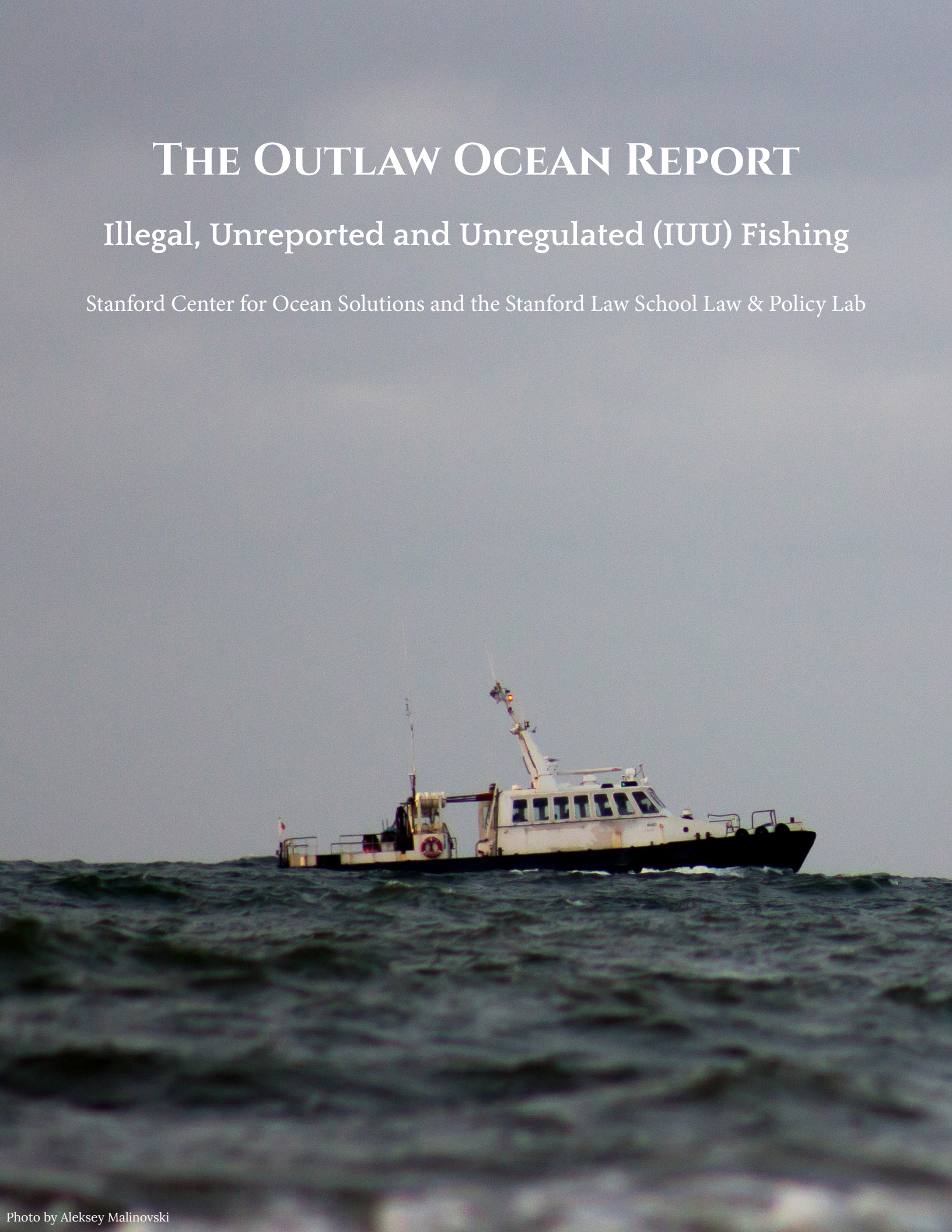
The Outlaw Ocean Report

Illegal, Unreported and Unregulated (IUU) Fishing

Stanford Center for Ocean Solutions and the Stanford Law School Law & Policy Lab



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IUU FISHING

I. INTRODUCTION

Illegal, unreported, and unregulated (IUU) fishing is one of the greatest threats to the sustainability of global fisheries. Fisheries managers' inability to know what is happening in the distant areas of the ocean is one of the main impediments to preventing IUU fishing. However, new tools are reshaping this landscape. In combination with emerging possibilities for data and social media analysis, technologies above and under the water are giving managers new, real-time insight into activity on the oceans. Global Fishing Watch (GFW) has been on the vanguard of technology pioneers. GFW uses satellite data with advanced machine learning analytics to track fishing vessel activity globally. GFW's platform and databases are becoming increasingly popular tools for both fisheries managers and enforcers in detecting and preventing IUU activity.

However, there are key legal questions about how GFW data can be used in different types of decision making. Automatic identification system (AIS) units, for example, were initially installed on boats for safety purposes and can easily be turned off by fishers wishing to evade detection. Data from AIS is thus usable only for certain kinds of enforcement decisions. Higher quality data from Vessel Monitoring System (VMS) units is more fit for enforcement decisions but is generally considered highly confidential by national governments.

GFW has begun an initiative to increase transparency in fisheries by encouraging governments to share their VMS data publicly. To date, only five countries have agreed to this: Indonesia, Chile, Peru, Panama, and Costa Rica. The first research paper in this section looks at what social, political, and legal conditions enabled Chile and Peru to agree to share their VMS data. It then uses this lens to address the potential for VMS data sharing in Ecuador. Understanding these conditions is essential to future efforts to encourage more countries to agree to share VMS data publicly via GFW. This research illustrates barriers to data sharing that are applicable not only in fisheries but to questions about sharing and using ocean data more broadly.

Requiring data sharing comes with many hurdles. The second research paper explores an alternative model—incentivizing compliance using voluntary mechanisms. Trusted traveler programs—like Global Entry in the United States—are an example of this approach. Travelers who willingly share additional data on themselves and go through background check processes are rewarded with expedited entry into the country. A similar mechanism could be used for fisheries port inspections. Vessels that are able to show compliance by sharing detailed information, including vessel track and fishing locations, could receive expedited inspection and offloading of their catch. The students' research lays out what a voluntary compliance model for port entry could look like, including a comparative regional case study of the Republic of The Marshall Islands and the Republic of Mauritius.

II. PUBLIC DATA SHARING AS A MEANS OF COMBATING ILLEGAL FISHING: Three Case Studies in Latin America

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Abstract

Data transparency plays an important role in supporting regional and global efforts to combat illegal fishing and ensure healthy use of ocean resources. Location-monitoring data, like those generated by automatic identification systems (AIS) and Vessel Monitoring System (VMS) programs, offer an inside look at fishing vessels' activities. These data can aid enforcement of international maritime law and support states' reputations for engaging in sustainable and ethical fishing practices. Although the benefits of public data sharing are many, there are often legal and policy obstacles to achieving full data transparency. States face complex legislative histories that prohibit sharing of confidential information, such as VMS data. They must also navigate issues of political will and the influence of profitable fishing industry leaders. This research approaches the question of legal obstacles to data-sharing policy via case studies of three Latin American states. Peru, Chile, and Ecuador are all high-grossing coastal fishing nations and important global actors. Chile's and Peru's experiences with successfully publishing VMS data can provide insights into the key drivers of data publication. Meanwhile, a closer look at Ecuador's efforts to share data reveals some of the major hurdles to public sharing.

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A. Introduction

The ways to address the problem of illegal, unreported, and unregulated (IUU) fishing vary, but one intervention offers promising returns and marks a natural starting point: making fishing data publicly available. Without data, countries cannot know the full extent of illegal fishing in their waters, and countries will face difficulty mustering the political will to address the issue. Without data, countries cannot effectively implement the Port State Measures Agreement (PSMA), as information regarding a particular vessel seeking to offload its catch would not be available to the port state. And, without data, novel methods of discovering and prosecuting illegal fishing will lie dormant. To put it simply, a complex global issue like IUU fishing will not be effectively addressed without data.

It's no accident that Article 119, §2 of the United Nations Convention on the Law of the Sea identifies the sharing of data among signatory states as a priority:

> Available scientific information, catch and fishing effort statistics, and other data relevant to the conservation of fish stocks shall be contributed and exchanged on a regular basis through competent international organizations, whether subregional, regional or global, where appropriate and with participation by all States concerned.

Accordingly, nonprofit organizations like the Fisheries Transparency Initiative (FiTI) have underscored the critical importance of data transparency in the fisheries space.[1] Among the FiTI's recommendations are the publication of national reports on the state of fish stocks, the establishment of public online registries of large-scale vessels and their catches, and the collection of information on small-scale fishers.[2]

Location-monitoring data is one category of information for which transparency could pay major dividends. There are two principal forms of location-monitoring data in the fisheries sector: AIS and VMS. AIS is a transponder system using both satellite and VHF-radio bands for two-way communication.[3] AIS transmissions can occur between ships at sea or between a ship at sea and some receiver on land. The originally intended use of AIS was for safety—for example, preventing vessel collisions at sea. AIS is required by international law on all vessels of a certain size, but the system can be turned on or off by the crew to avoid detection (either for a beneficial reason, such as avoiding pirates, or for a less innocent reason, such as engaging in illegal fishing). The result of this AIS feature is gaps in data coverage when vessel operators turn off AIS or when ships are too far from other ships or a land-based receiver.

VMS also uses satellite technology to show vessel positioning, but VMS is closed and proprietary, meaning that the data is owned by a company, an organization, or an individual and is not open source. Thus, VMS is generally not available to the public. VMS offers one-way communication from a ship to monitoring agencies on shore, and it was introduced as a monitoring, control,

1 Fisheries Transparency Initiative, "FiTI Standard," accessed May 20, 2020, https://fisheriestransparency.org/fiti-standard.

2 Ibid.

3 World Wildlife Fund for Nature, "Monitoring Vessels & Tracking Catches," accessed April 22, 2020, https://wwf.panda.org/our_work/oceans/smart_fishing/how_we_do_this/good_governance2/transparent_seas_/satellite_tracking_via_ais_.

and surveillance tool to address illegal fishing practices. VMS is regulated at the regional and national levels, but it has become increasingly relevant in global IUU discussions as a mechanism for transparency of fishing practices.[4] It has a higher spatial resolution than AIS, and it cannot be turned off manually by the crew because the onboard devices are secured.

Global Fishing Watch (GFW) is an international nonprofit organization whose mission is "to advance ocean sustainability and stewardship through increasing transparency."[5] It was first developed as a collaborative project between Oceana,[6] SkyTruth,[7] and Google, but GFW has since become an independent nonprofit with partnerships around the world. GFW utilizes modern technology to help track and visualize global fishing activity and patterns on a public online platform. AIS data is used to track vessels on the platform, but a number of countries are beginning to sign agreements with GFW to share their VMS data on the platform for increased transparency and greater accuracy. GFW also engages in some data analysis and management on a case-by-case basis, but their primary product is the visual-tracking platform.

The past five years in particular have shown great progress in building a more transparent seafood system, from ship to shore to store. Since 2017, GFW has developed agreements with four countries—Indonesia, Peru, Chile, and Panama—that have resulted in the public sharing of VMS data on the GFW platform. At least two more countries—Costa Rica and Namibia—have made commitments to publish VMS data in the coming years.[8] To reach these milestones, GFW and their in-country partners who work for Oceana spend time partnering with local nonprofits in country and collaborating with government officials. Their goal is to help governments see the benefits of sharing vessel-tracking data, including a better global reputation, increased enforcement capacity, and additional data analysis. Each agreement is enshrined in a Memorandum of Understanding (MOU) between GFW and the partner country. The MOU expresses the terms by which GFW can publish and use the country's data. The MOU also ensures that the ownership of the data remains with the country so that GFW can only continue to share the VMS data with the country's permission.[9]

As more and more of the great expanse of the high seas is illuminated by transparent fishing practices via these MOU agreements, the trend toward sharing data will continue to grow. This creates an opportunity for GFW to continue partnering with governments worldwide in an effort to combat IUU fishing and build sustainable ocean systems. Because data production, distribution, and ownership look very different from country to country, it is vital that GFW approaches each partnership with an understanding of the legal and sociopolitical factors in each context, so that they can tailor and frame their work accordingly.

4 Global Fishing Watch, "Understanding Fishing Activity Using AIS and VMS Data," accessed April 10, 2020, https://globalfishingwatch.org/wp-content/uploads/Understanding-Fishing-Activity.pdf.

5 Global Fishing Watch, "Transparency in Commercial Fishing," accessed April 2, 2020, https://globalfishingwatch.org/about-us.

6 For more information, refer to Ocean's website at https://peru.oceana.org/es.

7 For more information, refer to SkyTruth's website at: https://skytruth.org.

8 Samantha Emmert, "Vessel Monitoring Systems in the Fishing Industry," Global Fishing Watch, December 6, 2019, https://globalfishingwatch.org/vms-transparency.

9 Tony Long, GFW, personal communication, April 9, 2020.

The research summarized in this report was born out of a need to better understand the influences that are at play in a country's decision to publicly share VMS data on a platform like GFW's. In this report, we assess the laws, regulations, and policies governing vessel-tracking data in three case study countries: Chile, Peru, and Ecuador. In support of GFW's mission, our goal is to identify any barriers to public sharing of VMS data. This research focuses on Latin America for a few key reasons. The southern and eastern Pacific Oceans are extremely productive marine ecosystems, and thus the coastal states of Chile, Peru, and Ecuador have economies that rely heavily on fisheries. The fishing grounds of these three countries also tend to overlap, so collaboration is key in maintaining healthy fish stocks. Chile, Peru, and Ecuador have each ratified the PSMA, signaling a shared commitment to transparency but perhaps differing yet illuminating legal barriers in each country. Because Chile and Peru have already made public their VMS data via GFW and Ecuador has not yet done so, a case study approach to this research provides insights into the major hurdles and key drivers of data publication and allows us to potentially apply lessons learned in Chile and Peru in the context of Ecuador.

> "The politics of data-sharing are so important. What is a country's identity? How does a country want to be perceived? Are they getting criticized for other things in the fishing industry?"
>
> Bronwen Golder, COS

This report is divided into four main parts: the three country-based case studies and a conclusion that outlines our central insights and takeaways. Within each case study, we give background on the role that fisheries play in each country's economic and political spheres, as well as the governance structure and legal framework for fisheries management. We conclude by identifying and discussing themes for both obstacles and drivers of data sharing in all three case studies. With a better understanding of the legal and sociopolitical contexts in country, governments and nonprofits like GFW will be better equipped to collaborate on agreements that increase transparency for global fisheries and ensure sustainable marine resource management.

B. Chile Case Study

1. Background

Chile is distinctive for its unique geography and extensive coastline. With a western seaboard spanning 4,300 kilometers, its exclusive economic zone (EEZ) covers 3,681,989 square kilometers and is the eleventh largest in the world.[10] The Humboldt Current moves cold, nutrient-dense water north along Chile's coast, making its fisheries some of the most productive in the world. Its annual exports total $US6 billion, making it the eighth largest fishing nation.[11] Most of its landings

10 D. Pauly, D. Zeller, and M.L.D. Palomares, eds., "Sea Around Us Concepts, Design and Data (seaaroundus.org)," 2020.

11 IUU Watch, "Oceana Celebrates the Public Release of Chile's Fishing Vessel Tracking Data," March 5, 2020, https://www.iuuwatch.eu/2020/03/oceana-celebrates-the-public-release-of-chiles-fishing-vessel-tracking-data.

are smaller species, such as anchovies, jack mackerel, and sardines, which are processed into oil and fishmeal.[12] Chile's fleet consists of nearly 14,000 vessels used for industrial fishing, artisanal fishing, and aquaculture.[13]

But Chile's lengthy coastline and large EEZ also make its waters particularly vulnerable to IUU fishing. In addition to harming ecologically important fish stocks, illegal fishing substantially impacts Chile's seafood economy. An estimated 320,000 metric tons of fish landings valued at $US400 million are attributed to IUU fishing in the EEZ.[14] This corresponds to about 30% of the fishing in Chile.

A national policy to fight IUU fishing was announced by Chile at the Our Ocean conference that took place in Washington, DC, in 2014. The announcement came alongside the Straddling Fish Stocks Agreement, which granted greater high-seas enforcement capacity to the Chilean Navy.[15] The following quote from the 2016 Report on the Committee on Fisheries and Aquaculture describes Chile's stance on illegal fishing:

> [I]llegal fishing became one of the most questionable violations of national law because it not only puts the future of our countries at risk, but it causes a great social impact due to the enormous number of people who live and work around the fishing, processing, and marketing of fishery products.[16]

Chile is currently one of fifteen members of the South Pacific Regional Fisheries Management Organization (SPRFMO).[17] The primary resources managed in the Southeast Pacific are jack mackerel and jumbo flying squid.[18] The goal of a Regional Fisheries Management Organization (RFMO) is to improve compliance with international agreements related to fishing practices and acts on the high seas. The SPRFMO is particularly successful in terms of management, compliance, and anti-IUU efforts globally.[19]

Chile has played an active role in many of the international marine conservation movements, and the nation has ratified most of the major conventions and treaties relating to ocean policy and stewardship, such as the Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries, United Nations Convention on the Law of the Sea, the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, and the International Plan of Action to Prevent, Deter and

12 National Oceanic and Atmospheric Association, "The Fisheries of Chile," *Marine Fisheries Review* . 50, no. 1 (1988): 62-7.

13 Supra, note 11.

14 Biblioteca del Congreso Nacional de Chile, "Historia de la Ley 21,123," January 31, 2019, https://www.bcn.cl/historiadelaley/nc/historia-de-la-ley/7619.

15 Madeleine Simon, "Chile Announces New Policy Against Illegal Fishing," Oceana, June 30, 2014, https://oceana.org/blog/chile-announces-new-policy-against-illegal-fishing.

16 Supra, note 14.

17 South Pacific Regional Fisheries Management Organization home page, accessed April 25, 2020, https://www.sprfmo.int.

18 Ibid.

19 Cristian Laborda, personal communication, May 6, 2020.

Eliminate Illegal, Unregulated and Unreported Fishing.[20] Past leadership has been particularly progressive in their stewardship of marine resources. For example, former President Michelle Bachelet designated more than one million square kilometers as marine reserves, increasing protection by more than 25%. The current government and administration continue to advance sustainability and equity in the marine resource sector. On May 15, 2019, Chile, through the National Fisheries Service (SERNAPESCA), and GFW signed an agreement to make its vessel-tracking data publicly available through GFW's map.[21] Last year, during the third Chile-Peru Binational Cabinet, both countries signed the Paracas Declaration, in which they committed to establish a working plan to carry out reciprocal support activities to prevent, discourage, and eliminate IUU.[22]

2. Legal and Regulatory Frameworks for Fisheries

General Law on Fisheries and Aquaculture

Law No. 18,892, or the General Law on Fisheries and Aquaculture, forms the backbone of Chile's regulatory structure, which has continuously developed since the law's enactment in 1989.[23] It covers fisheries management, implementation of national and international treaties, conservation of hydrobiological resources, artisanal and subsistence fishers, animal welfare, and aquaculture.[24] Supreme Decree No. 430 was issued in 1991 to maintain the "consolidated, coordinated and systematized text" of the General Law on Fisheries, including all subsequent modifications and amendments.[25]

VMS Data Laws and Amendments

Numerous amendments have been made to the General Law on Fisheries and Aquaculture to keep pace with the technological advancement and globalization of the fisheries sector. The introduction of VMS was one such advancement that required updated laws and control mechanisms for the robust monitoring, control, and surveillance (MCS) tool. Law No. 19,521 was introduced in 1997 to require the installation of VMS on registered Chilean fishing vessels and factory ships as well as foreign-flagged vessels authorized to fish and land in Chile.[26] The amendment added the following article to the General Law on Fisheries and Aquaculture:

20 Anthony Cox, *An Appraisal of the Chilean Fisheries Sector* (Paris; OECD Publishing, 2009).

21 Sarah Bladen, "Chile to Publish Vessel-Tracking Data Through Global Fishing Watch," Global Fishing Watch, May 15, 2019, https://globalfishingwatch.org/press-release/chile-to-publish-vessel-tracking-data-through-gfw.

22 Agencia Peruana de Noticias, "Peru y Chile Firman Compromisos en Pesca, Acuicultura Y Desarrollo Productivo," October 10, 2019, https://andina.pe/agencia/noticia-peru-y-chile-firman-compromisos-pesca-acuicultura-y-desarrollo-productivo-769339.aspx.

23 Ministerio de Economía, Fomento y Reconstrucción, "LEY-18892 23-DIC-1989 MINISTERIO DE ECONOMÍA, FOMENTO Y RECONSTRUCCIÓN," Ley Chile - Biblioteca del Congreso Nacional, June 9, 1991, https://www.leychile.cl/Navegar?idNorma=30265.

24 Ibid.

25 Ministerio de Economía, Fomento y Reconstrucción, "DTO-430 21-ENE-1992 MINISTERIO DE ECONOMÍA, FOMENTO Y RECONSTRUCCIÓN," Ley Chile - Biblioteca del Congreso Nacional, accessed May 16, 2020, https://www.leychile.cl/Navegar?idNorma=13315.

26 Ministerio de Economía, Fomento y Reconstrucción, "LEY-19521 23-OCT-1997 MINISTERIO DE ECONOMÍA, FOMENTO Y RECONSTRUCCIÓN, SUBSECRETARÍA DE ECONOMÍA, FOMENTO Y ECONSTRUCCION," Ley Chile - Biblioteca Del Congreso Nacional, accessed May 16, 2020, https://www.leychile.cl/Navegar?idNorma=76464.

> Article 64D. The information obtained through the system will be reserved. Its destruction, subtraction, or disclosure will be sanctioned with the penalties indicated in articles 242 or 247 of the Penal Code, as appropriate.[27]

This provision specifically prohibits the sharing of VMS data outside of the Chilean government. Responsibility for receiving and managing the data was split between the SERNAPESCA and the General Directorate of the Maritime Authority.[28] Article 64D clearly posed a legal hurdle for Chile if it wanted to work with GFW on greater data transparency, and public disclosure would require additional amendments to the General Law on Fisheries in order to share national VMS data. The text of Article 64D remained unchanged until January 2019, with the publication of Law No. 21,132, modernizing the function of the SERNAPESCA.

The history of Law No. 21,132 details much of the discussion during the three constitutional procedures as well as the Mixed Commission regarding the details of the law.[29] Of note, the Mixed Commission Report states that this particular piece of legislation "was approved by unanimous consent, without changes."[30]

That recent law modifies several distinct laws relating to the Ministry of Finance, the Ministry of Economy, Development, and Reconstruction, and other agencies to update the role and capacity of SERNAPESCA.[31] Article 9 of the law updates the first paragraph of Article 64D from Law No. 21,132 as follows:

> **§ 6.** The information emanating from the automatic positioning system will be public and must be updated monthly and published on the National Fisheries and Aquaculture Service's website. Anyone who maliciously destroys renders useless or alters the automatic positioning, or the information contained in it will be sanctioned with the penalty of minor prison in its minimum to medium degrees.[32]

This represented a significant shift in the fisheries data policy of Chile. Rather than writing a more nuanced piece of legislation allowing conditional use and sharing of VMS data, the entirety of the positioning data was made open to the public. This data includes vessel identity numbers, gear type, location, speed, direction, and other relevant monitoring information. Additionally, the nature of VMS allows the data to be shared in near real time.[33] While the data is public, the new law only requires it to be updated monthly on SERNAPESCA's website. However, the agreement between Chile and GFW expedites the publishing of the VMS data. Currently, a live

27 Ibid.

28 Ibid.

29 Supra, note 14.

30 Ibid.

31 Ministerio de Economía, Fomento y Turismo, "LEY-21132 31-ENE-2019 MINISTERIO DE ECONOMÍA, FOMENTO Y TURISMO," Ley Chile - Biblioteca del Congreso Nacional, accessed May 18, 2020, https://www.leychile.cl/Navegar?idNorma=1128370.

32 Ibid.

33 Tony Long, "Chile Shows Global Leadership on Fisheries Transparency," Global Fishing Watch, March 3, 2020, https://globalfishingwatch.org/vms-transparency/chile-leadership.

map of Chilean fishing and aquaculture vessels can be found on SERNAPESCA's website, thanks to GFW.[34]

This specific piece of legislation sets Chile apart from some of the other nations that have reached VMS data-sharing agreements with GFW. The now public nature of the data allows GFW to immediately release information such as International Maritime Organization (IMO) numbers (unique identifiers) and vessel names. Other countries are stricter with the information published, whether through more conservative MOU agreements or more restrictive national legislation. For example, the Ministry of Production, Fisheries Sector, of the Government of Peru (PRODUCE) requires, through their MOU with GFW, a ten-day delay before their VMS data is published onto the platform,[35] and Panama's vessel IMO numbers are replaced with anonymous GFW ID numbers.[36] These distinctions mark Chile as a true leader and first mover in data transparency.

It should be noted that there is still no existing platform that can be used to flag illegal fishing in time to prevent entry at ports in Chile. FAO is working on the development of such a platform, but GFW's platform is not being used for port-entry inspection. Therefore, Chile's transparency is principally a deterrent for IUU fishing activity. As Chile has made all VMS data public and available through GFW's platform, vessel owners and operators are less likely to engage in IUU behavior. This is especially true for the Chilean fleet, as all information related to vessel identity is available without the stipulation of delay or censorship.

Modernization of the National Service for Fisheries and Aquaculture (SERNAPESCA)

The continuous regulatory developments in response to IUU fishing, as well as other sustainability concerns, have significantly increased the duties of SERNAPESCA. The service plays a major role in the monitoring, controlling, and surveilling domestic and foreign-flagged vessels, but even more must be done to address the economic and environmental threat that IUU fishing poses, especially considering the size of the country's EEZ. Hence, Chile passed Law No. 21,132 in January of 2019 to increase the role of SERNAPESCA. One aspect of Law No. 21,132 is an addition of capacity to the organization. Specifically, Article 7 of the law increases the maximum staffing positions in the agency by 253.[37]

The law expands the role of the Department of Management of Fisheries Control Programs; particularly, the department now also assumes the role of coordinating the certification system of landing information, as SERNAPESCA performs this work directly or by contracting accredited auditing entities in cases where the law authorizes it. Finally, the modernization of SERNAPESCA changed the status of the VMS data to public access.

34 Inicio, "Monitoreo Satelital de Naves y Embarcaciones Pesqueras," accessed May 14, 2020, https://www.sernapesca.cl/informacion-utilidad/monitoreo-satelital-de-naves-y-embarcaciones-pesqueras.

35 Global Fishing Watch, "Global Fishing Watch Shared Workspace," accessed April 28, 2020, https://globalfishingwatch.org/map.

36 Ibid.

37 Supra, note 31.

3. Industry Support

One issue at the forefront of VMS data sharing is the publication of sensitive information regarding fishing grounds. The industrial fisheries sector has always been competitive, and a large part of its success is knowing where and when to fish. While vessel owners have historically been strongly opposed to sharing information regarding their fishing grounds, that may not be the case anymore. Cristian Laborda is a Chilean lawyer and director of Laborda Abogados. He formerly acted as the head of the Oceanic Affairs Department in the Ministry of Foreign Affairs of Chile, as well as a legal advisor in the matter of International Law of the Seas and Fisheries. Regarding the new data transparency clause in Law No. 21,132, Cristian said there was little to no opposition from the industry.[38] While this may seem counterintuitive, it is also important to note that fishing grounds data can be acquired through other means. A combination of AIS data, fisheries statistics, and oceanographic data can produce valuable information on profitable fishing grounds, so vessel owners may be less concerned about data sharing.[39]

Chile's Association of Industrial Fisheries (ASIPES) itself confirmed industry support for the public access of its VMS data.[40] The association's president, Macarena Cepeda Godoy, stated that the new law is a "very good advance[ment] in transparency and information on how the different fishing actors operate at sea since it will allow us to know where they carry out their tasks, how they respect the respective exclusion zones, protected areas or areas of high natural value and combat illegal fishing."[41] This highlights several motivations for their support of public access for VMS data. First, many industrial vessels have received accusations and complaints from the artisanal sector, claiming that the industrial fleet is fishing in reserved, artisanal-only zones. It is in the best interest of the industrial fishers to dispute these claims, and ASIPES believes that transparency will resolve the accusations. Second, the fisheries are losing 30% of their catch to illegal fishing, providing a financial incentive. Lastly, the progressive association of fisheries values sustainability of marine resources, understanding the dependence of their industry on the health of their fish stocks.[42]

ASIPES created its own fisheries data platform in 2016, similar to that of GFW.[43] The program is called the Online Supply Monitoring System for the Fisheries Industry (SIDES). Operating across four areas, the online platform aims to offer more information than GFW does. First, real-time satellite data from the fishing fleets of ASIPES companies is available publicly. A second initiative is to post daily reports of fishing catches for each vessel in the association. Lastly, the platform aims to provide holistic information on the supply chain for hook-to-plate transparency, including raw material destinations and third-party purchases.[44] Joining this platform is compulsory for all companies that are part of ASIPES. This includes Blumar, Pacific Blu, Landes, Camanchaca, and

38 Supra, note 19.

39 Ibid.

40 ASIPES, "Asipes Valora Acceso Público del Sistema de Monitoreo Satelital Impulsado por Sernapesca y Recalca Su Compromiso por la Protección del Mar y Sus Recursos," accessed May 25, 2020, https://www.asipes.cl/novedades/detalle/id/419.

41 Ibid.

42 Ibid.

43 Genesis Saldaña Vásquez, "BIOBIO – Pesca Industrial Incorpora Inédito Monitoreo en Línea de Abastecimiento de Materia Prima," Peru Pesquero, June 3, 2016, https://www.perupesquero.org/biobio-pesca-industrial-incorpora-inedito-monitoreo-en-linea-de-abastecimiento-de-materia-prima.

44 Ibid.

Alimar.[45] SIDES is accessible online today, but it requires registration with a Unique National Role (RUT)- a Chilean citizen identification number.

This platform was implemented by the industry to guarantee traceability, combat illegal fishing, and dispute allegations from the artisanal sector. Hence, the large industry players had no need to oppose a law requiring public access to VMS data. Rather, they advocated for this law and played a role in its success.

4. Coda

Chile's relatively early move toward data transparency can be linked to three factors. First, the political will within the country's government was high, because Chile has a history of leadership in global marine stewardship. Additionally, the quantification of IUU efforts and its impact on the Chilean economy drove political motivation to directly address the issue. Second, the support of industry players was important, especially because VMS data is installed and paid for by the vessel owners themselves. In Chile's case, the major industrial fishers had several reasons to make VMS data public and increase transparency and traceability in their sector. Evidence for compliance with artisanal zone regulations and long-term sustainability of the fishing business were two principal reasons. Lastly, the legal frameworks previously in place and a significant modification to the General Law on Fisheries and Aquaculture streamlined Chile toward data transparency. A prior clause preventing the sharing of VMS data outside of the country was unanimously modified to make all VMS data public, and this has made Chile the most data-transparent country on the GFW platform to date.

While sharing VMS data with GFW allows for a public audience, SERNAPESCA also gains value from the use of the platform. They are able to use the map and GFW algorithms "to visualize and track the position of the vessels in its fleet, including vessels participating in aquaculture."[46] The algorithms for detecting "apparent fishing activity" streamline the investigative work that SERNAPESCA is responsible for. This is true for other countries as well. While one aspect of GFW's platform is public transparency, another is to provide monitoring assistance to national agencies regulating fishing activity. Each country that shares data with GFW has access to a personalized platform with complete, unredacted data to detect IUU fishing in their waters or fleets. These two mechanisms together can have a significant impact on illegal fishing, so joining the GFW platform provides incentive for countries struggling with this issue in their waters.

45 Ibid.

46 SERNAPESCA, "Monitoreo Satelital de Naves y Embarcaciones Pesqueras," accessed May 24, 2020, https://www.sernapesca.cl/informacion-utilidad/monitoreo-satelital-de-naves-y-embarcaciones-pesqueras.

C. Peru Case Study

1. Background

Peru is situated such that the cold Humboldt Current, together with winds blowing along the country's 2,414-kilometer coastline, generates an upwelling system that brings nutrients and cold water to the surface from the deep ocean. The result is an exceptionally fertile aquatic environment that sustains a huge variety of ocean life.[47]

On this geographical backdrop, fishing has become deeply ingrained in Peru's economy, politics, and culture. Peru is the second largest fishing country in the world, behind only China.[48] Indeed, about 10 percent of the world's catch comes from Peruvian waters.[49] As can be expected, this catch is vital to Peru's economy. By some estimates, some 232,000 Peruvian jobs—comprising fishermen, shippers, processors, restaurant workers, and more—depend on the country's seafood sector as of 2014.[50] In 2019, Peru's fishing sector exported almost $US3.5 billion worth of fish—mostly several million metric tons of anchoveta.[51]

The fishing sector in Peru is centered around anchoveta, a species of fish in the anchovy family that is a very common base for fishmeal, which is a processed commercial product widely used to feed livestock. Peru has the world's largest anchoveta fishery, and anchoveta dominates fish landings.[52] Other prominent catches include invertebrates like giant squid, tuna, and mackerel, roughly in descending order of contribution to gross domestic product (GDP).[53]

Given the number of Peruvians who rely on fishing for their livelihood, overfishing, IUU fishing, and El Niño events exacerbated by climate change are particularly pressing problems for the country. These factors have contributed to low annual catches in the middle of the past decade, including reports of low landings and small, sexually immature fish in 2014, 2015, and 2016.[54]

In particular, overfishing and IUU fishing have emerged as serious, interlinked threats in Peru. Reliable systematic analyses of overfishing in Peru are limited due to the lack of reliable information on fish stocks and because concepts like overfishing and overexploitation are not

47 Alfred Grünwaldt, "Will Peru Have Enough Seafood in 50 Years? The Reason for Sustainable Fishing," Inter-American Development Bank, March 4, 2019, https://blogs.iadb.org/sostenibilidad/en/will-peru-have-enough-seafood-in-50-years-the-reason-for-sustainable-fishing.

48 Food and Agriculture Organization of the United Nations, "State of World Fisheries and Aquaculture 2018," 2018, http://www.fao.org/state-of-fisheries-aquaculture/es.

49 Ibid.

50 Villy Christensen, Santiago de la Puente, Juan Carlos Sueiro, Jeroen Steenbeek, and Patricia Majluf, "Valuing Seafood: The Peruvian Fisheries Sector," *Marine Policy* 44 (February 2014): 302–11, https://doi.org/10.1016/j.marpol.2013.09.022.

51 Sociedad Nacional de Pesquería, "Exportaciones Pesqueras Año 2019," https://www.snp.org.pe/wp-content/uploads/2020/01/12-REPORTE-DE-LAS-EXPORTACIONES-PESQUERAS-A%C3%91O-2019.pdf.

52 Supra, note 50.

53 Ibid.

54 Allison Guy, "Overfishing and El Niño Push the World's Biggest Single-Species Fishery to a Critical Point," Oceana, February 2, 2016, https://oceana.org/blog/overfishing-and-el-ni%C3%B1o-push-world%E2%80%99s-biggest-single-species-fishery-critical-point.

contemplated in national regulations.[55] However, anecdotal evidence points to a crisis. Analyzing data between 2009 and the first half of 2011, investigative journalists found that 630,000 metric tons of anchoveta, worth nearly $200 million as fishmeal, were caught and processed, yet simply missing from official counts.[56] Despite reforms to anchoveta fishery management, the trend of unreported anchoveta continues today. Between 120,000 and 150,000 metric tons of anchoveta are not reported each year.[57] Similarly, researchers estimate that Peru's total aggregate fish catch between 1950 and 2010 was underreported by 25%.[58] Peru has also struggled with juvenile-heavy catches, a telltale sign of overfishing. For example, despite regulations limiting the acceptable juvenile catch ratio to 30%, a 2009 report from the Sea Institute of Peru (IMARPE) showed that some 60% of caught jack mackerel were juveniles.[59] Furthermore, Samuel Amorós, a World Wildlife Fund Peru marine affairs specialist, believes that more than 9,000 of the more than 16,000 fishing vessels in Peru are illegal.[60]

For Peru, IUU fishing and overfishing are not mere annoyances. They threaten the food and nutritional needs of some 300,000 Peruvians.[61]

Peru has responded through various efforts to combat IUU fishing and overfishing. Working with the World Bank since 2009, the Peruvian government has adopted and implemented rights-based management of industrial anchoveta fleets, with quotas set by a scientific body and assigned to individual companies. The ultimate goal is to reduce fishing and rebuild fish stocks. Early impacts have seemed positive—as of 2017, a quarter of the country's industrial anchoveta fleet was decommissioned under the new management system (fishers who were out of a job received access to unemployment benefits).[62] Peru has also made efforts toward combating other less directly anthropogenic causes of fish stock depletion. For example, Peru has cooperated with the Inter-American Development Bank to develop the technological capacity to monitor and evaluate climate change impacts on oceanic ecosystems.[63]

New initiatives like these in the fisheries space corresponded with a growing political will for transparency after years of diminished catches in the 2010s. Crucial to this shift was a change in the industrial fishers' position. This occurred in part because leaders in the fishing industry determined that the risk of sharing prime fishing spots was no longer prohibitive, as such

55 Oceana Peru, "Promover la Pesca Sostenible," accessed May 29, 2020, https://peru.oceana.org/es/our-campaigns/promover_la_pesca_sostenible/campaign.

56 Milagros Salazar, "Peru's Vanishing Fish," The Center for Public Integrity, January 26, 2012, https://publicintegrity.org/environment/peru-vanishing-fish.

57 Yvette Sierra Praeli, "Peru: The Wealth of a Biodiverse Sea Open to Exploitation," Mongabay, August 23, 2018, https://es.mongabay.com/2018/08/oceanos-mar-de-peru-explotacion.

58 Jaime Mendo and Claudia Wosnitza-Mendo, "Reconstruction of Total Marine Fisheries Catches for Peru: 1950-2010," Fishing Centre Working Paper Series, University of British Columbia, 2014, http://www.seaaroundus.org/doc/publications/wp/2014/Mendo-et-al-Peru.pdf.

59 Ibid.

60 Milton López Tarabochia, "Illegal Fishing in Peru: A Threat to Marine Conservation," Mongabay, June 9, 2016, https://es.mongabay.com/2016/06/pesca-ilegal-peru-amenaza-la-salud-publica-las-areas-conservacion-marinas.

61 Food and Agriculture Organization of the United Nations, "Peru Defines Further Measures to Tackle IUU Fishing," February 26, 2019, http://www.fao.org/iuu-fishing/news-events/detail/en/c/1182106.

62 World Bank, "In Peru, Fishing Less Anchoveta Pays Off," March 6, 2017, https://www.worldbank.org/en/news/feature/2017/03/06/peru-anchoveta-pescadores.

63 Inter-American Development Bank, "PE-T1297: Adaptación al Cambio Climático del Sector Pesquero y del Ecosistema Marino-Coste," accessed May 19, 2020, https://www.iadb.org/es/project/PE-T1297.

information was already available to interested parties via other oceanographic data that can be relatively easily obtained.[64] Additionally, industrial leaders were impressed with the growing technological possibilities of analyzing public vessel-location datasets. For instance, one Oceana affiliate had developed a method that cross-referenced satellite imaging and AIS data to visualize Chinese IUU fishing in Peruvian waters.[65] Although this method used AIS and not VMS data, such new algorithms and methods have brought attention to the potential upsides of data transparency.

According to Juan Carlos Sueiro, Oceana's fisheries director, the industry's position also changed in part due to shifting employment of individuals between the public and private sectors in Peru.[66] Of note, former Minister of Production Elena Conterno, a major advocate of data transparency in fisheries during her tenure in 2009, became head of the National Fishery Society (SNP), an organization representing Peru's large industrial fishers. Conterno attempted to broker a public data-sharing agreement between the government and industry stakeholders in 2009, though the effort was unsuccessful then. But through her new position leading SNP, Conterno was able to steer the position of the industrial fishers toward public data sharing.[67]

In addition, a slate of new leaders focused on fisheries issues emerged. According to Sueiro, the Vice Minister of Fisheries and Aquaculture, Héctor Soldi, brought to the Ministry of Production an internationalist lens on fisheries issues.[68] Indeed, Peru ratified the PSMA in 2017. Soldi had spent time in the United States representing the interests of Peru and Latin America, and he was keen on the possibilities in international cooperation to address Peru's fisheries issues.

Peru's position shifted dramatically since the last time public VMS data sharing was suggested in 2009. By 2016, serious discussions on public data sharing were underway. Around the same time, Peru also created an online portal called TRASAT,[69] which publicly documents vessel data for all ships passing through Peru's jurisdictional waters, though TRASAT is more limited than the GFW platform—it can be searched only one vessel at a time, and the timeframe for which data is available is limited.

Ultimately, Peru signed a MOU with GFW on October 5, 2017, promising to work to make its VMS data public.[70] Data on Peruvian-flagged ships began appearing on the GFW platform a year later, making Peru the second country, behind only Indonesia, to make its VMS dataset freely and publicly available on GFW's platform.[71]

64 Juan Carlos Sueiro, personal communication, May 12, 2020.

65 Ibid.

66 Ibid.

67 Ibid.

68 Ibid.

69 Peru Ministry of Production, "TRASAT," accessed May 20, 2020, https://www.produce.gob.pe/index.php/shortcode/servicios-pesca/trasat.

70 Andy Sharpless, "CEO Note: A Victory for Transparency in Peru," Oceana, September 29, 2017, https://oceana.org/blog/ceo-note-victory-transparency-peru.

71 Samantha Emmert, "Peru's Vessel Tracking Data Now Publicly Available Through Global Fishing Watch," Global Fishing Watch, October 25, 2018, https://globalfishingwatch.org/press-release/perus-vessel-tracking-data-now-publicly-available.

In this section, we first discuss the current state of the fishing sector in Peru. We then examine the legal framework on which Peru implemented public sharing of its VMS dataset.

2. Legal and Regulatory Frameworks for Fisheries

In this subsection, we discuss the legal framework for VMS datasets and data privacy rules in Peru that ultimately empowered Peru to publicly share its VMS data with GFW.

Vessel-Monitoring System Framework

The General Fishing Law approved by Decree Law No. 25977 in 1992 sets out the framework for the management of oceanic resources. The General Fishing Law declares broadly that the hydrobiological resources contained in the territorial waters of Peru constitute national patrimony, so that the government must regulate the integral management and rational exploitation of these resources to achieve sustainability and preservation for future generations. Under the Constitution of Peru, the maritime domain of the Peruvian government includes the sea adjacent to its coastal water, rivers, and underground waters up to a distance of 200 nautical miles. This area is commonly known as Peru's EEZ. Importantly, the General Fishing Law[72] and its Regulation (approved by Supreme Decree No. 012-2001-PE) are the regulatory framework for essentially all fishing regulations since 1992. See, for example, Legislative Decree N° 1084, Law of Maximum Catch per Vessel (the aforementioned individual vessel quota system instituted in 2009).

The Ministry of Production, through the Vice Ministry of Fisheries and Aquaculture, is the governing authority in charge of formulating, coordinating, executing, and monitoring Peru's fisheries and aquaculture development policy. Its main functions are the following: to adopt fisheries management measures; to grant administrative rights to individuals for the development of fishing activities; and to inspect—and punish, if appropriate—any infringers of promulgated rules.[73]

Because natural resources are national heritage, their exploitation must be determined by law under the Peruvian Constitution. The Peruvian government, through its competent entities, must authorize any exploitation of natural resources. In the case of industrial fishing vessels seeking to extract fishing resources from Peruvian waters, such vessels must obtain a fishing permit from the Ministry of Production.[74] But artisanal fishers and subsistence fishers need not acquire a permit.

Peru first conceived of its VMS requirement for Peruvian-flagged ships in 2001, when the VMS system was addressed in the Regulation of the General Fishing Law. That regulation created a satellite tracking system called SISESAT.[75] Administered by the Ministry of Production, SISESAT

72 In order for the General Fishing Law to enter into force, a regulation is needed, which is approved through a Supreme Decree by the Executive Power.

73 Baker McKenzie, "Doing Business in Peru 2017," November 2017, https://www.bakermckenzie.com/-/media/files/insight/publications/2017/11/bk_peru_doingbusiness_nov17.pdf?la=en.

74 Decreto Supremo No. 012-2001-PE, Articles 28 and 40.1.

75 Decreto Supremo No. 012-2001-PE, Articles 109-110.

aims to "contribute to the adoption of fisheries management measures and the responsible use of hydrobiological resources, as well as complementing follow-up, control and surveillance actions of extractive activities."[76] In essence, SISESAT mandates that all industrial vessels along with other specific categories of fishing vessels install VMS equipment,[77] maintain signal continuously, and transmit data to the Ministry of Production at stated fixed intervals.[78] The regulation also grants the Ministry of Production broad enforcement authority against vessels that fail to use an operational VMS system.[79] A list of offenders over any given preceding 24-hour period is published online.[80]

Peru periodically updates its SISESAT framework to maintain currency amid shifting technology and contractual obligations. For example, a major update to SISESAT came in 2003 with Supreme Decree N° 026-2003-PRODUCE. That regulation, although it is now repealed,[81] established the main data each transmission from a vessel should contain: date and time, identification, GPS coordinates, and messages varying depending on the context.[82] The regulation also established technical specifications and qualification standards for providers of the VMS technology.[83] The continuous update and improvement of SISESAT led the Peruvian government to approve a new regulation for SISESAT, which is the Supreme Decree N° 001-2014-PRODUCE. The Supreme Decree focused on the development of measures regarding technical specifications, installation and maintenance of satellite equipment, alert messages, latency of emissions, means of transmission, reception, and data security as well as technical specifications from the satellite communication service to the SISESAT control center in the Ministry of Production.

Data Rights

In Peru, VMS data property rights was initially a contested issue. Resolution of this issue in favor of the government was a significant step toward public sharing of VMS datasets.

Supreme Decree N° 012-2001-PE contains three relevant provisions:[84]

> **Article 115** – Reserved nature of the information and data
>
> 115.1 The rights to data, reports, and information from the Satellite Tracking System related to fishing vessels dedicated to the extraction of highly migratory and transzonal hydrobiological resources are reserved and confidential. The ship owners have access through the system to the data related to their fishing vessels.

76 Decreto Supremo No. 012-2001-PE, Article 109.

77 Decreto Supremo No. 001-2014-PRODUCE, Article 4.

78 Decreto Supremo No. 012-2001-PE, Article 111.

79 Decreto Supremo No. 012-2001-PE, Article 114.

80 Peru Ministry of Production, "Seguimiento Satelital", accessed May 5, 2020, https://www.produce.gob.pe/index.php/dgsfs-pa/seguimiento-satelital.

81 Decreto Supremo No. 001-2014-PRODUCE, first complementary derogatory provision.

82 Decreto Supremo No. 026-2003-PRODUCE, Article 3.

83 Decreto Supremo No. 026-2003-PRODUCE, Articles 6-7.

84 Decreto Supremo No. 012-2001-PE, Article 115, as modified by Decreto Supremo No. 008-2006-PRODUCE, Article 2.

> 115.2 The data, reports, and information from the Satellite Tracking System relating to fishing vessels dedicated to the extraction of hydrobiological resources other than those referred to in the preceding paragraph, may be used by fishing associations and guilds constituted according to law and that are duly recognized before the Ministry of Production, when so requested.
>
> 115.3 Non-individualized data, reports, and information may be used by other natural and legal persons authorized by the Ministry of Production and disseminated, in the cases, it deems appropriate, in accordance with the applicable legal provisions.

Article 116 states that fishing associations or guilds may obtain VMS data from the Main Control Center of the Ministry of Production.[85] Additionally, Article 117 makes all "data, reports, and information" from the SISESAT system admissible evidence in the prosecution of any legal violations.[86]

The general rule concerning information owned by the Peruvian government is that such information must be publicly available.[87] Article 115.1 of Supreme Decree N° 012-2001-PE states that VMS data rights are "reserved and confidential." But vessel owners can access to VMS data related to their vessels. Article 115.2 allows fishing associations and guilds to use VMS data, which will be provided by the Control Center of the Ministry of Production. The right Article 115 appears to grant vessel owners is the right to access their individualized data; the provision does not phrase the right of access as a property right. The regulation does state (1) that non-individualized data may be used and disseminated by the government and (2) that even individualized vessel data may be accessed by approved fishing associations and guilds that request such data. As a whole, Article 115 tees up the question of who owns and can distribute VMS data—the government or vessel owners.

Peru's courts have ruled on the question in favor of the government's ability to publicly disseminate its VMS datasets. That conclusion was described in a 2009 Peru Constitutional Court case,[88] in which the appellant Pesquera Alejandria S.A.C., a major fishing company and fish meal processor,[89] challenged the Ministry of Production's claimed power to disseminate vessel data. The appellant sought a writ of habeas data—essentially a type of lawsuit seeking a judgment ordering the government to properly protect the appellant's personal data.[90]

The appellant had argued that Article 115.2 and Article 116, paragraph 2, of Supreme Decree N° 012-2001-PE violated its constitutional right to informational self-determination. The Constitutional Court rejected this argument:

85 Decreto Supremo No. 012-2001-PE, Article 116, as modified by Decreto Supremo No. 008-2006-PRODUCE, Article 2.

86 Decreto Supremo No. 026-2003-PRODUCE, Article 117, as modified by Decreto Supremo No. 008-2006-PRODUCE, Article 2.

87 Law of Transparency and Access to Public Information, Amendment to Law No. 27806.

88 Exp. N.0 04670-2007-PHD/TC, Lima, Pesquera Alejandría S.A.C., Tribunal Constitucional (February 20, 2009).

89 SeafoodSource, "China Fishery Nets Peruvian Fishing Operation." May 18, 2010, https://www.seafoodsource.com/news/supply-trade/china-fishery-nets-peruvian-fishing-operation.

90 Rosalía Quiroz Papa de García, "El Hábeas Data, Protección al Derecho a la Información y a La Autodeterminación Informativa," *Letras* 87, no. 126 (2016).

> [Satellite location] information collected is not sensitive or reserved, so it can be disseminated by the Ministry of Production without violating any constitutional rule.... As can be seen, the information collected is not sensitive or reserved, so that, in the present case, the appellant's constitutional right to informative self-determination is not being violated, since the data being disseminated by the Ministry of Production is not sensitive or private. Nor do they refer to some mechanism or procedure that affects in a way the industrial or business secrets of the appellant, since the disclosed information refers only to the location and movement of fishing vessels. In this sense, the Constitutional Court considers that the disclosure of said data to third parties does not affect the right to informative self-determination of the appellant.

The upshot of the Constitutional Court's decision is that the Peruvian government need not ask vessels for permission to disseminate VMS data. An adverse ruling here could have seriously stymied Peru's efforts to share its VMS dataset publicly, perhaps requiring legislation or even constitutional amendment, but the Constitutional Court's holding is certainly decisive on the issue in favor of public sharing.

But, interestingly, the Ministry of Production ultimately did obtain support from industry leaders anyway.[91] As discussed earlier, the fishing industry in Peru agreed to share vessel data publicly as a result of a multiyear shift in political will toward data transparency measures. It likely would not have been wise to antagonize industry leaders by sending their VMS datasets for publication, even if the government was able to do so, considering how the Constitutional Court resolved the data rights issue, as the public sharing of VMS data is only one step toward revitalizing Peru's fisheries. To realize the General Fishing Law's purpose of preserving Peru's hydrobiological resources for future generations, the government should be working closely with the relevant stakeholders of the fishing sector for future policy initiatives as well, and burning that bridge to implement any one particular initiative would be shortsighted.

3. Coda

With the confluence of political will and a favorable data rights determination, the stage was set for Peru to sign the MOU with GFW, becoming in 2019 the first country in Latin America and the second country in the world to make all of its VMS data publicly available. Early insights have shown what could be possible with Peru's data. For instance, Peruvian VMS data was used to show the presence of Chinese and Korean fleets fishing giant squid just outside of Peru's EEZ, with intra-EEZ fishing suspected.[92] Additionally, the data indicated a significant quantity of unreported shark catches.[93] In 2017, SISESAT allowed the capture of 19 foreign and 45 national vessels that were involved in illegal fishing. As a result, 10 million metric tons of marine resources were delivered to low-income people.[94]

91 Supra, note 64.

92 Bloomberg Philanthropies, "Vibrant Oceans Q&A: Indonesia and Peru Commit to Publishing VMS Data on Global Fishing Watch," Medium, July 13, 2017, https://medium.com/@BloombergDotOrg/vibrant-oceans-q-a-indonesia-and-peru-commit-to-publishing-vms-data-on-global-fishing-watch-e3148a62590a.

93 Ibid.

94 Diario Gestion, "Como Funciona el Sistema Satelital para Identificar a las Embarcaciones de Pesca Legal e Ilegal?," August 31, 2017, https://gestion.pe/economia/funciona-sistema-satelital-identificar-embarcaciones-pesca-legal-e-ilegal-142698-noticia.

Countries seeking to navigate data rights and privacy issues in the fisheries space should pay close attention to how Peru ultimately shared its VMS data publicly, but they should also pay attention to the ways Peru is still working to improve its data transparency. Peru is clearly a first mover in the data transparency space, but there are nevertheless avenues for further improvement. For instance, Peru currently shares its VMS data with GFW after a 10-day delay,[95] whereas other countries on the GFW platform share their data on a shorter 72-hour delay.

D. Ecuador Case Study

1. Background

Ecuador is a coastal state in Latin America with 4,525 kilometers of coastline and an EEZ of around 1,150,000 square kilometers.[96] Like Chile and Peru, Ecuador is situated on the eastern Pacific Ocean where the Humboldt Current results in the upwelling of cold, nutrient-rich water and the subsequent diversity and abundance of marine life.[97] Ecuador's marine territorial holdings also include the region surrounding the Galapagos Archipelago, much of which is protected under the Galapagos Marine Reserve.

As a leading actor in both regional and global fisheries, Ecuador is the largest producer of shrimp and the second largest producer of tuna in the world.[98] For all global capture fisheries, Ecuador ranks in the top 25 countries, with a reported catch of about 715,357 metric tons in 2016.[99] The fisheries sector also plays a substantial role in Ecuador's economy, supporting more than 90,000 jobs and ranking second in value of exports, just after oil. Both the country's industrial fishing fleet—about 150 vessels—and artisanal fishing fleet—around 45,500 vessels—rely on effective government management of coastal and high seas fisheries to sustain regional and global demand.

The government agency in charge of administering Ecuadorian fisheries has changed over time. Details of the history of government agency restructurings are located in Appendix C-I. Today, the body in charge of fisheries management and development is the Vice Ministry of Aquaculture and Fisheries, nestled under the Ministry of Production, Foreign Trade, Investment and Fisheries, and regulated by Ministerial Agreement No. MPCEIP-DMPCEIP-2019-0034, which provides the Vice Ministry with "the exercise of the powers, functions, powers and responsibilities legally established to the highest authority, to continue subscribing the normative administrative acts and authorizations for the execution of the fishing activity in its various phases".[100]

95 Supra, note 71.

96 Marine Spatial Planning Programme, "Home," accessed May 23, 2020, https://msp.ioc-unesco.org/world-applications/americas/ecuador.

97 Jimmy Martínez-Ortiz, Alexandre M. Aires-da-Silva, Cleridy E. Lennert-Cody, and Mark N. Maunder, "The Ecuadorian Artisanal Fishery for Large Pelagics: Species Composition and Spatio-Temporal Dynamics," *PloS One* 10, no. 8 (2015): e0135136.

98 CNP Ecuador, "Tarjeta Amarilla, Una Oportunidad para Desarrollar un Nuevo Marco Regulatorio," December 3, 2019, https://camaradepesqueria.ec/tarjeta-amarilla.

99 Supra, note 48.

100 Ministerio de Producción Comercio Exterior Inversiones y Pesca, "Normativa legal de creación de la Subsecretaría de Recursos Pesqueros," https://www.produccion.gob.ec/normativa-legal-de-creacion-de-la-subsecretaria-de-recursos-pesqueros.

Since 1974, the agencies charged with managing Ecuadorian fisheries have been governed by the Law on Fisheries and Fisheries Development issued by Decree Law 178.[101] Modifications to the law were issued in 1985, and an updated Codification of the Law on Fisheries and Fisheries Development was published in 2005.[102] The 2005 Codification established a National Fisheries Development Council, which until April of 2020 acted as the main body in charge of "establishing and guiding the country's fisheries policies."

In April of 2020, motivated by and in response to a "pre-identification" notice in October 2019 from the European Commission regarding noncompliance with international rules on fisheries policy, Ecuador passed La Ley Orgánica para el Desarrollo de la Acuicultura y Pesca.[103] Hereinafter referred to as the Organic Fisheries Law, the law replaced the original 1974 fisheries legislation.

With the passing of the Organic Fisheries Law came a restructuring of fisheries governing agencies and institutions. Under the new legislation, there is to be established a National Aquaculture and Fishing System, which will be a large database that will integrate relevant information for county-wide management of fisheries and aquaculture. Under the new law, the Vice Ministry of Fisheries and Aquaculture will maintain authority and responsibility for overseeing the management of the fishing industry, and the National Aquaculture and Fishing System will act as a tool for facilitating such management.[104]

Ecuador is a member of two RFMOs, a cooperating nonmember of three regional organizations/conventions, and a party to the PSMA, having approved Legislative Opinion No. 008-18-DTI-CC.[105] Still, despite membership in multiple international management regimes and its ratification of the PSMA, Ecuador has been identified as noncompliant in addressing concerns around IUU fishing by national and international bodies—for example, the United States National Marine Fisheries Service in their Biennial Reports to Congress since 2011, and via the European Union's third-country carding process under the EU IUU Regulation as of October 2019.[106]

The EU's carding process is one that identifies countries based on their capacity and effort to "comply with agreed standards under international law of the seas as flag, port, and market states." Specifically, the yellow carding requires that Ecuador develop (1) a more robust enforcement and sanctioning system for IUU activity, and (2) more adequate control of the activity of fish processing plants. If Ecuador were not able to make sufficient improvements in their legal system that helped address the EU's concerns within six months from the initial identification, then the EU could decide to move one step further and issue a red card. A red card would mean that the EU would place a ban on imports from the Ecuadorian fisheries sector, a decision that would have a large impact on the economy of Ecuador. Currently, fisheries exports to Europe account for about

101 Supra, note 96.

102 Ley de Pesca y Desarrollo Pesquero, Codificación 2005-007, H. Congreso Nacional.

103 Nueva Ley de Acuicultura y Pesca Regulara Impulsara y Fomentara el Desarrollo de la Actividad Acuicola y Pesquera Nacional, "Ministerio de Producción Comercio Exterior Inversiones y Pesca." February 19, 2020, https://www.produccion.gob.ec/nueva-ley-de-acuicultura-y-pesca-regulara-impulsara-y-fomentara-el-desarrollo-de-la-actividad-acuicola-y-pesquera-nacional/?preview=true.

104 Pablo Guerrero, personal communication, May 20, 2020

105 Legislative Opinion No. 008-18-DTI-CC.

106 European Commission, "Commission Notifies the Republic of Ecuador over the Need to Step up Action to Fight Illegal Fishing," October 30, 2019, https://ec.europa.eu/commission/presscorner/detail/en/ip_19_6036.

$US1.4 billion a year toward the Ecuadorian economy.[107] The timeline for evaluation of Ecuador's response to the yellow card set the first in-country visit of an EU commission to Ecuador in April of 2020. Following the initial visit, subsequent evaluations will occur every six months.[108] The status of these evaluations at the time of this research is unclear, given government shutdowns, bans on international travel, and a focus on public health due to the COVID-19 pandemic, which began in December 2019. At the time of this research, no press releases or updates have been issued by either the Ecuadorian government or the EU as to the status of the yellow card process, but it has been confirmed that the initial visit—scheduled for April 2020—did not occur due to the pandemic.[109]

To understand fisheries management and a country's ability to effectively combat IUU fishing, it is also very important to understand the political context that influences economic and environmental policy.

In addition to the frequent restructuring of ministries in Ecuador, there is a high turnover in top positions within the governing bodies for fisheries management, which results in frequent shifts in political priorities. According to Pablo Guerrero, Marine Conservation Director for WWF Ecuador, the Vice Ministry for Fisheries and Aquaculture had at least four different undersecretariats for fisheries resources in 2019, a rate of replacement that far surpasses Ecuador's usual four-year term for federal positions.

Guerrero also cites industry opinion as being influential in the Ecuadorian government's decisions around fisheries policy, particularly when it comes to data sharing. He explained that the Ecuadorian tuna industry, in particular, has varying concerns about government regulation of fisheries. He categorized the industry into two groups: the first is composed of the large industrial fishing companies, and the second includes smaller industrial fishers and artisanal fishers. The larger companies are those that rely primarily on an export-based economy; they are more vertically integrated, they are less dependent on other companies for processing or marketing, and they sometimes have their own environmental and social policies in place, including requirements about mandated observers and VMS data. The structure of the smaller companies and artisanal fishers is less understood because this group often relies on multiple other organizations to move fish through the supply chain. Only purse seiners that are greater than 363 cubic meters in capacity are considered Class VI boats by the Inter-American Tropical Tuna Commission (IATTC) and are required to have observers on board for all trips. Observer coverage on industrial longliners greater than 20 meters in length averages around 5%, further obscuring government and non-governmental organization (NGO) understanding of vessel behavior. Ecuador's tuna fleet has 22 longliners registered with the IATTC, while the remaining 112 ships are purse seiners.[110]

107 Agence France-Presse and ThemeGrill, "EU Warns Ecuador over Illegal Fishing," October 30, 2019, https://www.courthousenews.com/eu-warns-ecuador-over-illegal-fishing.

108 El Universo, "Unión Europea Evaluará Progresos de Ecuador Para Retiro de Tarjeta Amarilla Sobre Pesca de Atún," November 28, 2019, https://www.eluniverso.com/noticias/2019/11/28/nota/7624820/union-europea-evaluara-progresos-ecuador-retiro-tarjeta-amarilla.

109 Supra, note 104.

110 Ibid.

Guerrero notes that while national or global reputation might be an incentive for the larger companies described above, that is rarely the case for smaller companies or the artisanal sector. In this context, international NGOs like WWF are working with local companies to establish more transparent fisheries practices, whether by issuing eco-certifications that assure consumers that the fish was legally caught or by automating onboard processes such as logbooks and observers.

Guerrero mentions that reputation can drive industry change but that it's a process. "Changing minds and changing ships is not easy," he notes.

> "Changing minds and changing ships is not easy. It's a process."
>
> Pablo Guerrero, WWF

Guerrero cites particular pushback from industry leaders at the regional level within the RFMOs of which Ecuador is a member, particularly the IATTC. Many of the companies represented in the RFMOs are skeptical of how confidential data would be handled, worried about losing potentially profitable fishing grounds to other vessels, and suspicious of conflicting fisheries' practices between countries. Guerrero mentions that, though possibly more attainable than global sharing, data exchange at the RFMO level via a regional VMS system is difficult given the level of consensus needed. He notes that there have been proposals for such a mechanism in the past five to six years, but no progress because of the parliamentary procedures in the IATTC, which require approval via consensus among all members before the passing of a conservation measure or management agreement.

Additionally, data ownership and distribution rights in Ecuador are skewed more so toward the military—specifically the Navy—than any other government agency, a context that was not present in our research on both Chile and Peru. The relevant legislation will be discussed later in this report, but anecdotally, the role of the Ecuadorian Navy in VMS data sharing is more complex than initially understood. According to Guerrero, VMS data is managed by the Navy because it serves a much broader purpose than fisheries regulation. VMS data is used for managing issues of national defense, including illegal immigration, smuggling, narcotics and drugs, piracy, and other forms of crime that happen at sea. The Navy holds discretion in deciding how and what data is shared and does so via MOUs with specific ministries and agencies within the government. In the case of fisheries, because fishing activity is still monitored and regulated by fisheries control officers in the Fishing Authority, this might look like an agreement that allows fisheries control officers to access a portion of the VMS data relevant to specific vessels that is passed along under an MOU from the Minister of the Navy to the Undersecretariat of Fisheries Resources. The data is considered to be sensitive information and is extremely confidential.

Finally, data transparency and data privacy have been high-profile topics in Ecuador for the last ten years, and even more so in the past eight months. Ecuador has an Open Data Portal, which is an online database that resulted from a series of laws and agreements issued in 2012–2013 aimed at increasing government transparency in accordance with the Organic Law of Transparency and Access to Public Information.[111] The portal currently houses 128 datasets from 16 different government organizations. Of these 128 datasets, there are no data on the fisheries sector. The

111 "Conjuntos de Datos - Datos Abiertos Ecuador," accessed June 1, 2020, http://catalogo.datosabiertos.gob.ec/dataset.

fishing authority does manage some databases that are not public, according to Guerrero. In September of 2019, a data breach originating from an online server based in Miami, Florida, exposed the personal data of all 16.6 million Ecuadorian residents. The data breach led to an arrest and the fast-tracking of new personal data privacy laws in the country.[112]

While not directly connected to environmental legislation or fisheries management, general concerns about the government's ability to effectively use and protect data are widespread and may have lingering impacts on the country's ability to pass legislation that makes data sharing more achievable.

2. Legal and Regulatory Frameworks for Fisheries

In this subsection, we summarize and assess the legislation and policies in place regarding fisheries management and VMS data in Ecuador. It is important to note here that in Ecuadorian legislation, the terms "satellite monitoring systems," "satellite positioning system," "ship tracking system," "vessel tracking system," "SMS," and "DMS" all refer to VMS.

Organic Fisheries Law

The key regulatory framework for governing fisheries in Ecuador is the Organic Fisheries Law. This legislation, passed in April 2020, amends, modifies, and modernizes Ecuador's legal structure for fisheries management and establishes new regulations for both the industrial and artisanal sectors.

Three of the most notable takeaways from the Organic Fisheries Law are (1) the collaboration between the aquaculture and fisheries authority and the National Defense Authority toward combating IUU fishing; (2) the relatively loose framework established for VMS data regulation and dissemination, and how it interacts with ministerial agreements and resolutions passed years earlier; and (3) the way the law regulated the artisanal fisheries sector, which can give insight into requirements and strategies for open-water fleet management.

The first key takeaway deals with data owners and managers. Chapter VI of the Organic Fisheries Law deals with "Fisheries Monitoring, Control, and Surveillance." Article 159 of the law states that the governing body "will coordinate with the Ecuadorian Navy" on monitoring, control, and surveillance of fisheries activities in aquatic zones. Article 160 further expands the role of the Navy, stating that "the Ecuadorian Navy is empowered to carry out inspections of vessels engaged in fishing activities when they are in fishing operations and to report to the governing body any new developments." From these two articles, we begin to see the bare bones of a partnership between the fisheries authority and the Navy in addressing general fisheries management. In sum, the maritime authority—the Navy—has the ability to board vessels, and fisheries inspectors, as the administrative authority for this sector, must be accompanied by a naval officer to complete

112 Tom Azzopardi, "Ecuador Pushes Data Protection Bill That Mirrors EU Model," Bloomberg Law, September 24, 2019, https://news.bloomberglaw.com/privacy-and-data-security/ecuador-pushes-data-protection-bill-that-mirrors-eu-model.

an inspection of a ship; this relationship is important in understanding fisheries management cooperation between the Navy and the fisheries authority beyond just VMS sharing.[113]

Additionally, Article 167 includes provisions that state that the fisheries authority will "coordinate with the governing body of national defense, in charge of the ship tracking system" for the "interconnection that allows obtaining the required information," and that such access will be provided only "upon signing confidentiality agreements." Furthermore, Article 168 makes clear that all "artisanal, recreational, or research fishing vessels that carry out extractive fishing activity, and industry fishing vessels" must have on board at least one tracking device "endorsed by the governing body of national defense."

Read from one perspective, Article 159 might seem to say that the fisheries authority retains ultimate jurisdiction over all fisheries monitoring and control matters, and that the authority will "coordinate with the Ecuadorian Navy." But, Articles 160, 167, and 168 seem to imply that the governing body of national defense maintains more control over monitoring of fishing vessels, particularly in the case of vessel-tracking systems, like AIS and VMS, the management of which are the responsibility of the Navy. From these articles, it can be concluded that the relationship between the fisheries authority and the governing body of national defense is not simply hierarchical, but rather that each agency maintains some degree of responsibility for different aspects of fisheries governance, and so collaboration is necessary.

The second key takeaway from the Organic Fisheries Law is the loose framework regarding satellite monitoring systems (SMS) established by the law. As will be discussed later, more specific legislation regarding SMS was passed in 2007, 2011, and 2018. The 2020 amendments to the general fisheries law do not refer to these earlier ministerial agreements and resolutions, but repeat the language used in these other legal documents when setting requirements for fishing vessels to have onboard SMS. The law clarifies that as long as any new rules are aligned with current standards, earlier rules and regulations are still in effect unless repealed by the competent authorities. The Organic Fisheries Law does not repeal or supersede any earlier legislation.

A third takeaway from the Organic Fisheries Law, important in the context of understanding fisheries management on the whole, is the regulation of VMS for the artisanal fishing sector in Ecuador. The most direct reference made to SMS for the artisanal fleet comes in Chapter II, Section I, paragraph I. This language requires shipowners to install a satellite monitoring device and "guarantee the automatic transmission of the updated geographic position of the vessel."

Prior to this piece of legislation, artisanal vessels in Ecuadorian waters were not required to have a satellite-based monitoring system on board. The artisanal fishing industry, subdivided into two different types of fishers, has expanded in the past 20 years from traditional coastal fishing grounds to operate farther from shore, creating what is now known as an "oceanic-artisanal fishery." Artisanal vessels have been known to operate in regions as far as 1,400 nautical miles from shore, past the Galapagos Archipelago.[114] It is increasingly important, as the fishery expands into open ocean ecosystems, that vessel-tracking systems and data collection on board artisanal

113 Supra, note 104.

114 Supra, note 97.

vessels provide a clear picture of the state of the fishery and management practices, the same as with the industrial sector.

VMS and Other Satellite-Monitoring Data Legislation

Beyond the general fisheries law amended and passed in April of 2020, there have been a few key policies, regulations, and ministerial agreements that influence the handling and use of VMS data in the fisheries sector in Ecuador.

The earliest mention of an SMS for fisheries management in Ecuador is found in the 2005 Plan of National Action to Prevent, Discourage, and Eliminate Illegal, Undeclared, and Unregulated Fishing by the Republic of Ecuador (PAN-IUU) passed by the Undersecretariat of Fisheries. Section III, Article 8:[115]

> To date, there is no satellite positioning system in operation of ships. The implementation of a system is under study of maritime port management, which will incorporate a module for satellite control of ships.

Section V of the PAN-IUU deals with Ecuador's role as a coastal state in combating IUU fishing, specifically through measures undertaken to comply with international law and national legislation. The measure relevant to VMS data reads as follows:

> All industrial fishing vessels in the Tuna fishery must use the VMS system permanently, in accordance with the CIAT agreements, a system that will be implemented in the immediate future.

CIAT (in English IATTC) is a regional management body of which Ecuador is a member, and whose rules and regulations apply to Ecuador's industrial tuna fishing fleet. The mission of the IATTC is to "ensure the long-term conservation and sustainable use of tuna and tuna-like species and other species of fish taken by vessels fishing for tunas and tuna like species in the Eastern Pacific Ocean, in accordance with the relevant rules of international law." [116]

Section VI of the PAN-IUU deals with Ecuador's role as a port state. Section VI, Article 3 refers to control and monitoring practices that the General Directorate of Fisheries and the Maritime Authority employ in managing the entry of foreign-flagged vessels. The first provision of this article reads that "foreign flag ships must accredit their area of operation through the information generated by a satellite positioning system (VMS), which must be referred to the maritime or fisheries authority."

The lack of a national satellite monitoring system, as stated in Section III and Section IV of the PAN-IUU, in conjunction with the requirement for all tuna fishery vessels to operate a VMS device

115 Subsecretaría de Pesca, República del Ecuador, *Plan de Acción Nacional para Prevenir, Desalentar y Eliminar la Pesca Ilegal No Declarada y No Reglamentada* (PAN-INDNR) - *República del Ecuador* (2005).

116 Food and Agriculture Organization of the United Nations, accessed May 12, 2020, "Inter-American Tropical Tuna Commission (IATTC)," http://www.fao.org/fishery/rfb/iattc/en.

by the IATTC and the requirement by Ecuadorian authorities that all foreign-flagged vessels operate VMS suggests a high level of political activity around data acquisition and monitoring in the fisheries sector at this time. Although it is not yet available, the Ecuadorian government has made clear through the Organic Fisheries Law that it intends to move forward with a more robust satellite monitoring system in the coming years.

Subsequently, in 2007 two major legislative events in the context of VMS regulations in Ecuador occurred.

First, within the Executive Decree No. 254, Ecuador "establish[ed] that the General Directorate of the Merchant Marine and the Littoral (DIGMER, in the maritime field) is responsible for controlling the ships; and, that the ships have a mandatory Satellite Monitoring Device, DMS." DIGMER was the key maritime enforcement authority in Ecuador at the time. Today, it has been replaced by the National Directorate of Aquatic Spaces (DIRNEA), which retains the same functions and powers exercised by DIGMER.[117] To comply with Executive Decree No. 254:

> [I]t is necessary to establish the rules that will allow the implementation in the country of a Satellite Monitoring System for Ships in order to permanently know their identification and position.

Second, and shortly after the Executive Decree was adopted, via Resolution No. 054/07 by DIGMER, Ecuador issued "Provisions for the Implementation of a Satellite Monitoring System for Ships—SMS."[118] This document identifies the most clear and strict legal guidelines for satellite-based monitoring systems on fishing vessels to date. Article 2 includes the clearest reference to the privacy of such data generated by DMS and collected by CMS:

> The information on the movements and activity of the ships obtained through the Satellite Monitoring System regulated in this resolution, will be strictly confidential, and its sole purpose will be that of the control established by the Maritime Authority and by other organizations of the Ecuadorian State.

Article 4 and Article 7 in Annex I deal with specifications for the satellite communication service and obligations to be fulfilled by the service provider companies, including the use of security algorithms and assurances of confidentiality by the DMS service providers.

Resolution No. 054/07 was repealed in 2011 by Resolution No. 01/11, "Issuing and Provisions for the Implementation of the Satellite Monitoring System in Ships of More Than 20 TRB," which was enacted in order to collect in one regulation all stipulations regarding the satellite monitoring system for vessels.[119] There were no major data privacy–related updates made to the original law

117 República del Ecuador, Decreto Ejecutivo No. 254 (2007).

118 Dirección General de la Marina Mercante y del Litoral, República del Ecuador, Resolución No. 054/07, "Expedir Disposiciones para la Implantación de un Sistema de Monitoreo Satelital de Naves-SMS" (2007).

119 Dirección General de la Marina Mercante y del Litoral, República del Ecuador, Resolución No. 01/11, "Expedir Disposiciones para la Implementación del Sistema de Monitoreo Satelital en Buques de Más de 20 TRB" (2011).

by this updated resolution, but it further solidified the role of the national maritime authority in data management and distribution.

In 2015, the Ministry of National Defense passed Ministerial Resolution No. 36, "Rules Governing the Operation of Ship Monitoring," which clarifies data policy and data sharing for VMS-generated data. Article 2 states:

> The information on the movements and activity of the vessels obtained through the Monitoring System regulated in this Resolution, will have a confidential nature, and its sole purpose will be that of the control established by the Maritime Authority and by other Organizations of the Ecuadorian State.

Article 5 further clarifies: "The information from the monitoring of the ships obtained in the Data Center will be confidential, however it may be shared with other State entities that require them according to protocols previously established according to their needs and under the protection of Inter-institutional Cooperation Agreements." This resolution definitively establishes the need for agreements between organizations within the Ecuadorian government before VMS data can be shared by the Ministry of National Defense.

Subsequently, in 2018, the Ministry of Aquaculture and Fisheries passed Agreement No. MAP-SRP-2018-0104-A, "Rules and Regulations for the Operation of Satellite Monitoring Systems Aimed at Fishing Vessels," which reiterates language used in Ministerial Resolution No. 36 by the Ministry of National Defense and narrows the type of vessels for which SMS requirements apply to fishing vessels, specifically. The legislation makes no major amendments to the earlier Resolutions No. 54/07, No. 01/11, or No. 36 and reiterates the role of DIRNEA in authorizing DMS devices. The only specific reference to the ownership, responsibility, and sharing of data reads as follows:

> Article 1. The Fishing authority guarantees the inviolability and reservation of the data transmitted by the boat.

Unlike Resolution No. 54/07, Resolution No. 01/11, or Resolution No. 36, Agreement No. MAP-SRP-2018-0104-A uses language that implies that it is the responsibility of the fisheries authority to maintain the confidentiality of the data generated by DMS devices. Additionally, this legislation refrains from using the phrase "confidentiality," and instead refers to data privacy by way of "inviolability and reserve."

To better understand the responsibilities of data owners and producers, as well as the differences between different types of classifications of data under Ecuadorian law, it's necessary to look at Ecuador's data transparency and privacy law, a general piece of legislation passed in 2004 that applies to all information generated by the national government or generated by citizens of the state but in the possession of the public sector.

Organic Law of Transparency and Access to Public Information

Passed in 2004, the Organic Law of Transparency and Access to Public Information, hereinafter referred to as Organic Transparency Law, is the active piece of legislation that governs Ecuador's data transparency and defines what information is considered public. Article 1 of said law establishes that all information in government possession is considered public:

> All the information that emanates or that is in the possession of the institutions, organisms and entities, legal persons of public or private law who, for the subject matter of the information, have participation of the State or are its concessionaires, in any of its modalities... are subject to transparency principle; therefore, all information they possess is public, with the exceptions established in this Law.

The law continues in Article 4 by clarifying that "all public information belongs to the citizens" but that the government agencies, entities, and producers of such information are to be the administrators and managers of such information, giving them the responsibility for making public information accessible.

Under the Ecuadorian Constitution, private and government sectors that "manage public resources" are subject to the Organic Transparency Law. Article 5 of the Organic Transparency Law maintains that public information includes any document "in any format, which is in the possession of public institutions." The fisheries industry is a government sector, composed of both public and private companies, and so data generated by fisheries vessels is considered to be public information, not private. The fisheries sector is also obligated under the Organic Transparency Law to provide access to all public fisheries information. However, there are a few exceptions to this law that are relevant to understanding the Ecuadorian fisheries data policy, namely the defining of reserved information and its handling, and the protection of reserved information and subsequent process of petitioning for information.

First, it's important to reestablish that based on the language in both the Organic Fisheries Law and the resolutions discussed in the previous section, it is clear that data generated by the VMS systems administered by the governing body of national defense and applicable to the fisheries industry is confidential, reserved, and inviolable. In the context of data sharing, these three terms have slightly different meanings and interpretations under the law.

VMS data is, in the most active legislation, considered confidential. Under Article 6 of the Organic Transparency Law, confidential data is "personal public information... not subject to the principle of transparency." Information that can be classified as confidential is any information that is considered to be personal but enters into the public domain. This type of information cannot be shared without approval and is exempt from the open access requirement of the Organic Transparency Law.

VMS data is also classified as reserved under Agreement No. MAP-SRP-2018-0104-A. Under Article 17, information classified as reserved is often government information related to issues of defense or national security, including most information generated by the governing body of national defense. Article 17 of the Organic Transparency Law further exempts all data that is

either "motivated as reserved by the National Security Council, for reasons of national defense" or "information expressly established as reserved in current laws." Reserved information cannot be shared, except at the discretion of the managing authority and only after it has been declassified as reserved.

Under Agreement No. MAP-SRP-2018-0104-A, VMS data also is considered inviolable. There is no mention of inviolable information in the Organic Transparency Law and little precedent for regulation of inviolable information in other Ecuadorian legislation. The few references to inviolability of information are in the context of protection of home, personal documents, or other personal rights, such as the "inviolability of the domicile."[120] It can then be assumed that the most likely interpretation of "guarantee the inviolability...of the data" would ensure protection of the data from misuse by individuals other than the owner.

The second takeaway from the Organic Transparency Law is that the legislation makes important distinctions regrading declassification and handling of reserved or confidential information. Article 18 protects reserved data by clarifying that information classified as reserved cannot be declassified, except by the managing or producing body, or if fifteen years have passed since its classification. The National Security Council is responsible for classifying and declassifying information classified for reasons of national defense or security.

Article 18 also notes that "the information classified as reserved by the holders of the entities and institutions of the public sector, may be declassified at any time by the National Congress" via a majority vote. In the scope of this research, it has not been determined whether VMS data was reserved explicitly for purposes of national defense or whether it might fall under the category of information classified by institutions in the public sector. A clarification on the reasons for classification could permit the National Congress to declassify the data, thus perhaps allowing more leeway in a legal argument for public sharing of VMS data. Though it seems more likely that by nature of being data generated and held by the Ecuadorian Navy, there would need to be declassification by the National Security Council rather than the National Congress.

The Organic Transparency Law also permits individuals to petition the classification of information, including information classified as confidential or reserved. The process is detailed in Article 22 and states that in order for an informational request to be declined, the producing body must justify the classification of the data as reserved or confidential; additionally, the classification of the data as reserved or confidential cannot occur after the request to view information has been submitted. If the judge determines that the information requested is not justifiably classified as reserved or confidential, then "under the terms of this Law, [the managing body] will provide the delivery of said information to the recurring, within twenty-four hours."

In summary, based on the classification of fisheries VMS data in federal rules and regulations and the framework established by the Organic Transparency Law, we can identify a few main takeaways regarding the governing of satellite data by the Ecuadorian government. First, it is important to note that VMS data is in the public domain, and thus belongs to the citizens of Ecuador. That being said, it also falls under two main categories of data—reserved and confidential—that are

120 José C. García Falconí, "Derechos Constitucionales a la Intimidad, Privacidad y la Imagen," November 24, 2005, https://www.derechoecuador.com/derechos-constitucionales-a-la-intimidad-privacidad-y-la-imagen.

exempted from the transparency laws that would otherwise make this data accessible to the public and permissible to share. These laws also identify the manager of the data as the entity that produces the data—in this case, the governing body of national defense or, more specifically, the Ecuadorian Navy. As the manager of the data, the Navy seems to have the right to share it, but as noted in the Organic Fisheries Law, only with the fisheries authority upon the signing of a confidentiality notice. Furthermore, Resolution No. 36 solidifies the need for interagency agreements before sharing of data can occur.

Agreements and Regulations under RFMOs

The final group of legal documents relevant to the governance of satellite monitoring systems in Ecuador exists at the regional level, through the RFMOs that Ecuador is a member of—the IATTC and the SPRFMO. Ecuador is also a member of the Permanent Commission of the South Pacific (CPPS), which is an intergovernmental mechanism for maritime policy cooperation, but whose regulations are not binding. Ecuador is also a cooperating nonmember of the Western and Central Pacific Fisheries Commission (WCPFC). This legislation is most relevant to regional sharing of VMS data.

As a member of the IATTC, Ecuador is required to comply with one VMS-specific regulation, first approved in 2004 and then amended in 2014. Resolution C-04-06, "Resolution on the Establishment of a Vessel Monitoring System (VMS)" required that "each party with tuna-fishing vessels" establish a VMS by January 1, 2005. It also stated, "that any information provided to the Director or the Commission . . . is maintained in strict accordance with the Commission's rules and procedures on confidentiality."

In 2014, the updated Resolution C-14-02, "Resolution (Amended) on the Establishment of a Vessel Monitoring System (VMS)," recognized the lack of a binding agreement that requires all member and cooperating nonmember parties (CPC) to have an operating VMS. The new resolution created such a requirement for "commercial fishing vessels 24 meters or more in length operating in the Eastern Pacific Ocean and harvesting tuna or tuna-like species." This language is a broadening of the initial resolution to include a wider range of marine migratory species, besides tuna, as well as to include industrial longliners from countries that operate long-distance fleets, such as China, Korea, Taiwan, and Japan. The date for compliance was set at January 2016.[121] Article 2 of the resolution clarifies what data should be collected by the VMS and specifies that the generated information be collected "by the land-based Fisheries-Monitoring-Center (FMC) of the flag CPC." Article 4 clarifies that VMS data specified by other IATTC Resolutions should be transmitted to the director. As of now, there are no resolutions requiring active positioning data to be shared between members of the IATTC. IATTC Resolutions C-03-04 and C-03-05 only require such biological data as catch and effort, specifics on tuna captured, and dolphin mortalities, as well as boat operations data (position of fishing gear deployment, captains' logbooks, etc.) to be shared.[122]

121 Inter-American Tropical Tuna Commission, Resolution C-04-06, "Resolution on the Establishment of a Vessel Monitoring System (VMS)" (June 2004); Inter-American Tropical Tuna Commission, Resolution C-14-02, "Resolution (Amended) on the Establishment of a Vessel Monitoring System (VMS)" (July 2014).

122 Inter-American Tropical Tuna Commission, Resolution C-03-04, "Resolution on At-Sea Reporting" (June 2003); Inter-American Tropical Tuna Commission, Resolution C-03-05, "Resolution on Data Provision" (June 2003).

As a member of the SPRFMO, Ecuador is required to comply with four regional regulations relevant to VMS. The first mention of requirements for VMS for countries party to the SPRFMO comes in the 2015 Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean.[123] Article 25 of the Convention document requires all flag states to ensure that all fishing vessels "carry and operate equipment sufficient to comply with vessel monitoring system standards and procedures adopted by the Commission." Provision 27.1a refers specifically to the creation of a regional VMS, suggesting that such a system would provide for direct transmission of information between the Commission and the flag state.

CMM 06-2020, "Conservation and Management Measure for the Establishment of the Vessel Monitoring System in the SPRFMO Convention Area," creates the procedures, rules, and regulations for a Commission VMS that will be applicable to "all vessels included in the Commission Record of Vessels Authorized to Fish in the SPRFMO Convention Area." This resolution was adopted in June of 2020.[124] To date, Ecuador has only one vessel registered in the Commission Record: *Maria Del Carmen IV*, a 2,500-ton oil products tanker registered as a "Mothership" in the Commission Record. A second vessel, a fishing liner, is registered as "not active" in the record. Though perhaps applicable to only one Ecuadorian flagged vessel at the moment, the resolution establishes clear requirements for the sharing of Commission VMS data, which is any data generated by "the SPRFMO Vessel Monitoring System that is established under this CMM."

There are a few keys provisions governing the sharing of this VMS data. In summary, the provisions require that Commission VMS data be securely stored and used only by the members and the cooperating nonmember parties (CNCPs). The agreement also sets confidentiality requirements by which use of the data need comply, such as secure communication methods and established boundaries for when written consent is needed for use of another member's data. The Maintenance of Confidentiality section of CMM 02-2020 clarifies and reiterates that confidentiality of data be maintained in the sharing of data for scientific and management purposes.[125] It references some specific "public domain" data, which does not include real-time VMS data. The only reference to VMS is for the purpose of "position verification through vessel monitoring system" for scientific data.

As a cooperating nonmember to the WCPFC, Ecuador is required to comply with rules and regulations adopted by the commission that apply to both members and cooperating nonmembers. Part V of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean deals with duties of the flag state. The relevant provision states that all states with vessels fishing in the Convention area require such vessels to use real-time satellite position–fixing transmitters.

Similar to the conventions adopted by SPRFMO, the WCPFC provisions require flag states to share VMS data with the commission. Provisions also "protect the confidentiality of information

123 South Pacific Regional Fisheries Management Organization, *Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean* (2015).

124 South Pacific Regional Fisheries Management Organization, CMM 06-2020, "Conservation and Management for the Establishment of the Vessel Monitoring System in the SPRFMO Area" (June 2020).

125 South Pacific Regional Fisheries Management Organization, CMM 02-2020, "Conservation and Management Measure on Standards for the Collection, Reporting, Verification and Exchange of Data" (February 2020).

received through the vessel monitoring system."[126] All members and cooperating nonmembers with vessels registered to fish in the commission area are required to operate active VMS and report VMS data to the commission while operating in the commission area; Ecuador has seven vessels registered via the WCPFC Vessel List.[127]

3. Coda

While Ecuador's most recent fisheries law is a promising step toward more sustainable management of local and high seas fisheries, the country still has much to do in its efforts to help combat IUU fishing. Namely, increasing transparency in the fishing industry, especially in regard to fisheries data, will support more sustainable use of marine resources. This might be most achievable via requirements regarding the sharing of VMS data at the regional level, among RFMOs, since countries are obligated to comply for membership, and they value the benefits of maintaining those regional partnerships.

There are some obstacles to Ecuador's public sharing of vessel monitoring data on a platform like GFW. First, the lack of clear authority over many aspects of fisheries monitoring and control results in a confusing bureaucracy of data management and ownership. To negotiate agreements between the Ecuadorian government and GFW, it is necessary to understand the relationship between VMS data, the Ecuadorian maritime authority, and the Ecuadorian fisheries authority. Additionally, political will seems to have a big influence on government decision making, but high degrees of skepticism about data sharing have been cited at both the national and regional levels within high-profile fishing companies. Finally, although Ecuador's VMS data is considered to be public information under the law, it is explicitly classified as confidential and reserved information, which prohibits its sharing until declassification by either the National Security Council or the National Congress. At this point, there are still strict regulations around VMS data sharing even within the national government, which makes public sharing on a platform like GFW's seem like a distant goal.

E. Insights and Conclusions

1. Generating Political Will

It's clear that amassing political will, as amorphous a concept as that is, matters significantly for achieving VMS data sharing. In all three case study countries, support from industry and political leaders controlled whether data sharing occurred.

In Chile and Peru, reversing industrial opposition to data transparency was the tipping point for new laws. After initial opposition, industry players in Chile have now been advocates for VMS data transparency for many years, and industrial fishers have even taken it upon themselves to share data themselves via their platform. In Peru, political support from both industry and government

126 Western and Central Pacific Fisheries Commission, *Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean* (September 2000).

127 Western and Central Pacific Fisheries Commission, accessed May 27, 2020, "Vessel Monitoring System: Background," https://www.wcpfc.int/vessel-monitoring-system.

leaders was critical to combating IUU fishing and overfishing. This was supported by frequent cross-employment between the private and public sectors. Savvy Peruvian political leaders even decided to obtain consent from industry leaders to share VMS data publicly, as a courtesy, to preserve good relations with the industry. Political will is a difficult asset to obtain and an easy asset to lose—cooperation between powerful stakeholders and the Peruvian government will likely be necessary to combat illegal fishing and associated problems to realize the 1992 General Fishing Law's refrain of preserving Peru's oceans for future generations.

In Ecuador, on the other hand, there does not seem to be industrial or governmental appetite for broader-scale VMS data transparency just yet; the fishing industry still has a vice grip on Ecuadorian fishing policy. One of our interviewees suggested that the Ecuadorian fisheries sector and adjacent companies seem to have a greater sway in government decision making than that of Peru or Chile. But the headwinds may be changing. The EU yellow card issued against Ecuador has hit the country's pocketbook and may inspire reform. Nevertheless, considering recent data breaches in Ecuador, data privacy is both an extremely visible and potentially controversial issue at the moment.

Combating IUU fishing will require that international NGOs and governments work cooperatively to push forward legislation that supports global fisheries policy while understanding the political realities on the ground in each country. In some cases, as in Peru or Chile, there was a political tipping point among industry leaders where the stance shifted in favor of transparency. In other cases, as in Ecuador, more work may have to go into convincing industry and government leaders that data transparency is the right step.

2. Legal Form and Barriers

Even if a country generated the political will for VMS data transparency, existing legal frameworks may pose barriers to immediate data sharing with a group like GFW.

In Chile, legislation was enacted to undo the confidential nature of VMS data, and this facilitated a rather straightforward agreement to share data with GFW and the public. However, this piece of legislation was specifically necessary, as the previous version of the law explicitly prohibited the sharing of VMS data outside of the country. Depending on their data laws, other countries may also maintain on the public-facing platform the confidential nature of data such as vessel identification.

Also crucial in Peru's effort to share VMS data publicly was resolving questions related to data rights. Ships produce data through onboard VMS equipment, but the fact that ships produce the data does not necessarily mean the ships have rights to the data. Peru's data rights framework here is somewhat confusing. Certain regulations in Peru vest in a ship owner the right to

> "You need to create the incentive from the industry's perspective. You need to show them the benefits of global sharing. We must find the common denominator that unites the industry."
>
> Pablo Guerrero, WWF

access that ship's data after it is transmitted and stored with the Ministry of Production. Peru's regulations also identify VMS data as "reserved and confidential," but the same regulations grant the government distribution authority over the data. Peru's Constitutional Court cleared the confusion in 2009, concluding that the Peruvian government could constitutionally disseminate the aggregated VMS dataset from Peruvian ships. As a consequence, VMS data could be used by the government without obtaining consent from individual vessel owners (although, as described above, the Peruvian government nevertheless cooperated with industry leaders in order to maintain a good working relationship).

Another issue area that is ripe for dispute is data privacy and data ownership. Such conflicts will need to be resolved before dissemination of VMS data is possible. In both Chile and Peru, VMS data are or were termed reserved and confidential. That seems to imply that individual vessel owners own the data. But changes in law had to occur before an arrangement like an MOU with GFW could occur. In Chile, legislation made the country's VMS data public. In Peru, a regulation gave the fisheries agency discretion to share data in its possession, and a 2009 Constitutional Court case ruled that such sharing did not violate companies' or individuals' privacy rights.

In Ecuador, the Navy and governing body of national defense appear to have ultimate discretion over what happens to the VMS data in their possession. Ecuador's new fisheries law is still in its nascence, but the law also contains a provision making VMS data reserved. Beyond this, the regulatory framework governing data sharing in Ecuador gets more complex. There exist multiple references to VMS data in active legislation, as well as regulations and agreements regarding satellite monitoring of vessels under RFMOs to which Ecuador is a member. Our understanding of the legal barriers to sharing comes from a collection of different legal sources, perhaps the most important of which includes Resolution No. 36, issued by the Minister of National Defense, and the Organic Transparency Law. The major difference between the case studies of Chile, Peru, and Ecuador is the presence of legislative language that classifies VMS data as confidential in Ecuador even though it is legally considered public, rather than private, information. The confidential classification makes sharing of VMS data extremely hard. Because of this, a law or lawsuit explicitly declassifying VMS data, which is already in the public domain, might be necessary before moving forward with any international data-sharing agreements.

For Ecuador to move forward into the arena of sustainable fisheries and become a leader on data transparency in the region, the government must clarify specifically the legal frameworks around VMS data sharing. There is potential via the new Organic Law for the Development of Aquaculture and Fisheries for more substantial data management regulations, specifically on the subject of between-country sharing of data, providing an opportunity for local and international organizations to focus on pushing for sustainable fisheries policy change.

3. Scope of Data Sharing

Finally, countries must decide how much data to share. The countries currently making VMS data available on the GFW platform each share data differently, some with delays in publication and some with varying obfuscation in identifying information.

For example, Peru has the longest delay out of the countries on the GFW platform: a 10-day delay between government receipt and public data sharing. Vessel-identifying information is also

redacted. On the other hand, Chile is unique in the completely public and unredacted nature of its VMS data. Unredacted information on the platform (vessel identification, gear type, and so on) may prove to be a stronger deterrent to IUU activity than a censored or anonymized dataset. The only references to permitted data sharing of VMS information in Ecuadorian law suggest that the data owners have full authority over how much and in what capacity data is shared. For data to be shared with an agency, an organization, or a country outside of the original owner, specific MOUs must be signed clarifying the intention behind the use of the data and for how long it will be shared. If Ecuador were to ever share VMS data more publicly, it seems that very particular MOUs would be required for each sharing agreement or that new regulations would need to be passed that streamlined the process for data sharing, as well as explicit declassification of the information by the National Security Council.

While each of these three case study countries are in a different stage of public VMS data sharing, they all provide valuable insights into the process by which policy and legislation can promote transparency in the fishing industry. It is important to remember, however, that a country's specific sociopolitical and economic context will determine the speed at which legislation supporting public data is passed, the type of data-sharing agreements that result, and the accuracy and usability of the publicized data.

III. EXPEDITED ENTRY PORT SYSTEM: A Proposal for the Implementation of a Voluntary Compliance-Based Structure to Reduce Global IUU Fishing

Laura Anderson, Sadie Cwikiel, Josheena Naggea

Abstract

Illegal, unreported, and unregulated (IUU) fishing accounts for nearly 20% of the world catch and has widespread and well-recognized negative effects on the environment, economies, and human rights. Enforcement efforts to penalize vessels engaged in IUU fishing can be costly, given the vastness of the ocean. Developing innovative solutions that look beyond the traditional enforcement model may provide new pathways to combat IUU fishing. A compliance-based system could shift the burden of demonstrating compliance to vessels such that port authorities would have more capacity for inspecting noncompliant vessels. This research evaluates the requirements to operationalize an Expedited Entry Port System (EEPS) for fishing vessels at ports. The research examines the possibilities and constraints of a proposed EEPS by delving into current Port State control measures in two island states, the Republic of the Marshall Islands and the Republic of Mauritius. To develop the proposed system, the researchers used analogous systems and interviews for reference. From this work, a series of recommendations emerged, including the need for a more integrated approach at port level to incorporate different Regional Fisheries Management Organizations (RFMOs) and fishery types, regional support for more effective implementation of EEPS, and expanded electronic reporting systems (ERS) to facilitate efficient communication among port authorities, government agencies, and RFMOs, all while recognizing that physical inspections cannot be fully exempt for a system to work effectively.

Contents

A. Introduction

1. IUU Fishing

IUU fishing is an issue prevalent around the globe. Accounting for nearly 20% of the world's catch,[1] IUU fishing has widespread and well-recognized negative effects on the environment, economies, and human rights.

Millions of people around the world depend on fisheries for food and livelihood. An estimated 17% of the world's population relies on fish as their main source of animal protein,[2] but those fish stocks are at risk of depletion. The losses due to IUU fishing worldwide represent 11–26 million tonnes of fish every year.[3] There are also significant economic costs to IUU fishing, with a yearly estimate of more than $US15 billion in economic losses to nations and communities.[4] Vessels engaging in IUU fishing have large economic incentives and participate in a low-risk, high-gain activity, while legal fishers experience negative economic impacts and reduced fish stocks. With increasingly thin economic margins for legal fishing and decreasing fish populations, IUU fishing may become increasingly more appealing and further negatively impact legal fishers.[5] Climate change may also decrease fish stocks and increase pressure on fishing communities and the fishing industry.[6] Depleted fish stocks and fishing practices like bottom trawling, cyanide fishing, dynamite fishing, purse seine fishing, using fish aggregating devices (FADs), and longlining can have a damaging impact on marine ecosystems, the fishing industry, and nations around the world.

2. Policy Context

Given the vastness of the ocean, there has been an increased focus on port control efforts and policies as a more cost-effective way to tackle IUU fishing. Implementing Port State measures (PSM) to increase the security of fishing ports and reduce the landing of illegal fish has the potential to significantly reduce the amount of IUU fishing that occurs globally.

Due to the complexity and the scale of IUU fishing, a comprehensive global system consisting of enforcement and voluntary compliance is essential. So far even though numerous efforts to deter IUU fishing are international and regional (through RFMOs), national governments must initiate much of the action. This includes regulating their respective coastal fisheries, enacting

1 David J. Agnew et al., "Estimating the Worldwide Extent of Illegal Fishing," *PLoS ONE* 4, no. 2 (2009), https://doi.org/10.1371/journal.pone.0004570.

2 Food and Agriculture Organization of the United Nations, *The State of World Fisheries and Aquaculture 2016: Contributing to Food Security and Nutrition for All* (Rome: United Nations, 2016), http://www.fao.org/3/a-i5555e.pdf.

3 Supra, note 1.

4 Xuechan Ma, "An Economic and Legal Analysis of Trade Measures against Illegal, Unreported and Unregulated Fishing," *Marine Policy* 117 (July 2020), 103980, https://doi.org/10.1016/j.marpol.2020.103980.

5 Sjarief Widjaja et al., *Illegal, Unreported and Unregulated Fishing and Associated Drivers* (Washington, DC: World Resources Institute, 2019), https://www.oceanpanel.org/blue-papers/illegal-unreported-and-unregulated-fishing-and-associated-drivers.

6 Julie M. Roessig et al., "Effects of Global Climate Change on Marine and Estuarine Fishes and Fisheries." *Reviews in Fish Biology and Fisheries* 14, no. 2 (2004): 251–75, https://doi.org/10.1007/s11160-004-6749-0.

regulations at ports of entry, ratifying international agreements, and making use of new tracking and transparency technologies.[7]

One key regulation that has made strides toward the ambitious international goal of combating IUU by implementing controls at national ports is the Port State Measures Agreement (PSMA).[8] The PSMA builds on multiple legal frameworks (for example, the 1982 United Nations Convention on the Law of the Sea [UNCLOS] and the 2005 Rome Declaration on Illegal, Unreported and Unregulated Fishing) and sets minimum standards and processes that ports need to apply when foreign vessels seek entry. It also denies access to suspicious vessels that are linked to malpractices. Our proposal seeks to support the PSMA by rewarding "good vessels" and expediting their entry into ports.

3. Objectives

While the PSMA, which engages port states and RFMOs, aims to penalize blacklisted and suspicious vessels engaged in IUU, the agreement lacks incentives to reward highly compliant vessels. These vessels will be incentivized by market preference for strong PSM in the long term[9] and can be negatively impacted by IUU fishing actions by other vessels. Developing incentives for these "good actors" could encourage greater transparency and recognize and reward these compliant vessels. The more time a vessel spends at port for checks, the fewer profits it makes. For instance, the average time an Australian tooth fishing vessel that meets all requirements spends at a port is seven days. An appealing incentive for fishing vessels would be to spend at least 20% less time at ports.[10]

A voluntary compliance-based system could also shift the burden of demonstrating compliance to vessels such that port authorities have more capacity for inspecting noncompliant vessels. Along with the positive implications of such a system, it will be important to consider any potential disincentives for port states. The less time fishing vessels spend at ports, the less revenue is generated for port states.[11] Understanding and mitigating that revenue loss through other incentive structures is important for a successful system.

The objective of this policy memo is to explore and lay out a proposal to operationalize an EEPS for port state implementation. The system we recommend takes into account insights from fisheries policy and legal, industry, and agency experts around the world, as well as in-depth case study research in the Pacific Islands and the Indian Ocean. We aim to answer the following research questions: What are the possibilities and constraints to developing a voluntary compliance-based system for expedited entry of fishing vessels for port inspections? How might port states operationalize an expedited entry system?

7 Supra, note 5.

8 Food and Agriculture Organization of the United Nations, "Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing," opened for signature November 22, 2009, 129 Stat. 664 (entered into force June 5, 2016), http://www.fao.org/iuu-fishing/international-framework/psma/en/.

9 Dawn Borg Costanzi, personal communication, May 15, 2020.

10 Rhys Arangio, personal communication, May 12, 2020.

11 Jeromine Fanjanirina, personal communication, May 18, 2020.

B. Methodology

We conducted 18 semi-structured interviews using a snowball sampling approach with experts from the IUU policy and regulatory level, port states, industry actors, and fishing vessel operators. We iteratively analyzed and distilled more than 90 transcript pages from the interviews using an inductive approach.

To propose a system to operationalize the EEPS, we used the 2018 NOAA Fisheries Commerce Trusted Trader Program (CTTP),[12] the Environmental Justice Foundation report on improving transparency in global fisheries,[13]and the PSMA[14] as reference points. We also incorporated insights from other technical reports and from interviews.

Our research team used a comparative case study approach to understand possibilities and constraints and capture the nuances of port state operationalization. We focused on the Pacific region and the Indian Ocean region. In the Pacific, the Republic of the Marshall Islands (RMI) has pioneered a system of assessing vessel risk before its entry at the port of Majuro, without having yet ratified the PSMA. In the Indian Ocean, we focused on the Republic of Mauritius, a small island nation with one of the busiest ports in the region, which has ratified the PSMA.

Figure 1. Case Study Locations

Both RMI and Mauritius are large, important ports regionally with high numbers of transshipments, and high numbers of visits from foreign fishing vessels with large hold sizes. They are both members of several regional fisheries bodies, and both have some form of ERS. The main difference in terms of fisheries policy between the two nations is that RMI has not ratified the PSMA while Mauritius has (see Table 1).

12 U.S. Department of Commerce, National Oceanic and Atmospheric Administration, "Proposed Rule: Commerce Trusted Trader Program," 2018, https://www.regulations.gov/document?D=NOAA-NMFS-2016-0165-0001.

13 Environmental Justice Foundation, *Out of the Shadows: Improving Transparency in Global Fisheries to Stop Illegal, Unreported and Unregulated Fishing* (October 23, 2018).

14 Supra, note 8.

Table 1. Comparisons between the Fisheries Systems in RMI and Mauritius

	Republic of the Marshall Islands	Republic of Mauritius
Foreign Vessel Visits	1168	957
Foreign Fishing Vessel Hold Size	943,000 m^3	319,985 m^3
Regional Fishery Bodies	Pacific Islands Forum Fisheries Agency (FFA); The Pacific Community; Western and Central Pacific Fisheries Commission (WCPFC); Parties of the Nauru Agreement (PNA)	Indian Ocean Tuna Commission (IOTC); Southern Indian Ocean Fisheries Agreement (SIOFA); Southwest Indian Ocean Fisheries Commission (SWIOFC); Commission for the Conservation of Antarctic Marine Living resources (CCAMLR)
PSMA Ratification	No	Yes
Electronic Reporting System	Yes	Yes

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C. Findings

1. Related Models

We explored related port entry and risk assessment models around the world to develop an understanding of port-entry procedures and create a more informed EEPS proposal. These related models (see Table 2) were highlighted by our interviews with experts and recommendations for further exploration.

These models and insights from our interviews generated an overview of essential elements of an EEPS. First, as previously stated, fishing operators must demonstrate complete transparency to be granted expedited entry into a port. Second, port authorities must be able to efficiently and effectively process the information they need to verify vessel compliance, such as in the electronic Food and Agriculture Organization of the United Nations (FAO) Catch Documentation Scheme (CDS) guidelines.[15] Third, system stakeholders must feel incentivized to participate in the EEPS, balancing the benefits with any potential costs. And finally, the key incentive lies in that the entry system is more efficient for all key actors involved.

15 Supra, note 16.

Table 2. Related Models for an EEPS

Model	Background	Indicators	Insights
Port State Risk Scores	Based on a peer-reviewed study[16] supported by the Pew Charitable Trusts and mentioned by multiple respondents Attempts to show which states are most at risk of having illegally caught fish passing through their ports	AIS-derived and public domain data PSMA ratification status or other strong PSM RFMO compliance reports Flag of convenience states	Using a broad suite of indicators could create a more robust risk assessment system
FAO Catch ocumentation Scheme (CDS)[17]	The CDS is a market-related supply-chain management measure The FAO guidelines assist actors (e.g., states, RFMOs) looking to develop or improve CDS systems	Risk scores based on catch certificates Electronic information systems (e.g., sharing vessel identity information or tracking)	Electronic-based systems can help expedite processes An overarching framework assisting regional design is an example to consider for implementation
2018 U.S. National Marine Fisheries Service CTTP[18]	Importers can volunteer to adhere to certain requirements and become Commerce Trusted Traders (CTTs)	Establish a secure supply chain (free of IUU fish or fish product and falsely labeled seafood product) over at least a five-year history Submit to yearly third-party audits	Comparable proposed system/idea in a major state Incentives of streamlined entry and flexibility on certain documentation-heavy recordkeeping requirements
2017 Global Dialogue on Seafood Traceability[19]	Seafood industry forum working to "advance a unified framework for interoperable seafood traceability practices" Dialogue guidelines released in March 2020	"Key Data Elements" Data verification Data sharing and regulatory alignment	Established vessel data standards relevant to our EEPS proposal

16 Gilles Hosch et al., "Any Port in a Storm: Vessel Activity and the Risk of IUU-Caught Fish Passing through the World's Most Important Fishing Ports," *Journal of Ocean and Coastal Economics* 6, no. 1 (March 2019), https://doi.org/10.15351/2373-8456.1097.

17 Food and Agriculture Organization of the United Nations, *Voluntary Guidelines for Catch Documentation Schemes* (Rome: United Nations, 2017), http://www.fao.org/3/a-i8076e.pdf.

18 Supra note 12

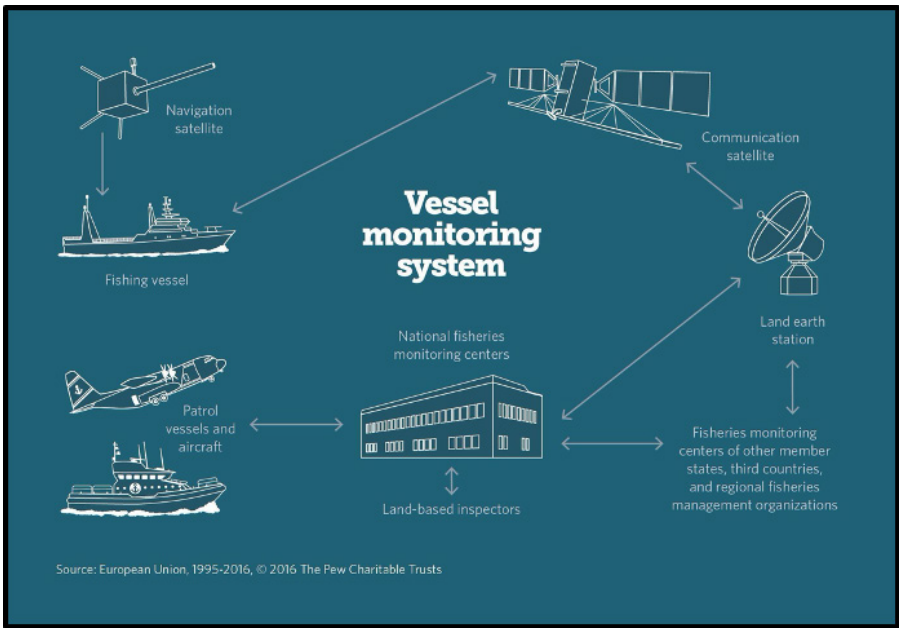
19 Global Dialogue on Seafood Traceability, *Standards and Guidelines for Interoperable Seafood Traceability Systems – Technical Implementation Guidance* (Version 1.0) (February 2020), https://traceability-dialogue.org/wp-content/uploads/2020/03/2020.03.11_GDST1.0Technica-lImplementationGuidancefinalMAR13.pdf.

2. Monitoring and Data Considerations

Global Fishing Watch (GFW) and other platforms have tracked global fishing operations from more than 60,000 vessels using open-source automatic identification system (AIS) data. Each year, an estimated 10–30% more vessels broadcast AIS data.[20] These tracking data have been used to digitize numerous systems in the shipping industry and share real-time positioning patterns used to combat illegal fishing.[21] Yet, there is no global mandate for vessels to have AIS transponders and to share AIS data. AIS transponders can also be turned off or tampered with, including manipulating vessel identity.[22]

A different tracking system that can be effective for combating IUU fishing uses Vessel Monitoring System (VMS) data. This satellite-based proprietary system is used by management authorities to monitor vessel activity and is highly reliable. However, not all countries operate a VMS system, and there are varying levels of data sharing related to VMS.[23] Certain policy measures like the PSMA and cooperation among members of RFMOs create pathways for VMS data sharing, including data sharing between member states and/or through arrangements with a secretariat. Still, the flag state in question may restrict access to VMS data because there are specific agreements between flag states and fishing vessels with regard to VMS data sharing. Agreements between flag states and port states are critical in these negotiations.

Figure 2. Vessel Monitoring System Overview [24]



20 Marc Taconet, David Kroodsma, and Jose A. Fernandes, *Global Atlas of AIS-Based Fishing Activity – Challenges and Opportunities* (Rome: FAO, 2019).

21 Dong Yang et al., "How Big Data Enriches Maritime Research – A Critical Review of Automatic Identification System (AIS) Data Applications," *Transport Reviews* 39, no. 6 (2019): 755-73, DOI: 10.1080/01441647.2019.1649315.

22 Supra, note 5.

23 Ibid.

24 The Pew Charitable Trusts, "Tracking Fishing Vessels Around the Globe," 2016, https://www.pewtrusts.org/-/media/assets/2016/05/tracking-fishing-vessels.pdf.

Interviews with key actors yielded multiple perspectives related to monitoring systems and data requirements. For several experts, accessing vessel VMS data was a central component of tracking and verification efforts. International, regional, and bilateral agreements and collaborations were highlighted as pathways for VMS data sharing. Agreements like the PSMA and the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) set standards for participating states regarding VMS capacity and transparency. Regional bodies like the Pacific Islands Forum Fisheries Agency (FFA) and the Indian Ocean Tuna Commission (IOTC) provide guidance in their respective regional waters to support PSM policies and implementation among member states. Agreements for data sharing between flag states and port states are critical in this context because many vessels are highly protective of VMS positions due to protecting intellectual property, preserving competitive fishing locations, and minimizing risk of IUU fishing.[25]

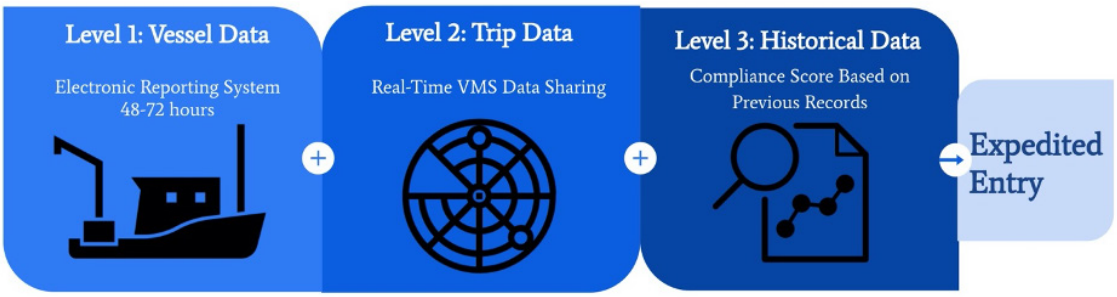
3. EEPS

The EEPS will require vessels to provide the necessary data and information to demonstrate compliance with fishing laws and regulations. It will be consistent with the PSMA and is meant to provide an added incentive for vessel compliance as well as a way to make ports more efficient and effective. If a vessel can demonstrate its compliance, with the support of its flag state it will be given expedited entry into port to land its catch. One estimate was that a fishing vessel loses around $US10,000 each day it is in port instead of fishing.[26] Given the potential cost of delays, expedited entry to land fish will be a significant incentive for vessel compliance.

A Proposed Model for an Expedited Entry Port System:

Forty-eight to seventy-two hours (depending on location and existing national requirements) before a fishing vessel[27] intends to enter a port, the vessel must provide the following information to the port authority in addition to the port's other entrance application requirements.

Figure 3. EEPS Level System Overview



25 Supra, note 10.

26 Francisco Blaha, personal communication, April 28, 2020.

27 Based on personal interviewee feedback, the EEPS could apply to fishing, carrier, supply, and support vessels.

If a vessel can provide or receive validation of all three levels of data and there is no evidence of noncompliance, the vessel will receive expedited entry. Table 3 specifies the data required by each level to prove compliance.

By shifting the burden of proof onto fishing vessels during port inspections, EEPS aims to reward proactively transparent and compliant vessels that meet three levels of information checks.

Table 3. Data Required to Receive Expedited Entry

Level One: Vessel Data	Level Two: Trip Data	Level Three: Historical Data
• Name of vessel • International Maritime Organization (IMO) number • Type of vessel • Flag of vessel • Size and tonnage of vessel • Registration number and date • Name and address of license holder • License or permit number and dates • Contact details • Registration number of any aircraft associated with the vessel; name and address of operator of the aircraft • Vessel catch log since last port of entry • Coastal or flag state method and species authorizations to fish • Reports of contact with other vessels • Full reports on transshipping, including the time, port, and areas that were authorized for transshipment • Report, clear marking, and identification of any FADs used by the vessel	• VMS data since last port of entry or VMS compliance verification from the flag state	• Historical VMS (or, if unavailable, AIS) track analysis where previous inspection outcomes could be stored to inform port authorities • Previous IUU violations • FAO Global Record status or good standing on a relevant regional or industry vessel register • Membership in industry compliance organizations • Observer reports • Flag state risk

Level One: Vessel Data includes data already required by ports around the world. The list above is adapted from the FFA Minimum Terms and Conditions (MTCs).[28] In cases where not all of these pieces of information are required by a port, the vessel must include the additional information to be eligible for expedited entry.

Level Two: Trip Data is the location data of the vessel since the last port of entry. This must be in the form of VMS data because this cannot be tampered with, unlike AIS data. Real-time VMS data sharing is ideal for proving compliance, but this data does not necessarily need to be public for this proposed system to work. Analysis of this location data in comparison to the vessel catch log, transshipping reports, and so on will ultimately determine the compliance of a vessel. This analysis would show if the vessel was fishing, stationary, motoring, or transshipping where they reported they were. Any inconsistencies between the logs or reports and the location data could indicate noncompliance and would be reason to investigate the vessel more thoroughly and not immediately give the vessel expedited entry. Currently, there is not enough capacity in most ports to be able to analyze all of the real-time location data, so a major priority moving forward with EEPS is to improve the analysis technology and ability of VMS data.

A port state does not necessarily have access to a vessel's VMS data, and the vessel might not even have access to its own VMS data; instead, it may be automatically shared with its flag state. Data sharing often involves agreements between the port state and the flag state. In many ports currently, a vessel's VMS location data is verified through a port access letter (PAL) from the flag state to the port state rather than the vessel sharing VMS data directly with the port state. Using flag state verification in the form of a PAL would not be as ideal as directly sharing VMS data to be analyzed by the port state, but it could also be a legitimate way a vessel could prove compliance. PAL systems are already in place in many ports, so for EEPS to be most realistically integrated into ports, the tradeoffs involved and the credibility of the PAL and the flag state issuing the PAL would need to be explored.

It is important to note that certain legal barriers for vessels from specific flag states or those from states that do not require their vessels to have VMS/AIS on board will be at a disadvantage from this system. Without support from the flag state, the vessel itself may not have the resources or the ability to meet the requirements of the EEPS.

Level Three: Historical Data aggregates historical data about a vessel's compliance, as well as the role of its flag state in reducing IUU fishing, into one holistic historical compliance score (HCS). The HCS will be a scale from 1.0 (completely noncompliant) to 5.0 (completely compliant). The HCS will take into account numerous historical data and information, averaging each category into a total score that informs the port state of that vessel's historical compliance and subsequent IUU fishing risk. The HCS will take into account data up to five years in the past. More recent data will be given more weight when calculating the weighted average compliance score. An HCS database will be available to ports online, providing accessible real-time information about the likelihood of compliance and risk of IUU fishing activity.

28 Pacific Islands Forum Fisheries Agency, *The Harmonized Minimum Terms and Conditions for Access by Fishing Vessels* (July 4, 2016), https://www.ffa.int/system/files/FINAL%20MTCs%20as%20revised%20by%20FFC99_4July2016.pdf.

While there is no current algorithm or streamlined way to analyze historical location data, this score would attempt to merge past offenses that would hopefully be analyzable in the future with current activity and compliance. The HCS database could be developed and maintained by a collection of RFMOs or other governmental agencies in collaboration with the FAO, or by a third-party organization such as GFW. Such operationalization would need to be explored in future research efforts. Additionally, observer reports, if available, would be included in the HCS. The rigor of the flag state's IUU regulations would be taken into account when analyzing whether a vessel is awarded expedited entry. A flag state would be scored based on their national IUU regulations, enforcement, levels of corruption, and rigor and legitimacy of inspections.

In this proposed EEPS, if a vessel can provide all of the necessary Level One, Level Two, and Level Three data and shows no evidence of IUU activity, the vessel is eligible for expedited entry into the port to unload its catch. If the vessel fails to do so, the port state may request more information from the flag state and/or the vessel, and the vessel may be inspected by a port authority. The port may also choose to automatically deny entry to the vessel if they do not provide the necessary data or have an HCS of 1 or 2.

4. Key Actor Perspectives

Interviews with key actors produced a range of feedback and insights. While overarchingly actors were interested in initiatives that could increase transparency, expedite systems, and reduce IUU fishing, there was a range of concerns that would need to be addressed or negotiated for effective implementation.

Table 4. Key Actor Interview Perspectives

Actor	Insights
Vessel Operators *Expedited entry could be an effective incentive, but there were concerns about public VMS data sharing.*	Current State: • Boats try to get in and out of port in 5–7 days • Relationships with port authorities are central to efficiency at port • Use a port access letter from their flag state for transparency requirements Potential Implementation: • Expedited entry (EE) enough of an incentive because any potential holdups at port are very costly • Interested in industry incentives Concerns: • Concerned about public VMS data sharing as part of EEPS and would prefer arrangements between port and flag states or nonpublic sharing • Any increased data-sharing requirements would need to include data confidentiality agreements
Monitoring, Control and Surveillance (MCS) Professionals *Port states determine what is required for compliance, and agreements with flag states are the predominant method of VMS data sharing.*	Current State: • Data-sharing agreements between port and flag states are the most common method of VMS data sharing • In some cases, vessels can provide own VMS track to port state • Port states ultimately determine whether AIS or VMS data is a sufficient demonstration of compliance Potential Implementation: • EE could occur by making it incumbent upon the vessel itself to provide tracking data and last track since port of call • An AIS track combined with multiple other lines of documentation for verification could be sufficient based on the capacity for data analysis and automated systems Concerns: • Historical vessel tracks are not typically accessible without a port–flag state agreement • AIS tracking is not recognized as an MCS system by many states

Actor	Insights
Industry Buyers *An industry focus on traceability is different depending on species type. Interest in improving speed and transparency but concerns about credibility of flag and port states.*	Current State: • Reputational risk drives a focus on traceability along the supply chain • Increased attention on sourcing has sparked several industry alliances (such as the International Seafood Sustainability Foundation [ISSF] and the Global Tuna Alliance) Potential Implementation: • EE would need a significant improvement on the speed of delivering catch and reduced administrative red tape • Different fish species involve different levels of industry action and coordination • Tuna industry has stronger coalitions and alliances • Non-tuna supply chains may need to rely more heavily on risk-based assessments • EEPS may need to be tailored to both regional and species contexts to be most effective, though that would reduce scalability and uptake • Buyers can drive further incentive structures for vessels and port states, but the incentives of transparency, economic gain, and efficiency must trigger one another Concerns: • Some companies may be worried about increased exposure based on reduced inspections • System dependent on the credibility of the flag and port state

Actor	Insights
Policy *Implementation most feasible at port-state level with regional leadership to avoid competition and varying standards. Industry pressure is important for maintaining incentive structures.*	Current State: • Not all ports are implementing the control measures of the PSMA • FAO Global Record of vessels (a 10-year project still in progress) will provide a one-stop shop for official and unofficial (but credible) information about vessels • The tuna industry (and tuna RFMOs) tend to be more influential for creating and maintaining incentives Potential Implementation: • EEPS should complement the PSMA • Should happen at port-state level with regional leadership to avoid competition with neighboring ports • Should be some global or regional guidelines like the FAO voluntary CDS so that each country does not have a different version of EEPS • Need to maintain industry pressure so that the entire supply chain is incentivized to be compliant • Denying entry to noncompliant vessels can benefit port states in the long run because industry actors do not want to purchase fish from suspicious ports • Compliant vessels will favor strong ports, which can create greater market access in the long term Concerns: • Creating an HCS based solely on RFMO vessel lists would not be feasible because those lists are not always updated • One challenge to EEPS is engaging non-tuna vessels, which tend to have lower levels of transparency and traceability

Actor	Insights
Regional Partnership (FFA/IOC) *Need to standardize protocols on a regional level. Physical inspections cannot be entirely exempt.*	Current State: • FFA is working on regional PSM and risk assessments • Nature of IUU fishing has changed from unregulated to unreported and illegal fishing Potential Implementation: • Port states make money from vessels entering port and would rather attract vessels with EE than deny entry • Need to standardize protocols at a regional level to increase reporting compliance • Standardized protocols decrease competition between port states • EEPS needs to build on existing national legislation and regional frameworks to expedite the implementation process Concerns: • Physical inspections cannot be exempt, because multiple verifications based on national port requirements need to happen to look into other malpractices, such as forced labor and drug trafficking • Identifying other areas of delay in the inspection process could target major delays, allow for these necessary checks, and still provide the incentive of faster port entry and exit

Actor	Insights
Port State *ERS are effective and could expedite the system.* *EEPS needs to factor in third-party agents and brokers. Physical inspections cannot be exempt in EEPS, and the system should target other delays.*	Current State: • ERS are highly effective in ensuring transparency and fast communication between RFMO and port state inspectors Potential Implementation: • The PSMA requires interagency collaboration, which could be a strong factor facilitating the implementation of EEPS • Different fisheries have different ERS (for example, multiple government approvals are needed for species like toothfish) and could be combined to create more efficiency • Advantage of placing vessels on a good standing list. The flag state has a responsibility to communicate that good standing to the regional body (RFMO or otherwise) • Fisheries specific checks include physical logbook examinations and VMS tracking, which could be done using an ERS Concerns: • Third-party agents and brokers are critical to the system • Fishing agents submit all paperwork on behalf of fishing vessels, often before vessels enter port • In the case of malpractice, both the vessel owner and the fishing agent are liable for penalties • Independent brokers provide services for refueling and the purchase of food and medical supplies while the vessel is in port • Physical inspections cannot be entirely exempt in the EEPS

5. Comparative Regional Case Studies

Even though the PSMA is a global treaty, implementation happens at the national level, supported by regional bodies such as RFMOs and NGOs providing support for collaboration, data sharing, and capacity building. Port system culture, governance structure, and bilateral agreements with flag states highly influence how agreements like the PSMA are implemented. We anticipate some overlapping hurdles and considerations with the EEPS, which we are conceptualizing to complement the PSMA and build on national legislation. Social norms around efficiency and transparency differ from port to port, which needs to be considered when operationalizing this system.

The small island states in the Pacific Ocean and Indian Ocean regions rely heavily on the oceans, and today fishing is one of their primary sources of economic well-being and food security. Distant water fishing nations pay small island states for access to fish in their extensive exclusive economic zone (EEZ).[29] We investigated two case studies in RMI and Mauritius to understand how an EEPS can build on existing systems of controls and enforcement at port level.

The Republic of the Marshall Islands in the Pacific Ocean Region

RMI has implemented strong PSM even though they have not ratified the PSMA. Majuro is one of the most important ports in the Pacific region for transshipment and tuna fishery in general. They have more than 400 transshipments each year, and the port has the second-highest number of foreign vessel visits in the Pacific (1,168 annual visits) and the highest total volume of foreign fishing vessel hold size.[30]

RMI is a leading nation in the FFA, an agency founded in 1979 by 16 island nations in the Pacific Ocean. The FFA acts as a forum for harmonizing and coordinating fisheries policies of its member states, and they negotiate arrangements with distant water fishing nations. FFA member countries have a small fleet of surveillance vessels. The FFA coordinates surveillance missions among the countries, navies, and air forces of France, the United States, Australia, and New Zealand. However, this sort of enforcement is expensive, and the FFA has been a large supporter/implementer of PSM.[31] The FFA has been a regional and global leader in combating IUU fishing. Although the majority of their member states have not ratified the PSMA, they provide strong support and resources to help nations tailor and implement a regional PSM framework. One such system is harmonized MTCs for access by fishing vessels. The MTCs require vessels to provide ports with comprehensive information about the vessel's specifications, ownership, and licenses, as well as details about any transshipments that may have occurred since the last port of entry.

Ships must also have a VMS unit on board—either an automatic location communicator (ALC) or a mobile transceiver unit (MTU)—that is FFA-approved if they want to be included on the FFA Vessel Register. The location data from these devices must transmit to the FFA VMS consistently

29 Quentin Hanich and Martin Tsamenyi, "Managing Fisheries and Corruption in the Pacific Islands Region," *Marine Policy* 33, no. 2 (2009): 386–92, https://doi.org/10.1016/j.marpol.2008.08.006.

30 The Pew Charitable Trusts, *Study Measures Countries' Exposure to Illegal Catch, Actions to Keep It from Markets* (July 2019), https://www.pewtrusts.org/-/media/assets/2019/12/psma_brief_round2_v3.pdf.

31 Supra, note 26

and automatically at all times during the period of a license.[32] Data sharing in the FFA is bilateral between the member nation and the FFA. The FFA has access to all regional VMS for vessels within EEZs, and if they are licensed under the regional Parties to the Nauru Agreement (PNA) arrangement, then they have access to vessel records, including location data and catch logs.[33] FFA members can track and monitor fishing activities across the region through the satellite-based system that monitors the position, speed, and direction of registered fishing vessels and is accessible to all FFA member countries.[34] PNA members are required to share vessel-location information, but this only happens on a country-to-country basis and is not uniform throughout the Pacific Islands.

In large part, the FFA has implemented measures that require vessels to provide all of the necessary information to demonstrate compliance with fishing regulations. The EEPS would help provide the incentive to vessels to be able to readily provide detailed information, and it would also provide a more universal way to convey historical compliance in addition to the latest trip data. Vessels and flag states may be more likely to comply and share data with the strong incentive that EEPS creates. Given the strong policies the FFA already has in place, the addition of EEPS would be manageable and would help ensure that some of the world's most vital fisheries are not further depleted.

The FFA Regional Monitoring and Control Strategy includes data sharing and management, various legal frameworks, and the Regional Surveillance Picture, which integrates and analyzes multiple datasets for real-time risk assessment and compliance monitoring.[35] There is a promising emergence of cost-effective electronic monitoring and reporting tools, and the FFA is working to digitize data and help member states move to e-reporting. Additionally, the FFA regional register compliance indices are used to track the compliance history of each entity on the register (for example, vessels, masters, owners).[36] Our proposed HCS could potentially be integrated or combined with this compliance index.

RMI currently has the highest level of implementation, and there is a lesser risk to the industry in terms of breaking the traceability claims here. The nation has a good reputation when it comes to fighting IUU fishing, although it is somewhat unclear how much data is being shared directly with other nations.[37] Although RMI has not ratified the PSMA, they are committed to upholding the standards of the PSMA. They have developed and implemented a similar system based on risk assessment without the administrative accountability required of parties to the PSMA.[38] RMI has started to implement the PSM system in its major port of Majuro.

Another important actor in the Pacific region is the Western and Central Pacific Fisheries Commission (WCPFC). The WCPFC is an RFMO focused on tuna management, and they have

32 F. McEachan, *Evaluation of the Regional FFA MCS Framework* (Australia: FAWT Group PTY LTD of the ACT, 2016).

33 Anonymous FFA personal communication, May 21, 2020.

34 Francisco Blaha, personal communication, May 31, 2020.

35 Supra, note 32.

36 Supra, note 32.

37 Supra, note 34.

38 Bronwen Golder, personal communication, May 4, 2020.

> The key incentive lies in that the entry system is more efficient for all actors involved.

the highest MCS transparency of all RFMOs that overlap with FFA.[39] Around 1,500 vessels are registered with the WCPFC and share VMS data directly with the RFMO. They collaborate with the FFA significantly, and their conservation and management measures are consistent with the FFA MCS. They also have strong MCS arrangements in the high seas.[40] FFA provides VMS services to WCPFC. This means that RMI has access to information about vessels from all 27 WCPFC member countries, 9 participating territories, and 7 cooperating nonmember countries fishing for tuna in the Pacific Ocean. Through a VMS unit, vessels that are members of the WCPFC fishing for tuna must provide information on vessel position, course, and speed 24 hours a day, 365 days a year for compliance, fisheries management, and research.[41]

In RMI and the Pacific Islands, for effective EEPS, increasing and supporting capacity building is important, especially for data analysis and training inspectors. VMS and other data are available through the FFA and WCPFC, but there is not always enough capacity to analyze the vessel track to check for compliance before the vessel comes to port.[42] There is also a lack of a formalized system between agents and port authorities throughout the FFA even though RMI has started to implement e-reporting, so being able to formalize and digitize throughout the region would be helpful to make EE possible.[43]

The Republic of Mauritius in the Indian Ocean Region

The Republic of Mauritius is located in the Indian Ocean, 804 kilometers off the east coast of Madagascar. Mauritius has an EEZ extending to more than 2.3 million square kilometers of exploitable marine resources. The national government prioritizes the ocean economy as a pillar in its future development endeavors, with a major focus on the fishing industry, which includes port-related services, seafood processing, and aquaculture. Globally, Port Louis in Mauritius, along with Port Victoria in Seychelles, are among the most frequently visited mid-ocean ports by foreign fishing vessels in terms of visit numbers as well as hold size of both fishing and carrier vessels.[44] Mauritius provides port facilities for landing and transshipment of tuna and other species such as toothfish, thus providing a free trade zone and associated infrastructures, including ship repair facilities, which incentivize Japanese, Taiwanese, and other Asian longliners.

39 Supra, note 34.

40 Western and Central Pacific Fisheries Commission, *Conservation and Management Measures* (CMMs) *and Resolutions of the Western Central Pacific Fisheries Commission* (WCPFC) (May 28, 2020), https://www.wcpfc.int/system/files/booklets/31/CMM%20and%20Resolutions.pdf.

41 Supra, note 34.

42 Supra, note 26.

43 Supra, note 32.

44 Supra, note 15.

The main inspection body for monitoring of fishing vessels at ports is the Port State Control Unit (PSCU), under the aegis of the Ministry of Blue Economy, Marine Resources, Fisheries and Shipping. PSCU is part of the MCS/VMS, Port State Control, and Import/Export Division, which is responsible for monitoring IUU in collaboration with the National Coast Guard, which is primarily focused on surveillance at sea in the EEZ of Mauritius. The principal objectives of this division are to implement the conservation and management measures for combating IUU fishing, monitoring licensed fishing vessels in the EEZ of Mauritius using VMS, keeping the port free of illegal fishing vessels, controlling the import and export of fish and fish products, and ensuring that only legally caught fish are traded.[45] National, regional, and international tools are followed, such as the Fisheries and Marine Resources Act 2007 and its associated regulations, the National Plan of Action to Combat IUU Fishing, the PSMA, ERS, UNCLOS, the Code of Conduct for Responsible Fishing, Resolutions of the IOTC, and Conservation measures of CCAMLR.[46] The focal activities carried out by the MCS unit and PSCU that can support EEPS are online processing of Advance Request for Entry into Port (AREP) through e-PSM (IOTC), boarding and inspection of fishing boats/vessels (both local and foreign); authorization for the landing of fish to all fishing vessels calling in the port; issuance of catch certificates for fish caught legally by the local fishing vessels; monitoring of unloading of fish (for example, Patagonian toothfish, which is reported to CCAMLR); and submitting reports and statistics to RFMOs such as IOTC and CCAMLR.

At the regional level, following IOTC requirements, the division is also involved in the national state scientific fisheries observer program, whereby Mauritian observers are deployed in Mauritian flagged vessels to monitor fishing activities and to collect data.[47] There were previously joint fisheries surveillance missions under the Regional Plan for Fisheries Surveillance.[48] The Geo-Maritime Information System (SIGMA) and the Regional Web Database Standardized Real Time Fisheries Information System Hub (StaRFISh) (outlined in Appendix C-II) have been two critical systems launched by IOC in 2014 to aggregate multiple information sources across countries and enable regional collaboration.[49] These two initiatives have run out of funding, but because they were influential in identifying IUU vessels, these systems will be incorporated into the upcoming Ecofish Program.[50] The Ecofish Program, funded by the European Union, involves support to joint regional MCS action plans, notably to deter IUU fishing, and implementation of conservation measures based on scientific evidence.[51] Systems like SIGMA and StaRFISh, through the Ecofish Program, could help support EEPS.

In terms of VMS tracking, since April 2005 Mauritius has set up a National Fisheries Monitoring Centre (FMC) with VMS tracking capacity to monitor fishing activities of Mauritian licensed

45 Ministry of Blue Economy, Marine Resources, Fisheries and Shipping, Republic of Mauritius, "MCS_ VMS_Port State Control and ImportExport Division," accessed April 25, 2020, http://blueconomy.govmu.org/English/Departments/Pages/MCS_-VMS_Port-State-Control-and-ImportExport-Division.aspx.

46 Ibid.

47 Indian Ocean Tuna Commission, "Resolution 11/04 on a Regional Observer Scheme" (2011), https://iotc.org/cmm/resolution-1104-regional-observer-scheme.

48 Supra, note 45.

49 Jeromine Fanjanirina, "The IOC Information Exchange Tools for Fisheries Monitoring Control and Surveillance," Indian Ocean Commission, SmartFiche 37.

50 Southwest Indian Ocean Fisheries Commission, *New Project* "ECOFISH", 2019, http://www.fao.org/3/ca6575en/ca6575en.pdf.

51 Ibid.

fishing vessels.[52] Under the VMS Regulation 2005, these vessels are obligated to share VMS data every two hours to the FMC.[53] In case of any suspicious activity, the officers of the MCS and Port State Control units can check directly with the FMC or vice versa. For fishing vessels with non-Mauritian fishing licenses, flag states and RFMOs are informed of the irregularities and port inspectors also check for VMS data once they board the vessel. This can take longer, highlighting the advantages of real-time VMS data sharing with the port state (Level Two of our proposed EEPS model).

There are two types of ERS by RFMOs that Mauritius follows closely: e-CDS through CCAMLR and e-PSM instituted by IOTC.

CCAMLR system:

- e-CDS is a user-friendly web-based application to create, validate, and store *Dissostichus* (toothfish) catch documents, export documents, re-export documents, and specially validated catch documents.

- e-CDS has been implemented to track toothfish from point of landing throughout the trade cycle and aims to include all toothfish landed and traded by CCAMLR participating states. CDS requires participating states to identify the origins and fishing methods of toothfish entering their markets and to determine whether toothfish was harvested in the CCAMLR area and is landed/imported into their territories.[54]

- Along with the e-CDS system, CCAMLR also pioneered the tracking of IUU vessels. Both the CDS and the IUU vessel list have been critical tools for success in curbing IUU fishing within CCAMLR.[55]

IOTC system:

- Through this e-PSM system (outlined in Figure 4), a vessel operator/agent submits a request to enter port, the port state receives it and can request more info or contact flag state, and then the port state decides whether to let the vessel enter, the extent of inspections, and so on.

- The e-PSM system by IOTC is completely in line with the PSMA.[56] Information requested through the AREP form in the e-PSM application is included in Appendix C-III.

52 Ministry of Fisheries and Rodrigues, *National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing* (2010), http://extwprlegs1.fao.org/docs/pdf/mat165160.pdf.

53 Ibid.

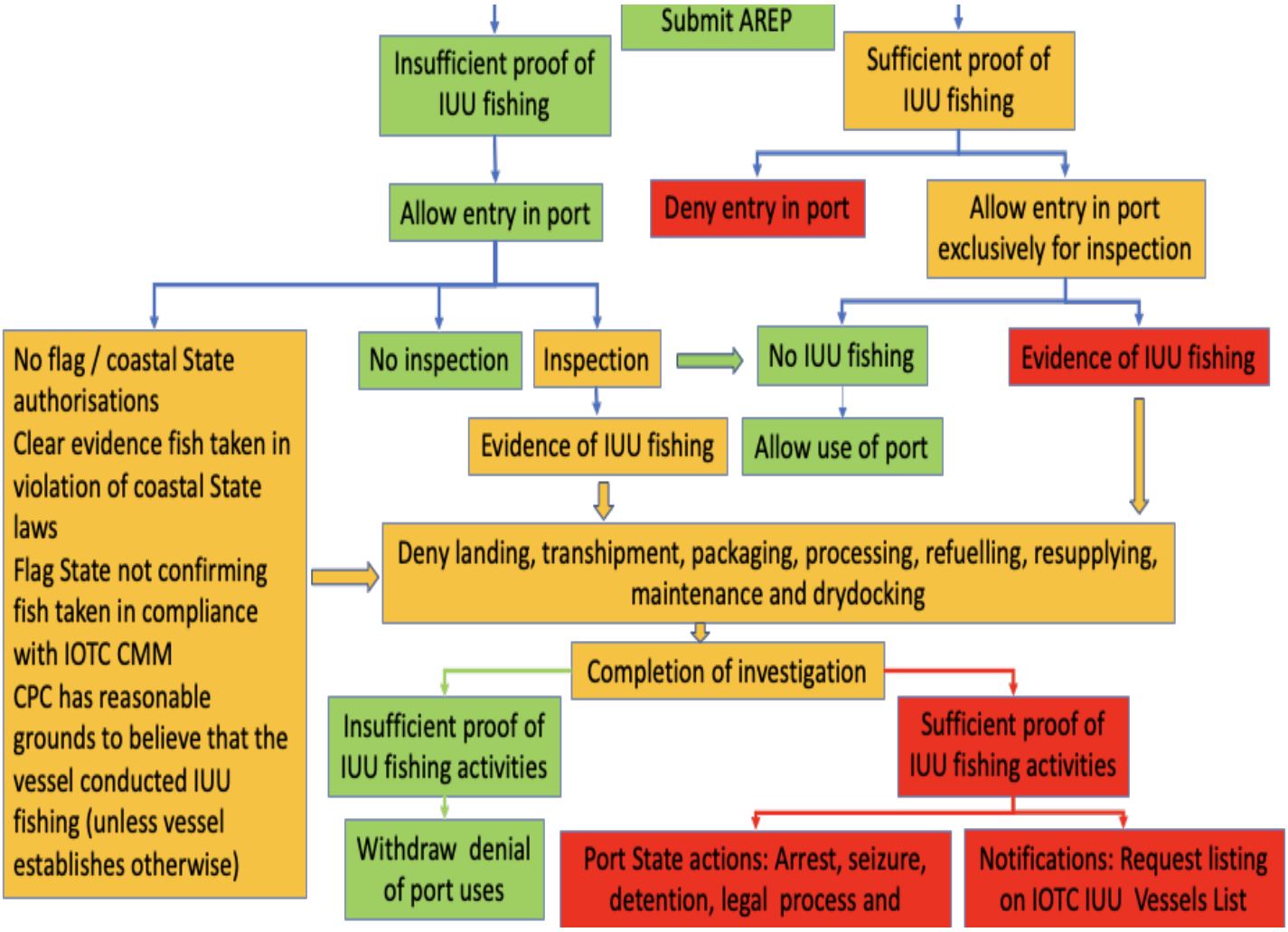
54 Commission for the Conservation of Antarctic Marine Living Resources, "Catch Documentation Scheme (CDS)," 2017, https://www.ccamlr.org/en/compliance/catch-documentation-scheme.

55 Lisen Schultz et al., "Adaptive Governance, Ecosystem Management, and Natural Capital," *Proceedings of the National Academy of Sciences of the United States of America* 112, no. 24 (2015): 7369–74, doi: 10.1073/pnas.1406493112.

56 Supra, note 9; IOTC Secretariat, personal communication, May 12, 2020.

- A risk assessment tool is incorporated on the e-PSM platform. The purpose of the Risk Assessment Report (RAR) (Appendix C-IV) is to provide assessment of criteria to guide the port state to define a risk score with the criteria in the RAR as well as other criteria the port state has at his disposition.[57] Port inspectors incorporate their observations following the physical inspection into the RAR. Depending on the level of suspicious activity, legal action is taken according to national legislation. Tools like RAR and the data generated over time could be incorporated into Level Three of our proposed EEPS model.

Figure 4. The Port State Process: From Vessel Advance Request to Enter Port to Port State Decision and Follow-Up Action[58]



57 IOTC Secretariat, personal communication, May 12, 2020.

58 IOTC, *Procedures for the Implementation of the Indian Ocean Tuna Commission Port State Measures* (Seychelles: FAO, 2020).

As such, e-PSM is the most closely related system to EEPS. Nonetheless, within the Mauritius case study, we have identified a specific scenario whereby all three levels of checks that we identified in our system model (Table 3) occur to a certain extent. For tuna vessels with Mauritian fishing licenses:

- **Level One Vessel Data Using ERS**: An ERS is already being used to notify inspectors about intention to enter the port through the e-PSM application system. It enables prescreening by port inspectors.

- **Level Two Trip Data**: There is real-time VMS data tracking, as all vessels with Mauritian fishing licenses have to share VMS tracks with the national FMC (as a requirement under the VMS Regulations 2005). Under this regulation, Mauritian licensed vessels are obligated to share their VMS data with the national FMC, whereas non-Mauritian licensed vessels have no such obligation and share their VMS data through their flag states.[59]

- **Level Three Historical Data**: The RAR tool on the e-PSM system (Appendix C-IV) provides a guideline to assess vessel risk based on previous violations and current fishing trip. In the Mauritius case study, risk scores are not computed. Port inspectors share their observations on the RAR online system in the Level Three criteria, which helps them decide on action to be undertaken based on national legislation in case of any violations.

    - Note: In terms of incorporating observer data in Level Three of our proposed model, the IOTC observer scheme is scientific in nature. There is no compliance observer scheme in IOTC on fishing vessels like the WCPFC compliance observer scheme. The IOTC Regional Observer Programme monitors transshipment at sea and is included in the RAR.[60] In the future, observer data can also be incorporated into Level Three of our proposed model in the Mauritius case study.

This scenario highlights the essential components and strengths of EEPS: (1) efficient communication and monitoring by port inspector and RFMO, improving transparency in the system of prescreening; (2) real-time VMS data tracking, helping quickly identify anomalies without having to contact flag states. To note, there are still discussions ongoing between IOTC members to adopt a regional VMS system;[61] and (3) regional support of RFMOs, such as IOTC and intergovernmental organizations like the IOC instrumental for capacity building to operationalize EEPS. Expanding this system that combines Level One to Level Three data for tuna fisheries to other fishery types using an integrated approach will be a step toward implementing EEPS.

However, additional considerations have been suggested by our respondents to properly incentivize fishing vessels for EEPS. Physical inspections, when there is no suspicious activity, typically take 1 to 2 hours.[62] In many cases, additional approvals from other government entities and inspections from other authorities can be the source of longer delays. In that sense, the

59 Supra, note 52.

60 Supra, note 32.

61 Ibid.

62 Supra, note 11.

PSMA guideline of improving interagency collaboration becomes essential to effectively make the system more efficient so that vessels can start offloading more quickly at ports. It is important to note that even in the case of the most compliant vessel, physical inspections at ports will not be able to be completely exempt, as there are many entities beyond fisheries monitoring that need to check the vessels—for example, the Customs Department, Veterinary Services, the Ministry of Health, and the Passport and Immigration Office. Moreover, after the MCS/PSCU units give approval for entry, the order of vessels arriving into port is determined by a different port authority, and sometimes there can be space constraints due to vessels like cruise ships, whereby a fishing vessel must wait outside the harbor until it can have access to a quay. These logistical concerns need to be taken into consideration on a case-by-case basis to ensure that the EEPS system can work effectively.

Building off existing systems, an EEPS that would be valuable in the Mauritian context will (1) include an integrated ERS that will include different fishery types and RFMOs and incorporate electronic logbooks that will minimize time spent during physical inspections; (2) require real-time VMS data sharing to port authorities, irrespective of the country that provided the fishing license; and (3) include a synchronized way of assessing historical compliance of vessels by involving different RFMOs and regional bodies, and a streamlined way of calculating risk scores.

D. Discussion

From our case studies, we see multiple instances of strengths that EEPS can build on as well as caveats we need to take into consideration to improve the proposed model. The tuna fisheries example with Mauritius fishing licenses is the most closely related model to the proposed EEPS that satisfies all three levels of data checks we proposed. A key strength highlighted is the advantage of prescreening through ERS in expediting the system. After risk assessments are conducted through RFMO assistance, a port inspector will spend time accordingly on the vessel for boarding and physical inspections: less time is spent on less risky vessels. Online reporting systems such as e-PSM and e-CDS increase transparency between port states and RFMOs, as both have access to information being provided by fishing vessels.

Policy experts have also highlighted that our proposed EEPS can build off and complement the existing PSMA framework. Measures encouraged by the PSMA, such as national interagency collaborations, will greatly benefit our proposed EEPS system by expediting bureaucratic approvals and streamlining inspection procedures.

Regional support of RFMOs and advising bodies like FFA and IOC are instrumental for capacity building to operationalize EEPS. These organizations understand the regional and local contexts best and are well positioned to support port states. Through our research process, multiple respondents have referred to strong regional collaborations through regional bodies as being strong influences to enhancing the strength of control systems at port state levels. In both case study regions, regional organizations are strongly advocating for a shift toward ERS. Capacity building for port inspectors for ERS supported by these regional bodies will be critical to support EEPS.

At present, in the Mauritian case study, VMS checks (for non-Mauritian licensed vessels) and physical logbooks checks are conducted during physical inspections. However, if (1) real-time VMS was looked into at the time of doing risk assessments (at the AREP stage) when the vessels request entry and (2) logbooks were in an electronic format, fisheries inspection could be streamlined. Other checks, such as customs, immigration, and health services, would still have to be conducted by the respective officers.

Currently in the Pacific, there is seemingly a lack of coordination between port states, flag states, and regional bodies, and efforts are disjointed. To be able to grant expedited entry, all of the disparate data and information need to be integrated into a single platform. Additionally, efforts are mainly focused on tuna fisheries because this is the dominant industry in the region. This needs to be considered when insights from RMI are extrapolated to other regions. There are opportunities to harmonize conservation measures and data sharing with adjoining or overlapping RFMOs or other agencies.[63]

Regional support of RFMOs and advising bodies like FFA and IOC are instrumental for capacity building to operationalize EEPS.

By integrating and consolidating the system of checks regionally with FFA's leadership and strong regional support, adding an expedited entry system to PSM efforts could be possible. Similar observations are made in the Mauritius case study, where efforts seem disjointed: tuna fishing vessels use the e-PSM system, toothfish vessels use the e-CDS system, while other fisheries rely on paperwork submitted by their fishing agents. For effective operationalization of EEPS, an integrated approach needs to be adopted, building off these existing systems of checks and controls. Efforts were made in that direction in the Indian Ocean, whereby there is a module on Port Inspection in StaRFISh (Appendix C-II) to avoid countries entering the same information twice on e-PSM and StaRFISh systems. The objective was to create the link between e-PSM and StaRFISh. Unfortunately, this was not completed due to lack of funding, but the Ecofish Program will potentially take over this component.[64]

Additional considerations include understanding the impact of fishing seasonality. Some months tend to be busier for ports compared to others. Hence, EEPS might provide a greater incentive during the peak seasons. For Levels Two and Three of our data checks, we need to delve further into port state, flag state, and RFMO agreements to understand VMS data sharing regulations.

Lastly, for our proposed HCS system (Level Three), the score system will need to be explored further. At present, we can use the existing vessel lists by regional bodies—for example, the FFA

63 Supra, note 32.

64 Supra, note 11.

Vessels Good Standing list and the IOTC vessel list. FAO is also working on a global record of vessels, which could be incorporated into our proposed model. HCS will also benefit from the inclusion of observer assessments on fishing vessels. Efforts to train observers and ensure their security will need to be considered. The HCS is a component of EEPS that would assist the port authority by combining multiple pieces of compliance data into one number that gives a strong indication of the vessel's historical IUU risk. When combined with real-time location data and vessel catch logs, the ports will be able to obtain an adequate picture of a vessel's compliance before it enters the port.

While the EEPS exploration and case study analysis provide a variety of possibilities for system efficiency and potential implementation, it is important to consider and analyze constraints relevant to such a system and how to address them.

Table 5. Evaluation of Constraints and Opportunities for Addressing Constraints (cont. on next page)

Constraint	Details	Addressing Constraint
Port state partnership and collaboration	Potential revenue loss from vessels spending less time physically in port could be a disincentive for EEPS and port state participation Need to standardize protocols at a regional level to increase reporting compliance	Encourage regional or global guidelines like the FAO voluntary CDS so that each port state does not have a different version of EEPS Implement EEPS and standardize protocols using the leverage of RFMOs and other regional bodies Target key ports that already have strong PSM standards for pilot implementation
VMS data sharing	EEPS will need to guarantee and support secure data sharing and analysis Several actors have expressed discomfort with public VMS data sharing A port access letter stand-in for VMS data sharing relies on negotiations between flag and port state and credibility not verifiable by the EEPS In Mauritius, there is a specific VMS Regulation 2005 in the legal framework, and authorities are comfortable sharing data only with other government entities nationally and in the IOC region In RMI, given that VMS data is already available through FFA (Level Two of our proposed model) and FFA has a list of vessels of Good Standing (Level Three of our proposed model), more support is needed to analyze the existing sources of data efficiently to detect anomalies	Capacity building for data analysis capability among port states and port inspectors Regional collaboration and system support for secure VMS data sharing among participating port states with ERS (for example, SIGMA and StaRFISh systems)

Constraint	Details	Addressing Constraint
Physical port inspections cannot be completely waived	National governments have a set of regulations to follow before allowing offloading of fish; these regulations need to be respected (police checks, customs, immigration, health services, veterinary services)	Streamlined and efficient system for inspections Move from physical to electronic logbooks, so that logbooks can be prescreened, which can reduce duration of physical inspections Potential for an online platform where all approvals by different entities can be viewed by all relevant stakeholders (for example, Mauritius TradeNet system which is used in seafood export)[65]
Bureaucratic delays	While physical inspections can take from one to two hours up to one day,[66] transferring paperwork and getting approvals from multiple government agencies can take multiple days depending on the season and other factors	Prescreening where port inspectors and RFMO officers can use the same online portal to monitor progress on inspections and share information As mentioned, in regard to RMI, there is a need to support ERS capacity for Level One to Level Three data to enhance the efficiency of the system for fully transparent vessels

65 Mauritius Network Services, *Mauritius Tradelink* (MFISH) (April 2018), http://servicesmns.mu/forms/SW/TradeLink(MFISH)%20Import%20Permit%20-%20QuickStepsGuide(ver2.0)%20for%20Applicant.pdf.

66 Supra, note 11.

E. Conclusion

IUU fishing is an elusive problem to solve given the scope and complexity of the issue and potential solutions. An EEPS could provide a relatively inexpensive and effective way to reduce IUU fishing compared to open ocean enforcement methods. By shifting the burden of proof onto fishing vessels during port inspections, EEPS aims to reward proactively transparent and compliant vessels that meet three levels of information checks. EEPS adds a strong incentive to existing PSM being implemented by fisheries agencies around the world. This proposal lays out a potential model for a general system that could be implemented at a port-state level and tailored to the specific needs and existing structures of the port.

Based on our exploration we have a several key recommendations:

- While implemented at a port-state level, EEPS would need strong regional leadership from RFMOs or other fisheries and regional agencies to effectively integrate different nations and fisheries types and navigate VMS data-sharing agreements.

- An ERS could expedite bureaucratic processes, as physical inspections cannot be fully exempt.

- Expanded ERS could facilitate efficient communication among port authorities, government agencies, and RFMOs, further expediting a port-entry procedure.

Further research and negotiations will be needed to reinforce and tailor the levels of assessments we have proposed in this report.

F. Next Steps

Following this exploratory analysis of a potential EEPS, there are numerous next steps to consider when moving forward:

- **Understanding and operationalizing an HCS** to develop a system of weighting factors and prioritizing certain compliance indicators. This investigation should explore which historical VMS data would be sufficient to verify compliance and which indicators and analyses would allow a determination of whether a vessel had fished illegally in the past. Operationalizing an HCS would also require an understanding of which body would host and manage the HCS database or online platform.

- **Exploring frameworks** like the FAO Voluntary Guidelines for CDS to understand how EEPS guidelines might be operationalized. Such guidelines would provide consistency across regions so that each port state does not have a different version of EEPS.

- **Identifying pilot ports** that supply key markets (for example, EU, US, Japan, China) and hold strong PSM standards to support a preliminary implementation of the EEPS based on either a FAO CDS guideline framework or another model.

- **Exploring the feasibility of a port access letter** standing in for real-time VMS data sharing in the EEPS. While this letter is currently used as a method to verify VMS data based on an agreement between a flag state and a port state, ensuring credibility and compliance in these agreements is critical should it suffice as a replacement for data sharing. Analyzing the tradeoffs of credibility and efficiency could assist in consideration of this port access letter.

- **Conducting a more in-depth regional comparative case study** between port states within one region and investigating specific port and flag state agreements. There is a need to understand collaborations between port states and the feasibility of ERS among port states in the same region.

- **Conducting an economic analysis** to understand the financial incentive of the EEPS for fishing vessels and any potential losses for port states if vessels spend less time at port. This analysis would help develop a system that factors in economic costs and benefits and foresees unintended negative consequences of expedited entry.

- **Interviewing third-party agents/brokers and coastal states actors** to include a broader range of perspectives. This could assist system assessments and highlight the nuances relevant to port-entry procedures in regions around the world.