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ILLEGAL, UNREPORTED, AND UNREGULATED FISHING IN OCEANIA

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THESIS

ILLEGAL, UNREPORTED, AND UNREGULATED FISHING IN OCEANIA

by

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March 2022

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Illegal, unreported, and unregulated fishing (IUUF) is a prevalent issue in Oceania, a vital region to the United States from a military, economic, and diplomatic perspective. IUUF activity is threatening to erode U.S. influence and poses significant homeland defense and security challenges. This thesis addresses the question of how the United States and its partnering nations can better address the IUUF threat in Oceania. A variety of academic research, journal articles, scientific studies, laws and treaties, domestic and international government documents, and non-government reports were analyzed to answer this question. The analysis explored counter-IUUF mitigation efforts underway in Oceania and, in doing so, outlined the region's counter-IUUF strategy. A six-step strategic analysis tool was applied to evaluate Oceania's counter-IUUF strategy and identify actions that the United States and its partnering nations can take to strengthen its effectiveness.

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ILLEGAL, UNREPORTED, AND UNREGULATED FISHING IN OCEANIA

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Submitted in partial fulfillment of the
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ABSTRACT

Illegal, unreported, and unregulated fishing (IUUF) is a prevalent issue in Oceania, a vital region to the United States from a military, economic, and diplomatic perspective. IUUF activity is threatening to erode U.S. influence and poses significant homeland defense and security challenges. This thesis addresses the question of how the United States and its partnering nations can better address the IUUF threat in Oceania. A variety of academic research, journal articles, scientific studies, laws and treaties, domestic and international government documents, and non-government reports were analyzed to answer this question. The analysis explored counter-IUUF mitigation efforts underway in Oceania and, in doing so, outlined the region's counter-IUUF strategy. A six-step strategic analysis tool was applied to evaluate Oceania's counter-IUUF strategy and identify actions that the United States and its partnering nations can take to strengthen its effectiveness.

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LIST OF ACRONYMS AND ABBREVIATIONS

AIS	automatic identification system
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CDS	catch documentation scheme
CFA	Compact of Free Association
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNMI	Commonwealth of the Northern Mariana Islands
CPI	consumer price index
DWFF	distant water fishing fleet
EEZ	exclusive economic zone
FOC	flag of convenience
FAO	Food and Agriculture Organization
FWS	Fish and Wildlife Service
GAO	Government Accountability Office
GFW	Global Fishing Watch
IATTC	Inter-American Tropical Tuna Commission
IPOA	International Plan of Action
IUUF	illegal, unreported, and unregulated fishing
MDA	maritime domain awareness
NGO	non-governmental organization
NOAA	National Oceanic and Atmospheric Administration
NSC	national security cutter
O-SIO-PB	objectives, strengths, improvements, opportunities, progress, barriers
PIFFA	Pacific Island Forum Fisheries Agency
PSMA	Agreement of Port State Measures
QUAD	Quadrilateral Security Dialogue
RFMO	regional fisheries management organization
SLL	southern longline

SWOT	strengths, weaknesses, opportunities, and threats
TLL	tropical longline
TOC	transnational organized crime
UAS	unmanned aircraft systems
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
USCG	United States Coast Guard
USV	unmanned surface vehicles
VHF	very high frequency
VMS	vessel monitoring system
WCPFC	Western and Central Pacific Fisheries Commission
WHO	World Health Organization
WTO	World Trade Organization

EXECUTIVE SUMMARY

Illegal, unreported, and unregulated fishing (IUUF) is a growing problem for the United States in the Western Pacific, especially in the Oceania region. Oceania extends from Australia to Hawaii and includes several U.S. territories. Overall, the region is vitally important to the United States from a military, economic, and diplomatic perspective. Although the epicenter of Oceania is 5,500 miles away from the U.S. mainland, IUUF activity in Oceania is a direct threat to U.S. homeland defense. China is using IUUF and a militarized fishing fleet to exert its influence in the Oceania region and is extending this influence across the Pacific, encroaching on the United States.[1] IUUF is also a direct threat to homeland security, especially economic security, the security effects from increased transnational organized crime, and border security.

Collectively, IUUF as a singular term represents detrimental fishing practices and is widespread throughout every region of the world. It is estimated that 15–30 percent of global fish catches are from IUUF practices.[2] Fishers resort to IUUF for many reasons. First and foremost, it can be extremely profitable—IUU fishers can easily ignore catch restrictions, sell fish at competitive prices, and bypass the costs associated with fishing legally such as licensing requirements.[3] Furthermore, even if fishers are caught conducting IUUF, the penalties incurred are not strong enough to deter their behavior. Next, there are very few barriers to entry—fishers can engage in illegal fishing with the skills and

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[1] Ian Urbina, "How China's Expanding Fishing Fleet Is Depleting the World's Oceans," *Yale Environment 360*, August 17, 2020, https://e360.yale.edu/features/how-chinas-expanding-fishing-fleet-is-depleting-worlds-oceans; Derek Grossman and Logan Ma, "A Short History of China's Fishing Militia and What It May Tell Us," *Maritime Issues*, April 5, 2020, 7, http://www.maritimeissues.com/uploaded/A%20Short%20History%20of%20China%E2%80%99s%20Fishing%20Militia%20%20and%20What%20it%20May%20Tell%20Us.pdf.

[2] National Intelligence Council, "Global Implications of Illegal, Unreported, and Unregulated (IUU) Fishing" (official memorandum, Washington, DC: Office of the Director of National Intelligence, 2016), https://irp.fas.org/nic/fishing.pdf.

[3] Centre for Economics and Business Research, *An Agent Based Model of IUU Fishing in a Two-State System with Information Sharing* (London: Centre for Economics and Business Research, 2020), https://cebr.com/wp-content/uploads/2021/03/An-agent-based-model-of-IUU-fishing-in-a-two-state-system-with-information-sharing-Cebr-report.pdf.

equipment they already possess.[4] Last, there is an overall low probability of detection. The oceans and waterways of the world are vast, fishery supply chains are complex, and there simply are not enough surveillance means and enforcement assets to monitor and enforce fishing regulations.

Oceania is vulnerable and susceptible to IUUF because of its geography, climate change, population growth, economic factors, proximity to overfished regions, and lack of governance and maritime enforcement assets. This vulnerability translates to instability in the region, which is especially concerning for the United States because Oceania is vitally important to U.S. defense strategies. Dating back to World War II, Oceania has played a critical role in U.S. defense. From the Pearl Harbor attack to the United States' retaliatory advancement on Japan through a Central Pacific island-hopping strategy, Oceanian Pacific islands played a vital role.[5] Oceanian islands play an equally important role today as part of the United States' island-chain strategy. This strategy includes several Oceanian islands under U.S. influence that act as barriers to Pacific expansion by China, Russia, and other Asian countries.[6] These islands include several United States territories and states—Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, and American Samoa—which play significant military, diplomatic, and economic roles for the United States. China is using IUUF, foreign aid, and trade to exert its influence in Oceania and disrupt the United States' island-chain strategy. As China expands its influence across Oceania, it is on an inevitable collision course with the United States.

The IUUF vulnerabilities of the region are also concerning from a homeland security perspective for the United States. From an economic security standpoint, IUUF is extremely challenging for the $5 billion U.S. fishing industry as more than 80 percent of

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[4] Centre for Economics and Business Research.

[5] James J. Wirtz, review of *Spies for Nimitz: Joint Military Intelligence in the Pacific War*, by Jeffrey M. Moore, *Naval War College Review* 58, no. 4 (2005): 153–55, http://www.jstor.org/stable/26396686.

[6] Sasha Davis, Lexi A. Munger, and Hannah J. Legacy, "Someone Else's Chain, Someone Else's Road: U.S. Military Strategy, China's Belt and Road Initiative, and Island Agency in the Pacific," *Island Studies Journal* 15, no. 2 (November 2020): 13–35, http://dx.doi.org.libproxy.nps.edu/10.24043/isj.104.

fish eaten domestically are imported.[7] Weak traceability regulations for these imports make it impossible to determine whether imported fish have been legally sourced, meaning that the United States is inadvertently supporting IUUF.[8] Next, transnational organized crime (TOC) resulting from IUUF also poses a security threat to the United States. Countries in Oceania rely on the fishing industry for survival. IUUF is destroying fish stocks and forcing fishing communities to turn to drug smuggling, human trafficking, piracy, and other illicit activities to make an income.[9] This increase in TOC leads to instability in the region, and expanding TOC networks have severe security implications for the United States and its territories, including smuggling threats, money laundering, government corruption, and the growth of terrorist organizations.[10] The last major homeland security concern is migration security issues for the United States that stem from IUUF in Oceania. Chiefly, some Oceanian fishers whose livelihood has been compromised by IUUF have turned to the United States and migration for survival, which leads to border security challenges, sustainability and economic growth concerns, and the potential importation of terrorists and criminals.[11]

While the region—especially superpowers, including the United States, Australia, France, and New Zealand—has made a concerted effort to combat IUUF, multiple gaps remain. The first involves transshipments involving the use of refrigerated cargo ships to transfer fish at sea, which masks IUUF practices. Second, the use of government subsidies

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[7] U.S. Coast Guard, *Illegal, Unreported, and Unregulated Fishing Strategic Outlook* (Washington, DC: U.S. Coast Guard, 2020), https://www.uscg.mil/iuufishing/.

[8] Kristina Boerder, Nathan Miller, and Boris Worm, "Global Hot Spots of Transshipment of Fish Catch at Sea," *Science Advances* 4, no. 7 (2018), https://doi.org/10.1126/sciadv.aat7159.

[9] U.S. Coast Guard, *Strategic Outlook*.

[10] National Security Council, "Transnational Organized Crime: A Growing Threat to National and International Security," Obama White House Archives, accessed January 2, 2021, https://obamawhitehouse.archives.gov/administration/eop/nsc/transnational-crime/threat; "Implications of Transnational Organized Crime (TOC)," ASIS International, January 3, 2019, http://www.asisonline.org/publications--resources/news/blog/implications-of-transnational-organized-crime-toc/.

[11] E. J. Moore and J. W. Smith, "Climatic Change and Migration from Oceania: Implications for Australia, New Zealand and the United States of America," *Population and Environment* 17, no. 2 (1995): 105–22, http://www.jstor.org/stable/27503450; Michael Humphrey, "Migration, Security and Insecurity," *Journal of Intercultural Studies* 34, no. 2 (2013): 178–95, https://doi.org/10.1080/07256868.2013.781982.

for fishing decreases fish stocks and increases IUUF practices. The third gap relates to supply chain traceability and the challenge for consumers to gauge whether their fish has been sustainably and legally sourced. Fourth, open-registry states—where fishing vessels can register with a country, even if it is not their home of residency—allow fishers to bypass IUUF regulations. Fifth, the overall lack of appropriate sanctions and enforcement for IUUF activity does little to deter IUUF behavior. Sixth, counter-IUUF monitoring, control, and surveillance are mostly inadequate in the Oceania region. Seventh, the United States' refusal to ratify the United Nations Convention on the Law of the Sea (UNCLOS) limits the overall effectiveness of the largest maritime international agreement and counter-IUUF mechanism. Eighth, information sharing between Oceanian territories is weak and hampers counter-IUUF practices. Ninth, fishing crews that want to alert authorities about IUUF activity lack whistleblowing regulations and protections. Tenth, several technological shortfalls hamper counter-IUUF strategies.

This thesis applied a six-step strategic analysis framework to evaluate these gaps and provide steps for the United States and its partnering nations to develop a more robust strategy to combat IUUF. The strategic recommendations and associated feasibility and risk concerns are summarized in the following table.

Table 1. Key Recommendations, Feasibility, and Risk Analysis.

Recommendation	**Feasibility and Risk (Political, Economic, Social, Technological)**
Superpower alliance and reliance	Feasible and low risk across all dimensions.
Improved transshipment policies	Economic feasibility challenges as limiting transshipments would take a toll on the cost structure of major fisheries. Technological feasibility challenges in trying to detect unreported transshipment activity.
Increased regional collaboration	While the technology certainly exists for this level of collaboration, there are political and social-equity feasibility challenges. Certain countries may be wary of sharing proprietary data, and if every country is not willing to fully share, it may create dissent and a lack of transparency.

Recommendation	Feasibility and Risk (Political, Economic, Social, Technological)
U.S. UNCLOS ratification	American leadership has historically viewed it as an economic and political risk, which still carries weight for present-day decision-making, thus restricting feasibility.
Whistleblowing protections	Social feasibility challenges for the reputation and trust of whistleblowers if their identities are not protected.
Sanctions	Feasible and low risk across all dimensions. Sanctions target only IUUF behavior, an acceptable political risk given that populations in the region want sustainable and protected fish stocks.
Regulation support	Politically challenging to encourage countries to support regulations they deem harmful. It might require political capital better reserved for more pressing regional issues.
Trade restrictions on flags of convenience (FOCs)	Feasible and low risk across all dimensions. The technology already exists to track these vessels, and it would be uneconomical for only those vessels operating under FOCs, which would be an acceptable risk for political leaders and the general regional population.
Emerging technology reliance	Economic risk considerations include cost–benefit analyses for investing in unproven technologies or relying on current technology.
NGO partnerships	Feasible and low risk across all dimensions.
Traceability mechanisms	Technology barriers for implementation. The technology exists, but its implementation on a large scale could make it infeasible. Socially feasible using meat, textiles, lumber, diamonds, and other industries as benchmarks.

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I. INTRODUCTION

Although the epicenter of Oceania lies 5,500 miles away from the U.S. mainland, illegal, unreported, and unregulated fishing (IUUF) in Oceania is a direct threat to U.S. homeland defense and security. China is affecting U.S. homeland defense by using IUUF and a militarized fishing fleet to exert its influence in the Oceania region and has been extending its influence across the Pacific, encroaching on Hawaii and the United States' Pacific territories.[1] IUUF is also a direct threat to U.S. homeland security for several reasons. First, IUUF has a negative impact on the U.S. economy by creating an unfair market for domestic fishers.[2] Next, IUUF has been linked to increased transnational organized crime that negatively affects U.S. homeland security with increased smuggling threats, money laundering, government corruption, and the growth of terrorist organizations.[3] Last, the migration security implications of IUUF, stemming from depleting fish stocks, have left thousands of people without jobs and their main food resource, thus increasing migration to the United States.[4]

A. PROBLEM STATEMENT

The Department of Defense defines homeland defense as "the protection of U.S. territory, sovereignty, domestic population, and critical infrastructure against external

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[1] Derek Grossman and Logan Ma, "A Short History of China's Fishing Militia and What It May Tell Us," Maritime Issues, April 5, 2020, http://www.maritimeissues.com/uploaded/A%20Short%20History%20of%20China%E2%80%99s%20Fishing%20Militia%20%20and%20What%20it%20May%20Tell%20Us.pdf; Daniel Pauly et al., "China's Distant-Water Fisheries in the 21st Century," *Fish and Fisheries* 15, no. 3 (2013): 474–88, https://onlinelibrary.wiley.com/doi/abs/10.1111/faf.12032.

[2] U.S. Coast Guard, *Illegal, Unreported, and Unregulated Fishing Strategic Outlook* (Washington, DC: U.S. Coast Guard, 2020), https://www.uscg.mil/iuufishing/.

[3] Ardi Hendharto, "Understanding IUU Fishing as Transnational Organized Crime with Special Example of Benjina Case," *Kajian* 23, no. 2 (2020): 95–110, http://jurnal.dpr.go.id/index.php/kajian/article/view/1876; National Security Council, "Transnational Organized Crime: A Growing Threat to National and International Security," Obama White House Archives, accessed January 2, 2021, https://obamawhitehouse.archives.gov/administration/eop/nsc/transnational-crime/threat.

[4] Andrés M. Cisneros-Montemayor et al., "A Global Estimate of Seafood Consumption by Coastal Indigenous Peoples," *PLOS One* 11, no. 12 (2016): e0166681, https://doi.org/10.1371/journal.pone.0166681.

threats and aggression."[5] Based on this definition, China's encroachment on the United States via IUUF is a chief homeland defense concern. China is the main contributor to IUUF as it uses thousands of fishing vessels to illegally fish throughout Oceania, stripping the region of its vital fishing resources.[6] As resources are depleted, China is moving farther across the Pacific to find more resources and is on an inevitable collision course with the United States. The problem has been further exacerbated since China made its fishing fleet a branch of its military—the Armed Fishing Militia—to stake sovereign claims wherever the fleet actively fishes.[7] China has a long history of disregarding international law and making illegal sovereign claims to grow its empire.[8]

As China spreads its influence across Oceania, it encroaches on the U.S. Pacific island territories, a region vitally important to the United States from a military, economic, and diplomatic perspective. According to CHDS graduate Colby Stanton, from a military standpoint, the U.S. Pacific territories serve as "critical infrastructure and logistical bases in a strategically and tactically important area of the world" by providing a buffer zone for the continental United States from Indo-Pacific powers.[9] From an economic lens, the U.S. Pacific territories have a combined 1.3 million square miles of exclusive economic zone (EEZ).[10] EEZ jurisdiction translates to full control over all natural resources therein.[11]

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[5] U.S. Air Force, *Homeland Operations*, Air Force Doctrine Document 2–10 (Washington, DC: U.S. Air Force, 2006), 58, https://fas.org/irp/doddir/usaf/afdd2-10.pdf.

[6] Ian Urbina, "How China's Expanding Fishing Fleet Is Depleting the World's Oceans," *Yale Environment 360*, August 17, 2020, https://e360.yale.edu/features/how-chinas-expanding-fishing-fleet-is-depleting-worlds-oceans.

[7] Grossman and Ma, "A Short History of China's Fishing Militia," 7.

[8] Zhao Hong, "The South China Sea Dispute and China-Asean Relations," *Asian Affairs* 44, no. 1 (2013): 27–43, https://doi.org/10.1080/03068374.2012.760785.

[9] Colby Stanton, "Punching Above Their Weight: The Homeland Security Contributions of the U.S. Pacific Territories," *Homeland Security Affairs* 15 (March 2019), https://www.hsaj.org/articles/15305.

[10] Alexander B. Gray and Douglas W. Domenech, "U.S. Territories: The Frontlines of Global Competition with China," RealClear Defense, March 11, 2021, https://www.realcleardefense.com/articles/2021/03/11/us_territories_the_frontlines_of_global_competition_with_china_767683.html.

[11] "What Is the EEZ?," National Oceanic and Atmospheric Administration, February 26, 2021, https://oceanservice.noaa.gov/facts/eez.html.

Last, the territories serve as vital diplomatic ambassadors with neighboring island countries throughout the Oceania region.[12] Thus, China's encroachment on the U.S. Pacific territories is a clear homeland defense issue as it poses a threat to U.S. territory, sovereignty, and critical infrastructure.

The 2010 *Quadrennial Homeland Security Review* defines homeland security as "a concerted national effort to ensure a homeland that is safe, secure, and resilient against terrorism and other hazards where American interests, aspirations, and ways of life can thrive."[13] IUUF in Oceania threatens U.S. homeland security in three major ways: it undermines U.S. economic security, leads to increased transnational organized crime (TOC), and creates a migration issue. From an economic security standpoint, IUUF wreaks havoc on the $5 billion U.S. fishing industry.[14] More than 80 percent of fish eaten domestically are imported.[15] Weak traceability regulations and transshipments at sea make it impossible to determine whether imported fish have been legally sourced.[16] Thus, the United States is inadvertently supporting IUUF. Furthermore, the United States is forcing domestic fishers who legally source their catch into direct competition with illegal fishers. U.S. fishers are losing an estimated $1 billion in revenue every year in this unfair competition.[17] In terms of supply and demand, illegal catches increase the volume of imports, leading to lower overall prices with which U.S. fishers must compete.[18]

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[12] Stanton, "Punching Above Their Weight."

[13] Department of Homeland Security, *Quadrennial Homeland Security Review Report* (Washington, DC: Department of Homeland Security, 2010), 13, https://www.dhs.gov/publication/2010-quadrennial-homeland-security-review-qhsr.

[14] U.S. Coast Guard, *Strategic Outlook*.

[15] U.S. Coast Guard.

[16] Kristina Boerder, Nathan Miller, and Boris Worm, "Global Hot Spots of Transshipment of Fish Catch at Sea," *Science Advances* 4, no. 7 (2018), https://doi.org/10.1126/sciadv.aat7159.

[17] World Wildlife Fund, *An Analysis of the Impact of IUU Imports on U.S. Fishermen* (Washington, DC: World Wildlife Fund, 2016), https://www.worldwildlife.org/publications/an-analysis-of-the-impact-of-iuu-imports-on-u-s-fishermen.

[18] World Wildlife Fund.

TOC resulting from IUUF also poses a security threat to the United States. Countries in Oceania rely on the fishing industry for survival. IUUF is destroying fish stocks and forcing fishing communities to turn to drug smuggling, human trafficking, piracy, and other illicit activity to make an income.[19] This increase in TOC leads to instability in the region, and expanding TOC networks have severe security implications for the United States and its territories, including smuggling threats, money laundering, government corruption, and the growth of terrorist organizations.[20]

Last, IUUF poses a migration security issue for the United States. Chiefly, some Oceania fishers whose livelihood has been compromised by IUUF have turned to migration for survival and are seeking out new places to live and make a living. Migration destinations include the United States and U.S. territories, leading to border security challenges, sustainability and economic growth concerns, and the potential importation of terrorists and criminals.[21]

Researching and advocating counter-IUUF strategies in Oceania is a necessity because IUUF activity in the region has severe consequences for the United States and several maritime partners. Research is needed to fully understand what the United States and its allies have done to counter the threat and what else needs to happen to eliminate IUUF in Oceania. According to Poseidon Aquatic Resource Management and the Global Initiative against Transnational Organized Crime, despite having a massive maritime jurisdiction and being vulnerable to IUUF threats, the United States has one of the best response strategies for reducing and containing IUUF domestically.[22] Developing

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[19] U.S. Coast Guard, *Strategic Outlook*.

[20] National Security Council, "Transnational Organized Crime"; "Implications of Transnational Organized Crime," ASIS International, January 3, 2019, http://www.asisonline.org/publications--resources/news/blog/implications-of-transnational-organized-crime-toc/.

[21] E. J. Moore and J. W. Smith, "Climatic Change and Migration from Oceania: Implications for Australia, New Zealand and the United States of America," *Population and Environment* 17, no. 2 (1995): 105–22, http://www.jstor.org/stable/27503450; Michael Humphrey, "Migration, Security and Insecurity," *Journal of Intercultural Studies* 34, no. 2 (2013): 178–95, https://doi.org/10.1080/07256868.2013.781982.

[22] G. Macfadyen et al., *The Illegal, Unreported and Unregulated Fishing Index* (Poseidon Aquatic Resource Management and Global Initiative against Transnational Organized Crime, 2019), https://global initiative.net/wp-content/uploads/2019/02/IUU-Fishing-Index-Report-web-version.pdf.

countries in Oceania cannot counter the threat in the same way for myriad reasons, including a lack of resources, governance, and political willpower. Thus, the United States and its allies have initiated mitigating efforts to curb IUUF in the region; however, there is no comprehensive review of these initiatives, and it is unclear how effective they are.

U.S. Coast Guard Commandant Karl Schultz announced in September 2020 that IUUF has supplanted piracy as the leading global maritime security threat because it "erodes both regional and national security, undermines maritime rules-based order, jeopardizes food access and availability, and destroys legitimate economies."[23] A 2019 fishing index by the Global Initiative against Transnational Organized Crime indicates that Oceania is the most vulnerable region in the world to IUUF, based on the size of its EEZ, agreement over maritime boundaries, authorization for foreign vessels to operate in the area, and dependency on fish for protein.[24] Although Oceania IUUF activity is several thousand miles from the United States, the vulnerabilities of the region and the associated homeland defense and security implications for the United States are grave. Research into mitigating IUUF strategies in the region will serve as the foundation for decisive and mandatory corrective action.

B. RESEARCH QUESTIONS

1. How can the United States and its partnering nations better address the IUUF threat in Oceania?
2. What have the United States and its partnering nations done so far to address the IUUF threat in Oceania?
3. How effective have those efforts been?
4. What are potential tenets of a revised regional strategy?

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[23] U.S. Coast Guard, *Strategic Outlook*, 2.

[24] Macfadyen et al., *Fishing Index*.

C. THESIS ROADMAP

This thesis is organized into six chapters. Chapter II outlines the research design and methods that were used to address the research questions. Chapter III introduces foundational definitions of concepts referenced throughout the entire thesis and provides a literature review that identifies gaps in existing research. Chapter IV describes the global IUUF problem, focusing specifically on its effect in Oceania. Chapter V contains an analysis of Oceania's IUUF mitigation strategy, and Chapter VI evaluates Oceania's IUUF mitigation strategy and provides recommendations for improvement.

II. RESEARCH DESIGN AND METHODS

The primary objective of this thesis is to present thorough research on the counter-IUUF strategy in Oceania and the gaps that exist therein. The research serves as the basis for a revised strategy that the region should employ. This unique compilation of information about Oceania and IUUF into one comprehensive document also serves as a foundation for further research, studies, strategy formulation, and policy development. A secondary objective is to elevate the conversation of IUUF as a security concern for the United States. Specifically, this thesis focuses on Oceania, one of the most troublesome geographic areas for IUUF, an area that poses significant security and defense implications for the United States.

A. DATA SOURCES

Prior to preliminary data gathering, I attended several internal Coast Guard briefings on IUUF in Oceania and an IUUF conference hosted by the Jack Gordon Institute for Public Policy at Florida International University on February 3, 2021. These events provided an initial general awareness of key topics and terms. From there, I spent several weeks using internet search engines to identify what sources and conversations existed on these key topics and terms. I sifted through and skimmed hundreds of sources to discover which were most relevant to my topic. The findings resulted in several research pieces, scientific studies, and government documents. Table 1 summarizes this preliminary research.

Table 1. Preliminary Data Source Summary.

Search Term	Results/Filters	Results/Key Documents (Non-Exhaustive)
"Illegal, unreported, unregulated fishing Oceania." Iterations of this search also put Oceania in quotation marks to get the exact phrase in the search results.	46,900 Results. Skimmed top sources for unique research, well-cited sources, reputable domains, and connections of IUUF to homeland security.	• *The Illegal, Unreported, Unregulated Fishing Index*[25] • *Illegal, Unreported, and Unregulated Fishing: Pilot Program*[26] • "Global Implications of Illegal, Unreported, and Unregulated (IUU) Fishing"[27]
"Illegal, unreported, and unregulated fishing Pacific islands." Used the term "Pacific islands" because it is often used instead of "Oceania" to describe the region.	454,000 Results. Skimmed top sources for unique research, well-cited sources, and reputable domains.	• *Towards the Quantification of IUU Fishing*[28]
"Illegal, unreported, and unregulated fishing security threat." This search term was used to home in on the homeland security implications of IUUF.	340,000 Results. Skimmed top sources for unique research, well-cited sources, reputable domains.	• *Illegal, Unreported, and Unregulated Fishing Strategic Outlook*[29]

[25] Macfadyen et al., *Fishing Index*.

[26] U.S. Coast Guard, *Illegal, Unreported, and Unregulated Fishing: Pilot Program* (Washington, DC: U.S. Coast Guard, 2019), https://www.dhs.gov/sites/default/files/publications/uscg_-_illegal_unreported_and_unregulated_fishing_-_pilot_program.pdf.

[27] National Intelligence Council, "Global Implications of Illegal, Unreported, and Unregulated (IUU) Fishing" (official memorandum, Washington, DC: Office of the Director of National Intelligence, 2016), https://irp.fas.org/nic/fishing.pdf.

[28] MRAG Asia Pacific, *Towards the Quantification of Illegal, Unreported, and Unregulated (IUU) Fishing in the Pacific Islands Region* (Toowong, Australia: MRAG Asia Pacific, 2016), https://www.ffa.int/files/FFA%20Quantifying%20IUU%20Report%20-%20Final.pdf.

[29] U.S. Coast Guard, *Strategic Outlook*.

Search Term	Results/Filters	Results/Key Documents (Non-Exhaustive)
"IUU fishing" for general understanding of the practice.	6,120,000 Results. Relied on reputable domains.	• IUUF website hosted by Food and Agriculture Organization of the United Nations[30] • IUUF website hosted by U.S. Department of State[31] • "How to End Illegal Fishing" by Pew Charitable Trusts[32] • "The National Security Imperative to Tackle IUUF" by Brookings[33]
"Illegal fishing mitigation" to understand existing general mitigation strategies. Did not use the full IUU term; instead sought broader search results with "illegal."	441,000 Results. Relied on reputable domains and well-cited sources.	• "How to End Illegal Fishing" by Pew Charitable Trusts[34]

From the documents listed in Table 1, I looked through works cited to extend my pool of resources. From these extended sources, coupled with another IUUF conference, hosted by the American Security Project on April 6, 2021, I created an initial draft outline comprising three main parts: Oceania, mitigation progress, and mitigation gaps. Table 2 summarizes the data sources gathered for these three areas.

30 "Illegal, Unreported and Unregulated (IUU) Fishing: FAO Compliance Agreement," Food and Agriculture Organization of the United Nations, accessed February 10, 2022, https://www.fao.org/iuu-fishing/international-framework/fao-compliance-agreement/en/.

31 "Illegal, Unreported, and Unregulated Fishing," Department of State, accessed February 26, 2022. https://www.state.gov/key-topics-office-of-marine-conservation/illegal-unreported-and-unregulated-fishing/.

32 "How to End Illegal Fishing," Pew Charitable Trusts, December 12, 2017, https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2017/12/how-to-end-illegal-fishing.

33 Michael Sinclair, "The National Security Imperative to Tackle Illegal, Unreported, and Unregulated Fishing," Brookings, January 25, 2021, https://www.brookings.edu/blog/order-from-chaos/2021/01/25/the-national-security-imperative-to-tackle-illegal-unreported-and-unregulated-fishing/.

34 Pew Charitable Trusts, "How to End Illegal Fishing."

Table 2. Main Topics/Data Source Summary.

Search Terms (non-exhaustive)	Discovery Database	General Source Type and Key Sources
1. Oceania		
Region specifics.	Search engines	• Intergovernmental organization documents, specific country websites.
China encroachment; topics included distant water fishing fleet, South China Sea depletion, armed forces maritime militia, subsidies, foreign aid.	NPS Library and Google Scholar	• Journal articles, government documents, and research think tank publications. • "Impact of the South China Sea Tribunal Ruling."[35] • *China's Engagement in Pacific Islands: Implications for the United States*.[36] • "The Risks of China's Ambitions in the South Pacific."[37]
Importance to United States; topics included island-chain strategy, World War II, U.S. territories.	Search engines, Google Scholar, and NPS Library	• Government documents, CHDS theses, Government Accountability Office (GAO) reports. • "Punching Above Their Weight."[38]
2. Mitigation Efforts		
Regulatory; topics included regional fishery management organizations, Port State Measures Agreement, United Nations Convention on the Law of the Sea (UNCLOS), UN Fish Stocks Agreement.	Search engines	• International and intergovernmental organization documents and websites. • Food and Agriculture Organization of the United Nations' website.[39]

[35] Amy Searight, "Impact of the South China Sea Tribunal Ruling," *Hampton Roads International Security Quarterly* (2017): 109, ProQuest.

[36] Ethan Meick, Michelle Ker, and Han May Chan, *China's Engagement in the Pacific Islands: Implications for the United States* (Washington, DC: U.S.-China Economic and Security Review Commission, 2018), https://www.uscc.gov/sites/default/files/Research/China-Pacific%20Islands%20Staff%20Report.pdf.

[37] Jonathan Pryke, "The Risks of China's Ambitions in the South Pacific," Brookings, July 20, 2020, https://www.brookings.edu/articles/the-risks-of-chinas-ambitions-in-the-south-pacific/.

[38] Stanton, "Punching Above Their Weight."

[39] "Illegal, Unreported and Unregulated (IUU) Fishing," Food and Agriculture Organization of the United Nations, accessed February 26, 2022, https://www.fao.org/iuu-fishing/en/.

Search Terms (non-exhaustive)	Discovery Database	General Source Type and Key Sources
Cooperation; topics included bilateral and multilateral agreements, ship rider agreements, Quadrilateral Security Dialogue.	NPS Library and search engines	• Journal articles, domestic military websites, foreign government documents.
Technology; topics included automatic identification system (AIS), vessel monitoring system (VMS), unmanned autonomous surface vehicles, unmanned aircraft, satellite imagery.	Search engines	• Government web pages and non-governmental organization documents. • U.S. Coast Guard's AIS web page.[40] • "Our Technology."[41]
3. Mitigation Gaps		
Transshipments; topics included distant water fishing fleets, Regional Fisheries Management Organization response.	NPS Library	• Journal articles. • "Moratorium on Transshipment on the High Seas."[42] • "Global Hot Spots of Transshipment."[43]
Subsidies; topics included World Trade Organization.	NPS Library	• Journal articles. • *Fisheries Subsidies, Sustainable Development and the WTO.*[44] • "How To Restore the Balance in Sustainable Fisheries."[45]

[40] "Automatic Identification System Overview," U.S. Coast Guard Navigation Center, accessed February 26, 2022, https://www.navcen.uscg.gov/?pageName=aismain.

[41] "Our Technology," Global Fishing Watch, June 15, 2018, https://globalfishingwatch.org/our-technology/.

[42] Christopher Ewell et al., "Potential Ecological and Social Benefits of a Moratorium on Transshipment on the High Seas," *Marine Policy* 81 (2017): 293–300, https://nyuscholars.nyu.edu/en/publications/potential-ecological-and-social-benefits-of-a-moratorium-on-trans.

[43] Boerder, Miller, and Worm, "Global Hot Spots of Transshipment."

[44] Anja von Moltke, *Fisheries Subsidies, Sustainable Development and the WTO* (London: Routledge, 2010), https://doi.org/10.4324/9781849776714.

[45] Benjamin Sovacool, "A Game of Cat and Fish: How to Restore the Balance in Sustainable Fisheries Management," *Ocean Development and International Law* 40 (2009), https://doi.org/10.1080/00908320802631486.

Search Terms (non-exhaustive)	Discovery Database	General Source Type and Key Sources
Traceability; topics included fishery supply chain, catch documentation schemes, labeling.	NPS Library and Google Scholar	• Intergovernmental organization documents and journal articles. • *Seafood Traceability Systems*.[46] • "U.S. Seafood Traceability as Food Law."[47]
Flags of convenience.	NPS Library	• Journal Articles, published non-governmental datasets. • "Fishing under Flags of Convenience."[48]
Sanctions; topics included fish/seafood consumer price history, enforcement mechanisms.	NPS Library, search engines	• Research reports, domestic and foreign government websites and documents, journal articles. • *Towards the Quantification of IUU Fishing*.[49] • "To Fight Illegal Fishing, Follow the Money."[50]
Monitoring; topics included fishing vessel identification, observer programs.	Search engines, NPS Library, Google Scholar	• International and non-governmental organization documents, research reports, intergovernmental strategy documents. • *Towards the Quantification of IUU Fishing*.[51]

[46] Melania Borit and Petter Olsen, *Seafood Traceability Systems: Gap Analysis of Inconsistencies in Standards and Norms*, FAO Fisheries and Aquaculture Circular No. 1123 (Rome: Food and Agriculture Organization of the United Nations, 2016).

[47] Anastasia Telesetsky, "U.S. Seafood Traceability as Food Law and the Future of Marine Fisheries," *Environmental Law* 47, no. 3 (2017): 765–95, https://law.lclark.edu/live/files/24725-13tojcitelesetsky-colorpdf.

[48] Elizabeth R. DeSombre, "Fishing under Flags of Convenience: Using Market Power to Increase Participation in International Regulation," *Global Environmental Politics* 5, no. 4 (2005), https://doi.org/10.1162/152638005774785507.

[49] MRAG Asia Pacific, Towards the Quantification of IUU Fishing.

[50] Thomas Huw, "To Fight Illegal Fishing, Follow the Money," Pew Charitable Trusts, July 19, 2018, https://pew.org/2I2CdcK.

[51] MRAG Asia Pacific, Towards the Quantification of IUU Fishing.

Search Terms (non-exhaustive)	Discovery Database	General Source Type and Key Sources
		• *Regional Monitoring, Control and Surveillance Strategy*.[52]
UNCLOS; topics included arbitral tribunal rulings.	Search engines	• Intergovernmental organization documents, think tank publications.
Coordination.	NPS Library, Google Scholar, search engines, IUUF Conference	• Research reports, non-governmental organization documents, intergovernmental strategy documents. • *An Agent Based Model of IUU Fishing*.[53] • *Regional Monitoring, Control and Surveillance Strategy*.[54]
Whistleblowing; topics included incentives.	Search engines	• GAO reports, domestic and foreign government documents. • *Combating Wildlife Trafficking*.[55]
Technology; topics included AIS, VMS.	Search engines	• Non-governmental organization documents, domestic government documents.

[52] Pacific Islands Forum Fisheries Agency, *Regional Monitoring, Control and Surveillance Strategy (RMCSS) 2018–2023* (Honiara, Solomon Islands: Pacific Islands Forum Fisheries Agency, 2018), https://www.ffa.int/system/files/RMCSS%20%202%20August%20web%20version.pdf.

[53] Centre for Economics and Business Research, *An Agent Based Model of IUU Fishing in a Two-State System with Information Sharing* (London: Centre for Economics and Business Research, 2020), https://cebr.com/wp-content/uploads/2021/03/An-agent-based-model-of-IUU-fishing-in-a-two-state-system-with-information-sharing-Cebr-report.pdf.

[54] Pacific Islands Forum Fisheries Agency, Regional Monitoring, Control and Surveillance Strategy.

[55] Anne-Marie Fennell, *Combating Wildlife Trafficking*, GAO-18-279 (Washington, DC: Government Accountability Office, 2018), https://www.gao.gov/assets/gao-18-279.pdf.

B. ANALYSIS PROCESS

The analytical process for this thesis followed Bloom's taxonomy—moving from application, to analysis, to synthesis, to evaluation—and is summarized in Figure 1.[56]

[56] *Britannica*, s.v. "Bloom's taxonomy," accessed January 26, 2022, https://www.britannica.com/topic/Blooms-taxonomy.

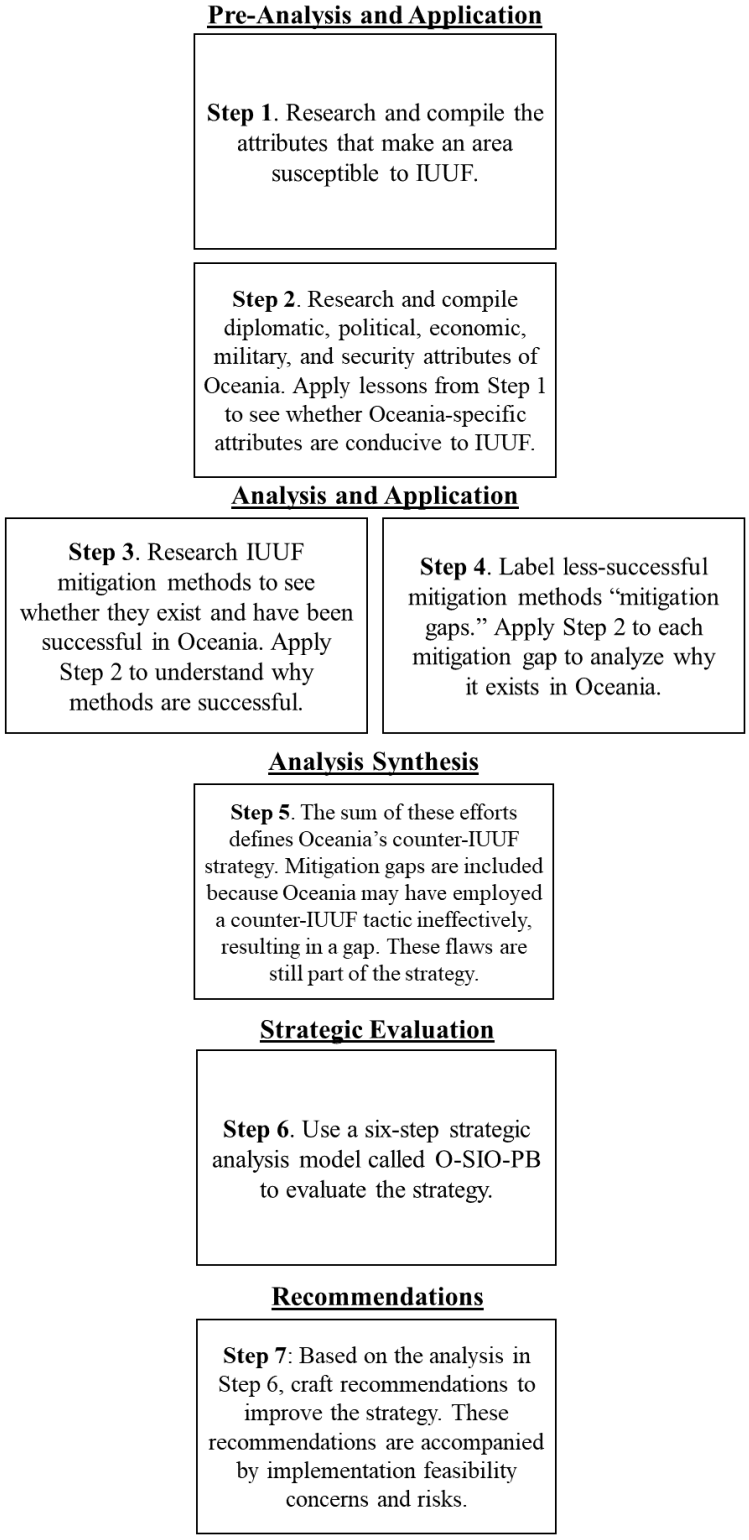

Figure 1. Analysis Process.

In the first step of the process, I researched and compiled attributes of areas across the world that were susceptible to IUUF. Next, I wanted to see whether these attributes were prevalent in Oceania to determine how vulnerable the region is to IUUF. Thus, I researched and compiled the specific diplomatic, political, economic, military, and security attributes of Oceania and applied what I learned from the first step to determine the region's IUUF susceptibility. The third step involved researching key IUUF mitigation methods from around the world. I explored whether these methods existed in Oceania and, if so, whether they were regarded as effective based on a collection of studies, journal articles, and research reports. If counter-IUUF methods were successful, I applied what I learned from the second step, looking at Oceania's attributes to understand why the methods worked. In the fourth step, I concentrated on IUUF mitigation methods that were not effective in the region and again applied what I learned from the second step to understand the mitigation gap. In the fifth step, I combined all the mitigation methods I discovered in the region, regardless of their effectiveness. The summation of these methods outlined the current counter-IUUF strategy in Oceania.

The sixth step of the analytical process involved applying a six-step strategic planning tool called the objectives, strengths, improvements, opportunities, progress, barriers (O-SIO-PB) framework to evaluate Oceania's counter-IUUF strategy. This analytical model is a variation of the strengths, weaknesses, opportunities, and threats (SWOT) model, which is part of a planning process that helps organizations examine internal and external factors to identify acceptable strategic risks given desired goals.[57] A SWOT model is also frequently used outside organizational strategies.[58] For instance, numerous scholarly publications have used SWOT models to analyze countries' strategies

[57] Edward Fields, *The Essentials of Finance and Accounting for Nonfinancial Managers*, 3rd ed. (New York: American Management Association, 2016); Thomas Chermack and Bernadette Kasshanna, "The Use and Misuse of SWOT Analysis and Implications for HRD Professionals," *Human Resource Development International* 10, no. 4 (2007).

[58] F. David, *Strategic Management*, 6th ed. (Upper Saddle River, NJ: Prentice Hall, 1997).

on a variety of topics.[59] Furthermore, many experts agree that SWOT analysis alone may give an incomplete picture of a strategy's risk portfolio and courses of action.[60] These scholars maintain it is also necessary to look at the political, economic, social, and technological factors that might uncover gaps or opportunities.[61] For instance, while SWOT analysis might uncover a strategic opportunity, it might prove infeasible given technological limitations.

According to Thomas Chermack and Bernadette Kasshanna, who researched the misuses of SWOT analysis, another key weakness is that organizations typically "ignore the implementation stage that would help them formulate strategies to achieve their objectives."[62] In other words, SWOT is used as a tool for starting the conversation but not turning the conversation into actionable plans. Moreover, SWOT is typically used to evaluate a strategy's current position.[63] Therefore, the SWOT model's focus on current factors lacks the direction to encourage future objectives, thus hindering the strategy.

The O-SIO-PB model uses elements of SWOT, but its action-oriented focus yields an executable plan as the final deliverable. This analysis starts with identifying the counter-IUUF *objectives* and strategic goals for the region. These objectives and goals are then linked to the region's counter-IUUF *strengths*, *improvements*, and *opportunities*. If the region can rely on its strengths, improve in weak areas, and capitalize on certain opportunities, these levers provide the baseline roadmap to accomplish the strategic

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[59] Chuanmin Shuai, "China's New Cooperation Strategy with the World Food Programme: A SWOT Analysis," *Outlook on Agriculture* 37, no. 2 (2008): 111–17, https://doi.org/10.5367/000000008784648898; Gulin Dede and Mehmet Akcay, "Technology Foresight in Practice: A Proposal for Turkish Space Vision," *Space Policy* 35 (February 2016): 1–5, https://www.sciencedirect.com/science/article/pii/S0265964615300138?via%3Dihub; Yong-Jeong Kim and Jaehun Park, "A Sustainable Development Strategy for the Uzbekistan Textile Industry: The Results of a SWOT-AHP Analysis," *Sustainability* 11, no. 17 (January 2019): 4613, https://doi.org/10.3390/su11174613.

[60] Kay Kendall, "The Increasing Importance of Risk Management in an Uncertain World," *Journal for Quality and Participation* 40, no. 1 (2017); Chermack and Kasshanna, "The Use and Misuse of SWOT Analysis."

[61] Kendall, "Risk Management in an Uncertain World."

[62] Chermack and Kasshanna, "The Use and Misuse of SWOT Analysis," 393.

[63] Adam Koch, "SWOT Does Not Need to Be Recalled: It Needs to Be Enhanced," *B Quest* 1, no. 1 (2000): 1–14, https://researchbank.swinburne.edu.au/items/904a3f97-a7ac-4fa9-b4ae-20bef8404a02/1/.

objectives. This roadmap is then set up with *progress metrics* to track results. Last, the model requires the identification of potential *barriers* and distractions that might hinder progress. While the SWOT *threats* component focuses solely on external threats, the O-SIO-PB model's *barriers* focus on both internal and external disruptions that may hinder the strategy.

Throughout the entire O-SIO-PB process, and documented as the final step of the analytical process for this thesis, each element of the action plan was evaluated from a political, economic, social, and technological feasibility and risk lens. O-SIO-PB also required constant reassessment during implementation. For instance, acting on an opportunity might have created additional threats or generated competition with resources already allocated to a strength. As Oceania's counter-IUUF strategy is extremely dynamic, O-SIO-PB had to be applied more than once to avoid a static action plan (see Figure 2).

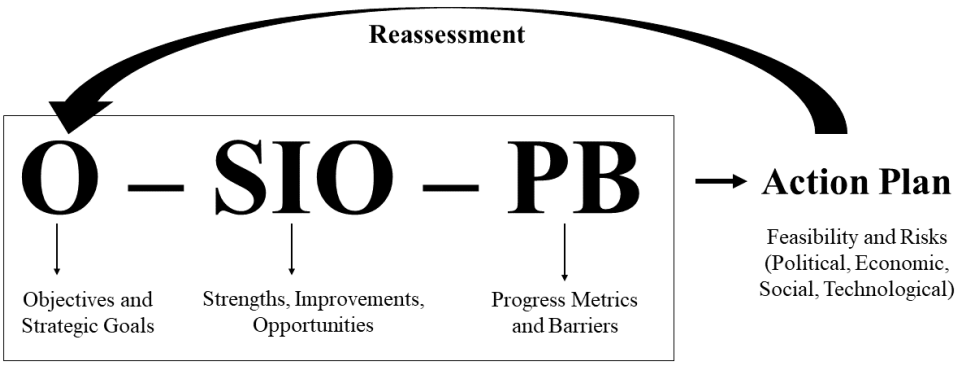

Figure 2. Evaluative Framework.

III. DEFINITIONS AND LITERATURE REVIEW

The first section of this chapter outlines key definitions that provide a foundation for this thesis and are referenced often throughout the rest of the text. The second section of this chapter is dedicated to the literature review, which outlines the research, topics, and conversations around Oceania IUUF used to identify remaining gaps in the research.

A. DEFINITIONS

1. Illegal, Unreported, and Unregulated Fishing

IUUF as a concept has been around for decades, first introduced in 1997 by the Commission for the Conservation of Antarctic Marine Living Resources due to the illicit fishing taking place near Antarctica.[64] In response to these events, the Food and Agriculture Organization (FAO) of the United Nations created a global strategy called "The International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing." This plan outlined the definitions of IUUF as follows:

- Illegal Fishing: refers to activities conducted by national or foreign vessels in waters under the jurisdiction of a State, without the permission of that State, or in contravention of its laws and regulations. Conducted by vessels flying the flag of States that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the States are bound, or relevant provisions of the applicable international law; or in violation of national laws or international obligations, including those undertaken by cooperating States to a relevant regional fisheries management organization.[65]

- Unreported Fishing: refers to fishing activities which have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or

[64] Joseph Christensen, "Illegal, Unreported and Unregulated Fishing in Historical Perspective," in *Perspectives on Oceans Past*, ed. Kathleen Schwerdtner-Manez and Bo Poulsen (New York: Springer, 2016), 133–53.

[65] Food and Agriculture Organization of the United Nations, "International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing," *Journal of International Wildlife Law & Policy* 4, no. 2 (January 2001): 186, https://doi.org/10.1080/13880290109353986.

undertaken in the area of competence of a relevant regional fisheries management organization which have not been reported or have been misreported, in contravention of the reporting procedures of that organization.[66]

- Unregulated Fishing: refers to fishing activities in the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law.[67]

2. Maritime Zones

IUUF activity can take place in different maritime zones. There are five primary maritime zones, as shown in Figure 3. The following maritime zones are defined by the United Nations Convention on the Law of the Sea (UNCLOS):

- *Internal waters* are "waters on the landward side of the baseline of the territorial sea."[68]

- *Territorial seas* are measured from a coastal state's baseline and cannot extend beyond 12 nautical miles. The coastal state has sovereignty over its territorial sea, the air above the territorial sea, and the bed and subsoil underneath the territorial sea.[69]

- The *contiguous zone* cannot exceed 24 nautical miles from a coastal state's baseline. Within this zone, the coastal state may "prevent

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66 Food and Agriculture Organization of the United Nations, 186.

67 Food and Agriculture Organization of the United Nations, 186.

68 United Nations Convention on the Law of the Sea, December 10, 1982, 1833 U.N.T.S. 397, pt. 2, https://www.un.org/depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm.

69 United Nations Convention on the Law of the Sea, pt. 2.

infringement of its customs, fiscal, immigration or sanitary laws and regulations."[70]

- The *exclusive economic zone* (EEZ) is measured from a coastal state's baseline and cannot exceed 200 nautical miles. In this zone, coastal states have "sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone" and the "jurisdiction . . . with regard to . . . the protection and preservation of the marine environment."[71]

- *High seas* are all seas outside of the territorial seas, contiguous zones, EEZs, and internal waters of coastal states.[72] UNCLOS Articles 117 and 118 mandate cooperation between coastal states to preserve this maritime zone.[73]

[70] United Nations Convention on the Law of the Sea, pt. 2.

[71] United Nations Convention on the Law of the Sea, pt. 5.

[72] United Nations Convention on the Law of the Sea, pt. 7.

[73] United Nations Convention on the Law of the Sea, art. 117–118.

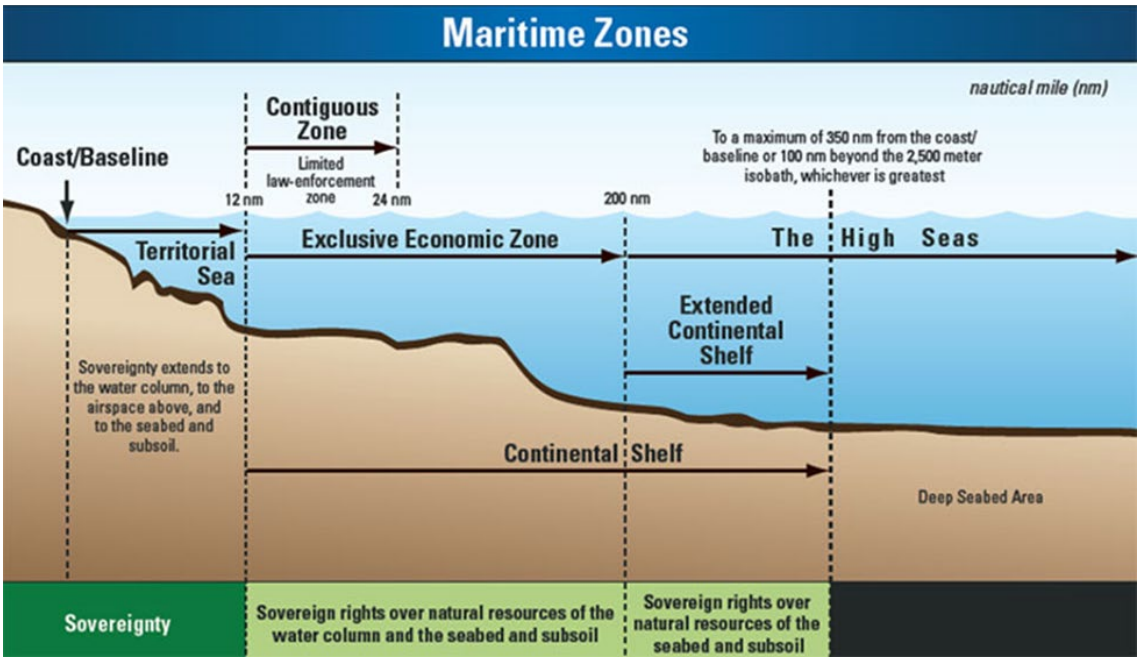

Figure 3. Maritime Zones.[74]

IUUF activity occurs in all these zones, as shown in Figure 4. Coastal states govern and enforce IUUF regulations in their territorial seas, contiguous zones, and EEZs. On the high seas, a collective effort of coastal states is required to create governance and enforce the regulations in this shared space.

[74] Source: Margot Bohan, "NOAA's Participation in the U.S. Extended Continental Shelf Project," National Oceanic and Atmospheric Administration, July 11, 2018, https://oceanexplorer.noaa.gov/okeanos/explorations/ex1810/ecs/welcome.html.

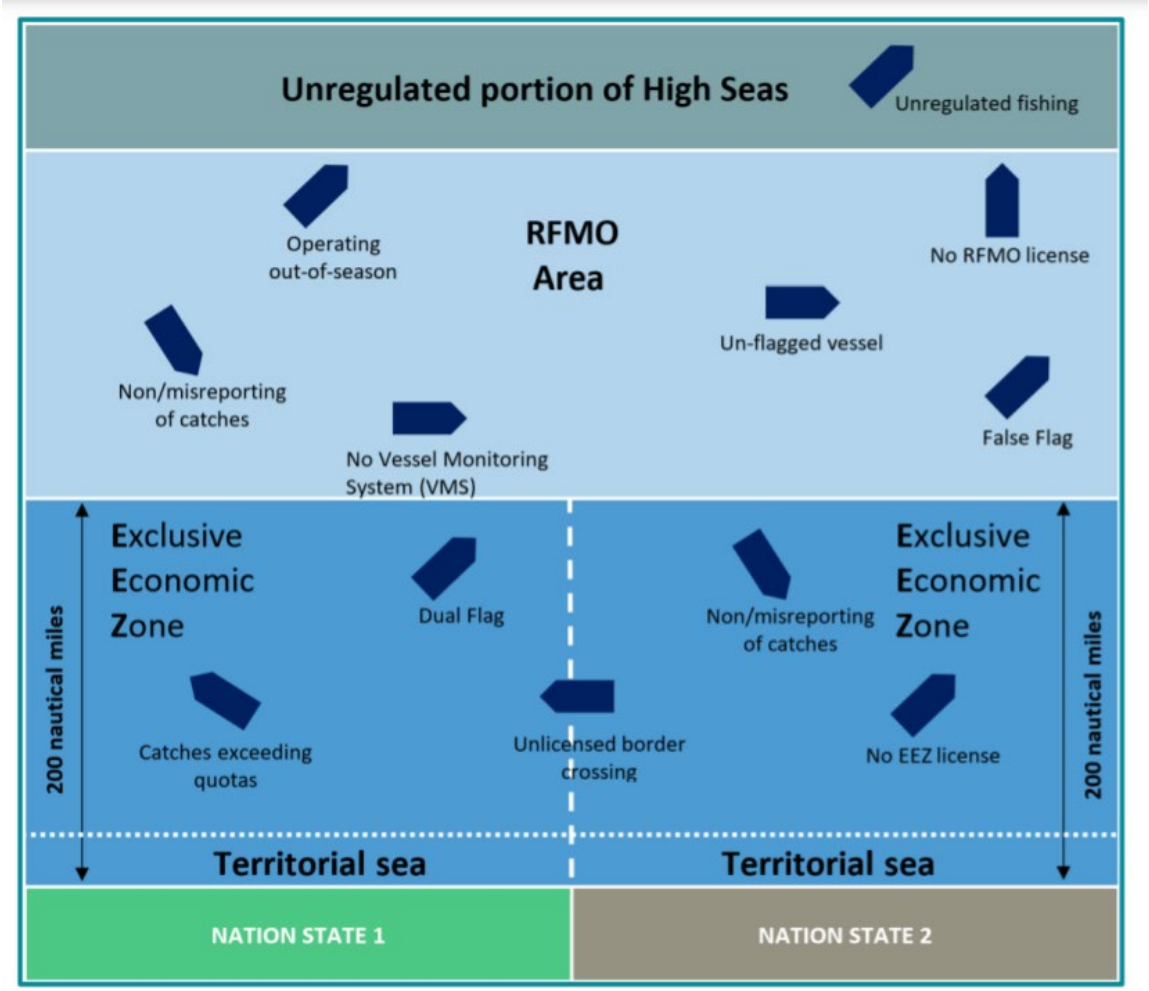

Figure 4. Different Types of IUUF in Different Maritime Zones.[75]

B. LITERATURE REVIEW

The concept of IUUF has existed since 1997, so ample literature has addressed IUUF mitigation strategies, primarily focused on three potential mitigations: laws and regulations, cooperation, and technology. Overall, these three areas in the literature broadly explain what mechanisms currently exist to combat IUUF. The research on these three areas of mitigation suggests that combating IUUF will require a holistic solution with many components. To date, this type of holistic, integrated solution has not been accomplished.

[75] Source: Centre for Economics and Business Research, *An Agent Based Model of IUU Fishing*.

This first part of this literature review provides an overview of the regulatory areas that exist to mitigate IUUF activity. The second component assesses research on the cooperative efforts between the United States and its maritime allies against other forms of maritime threats, notably drug trafficking, human trafficking, and piracy. The third section evaluates research on the technology used to combat IUUF.

1. Regulatory

The United States has taken several steps to mitigate IUUF domestically. For example, the United States has enacted laws to combat IUUF in its own waters, including the Corporate Transparency Act, Lacey Act, False Claims Act, Foreign Corrupt Practices Act, Endangered Species Act, and Magnuson Act, among many others. Yet, although the acts have yielded some successful results, they were multi-layered and not created with IUUF in mind as the primary motivator. Thus, without a direct, singular focus on IUUF, these acts have limited influence—especially outside U.S. jurisdiction. The United States has no authority internationally without treaties in place.

Regions outside U.S. jurisdiction, such as Oceania, where multiple developing countries make up the area, have far fewer laws and regulations and weak flag state governance. The few IUUF international legal mechanisms that are in place—such as the Agreement on Port State Measures and Guidelines for Flag State Performance and Catch Documentation Schemes—are newer directives; thus, they lack supporting analytical literature, discussions of effectiveness, or precedent-setting findings. Foreign-flagged fishing vessels are not heeding flag state and regional regulatory bodies, which is concerning because some IUUF regulatory mechanisms—such as the Committee on Fisheries' International Plans of Action under the FAO—have been around for a long time but still lack legitimacy.[76] Overall, without strong governance in the Oceania region, IUUF activity will continue to grow untamed.

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[76] David Doulman, *Illegal, Unreported, and Unregulated Fishing: Mandate for an International Plan of Action* (Rome: United Nations Food and Agriculture Organization, 2000), http://www.fao.org/3/Y3274E/y3274e06.htm.

The effectiveness of key IUUF regulatory bodies is a critical underlying component of IUUF mitigation. UNCLOS has 320 articles that regulate the use of the ocean and has been ratified by over 150 countries.[77] However, scholars have no strong consensus on the effectiveness of UNCLOS. Although proponents of UNCLOS assert that it provides a clear international framework for addressing crime on the high seas, critics claim UNCLOS is ineffective due to its lack of universal acceptance.[78] Namely, UNCLOS is missing several ratifications from key countries, including the United States.[79] The effectiveness debate further extends to regional fishery management organizations (RFMOs)—regional bodies that manage fish resources for particular regions.[80] RFMO operations are drastically different depending on the region and have glaring weaknesses such as a lack of regulatory protection for fishery observers.[81] The governance of the Oceania region requires effective and legitimate regulatory bodies. Without them, IUUF activity will continue to pervade the region.

Despite U.S. laws and regulations for some aspects of IUUF, gaps and limitations remain. For instance, limited regulations regard traceability and consumer preferences in the fishing industry. Despite their absence for the fishing industry, the meat, diamond, textile, and lumber industries have many traceability regulations.[82] Considerable research has investigated the effects and implications of clean label trends. However, few studies

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[77] "United Nations Convention on the Law of the Sea of 10 December 1982: Overview and Full Text," United Nations Division for Ocean Affairs and the Law of the Sea, November 2, 2020, https://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm.

[78] Tamsin Phillipa Paige, "The Impact and Effectiveness of UNCLOS on Counter-Piracy Operations," *Journal of Conflict and Security Law* 22, no. 1 (2017): 97–123, LexisNexis.

[79] Will Schrepferman, "Hypocri-Sea: The United States' Failure to Join the UN Convention on the Law of the Sea," *Harvard International Review*, October 31, 2019, https://hir.harvard.edu/hypocri-sea-the-united-states-failure-to-join-the-un-convention-on-the-law-of-the-sea-2/.

[80] "FAQ: What Is a Regional Fishery Management Organization?," Pew Charitable Trusts, accessed April 18, 2021, http://bit.ly/102wBKa.

[81] Christopher Ewell et al., "An Evaluation of Regional Fisheries Management Organization at Sea Compliance Monitoring and Observer Programs," *Marine Policy* 115 (May 2020): 103842, https://doi.org/10.1016/j.marpol.2020.103842.

[82] David L. Dickenson and DeeVon Bailey, "Willingness-to-Pay for Information: Experimental Evidence on Product Traceability from the U.S.A., Canada, the U.K., and Japan," Economic Research Institute Study Papers 2003–12 (Logan: Utah State University, 2003), 3, https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1269&context=eri.

investigate the effects of clean labels on IUUF.[83] IUUF regulations are also lacking in the governance of fishing subsidies. This gap is a major issue because subsidies make it possible for illegal fishers to conduct business. The impact of environmentally harmful subsidies and their associated regulations is well defined in the agriculture, forestry, and mining industries but has not been extended to fisheries.[84] Last, it is extremely complicated to understand which IUUF regulatory practices are best given specific geographic locations. From an economic, cultural, and political standpoint, Oceania is vastly different from coastal Africa, the Galapagos Islands, or the Caribbean and thus requires a unique solution focused on the specific characteristics of the region.

2. Cooperation

As defined by the *Naval War College Review*, maritime cooperation

> occurs when states, in order to realize their own goals, modify policies to meet preferences of other states [and is most successful when] addressing common threats can be carried out by midlevel officials of the states involved without immediate or direct supervision from strategic-level authorities.[85]

The United States has combated maritime crime—namely drug trafficking, human trafficking, and piracy—through cooperative efforts. The United States has established bilateral and multilateral agreements, ship-riding enforcement policies, overflight operations, pursuit tactics, cooperative targeting, and international training with multiple countries to fight maritime crime.[86]

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[83] Daniele Asioli et al., "Making Sense of the 'Clean Label' Trends: A Review of Consumer Food Choice Behavior and Discussion of Industry Implications," *Food Research International* 99 (September 2017): 58–71, https://doi.org/10.1016/j.foodres.2017.07.022.

[84] Organisation for Economic Co-operation and Development, *Environmentally Harmful Subsidies: Policy Issues and Challenges* (Paris: Organisation for Economic Co-operation and Development, 2003).

[85] John F. Bradford, "The Growing Prospects for Maritime Security Cooperation in Southeast Asia," *Naval War College Review* 58, no. 3 (2005): 63–86, http://www.jstor.org/stable/26394205.

[86] Aaron C. Davenport, Lessons from Maritime Narcotics Interdiction: Interdiction in the Maritime Source, Transit, and Arrival Zones of the Western Hemisphere (Santa Monica, CA: RAND Corporation, 2020).

Although cooperation serves as a significant force multiplier, regionalized enforcement cooperation is insufficient to combat growing, global maritime crimes. For instance, scholars reference the everlasting drug war and the challenge of forces being stretched thin with other competing demands.[87] Furthermore, specific cooperative efforts that are successful in one region of the world may not be successful in other regions. For example, in the drug war, chokepoint cooperative tactics in the Caribbean are not usable in the open-ocean Pacific.[88]

Piracy, human trafficking, and drug trafficking are not typically initiated by strong, developed countries. However, IUUF's biggest contributor is China.[89] How a cooperative maritime mitigation strategy would be adopted against a fierce superpower remains unknown. Likewise, which states are responsible for addressing maritime crime that spans multiple maritime jurisdictions and whether the primary mitigation responsibility lies with the coastal flag state or the global superpower are murky in international law.

3. Technology

The use of technology to detect IUUF activity is of the upmost importance to nations trying to eliminate the threat. Data produced from automatic identification systems (AIS) and vessel monitoring systems (VMS) are the most effective sources to track fishing vessel activity.[90] However, AIS and VMS data have limitations, especially because AIS and VMS data need to be supplemented by other data sources—drone footage, satellite imagery, deployed assets, or onboard observers—to achieve maritime domain awareness (MDA).[91] For IUUF crime spread across multiple flag state jurisdictions, MDA is

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87 Geoffrey Till, *The Real "Long War": The Illicit Drug Trade and the Role of the Military* (Carlisle, PA: Strategic Studies Institute, 2013), http://www.jstor.org/stable/resrep11779.

88 Till.

89 Macfadyen et al., *Fishing Index*.

90 T. Russo et al., "Assessing the Fishing Footprint Using Data Integrated from Different Tracking Devices: Issues and Opportunities," *Ecological Indicators* 69 (2016): 818–27, https://doi.org/10.1016/j.ecolind.2016.04.043; Pew Charitable Trusts, "How to End Illegal Fishing."

91 Pew Charitable Trusts, "How to End Illegal Fishing."

achievable only via collaborating and disseminating information with others. This actionable intelligence—which is abundant in counter-narcotics and counter-piracy strategy—contributes to an ecosystem of understanding and provides a picture of what is happening in regional maritime domains and how to address it. Achieving MDA through technology and information sharing is critical, so it is perplexing why countries and regions are hesitant about sharing data.[92]

Different countries have varying levels of IUUF technological abilities. Helping developing countries address technology gaps is challenging due to their unique economics, education, and culture.[93] Furthermore, convincing developing countries to make IUUF technological investments can prove difficult because they are also trying to tackle other plaguing issues that demand their limited capital.

C. SIGNIFICANCE

The regulation, cooperation, and technology areas do not specifically address how to stop the threat in Oceania. Research focused on regulations identifies multiple ways that regulatory bodies have tried to address IUUF but does not explain the best regulations for the countries in the Oceania region to achieve MDA and combat IUUF. Research focused on cooperation explains the benefits of multilateral cooperation against illicit maritime activity, such as drug trafficking, human trafficking, and piracy, but does not address the cooperative strategies required for IUUF—especially against a global superpower such as China. Research focused on technology addresses new advancements that can track fishing vessels engaging in illicit activity but does not explain why data generated from the technology is not seamlessly shared between nations. Overall, IUUF in Oceania is a significant problem that must be addressed. Oceania needs an integrated regulatory, cooperative, and technological solution focused on the unique characteristics of the region.

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[92] "Indonesia's Vessel Monitoring System," Global Fishing Watch, accessed April 20, 2021, https://globalfishingwatch.org/programs/indonesia-vms/.

[93] Joe Cackler, Emily Gu, and Mike Rodgers, "Technology in Developing Economies," Stanford University, March 17, 2008, https://cs.stanford.edu/people/eroberts/cs181/projects/2007-08/developing-economies/.

This study analyzes what is currently being done to address IUUF in the region, identifies the gaps, and then proposes recommendations to bridge those gaps to create a holistic solution.

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IV. IUUF IN OCEANIA: PROBLEM AND SIGNIFICANCE

The first section of this chapter explains attributes of areas around the world that are susceptible to IUUF and the associated consequences of IUUF activity. The next section explores whether these attributes are prevalent in Oceania to determine how vulnerable the region is to IUUF. The last section examines how the vulnerability of the region is an issue for the United States.

A. CONTEXT

Collectively, IUUF represents detrimental fishing practices that are widespread throughout every region in the world. It is estimated that 15–30 percent of global fish catches are from IUUF practices.[94] The IUUF Fishing Index, published by Poseidon Aquatic Resource Management and the Global Initiative against Transnational Organized Crime, indicates IUUF activity is most prevalent in Asia, followed by Africa, South America, Central America, and Oceania.[95] For the Asia-Pacific region, it is estimated that 3.4 to 8.1 million tons of fish are taken by IUUF practices every year.[96] This equates to 8–16 percent of total fish caught from the Pacific Ocean each year.[97] In Africa, fish is a major source of protein for 40 percent of the continent's population, but unfortunately, the FAO estimates that 30 percent of African fish stocks have been depleted or are near depletion, indicating severe sustainability concerns.[98]

Fishers resort to IUUF for many reasons. First and foremost, it can be extremely profitable, as IUU fishers can ignore catch restrictions, sell fish at competitive prices, and

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94 National Intelligence Council, "Global Implications."

95 Macfadyen et al., *Fishing Index*.

96 Asia-Pacific Economic Cooperation Fisheries Working Group, *Assessment of Impacts of Illegal Unreported and Unregulated IUU Fishing in the AsiaPacific* (Singapore: Asia-Pacific Economic Cooperation, 2008), https://www.apec.org/Publications/2008/11/Assessment-of-Impacts-of-Illegal-Unreported-and-Unregulated-IUU-Fishing-in-the-AsiaPacific.

97 Asia-Pacific Economic Cooperation Fisheries Working Group.

98 Kingsley Ighobor, "Overfishing Destroying Livelihoods," Africa Renewal, May 12, 2017, https://www.un.org/africarenewal/magazine/may-july-2017/overfishing-destroying-livelihoods.

bypass the costs associated with fishing legally such as licensing requirements.[99] Furthermore, even if fishers are caught conducting IUUF, the penalties incurred are not strong enough to deter their behavior. Citing an academic study, the U.S. National Intelligence Council surmises that "fines assessed to IUU fishing vessels would need to increase more than 20-fold for costs to match the benefits accrued from IUU fishing."[100] Next, there are few barriers to entry—fishers can engage in illegal fishing with the skills and equipment they already possess.[101] Last, there is an overall low probability of detection. The oceans and waterways of the world are vast, fishery supply chains are complex, and there simply are not enough surveillance means and enforcement assets to monitor and enforce fishing regulations.

1. Distant Water Fishing Fleets and China

Expanding distant water fishing fleet (DWFF) networks are a major contributing factor to IUUF activity. The countries with the largest DWFFs include China, Russia, Taiwan, Japan, and South Korea.[102] Not surprisingly, then, the countries that commit the most IUUF crimes include China, Russia, and Taiwan, as well as Vietnam and Thailand.[103] The Chinese DWFF is the largest in the world, estimated at 3,400 vessels, and operates in nearly 100 different nations' EEZs.[104] Not unexpectedly, with the largest DWFF, China also commits the most IUUF infractions, as its DWFF catches an estimated 4.6 million tons of fish per year.[105] China uses its DWFF not only to source fish; some of its fishing fleet has been outfitted with military grade equipment. According to Navy Rear Admiral Zhang

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99 Centre for Economics and Business Research, *Agent Based Model of IUU Fishing*.

100 National Intelligence Council, "Global Implications," 9.

101 Centre for Economics and Business Research, *Agent Based Model of IUU Fishing*.

102 Christopher Carolin, "The Dragon as a Fisherman: China's Distant Water Fishing Fleet and the Export of Environmental Insecurity," *SAIS Review of International Affairs* 35, no. 1 (2015): 133–44, http://www.jstor.org/stable/27000982.

103 Macfadyen et al., *Fishing Index*.

104 Carolin, "The Dragon as a Fisherman."

105 Pauly et al., "China's Distant-Water Fisheries"; Macfadyen et al., *Fishing Index*.

Zhaozhong of the People's Liberation Army, fishing vessels "are designed to mimic an occupying naval force," which China can send anywhere in the world to exercise its power.[106] These Chinese fishing vessels are registered with the People's Armed Forces Maritime Militia with the primary purpose of mobilizing "to defend and advance China's maritime territorial claims."[107] This objective is problematic because China has a history of enforcing false sovereign claims where it has fishing interests, as evidenced by its claims in the South China Sea and disregard for claims of other countries in the region.[108] China's militarized DWFF and fishing sovereignty claims combined with its Maritime and Polar Silk Road initiatives illustrate the country's expanding global influence via the maritime realm.

China's DWFF is also heavily subsidized by the Chinese government. In 2013, an estimated $6.5 billion in subsidies were provided to Chinese fishing vessels, primarily in the form of fuel subsidies that enable the DWFF's operations.[109] Furthermore, China uses foreign aid infrastructure investments to obtain fishing rights to foreign territorial seas.[110] With fishing rights, China can legally fish in a foreign territorial zone. However, China deviously selects countries where infrastructure investments ultimately benefit China rather than the foreign country. The most popular example was Chinese investment in a Sri Lankan port infrastructure project in 2015. When Sri Lanka could not pay back the Chinese-backed loans for the project, Sri Lanka performed a debt-for-equity swap and gave

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106 Carolin, "The Dragon as a Fisherman," 139.

107 Conor M. Kennedy and Andrew S. Erickson, *China's Third Sea Force, the People's Armed Forces Maritime Militia: Tethered to the PLA*, China Maritime Report No. 1 (Newport, RI: China Maritime Studies Institute, March 2017), 24, https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=1000&context=cmsi-maritime-reports.

108 D. Pauly and V. Ruiz-Leotaud, *Marine and Freshwater Miscellanea II*, vol. 28 (Vancouver, BC: Institute for the Oceans and Fisheries, 2020), https://core.ac.uk/download/pdf/288480459.pdf.

109 Tabitha Grace Mallory, "Fisheries Subsidies in China: Quantitative and Qualitative Assessment of Policy Coherence and Effectiveness," *Marine Policy* 68 (2016): 74–82, https://doi.org/10.1016/j.marpol.2016.01.028.

110 Pryke, "China's Ambitions in the South Pacific."

the port to the Chinese in what has been dubbed by scholars as Chinese "debt-trap diplomacy."[111]

2. IUUF Consequences

Severe consequences of IUUF include overfishing, ecosystem damage that can exacerbate food and environmental security, loss of employment, the disregard for rule of law, increased tension between countries, and increased risk for other maritime crimes. Almost 4.3 billion people around the world rely on fish as their protein source.[112] In 2018, global human consumption of fish was 172.4 million tons, which is more than global consumption each of beef and veal, pork, poultry, and sheep.[113] Since 1961, the growth in global fish consumption has been startling and higher than all other sources of animal protein.[114] According to the FAO, from 1961 to 2017, "global food fish consumption increased at an average rate of 3.1 percent" which is almost double the annual world population growth during the same period.[115] The FAO warns that "the fraction of fish stocks that are within biologically sustainable levels decreased from 90 percent in 1974 to 65.8 percent in 2017."[116] Certain regions are more overfished—and thus unsustainable—than others. For instance, according to 2017 data from the FAO, 62 percent of fish stocks in the Mediterranean and Black Sea are biologically unsustainable (see Figure 5).[117] When fish stocks can no longer sustain a countries' food needs, those countries use DWFFs to

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111 Zhen Wang and Feng Ye, "China–Sri Lanka Relations in the Context of the 21st-Century Maritime Silk Road: Motives, Challenges, and Prospects," *Asian Perspective* 43, no. 3 (Summer 2019): 490, ProQuest.

112 National Intelligence Council, "Global Implications."

113 Food and Agriculture Organization of the United Nations, *The State of World Fisheries and Aquaculture* (Rome: Food and Agriculture Organization of the United Nations, 2020), https://doi.org/10.4060/ca9229en; "Meat Consumption," Organisation for Economic Co-operation and Development, 2021, http://data.oecd.org/agroutput/meat-consumption.htm.

114 Food and Agriculture Organization of the United Nations, *World Fisheries and Aquaculture*.

115 Food and Agriculture Organization of the United Nations, 3.

116 Food and Agriculture Organization of the United Nations, 47.

117 Food and Agriculture Organization of the United Nations, 7.

fish in other areas of the world, thus compounding the problem in other regions.[118] Furthermore, sustainability of fish stocks is also critical because 40 million people work in the fishing industry and rely on fish stocks as a source of employment.[119]

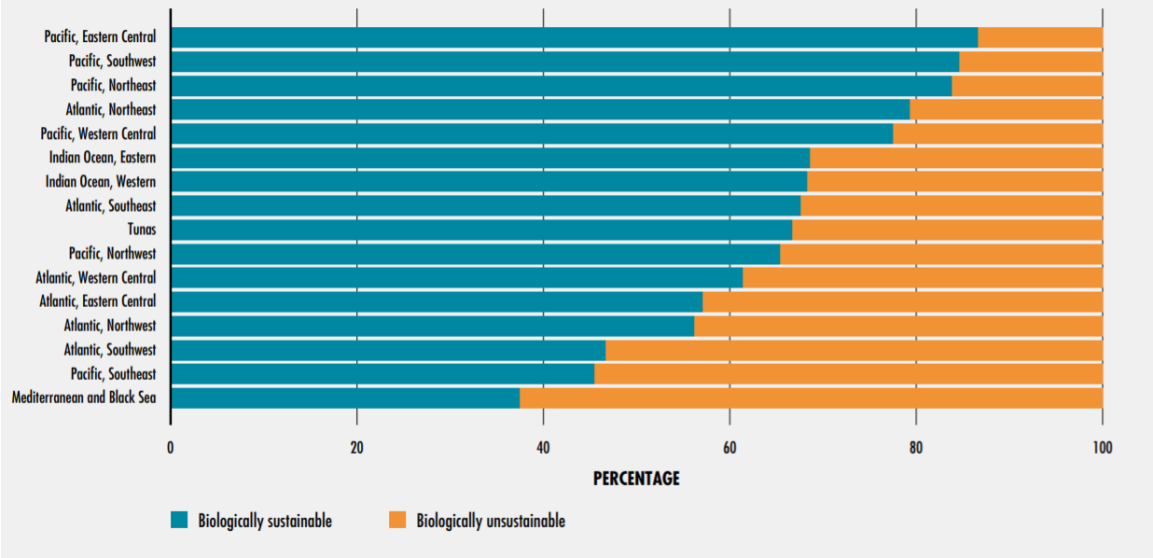

Figure 5. Sustainable Fish Stocks by Region.[120]

When countries have weak governance and enforcement mechanisms, IUU fishers can continue to operate. Inadequate laws and regulations for fish stock protection, port state measures, records management, and registration requirements, among others, make it possible for fishers to fish in regions unscathed. Compounding the issue, countries that do

[118] Carolin, "The Dragon as a Fisherman."

[119] National Intelligence Council, "Global Implications."

[120] Source: Food and Agriculture Organization of the United Nations, *World Fisheries and Aquaculture*, 49.

have some governance in place do not have robust navies or coast guards to enforce their laws.[121]

IUUF also leads to significantly increased tension between countries, especially when countries are using DWFFs to fish illegally in another country's waters. Tensions arise when territorial claims are disputed—and thus the access and rights to fish in the zone are disputed. In other cases, DWFFs can legally fish in international waters but illegally fish if they cross the border into a country's EEZ. An example of such tension was seen in 2016 when the Argentinian Coast Guard sank a Chinese vessel that was illegally fishing in Argentina's EEZ.[122]

IUUF has been linked to other forms of maritime crime, namely drug smuggling, piracy, and human trafficking. Some IUUF revenues have been traced to drug cartels and associated drug crime. This was the case with Franco Muto's Italian drug cartel, which was exposed and disbanded in 2016.[123] Furthermore, countries that experience reduced fish stocks are seeing their labor force switch to other revenue streams—including piracy.[124] According to maritime crime scholars Raj Desai and George Shambaugh, fish stock erosion "may give rise to less resilient coastal communities over time, and more stubborn problems

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121 "Marshall Islands," World Factbook, accessed August 29 2021, https://www.cia.gov/the-world-factbook/countries/; "French Polynesia," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/; "New Caledonia," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/; "Micronesia," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/; "Nauru," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/; "Niue," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/; "Palau," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/; "Samoa," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/; "Soloman Islands," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/; "Tuvalu," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/; "Vanuatu," World Factbook, accessed August 29, 2021, https://www.cia.gov/the-world-factbook/countries/.

122 National Intelligence Council, "Global Implications."

123 National Intelligence Council.

124 National Intelligence Council.

of piracy."[125] In terms of human trafficking, there have been many documented cases of fishers forced to sea in unfavorable conditions and threatened with death for noncompliance. For example, a 2009 United Nations' report on human trafficking uncovered that a staggering "60 percent of interviewed migrants trafficked from Cambodia into the Thai fishing industry reportedly witnessed the murder of a coworker by the ship's captain."[126]

No region in the world is immune from the severe implications of IUUF—overfishing, the loss of employment, the disregard for rule of law, increased tension between countries, and the increased risk for other maritime crimes. Oceania, a region that is critical to U.S. homeland defense and security, is an example of a region that has been devastated by IUUF.

B. OCEANIA

Oceania is a region that encompasses Australia, New Zealand, and 22 other countries and territories in the Pacific Ocean, as depicted in Figure 6.[127] The population of Oceania is 43.2 million people, most of whom reside in Australia, New Zealand, and Papua New Guinea, with a combined population of 39.76 million.[128] The region is incredibly diverse and has a mix of developed and developing countries and a range of different population densities, industries, geographies, demographics, and cultures.[129] Some of the main Oceania industries include tourism, agriculture, and fishing. For tourism,

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[125] Raj M. Desai and George E. Shambaugh, "Measuring the Global Impact of Destructive and Illegal Fishing on Maritime Piracy: A Spatial Analysis," *PLOS ONE* 16, no. 2 (2021): e0246835, https://doi.org/10.1371/journal.pone.0246835.

[126] National Intelligence Council, "Global Implications," 16.

[127] H. Pippard et al., *The Conservation Status of Marine Biodiversity of the Pacific Islands of Oceania* (Gland, Switzerland: International Union for Conservation of Nature, 2017), https://doi.org/10.2305/IUCN.CH.2017.04.en.

[128] "World Population Prospects 2019," United Nations Department of Economic and Social Affairs, accessed February 10, 2022, https://population.un.org/wpp/DataQuery/.

[129] Karen E. Charlton et al., "Fish, Food Security and Health in Pacific Island Countries and Territories: A Systematic Literature Review," *BMC Public Health* 16 (2016): 1, https://doi.org/10.1186/s12889-016-2953-9.

Oceania receives a quarter of the world's annual international tourists.[130] In 2019, Fiji alone had 900,000 visitors generating over $1.4 billion in tourism revenue.[131] In terms of fishing, excluding Australia and New Zealand, the industry contributes up to 10 percent of the region's gross domestic product.[132] The fishery and aquaculture industry produces 1.3 million tons, valued at more than $2 billion.[133] Around 500,000 people work in the fisheries and aquaculture industry in Oceania.[134] People in Oceania consume 18–63 kilograms of fish annually per person, with higher consumption rates coming from smaller island countries and territories.[135] This rate of consumption is far greater than the global fish consumption average which is around 20.5 kilograms per capita, indicating that fishing is critical to the survival of Oceanian populations.[136]

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[130] Chris Cooper and C. Michael Hall, *Oceania: A Tourism Handbook* (Bristol, UK: Channel View Publications, 2005), ProQuest.

[131] International Finance Corporation, *International Visitor Survey: Fiji* (Washington, DC: International Finance Corporation, 2020), https://www.mcttt.gov.fj/wp-content/uploads/2020/07/FIJI-2019-International-Visitor-Survey-1.pdf.

[132] Asian Development Bank, ed., *Pacific Choice*, Capacity Development Series (Mandaluyong City, Philippines: Asian Development Bank, 2008).

[133] Asian Development Bank.

[134] Food and Agriculture Organization of the United Nations, *World Fisheries and Aquaculture*.

[135] Charlton et al., "Fish, Food Security and Health"; Asian Development Bank, *Pacific Choice*.

[136] Food and Agriculture Organization of the United Nations, *World Fisheries and Aquaculture*.

Figure 6. Map of Oceania, Excluding Indonesia and the Philippines.[137]

Oceana's superpowers are the United States, Australia, France, and New Zealand. Australia has the largest maritime geographic presence in Oceania, dominated by a huge EEZ. Australia's EEZ encompasses almost four million square miles—larger than the surface area of Australia's mainland and territories combined.[138] Australia also has the largest diplomatic and economic presence in the Oceania region.[139] It is the largest provider of foreign aid to other Oceanian countries, and with its substantial population, Australia fuels the region's tourism industry.[140] In comparison, the United States has a

137 Source: Central Intelligence Agency, "Oceania," Library of Congress, 2001, https://www.loc.gov/item/2002622151/.

138 "Oceans and Seas," Geoscience Australia, accessed February 10, 2022, http://www.ga.gov.au/scientific-topics/national-location-information/dimensions/oceans-and-seas.

139 Pryke, "China's Ambitions in the South Pacific."

140 Pryke.

smaller but still significant maritime geographic presence at around 1.3 million square nautical miles (see Figure 7).[141]

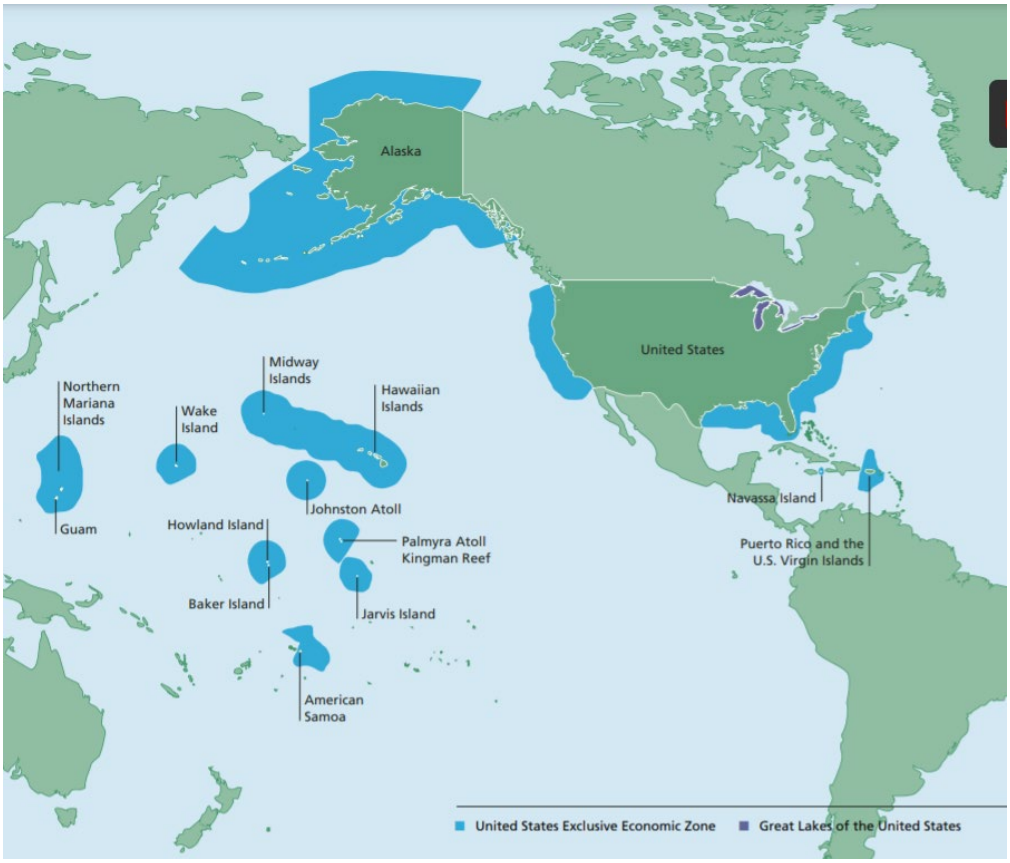

Figure 7. United States' EEZ.[142]

While the superpowers have significant diplomatic and economic influence in the region, the smaller Pacific islands can still wield some power. As described in a 2018 report by the U.S.-China Economic and Security Review Commission,

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[141] "Coast Guard, Navy Complete Joint Oceania Maritime Security Initiative Patrol in Pacific Ocean," U.S. Indo-Pacific Command, May 1, 2018, https://www.pacom.mil/Media/News/News-Article-View/Article/1509299/coast-guard-navy-complete-joint-oceania-maritime-security-initiative-patrol-in/.

[142] Source: National Oceanic and Atmospheric Administration, "The United States Is an Ocean Nation." The United States has 3.4 million square nautical miles of EEZ, 1.3 million square nautical miles of which are in Oceania. U.S. Indo-Pacific Command, "Joint Oceania Maritime Security Initiative Patrol"; "The United States Is an Ocean Nation," National Oceanic and Atmospheric Administration, accessed October 9, 2021, https://www.gc.noaa.gov/documents/2011/012711_gcil_maritime_eez_map.pdf.

> The Pacific Island countries have the same voting power as the world's largest economies in the United Nations (UN) General Assembly. They also wield a disproportionate amount of influence relative to their size on matters related to fisheries and climate change, given the importance of fisheries in their economies and their vulnerability to the effects of climate change.[143]

Nevertheless, despite the various powers and influence that the developed and developing countries in Oceania hold, the region cannot escape the plague of IUUF.

1. Extent of the IUUF Problem in Oceania

The International Union for Conservation of Nature (IUCN) estimates that the waters of Oceania contain more than 44,000 marine species.[144] An IUCN study that examined 2,856 of those species discovered that 9.9–20.5 percent were threatened.[145] For fish species, the primary reason for the threat was overexploitation.[146] Oceania is vulnerable and susceptible to IUUF because of its geography, climate change, population growth, economic factors, proximity to overfished regions, and lack of governance and maritime enforcement assets. First and foremost, Oceania is primarily a maritime geographic region and contains over 38 million square miles of Pacific Ocean.[147] According to Poseidon Aquatic Resource Management and the Global Initiative against Transnational Organized Crime, large EEZs for Oceanian nations were the chief reason Oceania had the highest coastal state vulnerability score among all world regions on the IUUF Fishing Index.[148]

Climate change is another major vulnerability that affects Oceania's fish stocks. A study sponsored by the United Kingdom's Commonwealth Marine Economies Programme identified that some fish populations are "expected to move eastward and to higher latitudes

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143 Meick, Ker, and Chan, China's Engagement in the Pacific Islands, 3.

144 Pippard et al., Conservation Status of Marine Biodiversity.

145 Pippard et al.

146 Pippard et al.

147 "About Oceania," International Union for Conservation of Nature, accessed February 10, 2022, https://www.iucn.org/regions/oceania/about.

148 Macfadyen et al., *Fishing Index*.

due to climate drivers."[149] These drivers include changing "water temperature, oxygen, ocean currents, stratification of the water column and the location of the Western Pacific Warm Pool."[150] While fish migrate out of the region, Oceania's human population is only expected to grow. By 2040, Oceania's population is expected to increase to 53 million people, a 23 percent increase from its population in 2021.[151] Increasing protein demand due to population increases combined with fish stocks migrating out of the region due to climate change will inevitably lead to a perpetual cycle of protection and evasion. Countries will be forced to further protect the sustainability of their endangered stocks. Increased protection will naturally result in increased IUUF practices as fishers attempt to source catches to feed their countries' growing populations. Many of the countries in Oceania have low human development indices with significant populations living in poverty (see Table 3).[152] This finding indicates that it would be extremely difficult for these countries to pivot to other industrial sectors outside of fishing.

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[149] Johanna Johnson, "Effects of Climate Change on Ocean Fisheries Relevant to the Pacific Islands," *Science Review* (2018): 177, https://reliefweb.int/sites/reliefweb.int/files/resources/11_Oceanic_Fisheries.pdf.

[150] Johnson, 177.

[151] Max Roser, "Future Population Growth," *Our World in Data*, May 9, 2013, https://ourworldindata.org/future-population-growth.

[152] According to the United Nations Development Programme, a human development index "is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living." "Multidimensional Poverty Index: Developing Countries," United Nations Development Programme, accessed September 5, 2021, http://hdr.undp.org/sites/default/files/2020_mpi_statistical_data_table_1_and_2_en.pdf.

Table 3. Poverty in Oceania.[153]

Nation	Total Population	Percentage of Population Living below US$1.25 per Day	Percentage of Incidence of Poverty[a] or Population below the Threshold for Relative Poverty[b]	Percentage of Population below 50% Median Income
Australia	22.3 million	N/A	N/A	N/A
Papua New Guinea	6.8 million	37.5 [15]	N/A	N/A
New Zealand	4.4 million	N/A	N/A	11 [123]
Fiji	860,000	31.0 [15]	35 [124]	N/A
Solomon Islands	538,000	N/A	22.7 [125]	N/A
French Polynesia	270,764	N/A	27.6 [126]	N/A
New Caledonia	254,000	N/A	N/A	17 [127]
Vanuatu	239,000	9.2 [128]	N/A	N/A

Oceania is also susceptible to IUUF because of its proximity to other severely overfished regions. The South China Sea is one of those overfished regions and is only a few hundred miles from the border of Oceania. Since the 1950s, South China Sea fish stocks have declined approximately 70 percent to 95 percent.[154] Despite the decline in fish stocks, the total amount of fish caught per year has increased.[155] This combination of decreasing fish stocks but increasing fish caught puts the South China Sea in a dangerous and unsustainable position. In 2016, it was estimated that 55 percent of global fishing vessels operated in the South China Sea region.[156] As global fish stocks are depleted, thousands of fishing vessels will be looking elsewhere for the next catch, including the neighboring waters of Oceania.

Next, many Oceanian countries have weak maritime enforcement mechanisms. Indeed, most Oceanian countries and territories—including the Marshall Islands, French Polynesia, New Caledonia, Micronesia, Nauru, Niue, Palau, Samoa, Solomon Islands, Tuvalu, and Vanuatu—lack a military, navy, coast guard, or maritime enforcement

153 Source: Kevin Kline et al., "Neglected Tropical Diseases of Oceania: Review of Their Prevalence, Distribution, and Opportunities for Control," *PLOS Neglected Tropical Diseases* 7, no. 1 (2013): e1755, https://doi.org/10.1371/journal.pntd.0001755.

154 Clive Schofield, Rashid Sumaila, and William Cheung, "Fishing, Not Oil, Is at the Heart of the South China Sea Dispute," Conversation, August 16, 2016, https://ro.uow.edu.au/cgi/viewcontent.cgi?referer=https://scholar.google.com/&httpsredir=1&article=3503&context=lhapapers.

155 Schofield, Sumaila, and Cheung.

156 Schofield, Sumaila, and Cheung.

agency.[157] These countries have formal and informal agreements with other countries, including the United States, France, Australia, and New Zealand, to provide maritime enforcement assistance.[158]

a. China

China has a strong influence in the Oceania region, and through its vast DWFF, China is using Oceania to expand its empire. Some of the DWFF fishing is done legally as China has made infrastructure investments in developing Oceanian countries in return for fishing access to their territorial waters.[159] China is the third largest foreign aid donor in the region, contributing over $1.5 billion from 2006 to 2017.[160] Some of this infrastructure investment has been linked to Chinese military usage, including a Vanuatu wharf financed by China.[161]

China has also become the leading trade partner in the region and has outstripped Australia as the principal two-way trade partner with every Oceania country except Papua New Guinea.[162] According to a staff research report by the U.S.-China Economic and Security Review Commission, in 2017, China's trade with Oceania, excluding Australia and New Zealand, reached $8.2 billion (see Figure 8).[163] Oceanian countries that have granted China fishing access to their waters because of foreign aid, trade, or other agreements have struggled to compete with China's government-subsidized fishing fleet and subsequent subsidized market pricing. For example, in the early 2000s, Fiji signed a

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157 See the World Factbook for profiles of each country.

158 World Factbook, "Marshall Islands"; World Factbook, "French Polynesia"; World Factbook, "New Caledonia"; World Factbook, "Micronesia"; World Factbook, "Nauru"; World Factbook, "Niue"; World Factbook, "Palau"; World Factbook, "Samoa"; World Factbook, "Soloman Islands"; World Factbook, "Tuvalu"; World Factbook, "Vanuatu."

159 Carolin, "The Dragon as a Fisherman."

160 Carolin, "The Dragon as a Fisherman"; Pryke, "China's Ambitions in the South Pacific."

161 Pryke, "China's Ambitions in the South Pacific."

162 Pryke.

163 Meick, Ker, and Chan, China's Engagement in the Pacific Islands, 7.

fisheries access agreement with China and then struggled to compete with China in tuna fishing in Fijian territorial seas.[164]

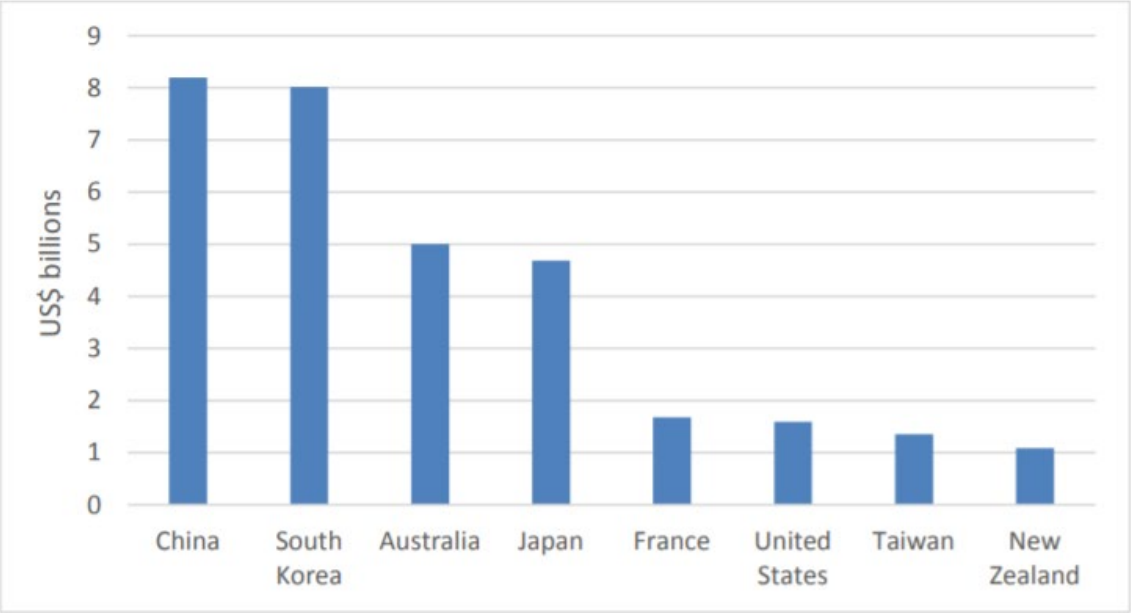

Figure 8. Trade Volume with Oceania, Not Including Australia and New Zealand.[165]

b. Economic Impact

IUUF affects the economy of Oceania significantly. A February 2016 study from the Marine Resources Assessment Group (MRAG) Asia Pacific was a concerted effort to "quantify the volume, species composition, and value of IUU fishing" for the Pacific islands.[166] The study concluded that the potential yearly economic loss for Pacific islands is estimated upwards of $152.67 million, as shown in Table 4.[167] Most of these losses are due to the earnings these countries would have received from fishing vessel licensing

[164] Carolin, "The Dragon as a Fisherman."

[165] Source: Meick, Ker, and Chan, China's Engagement in the Pacific Islands, 8.

[166] MRAG Asia Pacific, Towards the Quantification of IUU Fishing.

[167] MRAG Asia Pacific.

fees.[168] The study calculated these fees by examining the overall revenue generated from purse seining, tropical longline (TLL), and southern longline (SLL) in the region less normal profits and the various costs of doing business. The remaining portion represented what "could be expected to be returned to coastal states under efficient access fee arrangements."[169] Any increase in revenue due to IUUF was thus the calculated economic loss—money that should have been returned to Pacific island countries as an access fee.[170]

Table 4. Potential Economic Losses to Pacific Islands Due to IUUF.[171]

Sector	Revenue (ex-vessel)		Potential losses to Pacific Island countries (Economic profit)	
	BE ($)	90% range ($)	BE ($)	90% range ($)
Purse seine	$225.20m	$200.35m – $251.56m	$95.82m	$85.25m – $107.04m
TLL	$272.55m	$184.90m - $385.62m	$39.63m	$26.89m – $56.08m
SLL	$118.36m	$87.67m - $158.54m	$17.21m	$12.75 – $23.05m
Total	$616.11m	$517.91m - $740.17m	$152.67m	$135.47m - $173.23m

2. Importance of Oceania to the United States

The Oceania region is vitally important to the United States. First, Oceania encompasses Hawaii and several U.S. territories including Guam, the Commonwealth of the Northern Mariana Islands, and American Samoa. Hawaii's importance is the most obvious given its prominence in Polynesia.[172] Its unique geographic position makes Hawaii a vital and strategic military, naval, and trade location. Hawaii serves as a critical

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168 Centre for Economics and Business Research, *Agent Based Model of IUU Fishing*.

169 MRAG Asia Pacific, Towards the Quantification of IUU Fishing, 53.

170 MRAG Asia Pacific.

171 Source: MRAG Asia Pacific, Towards the Quantification of IUU Fishing, 54.

172 "Australia and Oceania: Physical Geography," National Geographic Society, January 4, 2012, http://www.nationalgeographic.org/encyclopedia/oceania-physical-geography/.

military staging area, acting as a buffer zone between the United States and the rest of the Northern Pacific. Since the United States annexed Hawaii, it means that one of the United States' enemies cannot control the territory.[173] Occupancy of Hawaii by a foreign enemy would undeniably give an enemy the means to threaten the U.S. Pacific coast.[174] For trade, controlling Hawaii allows trade to seamlessly flow in and out of the United States.[175]

Guam became a U.S. territory in 1898 and, like Hawaii, is an important location as a U.S. military and naval foothold in the Pacific.[176] Guam proved critical in defending against the Japanese during World War II and has a similar power today because of its proximity to Russia, North Korea, and the Indo-Pacific region.[177] Following the 1996 U.S.-Japanese agreement to scale back military forces in Japan, Guam became the perfect area for military relocation, and the territory became even more prominent.[178]

The Commonwealth of the Northern Mariana Islands (CNMI) and American Samoa play similar roles to Hawaii and Guam, albeit smaller. After World War II, the United States enacted a policy not to acquire new territories, yet in 1945, the assistant secretary of the navy required that some of the present-day CNMI be available for U.S. military bases.[179] In 1976, the CNMI entered a formal agreement with the United States that outlined the U.S. military's footprint on the islands, and since then, the islands have been used as a military training and support location for American forces.[180] American Samoa started the process of becoming a U.S. territory in the early 1900s, completing the

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173 John A. Harman, "The Political Importance of Hawaii," *North American Review* 160, no. 460 (1895): 374–77, http://www.jstor.org/stable/25103495.

174 Harman.

175 Harman.

176 Stanton, "Punching Above Their Weight."

177 Stanton.

178 Stanton.

179 Stanton.

180 Stanton.

process in 1925.[181] America Samoa has a small U.S. Army Reserve center and contingent of military personnel.[182] The small military presence in American Samoa does not mean the territory is unimportant. Instead, because American Samoa is farther south in the Oceania region, the United States has historically depended on allies Australia and New Zealand, rather than utilizing American Samoa, to control the region.[183] According to a 2017 Congressional Research Service report, "The United States has relied upon Australia, and to a lesser extent New Zealand, to help advance shared strategic interests, maintain global stability, and promote economic development in the Southwest Pacific."[184]

Figure 9. Map of U.S. Territories.[185]

[181] Stanton.

[182] Stanton.

[183] Stanton.

[184] Thomas Lum and Bruce Vaughn, *The Pacific Islands: Policy Issues*, CRS Report No. R44753 (Washington, DC: Congressional Research Service, 2017), 16, https://sgp.fas.org/crs/row/R44753.pdf.

[185] Source: "U.S. Territories: Public Debt Outlook—2019 Update," Government Accountability Office, June 28, 2019, https://www.gao.gov/products/gao-19-525.

Other countries in the region, while not official U.S. states or territories, are still vital to the United States. The Marshall Islands, the Federated States of Micronesia, and Palau are the United States' freely associated states under the Compact of Free Association (CFA) of 1982.[186] The Marshall Islands were under U.S. military control during World War II but signed an amended CFA with the United States in 1983 that gave the country full independence and sovereignty.[187] Under the CFA, "the United States has full authority and responsibility for security and defense of the Marshall Islands, and the Government of the Marshall Islands is obligated to refrain from taking actions that would be incompatible with these security and defense responsibilities."[188] Under a subsidiary agreement of the CFA, the United States has access to several parts of the Marshall Islands for military purposes and missile test ranges.[189] Similar to the Marshall Islands, the Federated States of Micronesia and Palau are both sovereign nations, but they rely on the United States for protection and defense, as outlined in the CFA.[190] As a result of the CFA, the United States has good diplomatic relations with all three Oceanian countries.

3. Oceanian IUUF Impact on U.S. Homeland Defense and Security

Outside of specific countries, the overall Oceania region is important to U.S. defense strategies. Dating back to World War II, Oceania played a critical role. From the Pearl Harbor attack to the United States' retaliatory advancement on Japan through a Central Pacific island-hopping strategy, Oceanian Pacific islands proved vital.[191] During

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186 *Britannica*, s.v. "compact of free association," accessed November 27, 2021, https://www.britannica.com/topic/Compact-of-Free-Association.

187 "U.S. Relations with Marshall Islands," Department of State, July 15, 2018, https://www.state.gov/u-s-relations-with-marshall-islands/.

188 Department of State.

189 Department of State.

190 "U.S. Relations with Palau," Department of State, August 14, 2018, https://www.state.gov/u-s-relations-with-palau/; "U.S. Relations with the Federated States of Micronesia," Department of State, October 19, 2021, https://www.state.gov/u-s-relations-with-the-federated-states-of-micronesia/.

191 James J. Wirtz, review of *Spies for Nimitz: Joint Military Intelligence in the Pacific War*, by Jeffrey M. Moore, *Naval War College Review* 58, no. 4 (2005): 153–55, http://www.jstor.org/stable/26396686.

the Cold War, Oceania played an important part in the United States' island-chain strategy, defined by scholars as the "set of north–south running 'chains' meant to completely block any penetration into the Pacific by an Asian power."[192] In the 1950s, when this strategy was popularized, Asian powers comprised the Soviet Union and China.[193] The island-chain strategy involved two chains, the first running from Japan to Taiwan to the Philippines and the second, from the Japanese Bonin islands to Guam, the Northern Mariana Islands, Yap, and Palau.[194] According to U.S. security doctrine, "The U.S. assumes that by holding these islands it can contain the Chinese military to a 'battlespace' around the first island chain, while holding the second island chain to ensure freedom of U.S. movement and sea lanes of communication to supply operations within the battlespace."[195] A third island chain, centered on Hawaii in the strategy, adds another layer of protection.[196] The success of the island-chain strategy is predicated on the islands of all the chains remaining under U.S. influence. As China uses it fishing fleet, illegal sovereign claims, foreign aid investment, trade mechanisms, and many other tools, it strengthens its influence in the Oceania region and simultaneously threatens the American island-chain strategy.

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[192] Sasha Davis, Lexi A. Munger, and Hannah J. Legacy, "Someone Else's Chain, Someone Else's Road: U.S. Military Strategy, China's Belt and Road Initiative, and Island Agency in the Pacific," *Island Studies Journal* 15, no. 2 (November 2020): 19, http://dx.doi.org.libproxy.nps.edu/10.24043/isj.104.

[193] Davis, Munger, and Legacy.

[194] Davis, Munger, and Legacy.

[195] Davis, Munger, and Legacy, 19.

[196] Wilson Vorndick, "China's Reach Has Grown; So Should the Island Chains," Asia Maritime Transparency Initiative, October 22, 2018, https://amti.csis.org/chinas-reach-grown-island-chains/.

Figure 10. Island-Chain Strategy.[197]

In addition to threatening the U.S. defense strategy, IUUF in Oceania threatens U.S. homeland security in three major ways: it undermines U.S. economic security, leads to increased transnational organized crime (TOC), and creates a migration issue. From an economic security standpoint, IUUF wreaks havoc on the $5 billion U.S. fishing industry.[198] More than 80 percent of fish eaten domestically are imported.[199] Weak traceability regulations and transshipments at sea make it impossible to determine whether imported fish have been legally sourced.[200] Thus, the United States is unintentionally

197 Source: United States-China Economic and Security Review Commission, *2017 Annual Report to Congress* (Washington, DC: United States-China Economic and Security Review Commission, 2017), 204, https://www.uscc.gov/sites/default/files/2019-10/Chapter%202,%20Section%202%20-%20China's%20Military%20Modernization%20in%202017.pdf.

198 U.S. Coast Guard, *Strategic Outlook*.

199 U.S. Coast Guard.

200 Boerder, Miller, and Worm, "Global Hot Spots of Transshipment of Fish."

financing IUUF. Furthermore, the United States is forcing domestic fishers who legally source their catch into direct competition with illegal fishers. U.S. fishers are losing an estimated $1 billion in revenue every year in this unfair competition.[201] In terms of supply and demand, illegal catches increase the volume of imports, leading to lower overall prices with which U.S. fishers have to compete.[202]

TOC resulting from IUUF also poses a security threat to the United States. Countries in Oceania rely on the fishing industry for survival. IUUF is destroying fish stocks and forcing fishing communities to turn to drug smuggling, human trafficking, piracy, and other illicit activity to make an income.[203] This increase in TOC leads to instability in the region, and expanding TOC networks have severe security implications for the United States and its territories, including smuggling threats, money laundering, government corruption, and the growth of terrorist organizations.[204]

Last, IUUF poses a migration security issue for the United States. Some Oceania fishers whose livelihood has been compromised by IUUF have turned to migration for survival, seeking new places to live and make a living. Migration destinations include the United States and U.S. territories, which lead to border security challenges, sustainability and economic growth concerns, and the potential importation of terrorists and criminals.[205]

Overall, Oceania is a diverse, complex region that has been significantly harmed by IUUF. The United States has many economic, military, and diplomatic motives for stabilizing the Oceania region. In sum, IUUF undermines the health of Oceania and subsequently threatens the United States' homeland defense and security.

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[201] World Wildlife Fund, Impact of IUU Imports on U.S. Fishermen.

[202] World Wildlife Fund.

[203] U.S. Coast Guard, *Strategic Outlook*.

[204] National Security Council, "Transnational Organized Crime"; ASIS International, "Implications of Transnational Organized Crime."

[205] Moore and Smith, "Climatic Change and Migration from Oceania"; Humphrey, "Migration, Security and Insecurity."

V. IUUF MITIGATION EFFORTS IN OCEANIA: PROGRESS AND GAP ANALYSIS

The first section of this chapter analyzes effective mitigation efforts in Oceania and gauges why they have been successful. The second section analyzes why other mitigation efforts in the region have been unsuccessful. The third section compiles all regional mitigation methods, regardless of effectiveness, to outline the current counter-IUUF strategy in Oceania. This strategy is then evaluated using a six-step strategic analysis tool, resulting in recommendations for improvement and a discussion on their implementation feasibility and risk.

A. IUUF MITIGATION PROGRESS

Several IUUF mitigation efforts underway in the Oceania region have been effective. These mitigation methods can be grouped into regulatory, cooperative, and technology practices. This section analyzes regulatory measures at the international and regional level that positively impact Oceania. Next, it examines the cooperative efforts in Oceania to counter IUUF. Last, it explores the technology being employed to combat IUUF. Table 5 summarizes the key findings of this phase of analysis.

Table 5. Progress Findings.

Category	Key Finding
Regulatory: Oceanian countries have accepted and implemented multiple counter-IUUF regulatory mechanisms.	• UNCLOS is the largest international maritime agreement that serves as a legal mechanism to counter IUUF. Fifteen Oceanian countries have ratified UNCLOS.[206] • The Port State Measures Agreement has been ratified by seven countries from Oceania and has been an effective way to combat IUUF in ports. • The FAO Compliance Agreement, UN Fish Stocks Agreement, and FAO International Plan of Action are three globally recognized counter-IUUF regulatory mechanisms that have signatories from multiple Oceanian countries. • The Convention on International Trade in Endangered Species of Wild Fauna and Flora is an international convention that influences local law making regarding IUUF. The Convention has 10 Oceanian countries as parties. • Multiple strong RFMOs cover all parts of the Oceania region and govern fish stocks.
Cooperation: Superpowers in the region have collaborated with smaller Oceanian countries to enforce established counter-IUUF regulations.	• The United States has led several effective joint operations in the region targeting IUUF practices, including the Oceanian Maritime Security Initiative and Operation AIGA. • Australia has multiple bilateral and multilateral agreements with Oceanian countries to combat IUUF. • The Quadrilateral Security Dialogue is a formal relationship between Oceanian superpowers to collaborate on security issues in the region.
Technology: Given its vastness, the Oceania region has relied on cutting-edge technology as a counter-IUUF mechanism to help with surveillance and enforcement.	• AIS and VMS are widely used by Oceanian countries as surveillance tools to track fishing vessel movements. • Unmanned aircraft, autonomous unmanned surface vehicles, satellite imagery, and even birds have been used in the region as surveillance and enforcement force multipliers. • Partnerships with NGOs, including Global Fishing Watch, have helped leverage technology.

206 "United Nations Treaty Collection," United Nations, May 12, 2021, https://treaties.un.org/pages/ViewDetailsIII.aspx?src=TREATY&mtdsg_no=XXI-6&chapter=21&Temp=mtdsg3&clang=_en.

1. Regulatory

Several international laws and associated regulations influence IUUF in Oceania. First, UNCLOS is a global agreement that governs international waters and has been ratified by 167 states and the European Union.[207] It came into force on November 16, 1994, and includes key attributes centered on IUUF, including a clause that flag states are required to work with other flag states to ensure the sustainability of living marine resources on the high seas.[208] The UNCLOS and its parties are creating binding international laws to protect the maritime environment, especially on the high seas.

Next, the Agreement of Port State Measures (PSMA) was initiated on November 22, 2009, and went into force in June 2016.[209] The PSMA outlines that ratifying countries must take extra steps to conduct port inspections of visiting foreign-flagged vessels to ensure they have not engaged in IUUF practices.[210] By conducting these inspections, it limits the number of illegal catches that turn up in the marketplace, thus hindering the economic incentive of IUUF. For instance, if prohibited fish species are on board a fishing vessel during a port inspection or if a port inspection of the ship's documents and electronic equipment reveals the vessel was fishing in an unauthorized area, the port state has the right to deny that catch from being processed in the port state country.[211] Overall, 69 countries are parties to the PSMA including several key Oceanian countries: Australia, New Zealand, Fiji, Vanuatu, Tonga, Palau, and the United States.[212] Some key countries,

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[207] United Nations.

[208] United Nations Division for Ocean Affairs and the Law of the Sea, "Overview and Full Text."

[209] "Agreement on Port State Measures (PSMA): Background," Food and Agriculture Organization of the United Nations, accessed February 10, 2022, http://www.fao.org/port-state-measures/background/en/.

[210] "Agreement on Port State Measures (PSMA): Benefits of Implementing PSMA," Food and Agriculture Organization of the United Nations, accessed February 10, 2022, http://www.fao.org/port-state-measures/background/benefits-implementing-psma/en/.

[211] Asia-Pacific Fishery Commission, *Port Inspections: Guide to Activities and Tasks*, RAP Publication 2013/13 (Bangkok: Food and Agriculture Organization of the United Nations, 2013), https://www.fao.org/3/i3510e/i3510e.pdf.

[212] "Agreement on Port State Measures (PSMA): Parties to the PSMA," Food and Agriculture Organization of the United Nations, accessed February 10, 2022, https://www.fao.org/port-state-measures/background/parties-psma/en/.

including Papua New Guinea and the Solomon Islands, are not part of the agreement, which slightly undermines PSMA efforts in Oceania because an illegal catch can be offloaded in these countries risk-free.[213] However, the overall value of the PSMA is significant as it represents a global approach to disincentivizing IUUF.

Next, the FAO Compliance Agreement was implemented on April 24, 2003.[214] This agreement targets flag states and outlines responsibility for these countries to ensure their fishing fleets are not engaging in IUUF practices on the high seas.[215] Another international agreement is the UN Fish Stocks Agreement (UNFSA), aimed at promoting the conservation and sustainable use of fish stocks.[216] Fish do not conform to countries' maritime boundaries, so fish stocks cannot be managed by individual countries. Rather, conservation requires a collective effort by groups of neighboring countries. Twelve Oceanian countries have ratified the UNFSA and have formally met twice—in 2006 and 2010—to review and improve the agreement.[217] The UNFSA produces recommendations on fish stock management, but it is up to the ratifying countries to implement those recommendations and hold other countries accountable for implementation.[218]

The FAO Committee on Fisheries implemented the International Plan of Action (IPOA) on March 2, 2001.[219] This is a published collection of different methods to address

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213 Food and Agriculture Organization of the United Nations.

214 "Illegal, Unreported and Unregulated (IUU) Fishing: FAO Compliance Agreement," Food and Agriculture Organization of the United Nations, accessed February 10, 2022, https://www.fao.org/iuu-fishing/international-framework/fao-compliance-agreement/en/.

215 Food and Agriculture Organization of the United Nations.

216 "United Nations Fish Stocks Agreement," Australian Department of Agriculture, Water and the Environment, accessed February 10, 2022, https://www.agriculture.gov.au/fisheries/legal-arrangements/un-fishstocks.

217 Stacy Baez et al., *Global Progress toward Implementing the United Nations Fish Stocks Agreement* (Washington, DC: Pew Charitable Trusts, 2016), http://pew.org/1Xs6iGJ; "Parties to the Fish Stocks Agreement," United Nations, May 2010, https://www.un.org/Depts/los/convention_agreements/reviewconf/FishStocks_EN_C.pdf.

218 Baez et al., Implementing the United Nations Fish Stocks Agreement.

219 "Illegal, Unreported and Unregulated (IUU) Fishing: IPOA-IUU," Food and Agriculture Organization of the United Nations, accessed February 10, 2022, http://www.fao.org/iuu-fishing/international-framework/ipoa-iuu/en/.

IUUF, providing countries with a counter-IUUF playbook they can adopt. Overall, the IPOA is working toward creating a global, standardized approach to combating IUUF. Examples include legislation recommendations, monitoring and surveillance techniques, and cooperation strategies.[220] Next, other major influential international measures include the Code of Conduct for Responsible Fisheries and Voluntary Guidelines for Flag State Performance. Both are voluntary tools established by the FAO to guide flag states during the creation of their own counter-IUUF measures.[221]

Last, another prominent international agreement is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which aims to protect the sustainability of all wild animals and plants. CITES has 183 countries in either an accession or ratification status, including over 10 countries and territories in Oceania.[222] The CITES convention appendix includes multiple fish species that have been identified as requiring control and regulation.[223] One of the stronger CITES regulations requires that for protected species being traded, the "exporting State must have advised that such export will not be detrimental to the survival of that species."[224] In sum, CITES is helping address the "unregulated" component of IUUF by creating management measures for otherwise unprotected fish species.

Within the Oceania region, localized regulatory measures are aimed at countering IUUF. The most important regulations come from Oceania's RFMOs, groups that manage

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[220] Food and Agriculture Organization of the United Nations, "International Plan of Action," 185–201.

[221] "Illegal, Unreported and Unregulated (IUU) Fishing: International Framework," Food and Agriculture Organization of the United Nations, accessed February 10, 2022, https://www.fao.org/iuu-fishing/international-framework/en/.

[222] "List of Contracting Parties," Convention on International Trade in Endangered Species of Wild Fauna and Flora, accessed February 10, 2022, https://cites.org/eng/disc/parties/chronolo.php.

[223] Convention on International Trade in Endangered Species of Wild Fauna and Flora, March 3, 1973, 993 U.N.T.S. 243, appendix I–III, https://cites.org/eng/disc/text.php.

[224] J. N. Nakamura and B. Kuemlangan, Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora through National Fisheries Legal Frameworks (Rome: Food and Agriculture Organization of the United Nations, 2020), http://www.fao.org/documents/card/en/c/cb1906en.

fish stocks based on geography or based on the species.[225] Instead of individual flag states trying to manage the fish stocks, multiple flag states come together under one management body to ensure the sustainability of fishing resources for the region. The Western and Central Pacific Fisheries Commission (WCPFC) is the primary RFMO for the Oceania region and has 22 Oceanian countries and territories as signatories.[226] To a lesser extent, the North Pacific Fisheries Commission (NPFC), the South Pacific Regional Fisheries Management Organization, and the Inter-American Tropical Tuna Commission (IATTC) are RFMOs that manage fish stocks in Oceania.[227] The WCPFC focuses on highly migratory fish stocks—namely tuna and billfish species—in the Western and Central Pacific Ocean.[228] The WCPFC establishes who can fish in the zone and enforces these measures via vessel monitoring and inspection boardings.[229] Boardings of fishing vessels are carried out by participating countries' patrol assets.[230] Fishing vessels found in violation of IUUF policies are placed on prohibited lists, and members of the WCPFC are forbidden from doing business with these offenders.[231] Such penalties also incentivize flag state WCPFC members to ensure their fishing fleets are not committing IUUF infractions.[232]

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225 "Regional Fisheries Management Organisations (RFMOs)," European Commission, accessed August 29, 2021, https://ec.europa.eu/oceans-and-fisheries/fisheries/international-agreements/regional-fisheries-management-organisations-rfmos_en.

226 "About WCPFC," Western and Central Pacific Fisheries Commission, February 12, 2021, https://www.wcpfc.int/about-wcpfc.

227 "Home Page," North Pacific Fisheries Commission, accessed August 29, 2021, https://www.npfc.int/; "Home Page," South Pacific Regional Management Organisation, accessed August 29, 2021, https://www.sprfmo.int/; "Home Page," Inter-American Tropical Tuna Commission, May 26, 2020, https://www.iattc.org/HomeENG.htm.

228 Western and Central Pacific Fisheries Commission, "About WCPFC."

229 "Frequently Asked Questions and Brochures," Western and Central Pacific Fisheries Commission, March 3, 2010, https://www.wcpfc.int/frequently-asked-questions-and-brochures.

230 Western and Central Pacific Fisheries Commission.

231 Western and Central Pacific Fisheries Commission.

232 Western and Central Pacific Fisheries Commission.

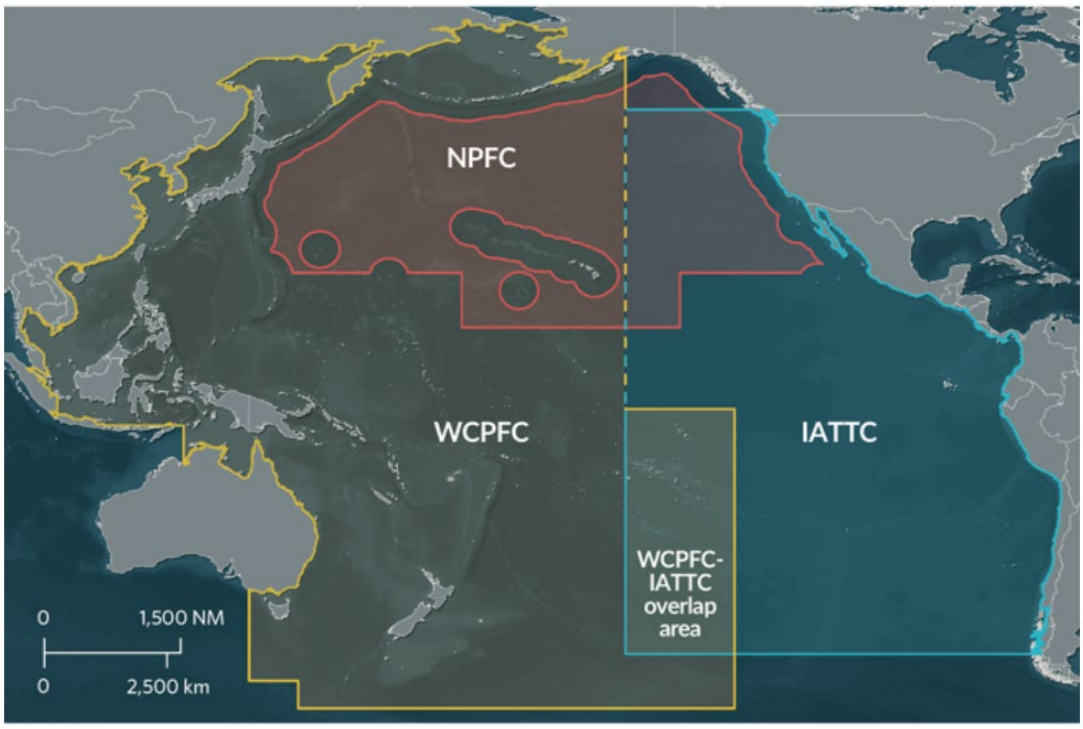

Figure 11. Map of WCPFC, IATTC, and NPFC Regions.[233]

Outside of the RFMOs, the next largest intergovernmental agreement in the Oceania region is the Nauru Agreement, which exists between the Federated States of Micronesia, Kiribati, the Marshall Islands, Nauru, Palau, Papua New Guinea, the Solomon Islands, and Tuvalu.[234] The agreement sets standards to preserve the largest tuna purse seine fishery in the world, which involves limiting the number of days that the area can be fished per year.[235]

[233] Source: "Transshipment in the Western and Central Pacific," Pew Charitable Trusts, September 12, 2019, https://www.pewtrusts.org/en/research-and-analysis/reports/2019/09/transshipment-in-the-western-and-central-pacific.

[234] "Home Page," Parties to the Nauru Agreement, accessed February 10, 2022, https://www.pnatuna.com/.

[235] Parties to the Nauru Agreement.

2. Cooperation

Several ongoing cooperative efforts in the region—most notably led by the United States and Australia—aim to counter IUUF. The United States initiated the Oceania Maritime Security Initiative in 2021 as a joint U.S. Navy–U.S. Coast Guard (USCG) operation, enforcing WCPFC regulations and other regional laws in Oceania.[236] The initiative is a U.S. Secretary of Defense effort "to improve maritime security and domain awareness, ultimately supporting regional stability and partnerships in Oceania."[237] Another collaborative American effort, Operation AIGA, was a USCG-led operation that used deployed USCG assets with onboard Samoan fishery, police, and immigration personnel—a technique known as "ship-riding"—to enforce Samoan fishery regulations.[238]

Australia has various bilateral and multilateral agreements with other countries and territories in Oceania that collectively work to combat IUUF in the region. These include multiple Oceanian French territories, Papua New Guinea, and New Zealand.[239] Some of the agreements center on training programs whereby Australian authorities train other Oceanian countries on appropriate fishery practices, surveillance techniques, and information-sharing tactics.[240] In 2007, Australia partnered with 10 other members to form the Regional Plan of Action to Promote Responsible Fishing Practices Including

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236 U.S. Third Fleet Public Affairs, "Coast Guard, Navy High Seas Oceania Maritime Security Initiative Patrol Continues," U.S. Navy, May 10, 2021, https://www.navy.mil/Press-Office/News-Stories/Article/2602541/coast-guard-navy-high-seas-oceania-maritime-security-initiative-patrol-continues/.

237 U.S. Third Fleet Public Affairs.

238 "Operation Aiga: U.S. Coast Guard Teams with Samoa Maritime Personnel to Patrol Samoan Waters," U.S. Embassy in Samoa, September 17, 2019, https://ws.usembassy.gov/operation-aiga-u-s-coast-guard-teams-with-samoa-maritime-personnel-to-patrol-samoan-waters/.

239 "Enforcement Operations," Australian Fisheries Management Authority, accessed February 10, 2022, https://www.afma.gov.au/enforcement-operations.

240 Australian Department of Agriculture, Water, and the Environment, *Australia's Second National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing* (Canberra: Commonwealth of Australia, 2014), 25, https://www.agriculture.gov.au/sites/default/files/sitecollection documents/fisheries/iuu/aus-second-npoa-iuu-fishing.pdf.

Combating IUU Fishing.[241] This coalition promotes better fishing management practices for part of the Oceania region.[242] Australia—along with more than a dozen other Oceanian countries and territories—is also a signatory of the Niue Treaty, which provides legal cooperative surveillance and law enforcement of fisheries for the signatories.[243]

The Quadrilateral Security Dialogue was the primary mechanism for the United States to collaborate with Australia on all security matters, including IUUF. This formal collaborative effort—known as QUAD—was created in 2004 between Australia, the United States, Japan, and India for security matters in the Indo-Pacific region.[244] The QUAD ended in 2007 due to turnover in leadership. However, attempts to revive the QUAD under the Trump administration did take place, and while the QUAD has not been fully revived, there is potential for future cooperation under the Biden administration.[245]

3. Technology

Several IUUF mitigating efforts based on emerging technology have been employed in the Oceania region. AIS, VMS, unmanned aircraft systems, and several other technologies are being used in innovative ways by government and non-government organizations.

a. AIS and VMS

AIS is a technological tool that can determine where fishing vessels are operating. If fishing vessels appear to be operating in protected areas, countries can use AIS data as a starting point and then either vector in enforcement assets or use satellite imagery to

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241 "Steps Australia Has Taken to Address Illegal Fishing," Australian Department of Agriculture, Water and the Environment, November 4, 2019, https://www.agriculture.gov.au/fisheries/iuu/illegal-fishing.

242 Australian Department of Agriculture, Water, and the Environment.

243 Australian Department of Agriculture, Water, and the Environment, *Second National Plan of Action*.

244 Ashok Rai, "Quadrilateral Security Dialogue 2 (Quad 2.0)—A Credible Strategic Construct or Mere 'Foam in the Ocean'?," *Maritime Affairs: Journal of the National Maritime Foundation of India* 14, no. 2 (2018): 138–48, https://doi.org/10.1080/09733159.2019.1572260.

245 Rai.

confirm IUUF activity. AIS was developed in the early 2000s after the International Maritime Organization mandated that ships over 300 gross tons embarking on international voyages must carry a vessel identification system for safety and anti-collision purposes.[246] Vessels with AIS are equipped with a transceiver that can be programmed and provided with relevant information including a vessel's name, location, speed, course bearing, and many other identifiers.[247] The vessel's AIS transceiver sends this information via a very high frequency (VHF) transmitter to other vessels, aircraft, and shore stations.[248] The signal production and reception is automatic and continuous.[249] Issues with signal overlap are infrequent because each transceiver creates its own transmission schedule and uses over 2,000 available transmission time slots that are refreshed every minute.[250] If there is a danger of signal overlap and system overload, signals farther away from the source will drop.[251] In navigable U.S. waterways, fishing vessels over 65 feet and engaged in commercial activity are required to carry and use AIS.[252] Shore stations can monitor fishing vessel locations to see whether vessels are operating in protected fishing areas, as well as vector in enforcement authorities to investigate and take further action against potential violators. If at-sea enforcement is not a possibility, a potential violator's data are sent to port authorities who can check the fishing vessels for violations when the vessel gets into port.

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246 "AIS Transponders," International Maritime Organization, accessed February 10, 2022, https://www.imo.org/en/OurWork/Safety/Pages/AIS.aspx.

247 "AIS Frequently Asked Questions," U.S. Coast Guard, November 23, 2020, https://www.navcen.uscg.gov/?pageName=AISFAQ.

248 "How AIS Works," U.S. Coast Guard, September 8, 2016, https://www.navcen.uscg.gov/?pageName=AISworks.

249 U.S. Coast Guard.

250 U.S. Coast Guard.

251 U.S. Coast Guard.

252 As per the *Code of Federal Regulations*, "navigable waterways" include territorial seas and internal waters of the United States. For criminal jurisdiction, which includes fishing illegally in refuges, territorial seas are waters 12 miles out from the coastline. Navigation and Navigable Waters, 33 C.F.R. 2.1–2.45 (2003), https://www.ecfr.gov/current/title-33/chapter-I/subchapter-A/part-2; "AIS Requirements," U.S. Coast Guard, January 8, 2021, https://www.navcen.uscg.gov/?pageName=AISRequirementsRev.

Alternatively, VMS was created specifically for fishing vessel monitoring. One difference between AIS and VMS is that the former uses VHF and satellites while the latter uses solely satellites.[253] VMS provides superior range and reliability compared to AIS.[254] Nevertheless, VMS is mandatory only for U.S. vessels fishing for highly migratory fish, so only 4,000 boats carry the system in the United States.[255]

Other Oceanian countries have similar carriage policies to the United States. In Australia, Marine Order 27 requires AIS to be active on regulated Australian ships and foreign-flagged vessels in certain Australian waters.[256] Australia allows any fishing vessel to "switch off its AIS if the master believes continual operation may compromise the safety or security of the vessel."[257] The Australian Maritime Safety Authority compiles its AIS data in a program called the Domain Awareness Information System and has shared this information with other countries in Oceania.[258] For Australian fishing vessels required to carry VMS, the tracking device must remain on at all times and can only be turned off with approval from the Australian Fisheries Management Authority.[259] Fiji's Maritime Transport Act of 2013 requires that Class-B AIS be installed on fishing vessels over 15

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253 "How Does AIS Compare and Contrast with VMS?," U.S. Coast Guard, accessed February 28, 2021, https://www.navcen.uscg.gov/pdf/AIS/Q_AIS_vs_VMS_Comparison.pdf.

254 Jennifer L. Shepperson et al., "A Comparison of VMS and AIS Data: The Effect of Data Coverage and Vessel Position Recording Frequency on Estimates of Fishing Footprints," *ICES Journal of Marine Science* 75, no. 3 (2018): 988–98, https://doi.org/10.1093/icesjms/fsx230; U.S. Coast Guard, "How Does AIS Compare?"; "What Is the Vessel Monitoring System?," NOAA Fisheries, December 30, 2019, https://www.fisheries.noaa.gov/node/696.

255 NOAA Fisheries, "What Is the Vessel Monitoring System?"; U.S. Coast Guard, "How Does AIS Compare?"

256 "Requirements for Carrying an Automatic Identification System," Australian Maritime Safety Authority, March 15, 2021, https://www.amsa.gov.au/safety-navigation/navigation-systems/requirements-carrying-automatic-identification-system.

257 Australian Maritime Safety Authority.

258 "Domain Awareness Enabling Safer Marine Pilot Transfers," Australian Maritime Safety Authority, October 31, 2019, https://www.transparency.gov.au/annual-reports/australian-maritime-safety-authority/reporting-year/2018-2019-32; "Vessel Tracking & Monitoring," Papua New Guinea National Maritime Safety Authority, accessed October 9, 2021, https://nmsa.gov.pg/navigation/vessel-tracking-monitoring/.

259 "Vessel Monitoring System Requirements," Australian Fisheries Management Authority, February 18, 2014, https://www.afma.gov.au/fisheries-services/vessel-monitoring.

meters in length and that the AIS be turned on and continuously transmitting signals.[260] This requirement applies to Fiji-owned fishing vessels and foreign-flagged vessels operating in Fijian waters.[261] As per New Zealand's Maritime Rules Part 40D, any fishing vessel traveling offshore must be outfitted with a radar transponder or an AIS search and rescue transmitter.[262]

Non-government agencies—such as Global Fishing Watch (GFW)—also use AIS and VMS data to help counter IUUF. Since AIS data are public, GFW can access the information to determine where fishing fleets are operating, as shown in Figure 12. GFW goes a step further by looking for dropped AIS signals in protected fish areas, which may indicate a vessel has turned its AIS off to fish illegally.[263] A dropped signal does not necessarily mean that a fishing vessel is engaging in illicit activity, but by using computer algorithms to "analyze the frequency and regularity of signals before and after a gap occurs," GFW can make educated conclusions about the fishing activity and help bolster a region's MDA.[264]

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[260] Act No. 20 of 2013 (Maritime Transport Act), *Maritime (Automatic Identification System for Ships) Regulations 2017* (Fiji), https://www.msaf.com.fj/wp-content/uploads/2020/12/Draft-2-of-the-Maritime-Automatic-Identification-System-for-Ships-Regulations-2017.pdf.

[261] Automatic Identification System for Ships.

[262] Maritime New Zealand, *Maritime Rules, Part 40D: Design, Construction and Equipment* (Wellington: Maritime New Zealand, 2019), https://www.maritimenz.govt.nz/rules/part-40D/Part40D-maritime-rule-current.pdf.

[263] Kimbra Cutlip, "When Vessels Turn Off AIS Broadcasts," Global Fishing Watch, July 31, 2016, https://globalfishingwatch.org/data/going-dark-when-vessels-turn-off-ais-broadcasts/.

[264] Cutlip.

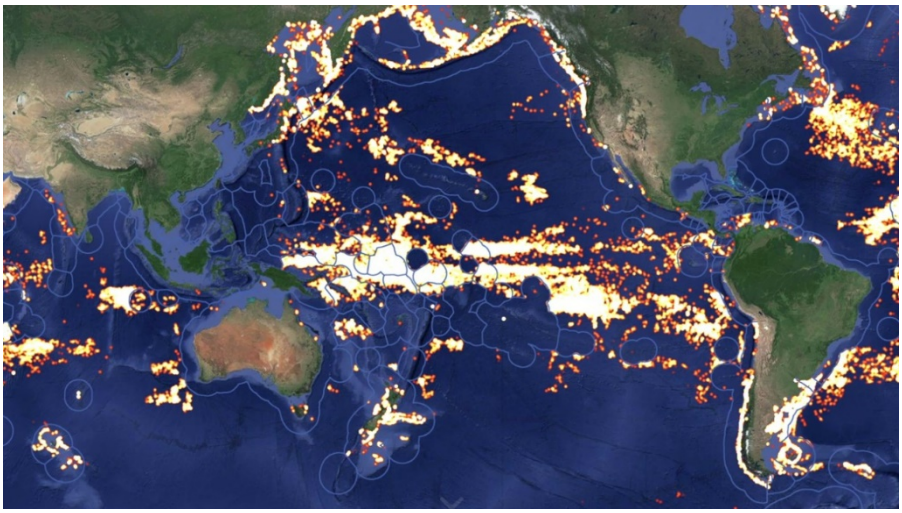

Figure 12. Global Fishing Watch Map of Fishing Activity in Oceania.[265]

b. Unmanned Aircraft Systems

In a fiscal year 2019 report to Congress, the USCG outlined its unmanned aircraft systems (UASs) operational pilot program for fiscal year 2020 to deter IUUF.[266] The program's objective was to equip all USCG national security cutters (NSCs) with ScanEagle UASs.[267] First introduced to the USCG in 2012, the ScanEagle UAS "is catapult-launched and wire-recovered, carries electro-optical and infrared sensors, and has the ability to stay aloft for more than 12 hours on a single gallon of fuel."[268] Since 2012, the USCG has tested the technology in a range of circumstances and deemed it the UAS of choice for the NSC fleet.[269] As part of the USCG's operational pilot program, the NSCs deployed to Oceania in fiscal year 2020 to deter IUUF activity used ScanEagle UAS technology, which provided the USCG assets with significantly increased enforcement

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[265] Source: Global Fishing Watch, "Our Technology."

[266] U.S. Coast Guard, *Pilot Program*.

[267] U.S. Coast Guard.

[268] U.S. Coast Guard, 4.

[269] U.S. Coast Guard.

range.[270] The USCG is also developing a land-based UAS with a range of one day to one week that could be deployed from various Pacific islands to increase MDA.[271] While the technology is still under development, it highlights a technological shift to UASs that provide the greatest enforcement surveillance range, which is critical for such an expansive region.

c. Other Technology

Many other technological innovations have been employed to counter IUUF activity in Oceania, including the use of birds, autonomous unmanned surface vehicles, and satellite imagery. A study led by Henri Weimerskirch of the French National Center for Scientific Research and funded by the European Research Council used albatross to track IUUF activity just south of Australia and New Zealand in the Southern Ocean.[272] Albatross were outfitted with data loggers that could recognize radar signals.[273] Since fishing vessels have radar for basic navigation, the detection of a signal indicated the presence of a vessel.[274] Albatross naturally flock to fishing vessels, so once they were released, they migrated toward such vessels.[275] Throughout the study, albatross impressively identified and homed in on vessels at a range of 30 km.[276] The logger data was overlayed with available AIS data to determine where fishing vessels were operating and whether they were operating in the dark without AIS.[277] The study concluded that

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[270] U.S. Coast Guard.

[271] U.S. Coast Guard.

[272] Henri Weimerskirch et al., "Ocean Sentinel Albatrosses Locate Illegal Vessels and Provide the First Estimate of the Extent of Nondeclared Fishing," *Proceedings of the National Academy of Sciences* 117, no. 6 (2020): 3006–14, https://doi.org/10.1073/pnas.1915499117.

[273] Weimerskirch et al.

[274] Weimerskirch et al.

[275] Weimerskirch et al.

[276] Weimerskirch et al.

[277] Weimerskirch et al.

more than one-third of vessels in international waters were not using their AIS. [278] In EEZs, over a quarter of boats detected were not using AIS, although this varied significantly by EEZ, as show in Table 6.[279]

Table 6. Percentage of Boats Not Using AIS across Several EEZs from Albatross Study.[280]

EEZ	Average % time spent in EEZ	Number of radar-detection events within EEZ	% with no AIS
International	42.2 ± 35.9	78	36.9
Crozet	30.5 ± 40.4	93	14.6
Kerguelen	18.5 ± 32.4	125	14.9
Amsterdam	3.4 ± 12.9	6	50
Heard	1.8 ± 7.9	4	0
Prince Edward	1.4 ± 7.3	31	100
Australia	1.3 ± 5.2	11	18.2
New Zealand	0.3 ± 2.6	5	20.0
Antarctica	0.3 ± 2.4	0	
South Africa	0.03 ± 0.3	0	

Autonomous unmanned surface vehicles (USVs) have been tested in Oceania to see whether they can provide enhanced MDA for remote Pacific areas. In October and November of 2020, Spatial Integrated Systems and Saildrone tested their USVs with the goal of operating without refueling for 30 consecutive days, detecting vessels within a one-nautical-mile range, and surviving in harsh maritime conditions.[281] Saildrone produced a prototype that was wind and solar powered with 360-degree infrared camera

[278] Weimerskirch et al.

[279] Weimerskirch et al.

[280] Source: Weimerskirch et al., 3010.

[281] Scott Craig, Blair Sweigart, and Loretta Haring, "Illegal, Unreported, and Unregulated Fishing," *Proceedings of the Marine Safety and Security Council* 78, no. 2 (2021): 39–43, https://www.dco.uscg.mil/Portals/9/DCO%20Documents/Proceedings%20Magazine/Archive/2021/Vol78_No2_Fall21.pdf?ver=wio_EEFRKhMYrCdLkM3yew%3D%3D.

technology.[282] Saildrone's prototype also used machine learning and artificial intelligence that "fuses data from all the sensors, recognizes and identifies targets of interest, and automatically alerts the end-user in real time."[283] One major lesson learned from the Oceanian USV test was that future prototypes should have the ability to follow targets of interest and obtain additional sources of imagery and data.[284] Such a capability will require a delicate balance between prototype endurance, MDA, stability, and speed.

Figure 13. Saildrone Prototypes.[285]

Last, satellite imagery is a useful way to detect IUUF activity. In 2018, a study led by GFW used PlanetScope and SkySat satellite imagery to identify illegal Chinese fishers

[282] "Combating IUU Fishing with Autonomous Vehicles," Saildrone, November 3, 2020, https://www.saildrone.com/news/autonomous-vehicles-combat-iuu-fishing.

[283] Saildrone.

[284] Craig, Sweigart, and Haring, "Illegal, Unreported, and Unregulated Fishing."

[285] Source: Craig, Sweigart, and Haring, 41.

to the north of Oceania near North Korea.[286] The satellite imagery was paired with AIS data to identify vessel origin, fishing activity, and fishing location to determine whether the activity was illicit.[287] The study supports that the technology is ready for further adoption to combat IUUF: "It is only with recent increases in data availability, accessibility, and computing power that these techniques can now be performed at large enough spatial and temporal scales—and by small, independent groups of researchers—to enable transparent fisheries monitoring."[288]

Overall, several established and emerging technologies are aiding flag states in combating IUUF in Oceania. With the help of non-governmental organizations (NGOs), flag states can employ a wide range of technologies to detect IUUF infractions and enforce regulations. Continual technological investments are critical to remaining one step ahead of IUUF crime.

B. IUUF MITIGATION GAPS

Some of Oceania's mitigation efforts have been unsuccessful. The region has also neglected to use several methods proven successful in other parts of the world. Thus, several mitigation gaps in Oceania have allowed IUUF activity to continue. Table 7 summarizes the key findings of this phase of analysis.

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286 Jaeyoon Park et al., "Illuminating Dark Fishing Fleets in North Korea," *Science Advances* 6, no. 30 (2020): eabb1197, https://doi.org/10.1126/sciadv.abb1197.

287 Park et al.

288 Park et al., 5.

Table 7. Gap Findings.

Category	Key Finding
Regulatory	
Transshipments: Use of refrigerated cargo ships to transfer fish at sea, which masks IUUF practices.	• RFMOs have only partial bans on transshipments largely due to financial and economical motives. Partial bans allow transshipments to continue.
Subsidies: Use of government subsidies for fishing decreases fish stocks and increases IUUF practices.	• The World Trade Organization (WTO)'s inability to enact subsidy reform. RFMOs' inability to influence the WTO. • Ethical challenges of a subsidy ban for developing countries. Banning subsidies has a far more significant impact on developing countries than on developed countries.
Supply chain traceability: Allows for consumers to understand whether their fish has been sustainably and legally sourced and acts as a tool to track fish from bait to plate.	• The supply chain is extremely complex. Fish move through multiple stages from fishing to consumption. • Lack of traceability regulation in Oceania.
Open-registry states: Fishing vessels can register with countries, even if it is not their home of residency, allowing them to bypass IUUF regulations.	• Multiple countries in Oceania are open-registry. Easy to register with low financial risk. • Lack of action by RFMOs to deter open registries, especially with recent rulings by the WTO.
Sanctions: Tool to deter IUUF activity.	• Overall lack of appropriate sanctions for IUUF activity. Monetary sanctions vary considerably by country. • Too heavily reliant on the superpowers in Oceania for enforcement.
Whistleblowing regulations and protections: Protected ability for fishers to come forward to report illegal activity.	• Lack of protections and financial incentives for fishers to come forward to report illegal activity. • The whistleblowing mechanisms and protections that do exist are not advertised well.
UNCLOS	• The United States is not a ratified party, which limits the effectiveness of the agreement and rule of law.

Category	Key Finding
Cooperation	
Information sharing	• No agreed-upon information-sharing network, which results in siloed information sharing at the country and regional levels.
Monitoring, control, and surveillance	• Inadequate observer coverage and lag time in observer reports. • Lack of fishing vessel licensing and identification.
Technology	
Technology	• Challenges and limitations of AIS and VMS. Data-sharing challenges of AIS/VMS are also a major gap.

1. Regulatory

The following section analyzes the regulatory mitigation gaps for IUUF in Oceania. These gaps include inadequate regulations on transshipments, subsidies, supply chain traceability, open-state registries, sanctions, and whistleblowing. Last, this section discusses UNCLOS and its effectiveness without the United States as a member state.

a. Transshipments

The first major gap surrounds transshipments. The FAO defines transshipments as the "act of transferring the catch from one fishing vessel to either another fishing vessel or to a vessel used solely for the carriage of cargo."[289] As coastal waters are becoming more overfished, many countries' DWFFs are fishing in international waters. Utilizing transshipments is a major cost savings for DWFFs, as individual fishing vessels need not go into port to offload their catch.[290] Rather, large refrigerated transshipment vessels can

[289] Food and Agriculture Organization of the United Nations, *FAO Technical Guidelines for Responsible Fisheries* (Rome: Food and Agriculture Organization of the United Nations, 2000), http://www.fao.org/3/w3591e/w3591e03.htm.

[290] Ewell et al., "Moratorium on Transshipment on the High Seas."

support multiple fishing vessels and offload catch in bulk.[291] A study conducted by the American Association for the Advancement of Science estimated that around 35 percent of transshipments take place on the high seas, but they are also frequent in EEZs.[292]

Transshipments influence IUUF in several ways. First, illegally and legally caught fish are combined on transshipment vessels, making it nearly impossible for port authorities to determine whether IUUF took place and an easy way for fishing companies to launder their illegal catch.[293] Second, DWFFs can operate in international waters for long periods, completely avoiding any enforcement or monitoring by coastal or port state authorities, as exemplified in Figure 14.[294] Transshipments allow for fishing vessels to offload their catch and resupply with food, water, fuel, bait, and other items to continue fishing operations.[295] Transshipments are also linked to human labor concerns as fishing vessels can underpay workers and force them to work in unacceptable conditions because they continue to operate on the high seas away from enforcement authorities.[296]

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[291] Ewell et al.

[292] Boerder, Miller, and Worm, "Global Hot Spots of Transshipment of Fish."

[293] Ewell et al., "Moratorium on Transshipment on the High Seas."

[294] Ewell et al.

[295] Boerder, Miller, and Worm, "Global Hot Spots of Transshipment of Fish."

[296] Ewell et al., "Moratorium on Transshipment on the High Seas."

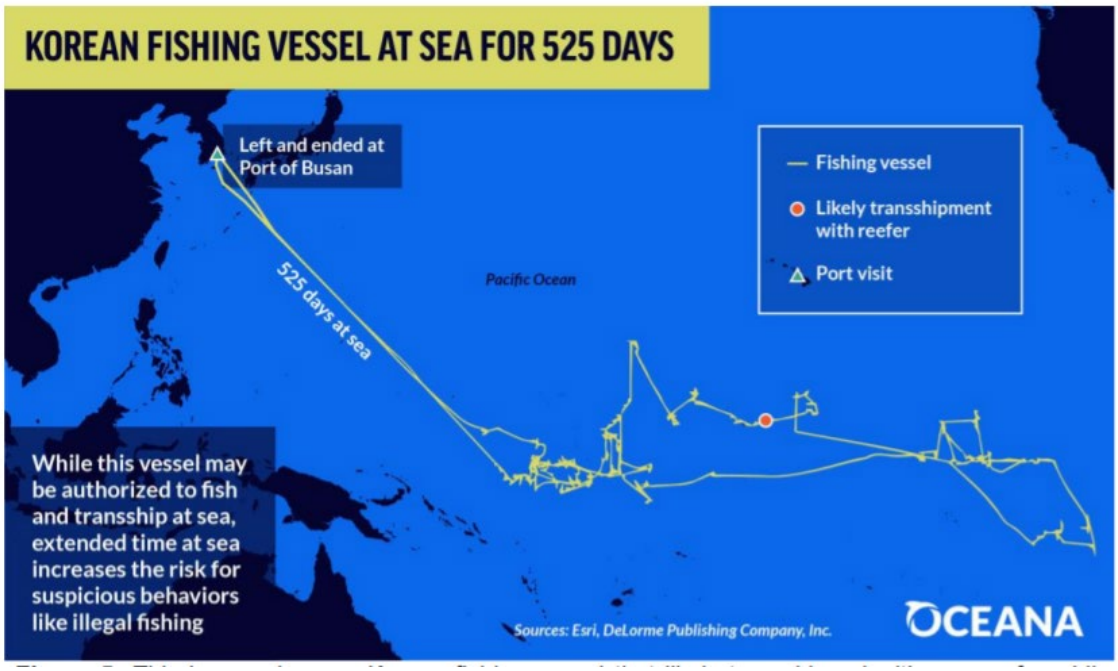

Figure 14. Korean Fishing Vessel in Oceania Supported by a Transshipment Vessel in 2015 and 2016.[297]

While many nations in Oceania have bans on transshipments in their sovereign waters, these bans do not extend into international waters, which comprise two-thirds of the ocean.[298] Some of the high seas are governed by different RFMOs in Oceania; however, none have complete bans on transshipment activity.[299] The WCPFC and IATTC, for example, have partial bans in place and ban transshipments for only certain vessel types.[300] Moreover, neither the WCPFC nor the IATTC bans transshipment activity for long-scale pelagic long-liners.[301] In fact, 58 percent of the WCPFC's registered vessels

297 Source: Lacey Malarky and Beth Lowell, "No More Hiding at Sea: Transshipping Exposed," Oceana USA, February 22, 2017, https://usa.oceana.org/TransshippingExposed.

298 A Second Arrangement Implementing the Nauru Agreement Setting Forth Additional Terms and Conditions of Access to the Fisheries Zones of the Parties, September 19, 1990, I.U.C.N. TRE-002009, https://pnatuna.com/sites/default/files/2nd%20Implementing%20Arrangement_0.pdf.

299 Ewell et al., "Moratorium on Transshipment on the High Seas."

300 Ewell et al.

301 Ewell et al.

are of this variety, so a partial ban on transshipment activity does not address most of the vessels operating in the region.[302] In justifying its actions, the WCPFC cites the economic hardship for fishing operators if it enforces complete bans.[303] Thus, the WCPFC—not to mention other RFMOs—completely dismisses the ecological and social dangers of transshipment activity in favor of economic incentives.

Ultimately, transshipment regulations and enforcement rely on flag state action. Because there are no flag state transshipment regulations for large DWFFs and a lack of global transshipment regulations, transshipments will continue on the high seas.[304] Furthermore, there are insignificant regulations for refrigerated transshipment vessels, operated primarily by Russia, Panama, and Liberia.[305] If transshipments continue unregulated, IUUF practices will persist. Even with better transshipment regulations, counter-IUUF operations will still require at-sea enforcement mechanisms that are hard to employ in the expansive region.

b. Subsidies

The next major regulatory gap surrounds fishing subsidies. IUUF is made easier and cheaper through government subsidies. As detailed in a report on fishery management from the Centre on Asia and Globalisation, subsidies broadly encompass

> preferential tax treatment; the provision of grants, low-cost loans, and loan guarantees for vessel construction and repair; discounts on the purchase of new gear; favorable trade restrictions and quotas in fisheries imports; support for construction of cold storage and processing plants; the creation of docks and better port facilities; direct investment in research and development for fishing technologies; support for fish prices and fishers' wages; naval and coast guard support to ensure the safety and security of

302 Ewell et al., 296.

303 Ewell et al.

304 Boerder, Miller, and Worm, "Global Hot Spots of Transshipment of Fish."

305 Boerder, Miller, and Worm.

> fishing vessels; and the provision of marine insurance, harbor maintenance, and fuel discounts.[306]

Global fishing subsidies are estimated at $35 billion—however, this number is only a rough estimate because most government subsidies go unreported.[307] Subsidies promote IUUF by making it cheaper to fish, creating a dangerous cycle of supply and demand. As fishing becomes cheaper, fish prices decrease; as fish prices decrease, consumption increases, promoting government subsidization, and the process repeats.[308] Thus, an increase in fishing—supported by government—and a decrease in global fish stocks form a breeding ground for IUUF practices. With stricter regulations on global fishing subsidies, the FAO estimates a global economic benefit of more than $16 billion every year: "If fishing pressures were relaxed to allow rehabilitation of stocks, fishers could stabilize their catch at a level 20 tons higher globally at a lower cost to the industry and environment."[309]

Subsidy reform is needed for multiple countries, but state reformers have yet to take the lead because doing so would prove uneconomical and place the countries at a disadvantage.[310] Thus, unless all countries requiring reform act at the same time, subsidy reform will not likely take place. At the global level, the biggest influencer is the WTO as its role is to "make international trade and environmental policies mutually supportive in favour of sustainable development."[311] Progress by the WTO to reach a universal agreement with fishing countries has been a slow and challenging process. First and foremost, there are no transparency and reporting mechanisms for governmental

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306 Sovacool, "A Game of Cat and Fish," 113.

307 Von Moltke, *Fisheries Subsidies, Sustainable Development and the WTO*; "Regulating Fishing Subsidies," United Nations Conference on Trade and Development, accessed February 11, 2022, https://unctad.org/project/regulating-fisheries-subsidies.

308 Sovacool, "A Game of Cat and Fish."

309 Sovacool, 114.

310 Von Moltke, Fisheries Subsidies, Sustainable Development and the WTO.

311 Von Moltke, xxiv.

subsidies.[312] To develop subsidy guidelines, the WTO must first understand the extent of the issue.

Also, at the heart of the WTO's challenge is trying to find even basic guidelines that developing and developed countries can agree on, as subsidy reform impacts these groups in drastically different ways.[313] The fishing industry for many developing countries is an integral backbone to their economies.[314] Furthermore, even if a consensus is reached on basic universal WTO guidelines on subsidies, those guidelines would need to be enforced at the RFMO and national government level.

c. Traceability, Seafood Markets, and Consumerism

Petter Olsen and Melania Borit, two leading traceability experts, define traceability as "the ability to access any or all information relating to that which is under consideration, throughout its entire life cycle, by means of recorded information."[315] The "Food Code" established by the FAO and World Health Organization (WHO) builds on this definition by describing traceability as being able to track food through the production, processing, and distribution nodes of the supply chain.[316] Traceability can take many forms—it can be directly on the item being transmitted or it can accompany the item via documentation.[317] The best traceability mechanisms are done electronically, although that requires coordination and acceptance on a standardized system between the many entities in the life cycle.[318] The main driver for counter-IUUF traceability is security and

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312 Von Moltke.

313 Von Moltke.

314 Von Moltke.

315 P. Olsen and M. Borit, "How to Define Traceability," *Trends in Food Sciences and Technology* 29, no. 2 (2013): 148.

316 Food and Agriculture Organization of the United Nations and World Health Organization, *Codex Alimentarius Commission Procedural Manual*, 27th ed. (Rome: Codex Alimentarius Commission, 2019), https://www.fao.org/3/ca2329en/ca2329en.pdf.

317 Borit and Olsen, Seafood Traceability Systems.

318 Borit and Olsen.

sustainability, which differ from other traceability chains driven by safety or quality.[319] For fisheries, the supply chain is extremely complex, as displayed in Figure 15. It is common for fish to travel 8,000 to 12,500 miles along the supply chain, spending 18 to 35 weeks from bait to plate.[320] The physical length and duration of travel has made it difficult for counter-IUUF traceability.

[319] Borit and Olsen.

[320] Boerder, Miller, and Worm, "Global Hot Spots of Transshipment of Fish."

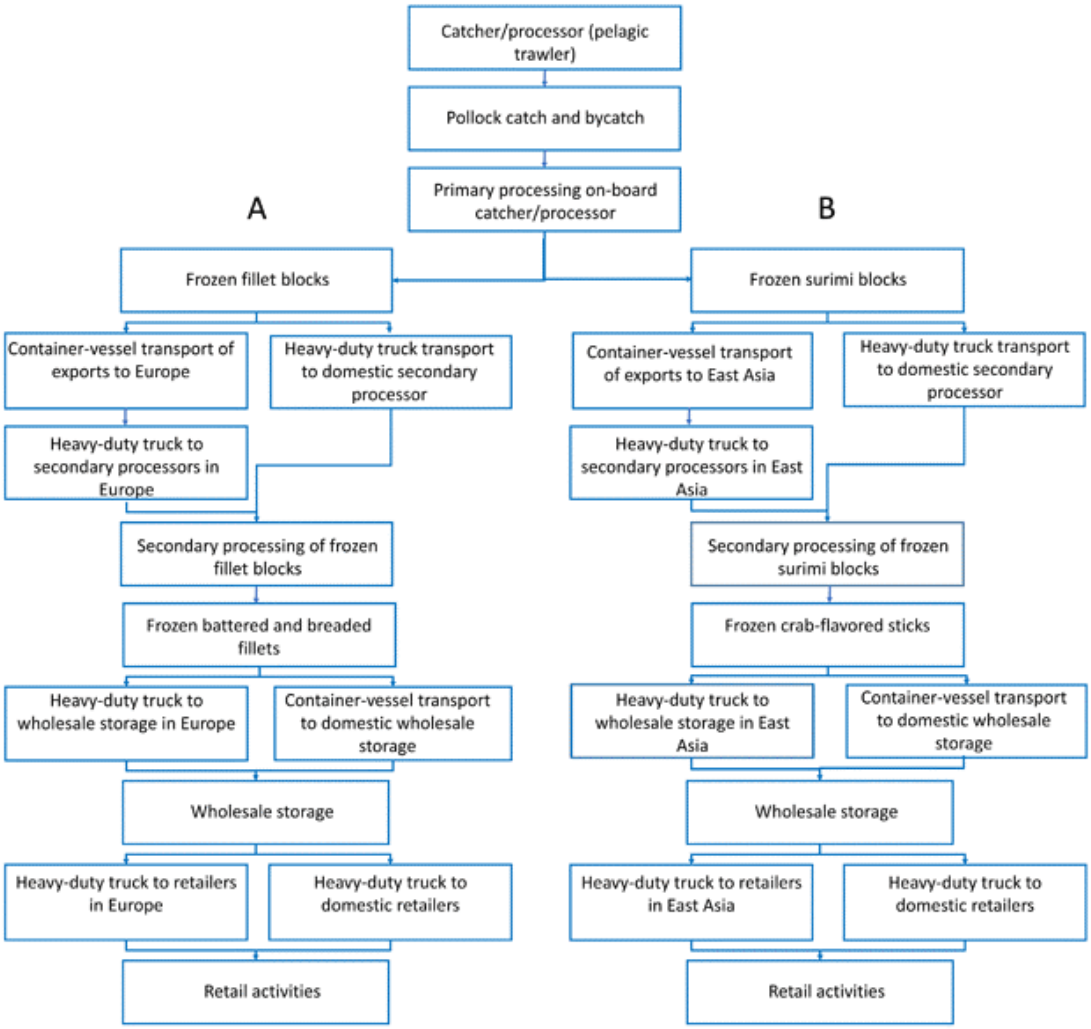

Figure 15. Fishery Supply Chain for Pollock.[321]

Traceability at both the international level and domestic level for the United States is inadequate. Internationally, the most prominent traceability mechanism is the FAO and WHO's Food Code. According to a 2016 FAO research report, the Food Code is inadequate "because it does not incorporate essential properties of traceability systems."[322] Another prominent international traceability standard is the World Organisation for Animal

[321] Source: Brandi L. McKuin et al., "Climate Forcing by Battered-and-Breaded Fillets and Crab-Flavored Sticks from Alaska Pollock," *Elementa: Science of the Anthropocene* 7, no. 48 (2019): 3, https://doi.org/10.1525/elementa.386.

[322] Borit and Olsen, Seafood Traceability Systems, 17.

Health's Aquatic Animal Health Code. However, this code is geared toward safety and health in the international aquatic animal trade and not the security and sustainability aspects related to IUUF.[323]

According to the 2016 FAO research report on seafood traceability, the United States has generally weak food traceability standards.[324] Among the American traceability standards are catch documentation schemes (CDSs). In 2000, the CDS concept was born out of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) for a threatened species of toothfish.[325] According to CCAMLR, a CDS "requires individuals involved in the supply chain of toothfish to record the fish at each state from capture to trade, including landing, transshipment, import, export, or re-export."[326] CCAMLR requires that its member states capture data on toothfish. CDS data can be validated with VMS data—together, they form a useful tool for fishery management organizations to detect IUUF.[327] If CDS and VMS data do not match, catch documentation can be revoked and the incident investigated further.[328]

There are several issues with CDS. First, fishery management organizations are very protective of their CDS data for proprietary reasons and may only share partial data.[329] Next, CDS data still require accurate flag state reporting that cannot be precisely verified by visual means or VMS data.[330] For example, the quantity of a catch cannot be verified unless the fishing vessel has an underway or port inspection. Furthermore, DWFFs

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323 Borit and Olsen.

324 Borit and Olsen.

325 Anastasia Telesetsky, "U.S. Seafood Traceability as Food Law and the Future of Marine Fisheries," *Environmental Law* 47, no. 3 (2017): 765–95, https://law.lclark.edu/live/files/24725-13tojcitelesetsky-colorpdf.

326 Telesetsky, 775.

327 Telesetsky.

328 Telesetsky.

329 Telesetsky.

330 Telesetsky.

rarely get inspected, so it is left to good faith to trust the reported information.[331] Another issue is that CDS data do not exist for every species. The United States has a CDS, but it focuses only on fisheries that are at risk and requires only limited harvest location information.[332] For instance, if a vessel is fishing outside its flag state waters, it need only report the general FAO fishing region it was operating in.[333] For broad expanses, such as Oceania, this information is relatively unhelpful. The Pacific Islands Forum Fisheries Agency (PIFFA) details a primary objective in its 2018–2023 *Regional Monitoring, Control and Surveillance Strategy*: the need to create Oceanian CDSs that are electronically documented to facilitate "regional coordination of data between Flag State, Coastal State, Port State, and Observer providers."[334]

In the United States, there is also no consumer labeling requirement. A certification standard for sustainable fishing practices gives the consumer power and places pressure on the fishing industry to ditch IUUF and improve its practices. In the absence of these measures, industrial and non-government agencies have tried to fill the gap with their own consumer ratings and traceability standards.[335] Examples of these agencies include the U.S. National Fisheries Institute, World Wildlife Fund Smart Fishing Initiative, and Marine Stewardship Council. As with the diamond, textile, meat, and timber industries, traceability is a valuable tool that would give power to the consumer to make informed purchase decisions, subsequently placing pressure on fishers to source their catches in sustainable and legal ways.[336]

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[331] Telesetsky.

[332] Telesetsky.

[333] Telesetsky.

[334] Pacific Islands Forum Fisheries Agency, Regional Monitoring, Control and Surveillance Strategy, 14.

[335] Telesetsky, "U.S. Seafood Traceability."

[336] Dickenson and Bailey, "Willingness-to-Pay for Information"; Wafaa Ahmed and Bart MacCarthy, "Blockchain-Enabled Supply Chain Traceability in the Textile and Apparel Supply Chain: A Case Study of the Fiber Producer, Lenzing," *Sustainability* 13, no. 19 (2021), ProQuest.

Overall, the FAO's 2016 seafood traceability report concluded that counter-IUUF traceability is difficult because there are many gaps: awareness issues, a lack of adequate technology, implementation challenges, and a lack of standards for information gathering required for traceability to be effective.[337] These gaps are prevalent at multiple stages of the complex supply chain:

> The gaps in the system occur at many levels: at sea, where monitoring, control and surveillance remain frequently inadequate; in ports, where systems to document catch landings are often weak or non-transparent; and in market countries, where effective systems to require traceability and proof of legal origin are lacking.[338]

d. Flags of Convenience

The next major gap surrounds a term called flags of convenience (FOCs). An FOC is a term for a fishing operator that registers its vessels with a country other than its home country.[339] The fishing operator is then required only to follow the regulations imposed by the country of registration. It is a win-win situation for both the open-registry country and the fishing vessel operator. The country offering registration gets routine registration fees, and the fishing vessel operator gets a competitive advantage via operation under less-stringent regulations compared to the regulations of its home of residency.[340] It is estimated that almost a quarter of all fishing vessels are registered under FOCs.[341] As per the Lloyd's Register of Shipping, the leading nations offering open-registry are Panama,

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337 Borit and Olsen, Seafood Traceability Systems.

338 Ganapathiraju Pramod et al., "Estimates of Illegal and Unreported Fish in Seafood Imports to the USA," *Marine Policy* 48 (2014): 111, https://doi.org/10.1016/j.marpol.2014.03.019.

339 Elizabeth R. DeSombre, "Fishing under Flags of Convenience: Using Market Power to Increase Participation in International Regulation," *Global Environmental Politics* 5, no. 4 (2005), https://doi.org/10.1162/152638005774785507.

340 DeSombre.

341 DeSombre.

Liberia, and the Marshall Islands.[342] In addition to the Marshall Islands, other open-registry states in Oceania include Vanuatu, Tuvalu, Tonga, Samoa, and the Cook Islands.[343]

FOCs completely undermine the efforts of flag states that impose sustainable fishing regulations on their registered vessels. These flag state regulations can sometimes be the only enforceable mechanism to counter IUUF in international waters.[344] FOCs disincentivize other flag states from taking proactive measures against IUUF because strict measures may limit fishing operations, subsequently influencing those vessels impacted to instead register with an FOC where they can operate risk-free. Thus, to compete with FOCs and avoid jeopardizing registration revenue, flag states may avoid controversial counter-IUUF strategies. Even more troublesome, it is very easy and inexpensive for a fishing vessel to change its flag registration; it can be done for around $1,000.[345] Thus, if an open-registry country increases its regulations on fishing, a fishing vessel can easily change to another open-registry country offering an FOC.

RFMOs have tried to get FOC states to join their organizations to subject them to regional regulations.[346] Overall, this has largely been an unsuccessful endeavor.[347] However, RFMOs and other flag states have been successful with trade restrictions on fishing vessels registered with an FOC.[348] For instance, in Oceania, if an FOC vessel

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342 "FAO Fisheries Circular, Appendix 6: Available Contact Information for Open Registry States That Register Fishing Vessels," Food and Agriculture Organization of the United Nations, accessed February 26, 2022, http://www.fao.org/3/y3824e/y3824e0e.htm; "Top 10 Flag States 2020," Lloyd's List, December 3, 2020, https://lloydslist.maritimeintelligence.informa.com/LL1134965/Top-10-flag-states-2020; "Liberian Registry Reaches 200 Million Gross Tons," Maritime Executive, May 19, 2021, https://www.maritime-executive.com/article/liberian-registry-reaches-200-million-gross-tons.

343 Food and Agriculture Organization of the United Nations, "FAO Fisheries Circular, Appendix 6."

344 Darren Calley, Market Denial and International Fisheries Regulations: The Targeted and Effective Use of Trade Measures against the Flag of Convenience Fishing Industry (Boston: Martinus Nijhoff, 2012), ProQuest.

345 DeSombre, "Fishing under Flags of Convenience."

346 DeSombre.

347 DeSombre.

348 DeSombre.

targets a highly migratory tuna species that the IATTC manages, that corresponding FOC state is prohibited from doing business with any nation state in the IATTC.[349] This penalty forces the FOC state to better manage its fishing vessel fleets. Trade restrictions are governed by the WTO, which has overturned trade restrictions imposed on FOC states.[350] However, baked within the WTO's process is "an increasing acceptance of environmental protection as a legitimate reason for restricting trade, as long as restrictions on trade are applied in a non-discriminatory way, are designed specifically for environmental protection, and are accompanied by multilateral attempts to address the environmental issue."[351]

e. Sanctions and Enforcement

Fines for IUUF activities are inadequate, do not deter IUUF behavior, and vary wildly by country. A study conducted by MRAG Asia Pacific from February 2016 concluded that fines must address the rent forgone from IUUF fishing—or those access fees not paid by IUU fishers—and the increased wages that IUU fishers receive.[352] As previously discussed, rent forgone is the residual after normal profits and the cost of doing business are deducted from the IUUF revenue.[353] These costs include the cost of labor.[354] Thus, if fines are set only to cover the avoided access fees for IUU fishers, there is still an incentive for IUUF to continue because the fines do not address the increased wages for fishers.[355]

Oceania IUUF sanctions vary significantly by country and territory. In the U.S. Oceania region, Hawaii's Division of Aquatic Resources has set illegal fishing fines

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[349] DeSombre.

[350] DeSombre.

[351] DeSombre, 89.

[352] MRAG Asia Pacific, Towards the Quantification of IUU Fishing.

[353] MRAG Asia Pacific.

[354] MRAG Asia Pacific.

[355] MRAG Asia Pacific.

between $100 and $10,000.[356] In contrast, the Australian Northern Supreme Court set a precedent in 2016 by fining a Papua New Guinean flagged vessel $110,000 for illegal fishing violations.[357] In Palau, illegal fishing penalties range from $250 for first convictions to upwards of $5,000 for more than three infractions.[358] The fines from these Oceanian countries show the inconsistency of sanctions from country to country, despite similar crimes being committed. A more uniform and calculated approach for the region is clearly needed.

Fines also cannot remain static. They must be continuously monitored and adjusted to match the benefits of illegal fishing and increasing seafood prices. A Bureau of Labor consumer price index (CPI) report from September 2020 to September 2021 identified a 7.1 percent sharp increase for fish and seafood consumer prices in the United States.[359] This jump does not come as a surprise as the CPI for seafood has seen an increasing trend since September of 2016, as shown in Figure 16.[360] According to Pew Charitable Trusts, IUUF results in $23.5 billion in seafood every year.[361] To counter the increasing seafood prices and the economic benefit for IUUF fishers, an Organization for Economic Cooperation and Development study suggests that "maximum penalties should be increased by as much as 24 times compared to current levels."[362]

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356 "Report Violations," Hawaii Division of Aquatic Resources, accessed February 11, 2022, https://dlnr.hawaii.gov/dar/fishing/fishing-regulations/report-violations/.

357 "Record Penalties for Illegal Foreign Fisherman," Australian Fisheries Management Authority, December 13, 2016, https://www.afma.gov.au/record-penalties-illegal-foreign-fisherman.

358 Palau Secretariat of the Pacific Community and Bureau of Marine Resources, *Palau Domestic Fishing Laws 2012* (Palau: Secretariat of the Pacific Community, 2012), https://chm.cbd.int/api/v2013/documents/6FE95FE4-BB12-0F51-0C3F-7CB651CAD80A/attachments/212198/Palau_DomesticFishingLaws_2012.pdf.

359 "Consumer Price Index for All Urban Consumers," Bureau of Labor Statistics, December 10, 2021, https://www.bls.gov/news.release/cpi.t07.htm.

360 "Consumer Prices for Meats, Poultry, Fish, and Eggs Up 10.5 Percent for Year Ended September 2021," Bureau of Labor Statistics, October 19, 2021, https://www.bls.gov/opub/ted/2021/consumer-prices-for-meats-poultry-fish-and-eggs-up-10-5-percent-for-year-ended-september-2021.htm.

361 Huw, "To Fight Illegal Fishing, Follow the Money."

362 Patrick Love, *Fisheries: While Stocks Last?* (Paris: OECD Publishing, 2010), 66, https://www.oecd-ilibrary.org/agriculture-and-food/fisheries_9789264079915-en.

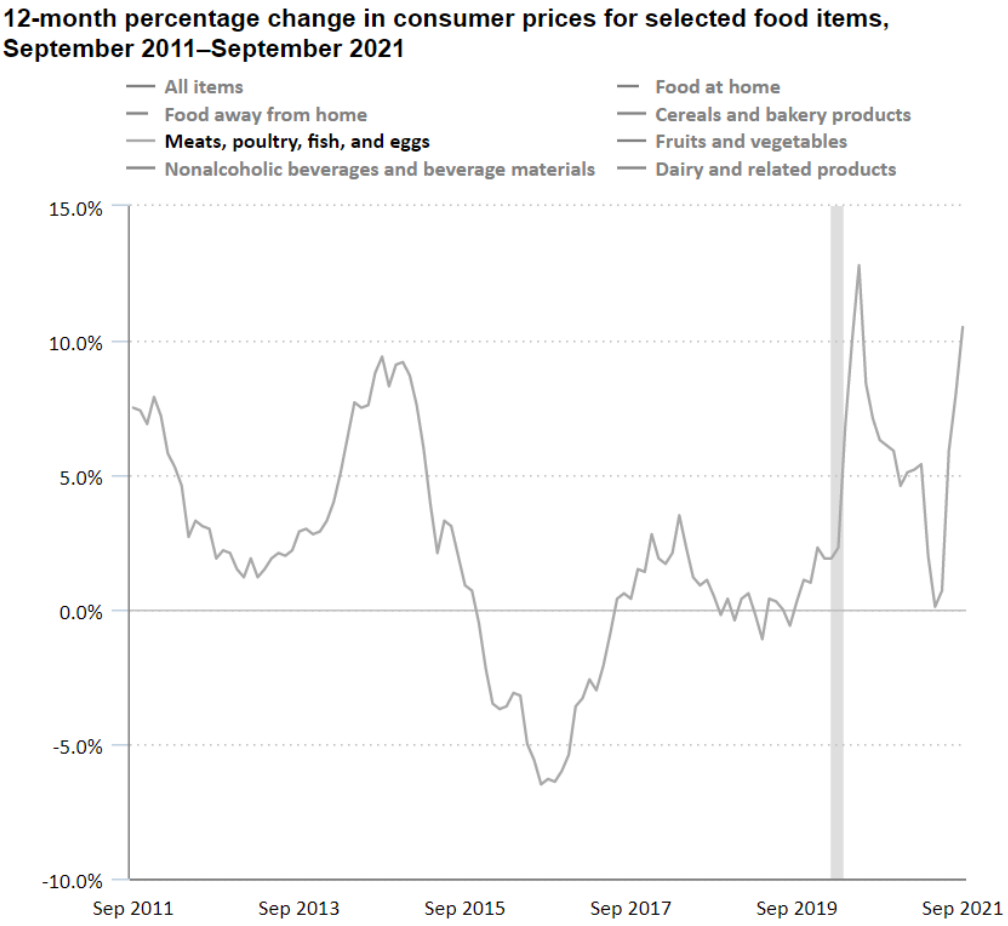

Figure 16. Bureau of Labor Consumer Prices for Seafood.[363]

Ultimately, sanctions can be applied only if IUUF activity is detected. Oceania relies heavily on the United States, Australia, and New Zealand to enforce the region's fishery regulations. As previously discussed, most Oceanian countries and territories lack a military, navy, coast guard, or maritime enforcement agency.[364] The United States has responded to IUUF threats in Oceania by increasing its presence in the area. In a fiscal year 2019 report to Congress, the USCG outlined its IUUF pilot program, which centers on increasing IUUF patrols in Oceania using NSCs and UASs.[365] Similarly, under its Pacific

[363] Source: Bureau of Labor Statistics, "Consumer Prices for Meats, Poultry, Fish, and Eggs."

[364] See the World Factbook for profiles of each country.

[365] U.S. Coast Guard, *Pilot Program*.

Maritime Security Program, Australia is delivering 21 patrol boats to 12 Pacific island countries between 2018 and 2023.[366] This program also has an integrated surveillance strategy to bolster enforcement in the region.[367] However, even with increased patrols and assets, it is not enough to effectively patrol Oceania's 29 million square nautical miles of Pacific Ocean.[368] Thus, to enhance sanction control, improved enforcement mechanisms must be part of the comprehensive solution.

f. Whistleblowing

Whistleblowing is a tactic that could easily alert enforcement authorities of IUUF activity. However, most countries in Oceania have no whistleblowing protections or incentives, making it a rarely used regional mitigation method. The United States has several acts that support whistleblowing alerts on illegal fishing activity. Most notably, the Endangered Species Act, Lacey Act, and Magnuson-Stevens Fishery Conservation and Management Act authorize the secretaries of Agriculture, Commerce, Treasury, and Interior to offer rewards to whistleblowers who alert the agencies about illegal fishing.[369] However, a GAO report uncovered that from 2007 to 2017, only 27 reports had been made and rewards totaling a paltry $205,500 had been paid out.[370] Furthermore, these reports were for wildlife trafficking in general, not just illegal fishing. Of the 27 cases, only one case was for fishing, a 2007 whistleblowing case for angelfish that paid out $10,000.[371] The Fish and Wildlife Service (FWS) and National Oceanic and Atmospheric Administration (NOAA) are the two primary agencies that carry out whistleblowing

366 "Pacific Maritime Security Program," Australian Department of Defence, accessed November 11, 2021, https://www.defence.gov.au/programs-initiatives/pacific-engagement/maritime-capability.

367 Australian Department of Defence.

368 "Commission on Ecosystem Management: Oceania," International Union for Conservation of Nature, accessed February 11, 2022, https://www.iucn.org/commissions/commission-ecosystem-management/regions/oceania.

369 Fennell, Combating Wildlife Trafficking.

370 Fennell.

371 Fennell.

incentive programs for the United States.[372] A GAO report concluded that neither agency successfully marketed its incentive program.[373] While the agencies did broadcast how to report illegal activity, they made little connection to potential rewards.[374] Furthermore, the report concluded that both the FWS and NOAA "have not reviewed the effectiveness of their use of financial rewards or considered whether any changes might improve the usefulness of rewards as a tool for combating wildlife trafficking."[375]

Outside the United States, there is little evidence to suggest other Oceanian countries use whistleblowing protections as a counter-IUUF strategy. Australia has a Department of Agriculture, Water and the Environment whistleblower hotline, but it is used more for cruel livestock treatment than for illegal fishing.[376] In New Zealand, the 2012 Fisheries (Foreign Charter Vessels and Other Matters) Amendment Act is the closest thing to providing protections for whistleblowers, but the act is focused more on human rights violations than on IUUF activity.[377] This is not to say that protections are absent in Oceanian countries and territories but rather that there is less of an incentive for crewmembers to come forward if they are unaware of any protections.

g. UNCLOS

UNCLOS is the largest maritime international agreement and counter-IUUF mechanism. It has been ratified by 167 states and the European Union; however, despite the agreement's prominence, UNCLOS is missing the United States as a critical member

372 Fennell.

373 Fennell.

374 Fennell.

375 Fennell, 26.

376 "Whistleblower Hotline," Australian Department of Agriculture, Water, and the Environment, November 4, 2019, https://www.awe.gov.au/biosecurity-trade/export/from-australia/whistleblower.

377 Michael McLeod and David Hammond, *The New Zealand Fisheries (Foreign Charter Vessels and Other Matters) Amendment Act* (Havant, UK: Human Rights at Sea, 2016), https://www.humanrightsatsea.org/wp-content/uploads/2015/05/20160531-Case-Study-New-Zealand-Fisheries.pdf.

state.[378] Originally, the United States' hesitation to ratify the agreement stemmed from controversy over deep seabed mining provisions.[379] Even though the provisions were remedied in 1994, critics claim that the ratification has been stymied by politics and suspicion of international law.[380] In both 2004 and 2007, the Senate Foreign Relations Committee voted in favor of joining the Convention.[381] However, on both occasions, the vote never made it to the full House or Senate floor.[382] Supporters of UNCLOS ratification range from a wide variety of organizations in fields such as energy, environment, communications, commerce, technology, law, and finance.[383] In May 2012, then–Secretary of State Hillary Clinton declared before the Senate Foreign Relations Committee that "as the 'world's foremost maritime power' and country with the largest Exclusive Economic Zone . . . the United States stands to gain more from this treaty in terms of economics, security, and international influence than any other nation."[384] Admiral Robert Papp, the 24th commandant of the USCG, was also a strong proponent of UNCLOS ratification as he claimed it would help eliminate IUUF.[385] In his June 2012 testimony before the Senate, Admiral Papp claimed, "As a party to the Convention, we would be in a stronger position to persuade other nations to abide by the UN Fish Stocks Agreement and other modern international standards of fisheries management and thus advance our Nation's interests in this field."[386]

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[378] United Nations, "United Nations Treaty Collection."

[379] David B. Sandalow, "Law of the Sea Convention: Should the U.S. Join?," Brookings, August 19, 2004, https://www.brookings.edu/research/law-of-the-sea-convention-should-the-u-s-join/.

[380] "Law of the Sea Convention," Department of State, January 5, 2021, https://www.state.gov/law-of-the-sea-convention/.

[381] Department of State.

[382] Department of State.

[383] Department of State.

[384] "Law of the Sea Convention," National Oceanic and Atmospheric Administration, accessed February 11, 2022, https://www.gc.noaa.gov/gcil_los.html.

[385] Robert Papp, "Enhancing Coast Guard Operations through UNCLOS Accession," *Hampton Roads International Security Quarterly* 12, no. 3 (2012): 47, ProQuest.

[386] Papp, 49.

Overall, since Oceania is a predominately island-based region, a large area of unregulated high seas promotes IUUF practices. The absence of the United States—the world's hegemon—limits the effectiveness of UNCLOS. Fathali Moghaddam, a renowned scholar on democratic psychology, explains in his book *The Psychology of Democracy* that "international organizations can only become effective in supporting rule of law if they have support from major countries."[387] The United States' failure to ratify UNCLOS implies that "rule of law only applies to weaker nations," and as Moghaddam explains, such a dynamic is problematic; employing a "might is right" attitude prevents the United States from achieving democratic actualization.[388] Moghaddam concludes by saying that international law—UNCLOS included—"can bring benefits but only when every nation and its leaders are equal before the law."[389]

One of the most prominent examples of the United States' limiting the effectiveness of UNCLOS was a 2016 case wherein the UNCLOS Arbitral Tribunal ruled in favor of the Philippines in claims it brought against China for illegal fishing and other breaches of the agreement.[390] The Filipino claims filed against China primarily targeted maritime jurisdiction and fishing access disputes near the South China Sea.[391] The tribunal ruled in favor of the Philippines in 14 of the 15 claims that were brought forward.[392] Legal experts concluded that the "findings mark a significant step in the clarification of the environmental protection provisions of UNCLOS, and could boost efforts to apply these obligations more widely among states, in the South China Sea and beyond."[393] However, China completely disregarded the rulings, and Chinese State Councilor Dai Bingguo claimed the findings

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387 Fathali Moghaddam, *The Psychology of Democracy* (Washington, DC: American Psychological Association, 2016), 84.

388 Moghaddam, 84.

389 Moghaddam, 84.

390 Searight, "Impact of the South China Sea Tribunal Ruling," 109.

391 Searight.

392 Searight.

393 Searight, 109.

were "just a piece of trash paper."[394] Following the rulings, in an act of defiance, China held a series of military exercises in the disputed territory.[395] The United States and other leading nations were quick to denounce the Chinese reactions and pledged support to the UNCLOS rulings.[396] The United States' reaction stood in stark contrast to its overall support of UNCLOS and its failure to ratify the agreement. China was able to leverage this weakness and challenge UNCLOS's validity, proving that without legitimate backing from every world power, UNCLOS rulings are weak and ineffective. In the end, the countries that truly suffered were the Philippines and other smaller countries that have relied on UNCLOS to give them a fair chance of taking on a global superpower.

2. Cooperation

The following section analyzes the cooperation mitigation gaps for IUUF in Oceania. These gaps include coordination and information-sharing challenges given the number of countries, organizations, and intergovernmental groups that have a stake in the region. This section also discusses gaps in monitoring, control, and surveillance.

a. Coordination and Information Sharing

A lack of information sharing is a critical gap in the prevention of IUUF. A study conducted by the United Kingdom's Centre for Economics and Business Research (CEBR) concluded that when fishery data are shared—even if the recipient does not share data in return—both the sending and receiving entities benefit.[397] The study found information sharing "decreased the propensity of IUU fishing, increased revenue from fines, and decreased the amount of illegal catch in the fishery."[398] Even if limited information is shared or the country sharing does not receive information in return, the country sharing

394 Searight, 110.

395 Searight.

396 Searight.

397 Centre for Economics and Business Research, *Agent Based Model of IUU Fishing*.

398 "Information Sharing Is Key to Ending Illegal, Unreported, and Unregulated Fishing," Pew Charitable Trusts, May 13, 2021, https://pew.org/3u7gxFg.

the information still benefits "since IUU activities being conducted in that country's waters are now more likely to be sanctioned."[399] The study further concluded that the country that receives the information but does not reciprocate still sees an improvement in its fish stocks because of the interconnectedness of fisheries.[400] Fish know no boundaries, so adjacent countries can feel the effects of neighboring countries' efforts. Overall, fish populations are healthier when there is mutual as opposed to one-sided information sharing.[401]

In Oceania, information sharing and coordination between countries is a major issue. PIFFA's 2018–2023 *Regional Monitoring, Control, and Surveillance Strategy* identifies one reason for this barrier: siloed information mechanisms at regional and national levels.[402] At the regional level, multiple RFMOs, intergovernmental agreements, and agencies cover only certain geographic areas or have certain Oceanian territories as signatory parties. At the national level, 22 countries and territories need to synchronize their information.[403] There is no agreed-upon routine or continuous method for these entities to share information with one another. Furthermore, since these regional and national bodies have created their own information databases in isolation, even if they want to share with one another, it can be complicated from a compatibility standpoint. PIFFA argues that at a minimum, national coordination committees are needed to publish reports routinely and make a concerted effort to improve information database compatibility.[404] Information sharing is increasingly harder at the regional level when multiple Oceanian countries are involved. For instance, WCPFC governance requires its commission—made

399 Centre for Economics and Business Research, *Agent Based Model of IUU Fishing*, 47.

400 Centre for Economics and Business Research.

401 Centre for Economics and Business Research.

402 Pacific Islands Forum Fisheries Agency, Regional Monitoring, Control and Surveillance Strategy.

403 Pippard et al., Conservation Status of Marine Biodiversity.

404 Pacific Islands Forum Fisheries Agency, Regional Monitoring, Control and Surveillance Strategy.

up of all member states—to have unanimous agreement on recommendations for them to go into effect. If any country objects to information sharing, the measure fails.[405]

b. Monitoring, Control, and Surveillance

Catch monitoring is weak in Oceania due to inadequate observer coverage, lag time in observer reports, and transshipment complications. Fishery observers are trained professionals who deploy aboard fishing vessels to collect information on the vessel's fishing catch.[406] Regarding IUUF, observers identify illegal or unauthorized catch and are a vital resource in IUUF deterrence. The WCPFC's Regional Observer Programme has set a benchmark of observing and documenting 5 percent of long-liners annually.[407] It also has mandatory purse-seiner observer documentation, but only in certain maritime areas.[408] These standards mean only a small portion of fishing fleets in Oceania must be observed every year. Furthermore, most fishing fleets can evade these standards because of transshipments and a lack of port inspections. Despite the WCPFC's establishing a 100 percent transshipment observer coverage annually, transshipments still frequently occur without observance.[409] Observer results are useless and inaccurate if fishing vessels transship their catch before an observance inspection.[410] For those fishers who are observed, there are limited ways for countries in Oceania to verify the results or take action against the offenders.[411] Even when observer records are provided, there are typically

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405 Ewell et al., "Moratorium on Transshipment on the High Seas."

406 "Fishery Observers," National Oceanic and Atmospheric Administration, October 19, 2021, https://www.fisheries.noaa.gov/topic/fishery-observers.

407 Western and Central Pacific Fisheries Commission, *Agreed Minimum Standards and Guidelines of the Regional Observer Programme* (Kolonia, Federated States of Micronesia: Western and Central Pacific Fisheries Commission, 2015), https://www.wcpfc.int/system/files/Agreed%20Minimum%20Standards%20and%20Guidelines%20of%20the%20WCPFC%20Regional%20Observer%20Programme%20.pdf.

408 Western and Central Pacific Fisheries Commission.

409 Western and Central Pacific Fisheries Commission.

410 MRAG Asia Pacific, Towards the Quantification of IUU Fishing.

411 MRAG Asia Pacific.

significant delays in observer log sheet submissions, so port inspectors miss out on the opportunity to verify the catch.[412]

Another monitoring, control, and surveillance area of weakness is a lack of mandatory standards for fishing vessel identification. In 1987, the International Maritime Organization introduced a global ship identification number scheme to aid in monitoring, control, and traceability.[413] Under this system, ships are assigned a permanent identification number that does not change, even if the vessel changes flag state registration.[414] This valuable identification tool can aid countries and RFMOs in determining which vessels are authorized to fish in their waters.[415] It also acts as a traceability mechanism whereby fish throughout the supply chain can be mapped using this identification number to the fishing vessel source of origin. In 2013, this global identification system became available for fishing vessels over 100 gross tons.[416] However, the application for fishing vessels is voluntary whereas the identification is mandatory for passenger ships over 100 gross tons and cargo ships over 300 gross tons.[417] Therefore, it is up to individual countries and RFMOs to mandate the usage of the identification system for their fishing vessels. Without mandatory application, fishing vessels are still able to evade permanent identification.

Regionally in Oceania, licensing and fishing vessel identification is an issue. PIFFA's 2018–2023 *Regional Monitoring, Control, and Surveillance Strategy* outlines the need for regional licensing standards.[418] PIFFA argues that having strict regional licensing

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412 MRAG Asia Pacific.

413 "The IMO Number Explained," Pew Charitable Trusts, September 19, 2019, http://pew.org/2pJuCbC.

414 Pew Charitable Trusts.

415 Pew Charitable Trusts.

416 "IMO Identification Number Schemes," International Maritime Organization, accessed October 9, 2021, https://www.imo.org/en/OurWork/MSAS/Pages/IMO-identification-number-scheme.aspx.

417 International Maritime Organization.

418 Pacific Islands Forum Fisheries Agency, Regional Monitoring, Control and Surveillance Strategy.

standards would help promote national licensing databases that could easily identify vessels and operators, the fees that have been paid, and the permits, certificates, and fishery access agreements on file.[419] PIFFA concluded in a 2009 study that over 95 percent of the total volume of IUU catch off Pacific islands was from licensed fishing vessels.[420] Unlicensed IUUF activity is rare and tends to occur only in boundaries of the Oceania region.[421] Thus, effectively accounting for and tracking licensed vessels is of the utmost importance and more critical than expending resources trying to track and apprehend unlicensed fishers.

3. Technology

Technology-based mitigation efforts have limitations as well. AIS is not a perfect technology and has several reliability issues. The VHF-based AIS is prone to reception issues, especially with lower-powered types of transceivers.[422] Satellite-based AIS has its flaws, too, as it depends on satellite revisit times to send out signals.[423] If this time is too long in between transmissions, it will not provide an accurate picture of where fishing vessels are operating. The reliability of satellite-based AIS is further impaired considering that only about 60 satellites are used for AIS—not enough to serve the 7,000,000 daily AIS signals.[424] Furthermore, many fishing vessels operate on the border of a nation's EEZ, where fishing inside the zone is illegal but fishing outside is not. Thus, having precise location data is of the upmost importance.

Next, AIS has further reliability concerns because the system can be easily tampered with. Fishers can turn their AIS off and operate in the dark, hiding their

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419 Pacific Islands Forum Fisheries Agency.

420 MRAG Asia Pacific, Towards the Quantification of IUU Fishing.

421 MRAG Asia Pacific.

422 Mélanie Fournier et al., "Past, Present, and Future of the Satellite-Based Automatic Identification System: Areas of Applications (2004–2016)," *WMU Journal of Maritime Affairs* 17, no. 3 (2018): 311–45, https://doi.org/10.1007/s13437-018-0151-6.

423 Fournier et al.

424 Fournier et al.

activity.[425] Another aspect of tampering involves fishers altering the data that go into the transceiver's signal.[426] For instance, they can spoof the identity of another vessel's maritime mobility service identity number to pretend they are a different boat or a boat that does not exist at all.[427] Fishing vessel operators can also tamper with their GPS location information, so the AIS signal indicates they are in a different location when they are fishing illegally in a protected zone.[428] According to the USCG, AIS tampering is a frequent occurrence because AIS is an "open, non-proprietary, unencrypted, unprotected radio system, intended to operate on non-secure VHF-FM channels."[429] Furthermore, AIS does not have virus or malware protection, so its level of security and protection is very low.[430] Given these vulnerabilities, AIS clearly has reliability issues and thus does not always maintain a specified level of performance.

In terms of accessibility, VMS data are less accessible than AIS data. According to the USCG, VMS "operates using a variety of closed, proprietary communication system protocols that operate predominately as a one-way system."[431] Thus, unless countries release their VMS data, private entities such as Global Fishing Watch are unable to utilize the information. To date, only four countries—Indonesia, Peru, Panama, and Chile—have released their VMS data.[432] Therefore, while the United States has millions of VMS data records, they have not been released and thus offer little value to counter-IUUF strategies.[433]

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425 "Can Fishing Vessels Turn Off Their AIS?," Global Fishing Watch, 2021, https://globalfishing watch.org/faqs/can-fishing-vessels-turn-off-their-ais/.

426 "Can Vessels Try to Hide Their Identity?," Global Fishing Watch, 2021, https://globalfishingwatch.org/faqs/can-vessels-try-to-hide-their-identity/.

427 Global Fishing Watch.

428 Kimbra Cutlip, "When Vessels Report False Locations," Global Fishing Watch, August 30, 2016, https://globalfishingwatch.org/data/when-vessels-report-false-locations/.

429 U.S. Coast Guard, "AIS Frequently Asked Questions."

430 U.S. Coast Guard.

431 U.S. Coast Guard, "How Does AIS Compare?"

432 Global Fishing, "Indonesia's Vessel Monitoring System."

433 Jordan T. Watson and Alan C. Haynie, "Using Vessel Monitoring System Data to Identify and Characterize Trips Made by Fishing Vessels in the United States North Pacific," *PLOS ONE* 11, no. 10 (2016): e0165173, https://doi.org/10.1371/journal.pone.0165173.

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VI. STRATEGY SYNTHESIS, RECOMMENDATIONS, AND CONCLUSION

This final chapter starts with an evaluation of Oceania's IUUF mitigation strategy. Next, based on the evaluation, it presents recommendations that should be employed in Oceania to improve the region's strategy. The thesis concludes with a summary of the research and discusses related topics that were not addressed but are critical areas for future study.

A. EVALUATION

Combining all the mitigation efforts—both effective and flawed methods—results in a defined counter-IUUF strategy for the region. In this section, this strategy is evaluated using a strategic evaluation tool called the O-SIO-PB. The evaluation provides key recommendations for improvements with implementation feasibility and risks.

1. Objectives

The first step shapes the strategic goals for the region. The defined goals are referenced often when applying the other elements of the model. Defining the objectives from the onset focuses the strategy toward a future ideal state. In other words, initially, the objectives should not be influenced by strengths, improvements, and opportunities. Analyzing these first might create biased goals based on that assessment. Instead, the goals are created, and then the analysis follows to identify gaps and determine how to address them. If gaps cannot be addressed, during the reassessment phase, the goals can be modified. The initial goals are as follows:

- *Eradicate IUUF practices*. This includes more robust regulations, better detection mechanisms, and heavier penalties for violators.

- *Address underlying causes that promote IUUF practices*. Targeting only the harmful IUUF end-product will not be enough for eradication. If conditions still exist that promote IUUF activity, those conditions must be addressed. These elements primarily include food scarcity, accessibility,

and profitability. For food scarcity, if populations in the region and nearby regions are still hungry and fishing is accessible and the only way to get protein for survival, then IUUF is a potential outcome. For profitability, IUUF is a lucrative practice. If populations in the region and nearby regions are poor and fishing is the only way to make money, then IUUF is a potential outcome.

- *Act as a collective unit* for the sake of sustainable fisheries and regional survival. This tactical objective focuses on identifying common ground and core choices that can guide both regional entities and flag states. As IUUF continues to grow in complexity, a cohesive regional entity will be required to address these issues.

2. Strengths (Internal)

The second step outlines what the region is doing well that contributes to the strategic goals. These strengths are also necessary elements that the region should continue to prioritize.

- *Superpowers*: The region is supported well by the resources of the United States, Australia, New Zealand, and France. From providing enforcement assets, to ship-riding agreements, to many other initiatives, the four superpowers of Oceania have supported the smaller countries and territories in the region on countless occasions.

- *Current regulations*: A handful of impactful current regulations, such as the PSMA, are working well and should act as cornerstones for a counter-IUUF strategy.

- *Population support*: A sense of urgency to back drastic action is supportable because of the number of people in the region that IUUF negatively impacts. Fish is a staple for both the 500,000 Oceanian workers in the fishing industry and the millions of fish protein consumers

throughout Oceania.[434] If Oceanian populations had multiple competing demands, it would be harder to convince personnel to rally in support of a counter-IUUF strategy.

3. Improvements (Internal)

The third step outlines what the region needs to improve to accomplish the strategic goals. This goes a step beyond just identifying weaknesses—it is an action-oriented approach that identifies weaknesses and how they can be addressed. These improvements are centered on internal actions that the region and key players can control. Looking internally helps identify realistic improvements that can be made.

- *Transshipment policy*: Transshipments need strict regulation in the region. To start, both the WCPFC and IATCC must issue a complete ban on transshipment activity. Second, there needs to be transshipment vessel documentation and tracking with onboard observers. This would eliminate the mixing of legally and illegally sourced fish. Third, transshipments that are not being reported need to be identified and penalized to an extent proportional to or greater than the benefits of acting illegally. Employing emerging technologies and leveraging partnerships with NGOs that specialize in this type of tracking are required to detect unreported transshipments. Controlling transshipments would force fishing vessels to make more frequent port calls, thus subjecting them to port state fishery inspections.

- *Collaboration*: Too many regional bodies and flag states in the region are working in different directions. There are 24 countries and territories, three major RFMOs, PIFFA, and dozens of treaties and agreements. There needs to be a singular, unified front against IUUF in the region because of the region's interconnectedness. A consolidated body can put more

[434] Food and Agriculture Organization of the United Nations, *World Fisheries and Aquaculture*.

collective resources toward key action items and provide one voice of advocacy for the region.

- *Information sharing*: Shared databases with licensing information, law enforcement history, access agreements, VMS and CDS data, and other valuable information could help manage the region's fisheries. A single country or territory is not incentivized to make its data public if other regional countries do not reciprocate. A collaborative approach to information sharing increases the incentives as there is more access to readily available, useful information for combating IUUF. Information sharing should be outlined under a new regional policy. The policy would require countries to share information as opposed to the current requesting method.

- *Monitoring, control, and surveillance*: First, the WCPFC needs to improve its Regional Observer Programme by increasing the annual observer documentation percentage for both long-liners and purse-seiners. The observer program should cover the entirety of the WCPFC region, and the documentation should be captured and disseminated in a timely manner. Incorporating electronic reporting mechanisms and shared databases is the most efficient way to capture and share the information. Next, PIFFA should continue to push for a regional licensing and documentation system. If executed correctly, the Oceania licensing and documentation model could serve as the blueprint for a more robust global identification standard.

- *Subsidies*: Collective pressure should be placed on the WTO for IUUF subsidy reform. Subsidy reform has not taken place chiefly because it is uneconomical and disadvantageous for a single country to demand reform that jeopardizes the benefits—albeit harmful to fishing sustainability—those subsidies provide. Demanding and implementing reform would put a single country in an unfavorable position against other territories in the

region that do not immediately surrender. Collective pressure puts all countries in the region on the same level. The first collective pressure point should be demanding transparent reporting mechanisms for subsidies. The WTO cannot initiate reforms without first understanding the extent of subsidies.

- *U.S. UNCLOS ratification*: UNCLOS has the potential to be the most significant international agreement and regulatory mechanism against IUUF. However, UNCLOS needs U.S. backing to have maximum effectiveness. Instead of focusing energy on creating new regulations against IUUF, the United States needs to take advantage of agreements that already exist.

- *Whistleblowing protections*: The creation and advertising of whistleblowing channels is needed at both a regional and flag state level. Whistleblowing needs to be accompanied with incentives for reporting including monetary rewards and protections for those fishers coming forward to alert authorities of IUUF infractions.

- *Sanctions*: Fines for IUUF violations need to be dynamic and set to a level that discourages IUUF activity. At a minimum, the fines should be set to cover the access fees that are not being paid and the increased wages that IUU fishers receive. The fines need to be dynamic, constantly changing to reflect the benefits of illegal fishing and prices of seafood. There also needs to be sanction parity across the region, so efforts from one country are not undermined by another.

- *Regulation support*: Some of the existing regulations are strong, but they are weakened when not all countries in the region are members. Collective pressure needs to be applied on those countries that have not ratified the PSMA, CITES, and UNFSA.

- *Flags of convenience*: RFMOs and other flag states must continue to impose trade restrictions on fishing vessels that are registered with an FOC under the posture of environmental protection so that the restrictions are not overturned by the WTO. The restrictions also need to be uniformly applied to all nations, so favorable treatment cannot be given to open-registration Oceanian countries—the Marshall Islands, Vanuatu, Tuvalu, Tonga, Samoa, and the Cook Islands.

4. Opportunities (External)

The fourth step identifies the opportunities that can be leveraged to support the strategic goals for the region. The opportunities discussion also focuses on the resources required to make the opportunity a reality. If these resources draw other resources from a key strength, then the opportunity—while helpful—may not be part of the overall course of action. Opportunities include the following:

- *Technology*: Several emerging technologies, from USVs to satellite imagery, can be used in new and creative ways to combat IUUF. These opportunities must be supported with funding and patience with experimentation.

- *Non-governmental partnerships*: Leveraging partnerships with NGOs such as GFW is of the utmost importance. These NGOs have the willpower and resources to help improve MDA for countries across Oceania.

- *Operations in the region*: Operation AIGA and the Oceania Maritime Security Initiative were major successes for the United States. There are opportunities to continue these types of operations with a focus on training Pacific island nations on counter-IUUF tactics, techniques, and procedures. The developed countries' resources are stretched thin for the region. Training serves as a force multiplier and lets the 24 countries and territories in the region operate autonomously.

- *Traceability* is an accountability opportunity to help eradicate IUUF. The superpowers of the region need to significantly invest in a fishery supply chain traceability mechanism. The most important part of the mechanism needs to be communication with consumers. Seafood packaging should clearly indicate whether produce has been legally and sustainably caught. This effort can build on the work already done by several non-government agencies that have created consumer ratings and traceability standards.

- *Developed country collaboration*: Developed countries in the region should seek opportunities to work together and collaborate, resulting in better overall leadership for the region. A great example is reviving the QUAD or even forming a new security collaboration initiative between the United States, Australia, New Zealand, and France.

5. Progress

The fifth step outlines how progress will be measured. These progress metrics help indicate whether the action plan is working as intended. They are directly tied to the strategic goals from the first step. Using only a single metric from the following list is an inadequate representation of progress. For instance, focusing solely on fish sustainability metrics is inadequate because this metric may also be influenced by sustainability practices—such as conservation efforts for fish habitats—that fall outside of counter-IUUF efforts.[435] Therefore, the progress metrics need to be considered collectively to measure progress effectively. The metrics include the following:

- *Fish sustainability metrics*: The health of fish stocks across the region need to be tracked.

- *Observer and law enforcement metrics*: These metrics include underway enforcement hours, number of boardings, amount of catch documented and observed, number of violations, citations given, and penalty amounts.

435 "Understanding Sustainable Seafood," National Oceanic and Atmospheric Administration, January 27, 2021, https://www.fisheries.noaa.gov/insight/understanding-sustainable-seafood.

Having a shared regional information database would be essential for compiling and sharing observer and law enforcement metrics.

- *Collaboration metric*: These metrics include tracking the individual countries' involvement with various regional counter-IUUF regulations and organizations, with the goal of achieving complete regional participation. This metric should also track the number of counter-IUUF summits held, shared databases created, and joint operations conducted between regional partners.

- *Food scarcity, poverty, and employment metrics:* Underlying causes that support IUUF practices need to be monitored closely and addressed if they fall below certain thresholds. The superpowers of the region cannot ignore the smaller regional territories' economic conditions that support IUUF practices. These struggling Oceanian countries are also vulnerable to outside influence and aid from countries such as China.

6. Barriers (Internal and External)

The sixth step identifies how progress could be disrupted. Barriers also refer to distractions that the region has focused on in the current-IUUF strategy but should ignore. Since this is an action-oriented model, this section identifies what the region can do to avoid potential barriers and distractions.

- *China* could disregard laws and regulations established for the region. It has a history of such behavior, most notably in the South China Sea maritime jurisdiction and fishing access rulings issued against it by the UNCLOS's arbitral tribunal in 2016. To hold China accountable, the United States needs to ratify UNCLOS and any other regulatory mechanism that promotes counter-IUUF practices. Second, countries in Oceania could side with China and offer fishing rights in Oceanian waters in exchange for foreign aid, access to trade, or myriad other reasons. Thus, Oceanian partnerships are of the utmost importance. If territories and

countries in Oceania have a binding partnership, together they can withstand pressures from harmful external influence.

- *Movement by another global power*: Russia, South Korea, Japan, and several other countries have large DWFFs and growing populations.[436] Their proximity to Oceania could result in more foreign global powers vying for resources in the region. Thus, the regional strategy should not fixate on China alone. The action plan must be applicable to any foreign power that poses a threat.

- *Siloed focus on individual countries and territories*: The benefits need to be clearly articulated to every Oceanian territory to build a strong alliance and prevent nationalism from prevailing over regionalism.

- *Accessibility*: The vast expanse of Oceania's waters means that accessibility will always be a prevailing barrier to IUUF eradication. No level of sophisticated detection and law enforcement activity can completely eliminate IUUF in the region. Therefore, a pitfall distraction is hyper-focusing on boundaries and accessibility issues rather than concentrating on more tangible improvements.

- *Global IUUF activity*: IUUF activities in Africa, the Caribbean, and other parts of the world may take the focus and resources away from Oceania. Notably, the United States has 3.4 million miles of EEZ to protect.[437] With Arctic icepack melt and other large fishery zones in the Atlantic, Gulf of Mexico, and Caribbean, a diversion from Oceania to another region is realistic. Therefore, the risks associated with diverting resources away from Oceania need to be clearly articulated.

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[436] Carolin, "The Dragon as a Fisherman."

[437] National Oceanic and Atmospheric Administration, "The United States Is an Ocean Nation."

- *Climate change*: Fish migration out of the region due to climate change cannot be mistaken for IUUF activity. This is an example of a factor that is outside the control of this regional strategy. There are already existing climate change mitigation levers, and while this regional IUUF strategy can help influence those levers, this strategy must account for climate change without shifting resources away from chief strategic goals.

- *Other homeland security concerns*: For the United States specifically, there are several other homeland security concerns that currently garner far more attention than IUUF. If these security concerns continue to be a higher priority, they will restrict the required resources and draw attention away from a counter-IUUF strategy. IUUF practices do not spark a sense of urgency identifiable by policymakers and the general population.

B. RECOMMENDATIONS

The last step before reassessment is examining each recommendation and identifying any feasibility concerns or risks. Specifically, looking at the political, economic, social, and technological dimensions helps to uncover gaps that can be addressed during the reassessment phase. Table 8 organizes recommendations by issue and evaluates their feasibility based on these dimensions.

Table 8. Key Recommendations, Feasibility, and Risk Analysis.

Recommendation	Feasibility and Risk (Political, Economic, Social, Technological)
Superpower alliance and reliance	Feasible and low risk across all dimensions.
Improved transshipment policies	Economic feasibility challenges as limiting transshipments would take a toll on the cost structure of major fisheries. Technological feasibility challenges in trying to detect unreported transshipment activity.
Increased regional collaboration	While the technology certainly exists for this level of collaboration, there are political and social-equity feasibility challenges. Certain countries may be wary of sharing proprietary data, and if every country is not willing to fully share, it may create dissent and a lack of transparency.

Recommendation	Feasibility and Risk (Political, Economic, Social, Technological)
U.S. UNCLOS ratification	American leadership has historically viewed it as an economic and political risk, which still carries weight for present-day decision-making, thus restricting feasibility.
Whistleblowing protections	Social feasibility challenges for the reputation and trust of whistleblowers if their identities are not protected.
Sanctions	Feasible and low risk across all dimensions. Sanctions target only IUUF behavior, an acceptable political risk given that populations in the region want sustainable and protected fish stocks.
Regulation support	Politically challenging to encourage countries to support regulations they deem harmful. It might require political capital better reserved for more pressing regional issues.
Trade restrictions on FOCs	Feasible and low risk across all dimensions. The technology already exists to track these vessels, and it would be uneconomical for only those vessels operating under FOCs, which would be an acceptable risk for political leaders and the general regional population.
Emerging technology reliance	Economic risk considerations include cost–benefit analyses for investing in unproven technologies or relying on current technology.
NGO partnerships	Feasible and low risk across all dimensions.
Traceability mechanisms	Technology barriers for implementation. The technology exists, but its implementation on a large scale could make it infeasible. Socially feasible using meat, textiles, lumber, diamonds, and other industries as benchmarks.

C. CONCLUSION AND FUTURE RESEARCH

The purpose of this thesis was to outline the homeland security and defense issues for the United States due to IUUF in Oceania, research reasons IUUF is prevalent in the region, analyze the region's IUUF mitigation methods, and provide strategic recommendations that could further help combat IUUF in Oceania. This thesis was one of the first academic attempts to significantly compile and analyze information on IUUF in Oceania. Thus, there are many opportunities for further research. First, any elements from the improvements section could be further researched and analyzed with more in-depth recommendations and courses of action. Second, IUUF in Oceania could be analyzed from the lens of a different superpower in the region. Analysis from the viewpoint of Australia,

New Zealand, or France could offer perspectives and courses of corrective action that differ from this U.S.-focused research. Third, geographic areas outside Oceania have significant IUUF concerns, too. These areas could be researched with a discussion on how they uniquely threaten the security and defense of the United States. Fourth, alternatives to fishing to alleviate food scarcity is a valuable topic to explore. This thesis did not address aquaculture and bioengineered protein sources to help take the burden off the fishing industry. Overall, strong counter-IUUF policies and strategies cannot be developed without thorough supporting research that elevates the conversation about this important topic.

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