfare won't be determined by the size of individual platforms or the number of ships in a fleet, but by the ability to create and sustain distributed networks that can adapt, survive, and prevail in contested environments.

In this future, mesh fleets operating within kill web frameworks represent not just an evolution in naval tactics, but a revolution in how maritime nations protect their interests and values in an increasingly dangerous world.

The question is no longer whether this transformation will occur, but how quickly maritime forces can adapt their training, doctrine, and acquisition processes to fully realize these capabilities.

For nations that embrace this transformation, the mesh fleet and kill web combination offers a path to maintaining maritime security in an era of renewed major power competition. For those that don't, the risks of obsolescence grow with each passing day.

# CHAPTER 7
# MARITIME OPERATIONS IN A MULTI-POLAR WORLD: THE CASE FOR DISTRIBUTED AUTONOMOUS FORCES

THE EMERGENCE of a multi-polar authoritarian world represents one of the most significant strategic challenges of the 21st century. This new global landscape demands nothing less than a fundamental transformation in how military forces conceive, plan, and execute maritime operations.

The traditional paradigms that governed naval warfare for decades which was built around the projection of power through concentrated capital ship formations are increasingly inadequate against adversaries who have studied Western military doctrine and developed sophisticated countermeasures specifically designed to exploit the vulnerabilities of centralized naval power.

China's anti-access/area-denial (A2/AD) capabilities, Russia's advanced submarine warfare technologies, and Iran's asymmetric naval strategies all represent direct challenges to conventional naval supremacy that cannot be addressed through incremental improvements to existing systems.

The convergence of these strategic pressures with revolutionary advances in autonomous systems, artificial intelligence, and modular manufacturing technologies has created both an

unprecedented threat environment and an extraordinary opportunity for military innovation.

We stand at an inflection point where the very nature of maritime warfare is being redefined not by the preferences of military planners, but by the inexorable advance of technology and the adaptive strategies of our adversaries.

The question is no longer whether autonomous systems will transform naval operations, but whether Western military forces will lead this transformation or be overtaken by it.

This reality demands a comprehensive rethink of military operations and crisis management strategies that moves decisively away from legacy platforms toward distributed, autonomous-enabled kill web forces capable of operating effectively in contested environments where traditional capital ships face existential threats.

## FOUNDATIONAL RESEARCH FRAMEWORK

The arguments presented in this report build upon an extensive body of research I have conducted over the past several years, documented in three comprehensive books that trace the evolution of maritime warfare from traditional capital ship operations to distributed autonomous systems.

This foundational work provides the theoretical and practical framework for understanding the paradigm shift currently transforming naval operations worldwide.

The first volume in this series, *A Maritime Kill Web Force in the Making: Deterrence and Warfighting in the 21st Century,* co-authored with Ed Timperlake and published in 2022, established the conceptual foundation for understanding how networked maritime forces can create enhanced deterrence and warfighting capabilities. This work introduced the concept of the maritime kill web as a distributed network of sensors, shooters, and decision-makers capable of operating across multiple domains simultaneously.

Building upon this foundation, my 2024 publication *The Coming of Maritime Autonomous Systems: Empowering and Enabling the Kill Web Force* examined the specific technologies and operational concepts that would enable the transition from traditional naval formations to autonomous-enhanced distributed forces. This book provided detailed analysis of how maritime autonomous systems could be integrated into existing force structures while simultaneously transforming operational capabilities.

The most recent volume, *A Paradigm Shift in Maritime Operations: Autonomous Systems and Their Impact*, published this year, synthesizes these concepts into a comprehensive framework for understanding the fundamental transformation currently underway in maritime warfare. This work demonstrates how the convergence of autonomous technologies, advanced manufacturing, and new operational concepts is reshaping the very nature of naval power projection.

## THE DISTRIBUTED MARITIME EFFECTS REVOLUTION

The paradigm shift in maritime operations involves a fundamental move away from concentrating power in capital ships toward distributing capabilities across a network of interconnected assets. This transformation represents more than a tactical adjustment.It constitutes a strategic revolution that redefines the relationship between platforms, weapons systems, and operational effects.

Distributed Maritime Effects (DME) represent the combat outcomes created by this distributed force structure, operating either independently or as supplements to traditional capital ship operations. These effects emerge from the coordinated action of multiple platforms working in concert rather than from the overwhelming firepower of individual vessels. The distributed approach creates resilience through redundancy, complicates enemy targeting solutions, and enables

sustained operations even when individual platforms are compromised.

The foundational work highlights the transition from traditional capital ship-centric warfare to a distributed, kill web-enabled force structure. This transformation emphasizes the critical importance of integrating autonomous systems and modular capabilities to achieve enhanced combat effectiveness across multiple operational domains simultaneously.

Distributed maritime effects will increasingly be generated through the employment of non-capital ship maritime assets operating in coordination with air and sea autonomous systems coupled with manned aircraft.

This combined capability creates combat clusters capable of delivering distributed maritime effects that can operate supplemental to or entirely independent of capital ship formations. This is a fundamental shift that reduces dependence on high-value platforms while increasing overall operational flexibility and survivability.

## AUTONOMOUS SYSTEMS AND MODULAR INNOVATION

The research explores the transformative potential of maritime autonomous systems (MAS) to deliver distributed maritime operations (DMO) effects across a wide spectrum of operational scenarios. Central to this transformation is the contrast between legacy shipbuilding approaches which are characterized by lengthy development cycles, massive platforms, and enormous costs and innovative modular approaches that enable rapid building and deployment of naval forces tailored to specific operational requirements.

The modular approach represents a fundamental departure from traditional naval acquisition practices, enabling the rapid integration of new technologies and the flexible reconfiguration of capabilities based on evolving operational needs. This approach dramatically reduces the time from concept to deploy-

ment while simultaneously lowering costs and increasing the overall adaptability of naval forces.

The overarching argument calls for a comprehensive rethinking of maritime strategy that fully embraces autonomous technologies, distributed force structures, and innovative acquisition models.

This transformation is not optional for it represents an essential adaptation to the realities of 21st-century warfare in a multipolar world where traditional approaches to naval power projection are increasingly vulnerable to sophisticated countermeasures.

## PROFESSIONAL ASSESSMENT AND IMPLEMENTATION

As LtGen (Retired) Steve Rudder notes in his foreword to the most recent book: "Dr. Robbin Laird has been leading the reporting on Unmanned Systems and Kill Webs for many years and has been producing forward thinking pieces on the evolution of autonomy. At each achievement, whether it be Ukraine, TF-59 in the Arabian Gulf, or the Australian Defence Force, his articles and books have provided a window into the future dominance of autonomous maritime systems and the journey into the Kill Web."

General Rudder's assessment emphasizes the regulatory framework governing autonomous systems implementation: "From the technology standpoint, when we talk of autonomous weapons, swarming technology and the associated approvals to employ are governed by the recently updated DOD DIRECTIVE 3000.09, AUTONOMY IN WEAPON SYSTEMS. 3000.09 requirements established in the Directive include the following: 'Autonomous and semi-autonomous weapon systems will be designed to allow commanders and operators to exercise appropriate levels of human judgment over the use of force.'"

Critically, General Rudder emphasizes the urgency of implementation: "Today's industry has the technology to field

unmanned capabilities today thus we should not celebrate lengthy testing and analysis. We should embrace current technology and field systems today."

He highlights the immediate potential: "The possibilities are endless for unmanned surface craft and the teaming with unmanned aircraft. The capability to extend the eyes and ears of the Naval fleets and patrol contested waters requires the fielding and deployment of these vessels inside the current acquisition process."

His conclusion underscores the inevitability of this transformation: "These capabilities are 'off the shelf' and, as Robbin appropriately states, are coming WHETHER YOU WANT IT OR NOT."

All three foundational books are available in e-book, paperback, and hardback editions through Amazon, providing comprehensive documentation of the theoretical framework and practical applications that form the foundation for the analysis presented in this report.