

# WHAT WE **KNOW** ABOUT MARITIME ENVIRONMENTAL CRIME



one earth  
FUTURE



**STABLE SEAS**

*a program of One Earth Future*



**SAFE SEAS**



# WHAT WE KNOW ABOUT MARITIME ENVIRONMENTAL CRIME

## Authors:

| Tyler Lycan and Lexie Van Buskirk

## Contributors:

| Professor Christian Bueger, Professor Timothy Edmunds, Dr. Scott Edwards, Dr. Conor Seyle

July 2021

Cover Image: Indonesian authorities destroy seven of seventy five foreign illegal fishing vessels in the waters off Belawan in Medan, North Sumatra province, on April 1, 2017, as scuttling of fishing vessels took place in eleven different locations at the same time.  
Photo: GATHA GINTING/AFP via Getty Images.

# FOREWORD

*What We Know About Maritime Environmental Crime* is the outcome of a collaboration between the [SafeSeas Network](#), based at the Universities of Bristol (UK) and Copenhagen (Denmark) and the [Stable Seas program](#) of the One Earth Future Foundation. The report provides a comprehensive overview of the data available on maritime environmental crime, drawing on desk-based research conducted between January and March 2021. It is the third of three reports and was preceded by similar data overviews on piracy and on illicit maritime trades.

The research forms part of the research project Transnational Organised Crime at Sea: New Evidence for Better Responses, which is funded by the UK [Economic and Social Research Council](#) (ESRC) as part of UK Research and Innovation's (UKRI) [Partnership for Conflict, Crime and Security Research](#) (PaCCS) (Award Number: ES/S008810/1). Additional funding for the work was provided by the One Earth Future Foundation. Further information on the project is available at [www.safeseas.net](http://www.safeseas.net).

The report was authored by Tyler Lycan and Lexie Van Buskirk (Stable Seas). Input and comments were provided by Professor Tim Edmunds (SafeSeas/University of Bristol), Dr. Scott Edwards (SafeSeas/University of Bristol), Professor Christian Bueger (SafeSeas/University of Copenhagen), and Dr. Conor Seyle (One Earth Future).



# TABLE OF CONTENTS

<b>I. INTRODUCTION .....</b>	<b>01</b>
<b>KEY MESSAGES .....</b>	<b>02</b>
<b>II. MARITIME ENVIRONMENTAL CRIMES: AN OVERVIEW .....</b>	<b>04</b>
Marine Pollution .....	04
Illegal Mining, Resource Extraction, and Dredging.....	06
Fisheries Crimes .....	07
Other Maritime Environmental Crime.....	08
<b>III. DATA COLLECTION ON MARITIME ENVIRONMENTAL CRIME .....</b>	<b>10</b>
Organizations with a Global Focus.....	10
<i>UN System.....</i>	<i>10</i>
<i>Other International Governmental Organizations .....</i>	<i>12</i>
<i>Civil Society Organizations .....</i>	<i>12</i>
Organizations with a Regional Focus.....	15
<i>European Union.....</i>	<i>15</i>
<i>Government or International Governmental Organizations .....</i>	<i>15</i>
<i>Civil Society Organizations .....</i>	<i>15</i>
Organizations with a Domestic Focus.....	16
<b>IV. ANALYSIS.....</b>	<b>19</b>
Analysis and Summary .....	19
Data Availability.....	19
Diversity and Disaggregation of Data .....	20
Compliance and Reporting.....	20
Looking Forward.....	21
<b>ANNEX: DATA SOURCES RELEVANT TO MARITIME ENVIRONMENTAL     CRIMES .....</b>	<b>22</b>
<b>ENDNOTES.....</b>	<b>23</b>

# GLOSSARY OF TERMS

AIS	Automatic Identification System	JAMSTEC	Japan Agency for Marine-Earth Science and Technology
COASST	Coastal Observation and Seabird Survey Team	NOAA	National Oceanic and Atmospheric Administration
CSV	Comma-Separated Values	OECD	Organisation for Economic Co-operation and Development
EMODnet	European Marine Observation and Data Network	OHI	Ocean Health Index
EFFACE	European Union Action to Fight Environmental Crime	OR&R	Office of Response and Restoration
FAO	Food and Agriculture Organization of the United Nations	PVR	ProActive Vessel Register
FIGIS	Fisheries Global Information System	RFB	Regional Fishery Body
FIRMS	Fisheries and Resources Monitoring System	RFMO	Regional Fisheries Management Organisation
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection	SAR	Synthetic-Aperture Radar
GGGI	Global Ghost Gear Initiative	SEAFDEC	Southeast Asian Fisheries Development Center
GIS	Geographic Information System	TIDES	Trash Information and Data for Education and Solutions
IMO	International Maritime Organization	TMT	Trygg Mat Tracking
ISA	International Seabed Authority	UN	United Nations
ISSF	International Seafood Sustainability Foundation	UNEP	United Nations Environment Programme
ITOPF	International Tanker Owners Pollution Federation Ltd.	VMS	Vessel Monitoring System
IUU	Illegal, Unreported, and Unregulated	WCPFC	Western and Central Pacific Fisheries Commission

# I. INTRODUCTION

The aim of this paper is to review what we know about environmental crimes in the maritime context, consider how we know it, note what data is collected and drawn on, and assess the quality of this information across and between issues. The goal is to provide a concise introduction to knowledge sources for practitioners and analysts, discuss the quality of these sources, and identify inconsistencies and gaps in data.

This paper will begin with an overview of the types of maritime environmental crime we consider here. Maritime environmental crime refers to criminality which takes place in the sea and that has a harmful impact on the marine environment. The seas and oceans pose particular challenges in this regard. Their vastness makes them difficult to monitor effectively. The high seas are also subject to looser and more ambiguous systems of legal regulation than many territories under the control of individual states. The paper focuses specifically on three crimes which together make up the most visible and emblematic examples of maritime environmental crime: marine pollution; illegal mining, resource extraction, and dredging; and fisheries crimes. The scope of maritime environmental crime is broader than just these three, yet the breadth and relative infrequency of other environmental crimes mean that significantly less data is available on the others.

*Maritime environmental crime refers to criminality which takes place in the sea and that has a harmful impact on the marine environment.*

The first section of the paper provides an overview of the problem of maritime environmental crime. From there, we provide a review of the organizations that collect data on these crimes, followed by an analysis of the quantity and quality of the data collected. We conclude with a series of recommendations and next steps for maritime security decision-makers. The report sheds light on the gaps that currently exist in data collection efforts across the facets of maritime environmental crime and aims to encourage an interest in and action towards a comprehensive plan for addressing these.

This report focuses on data sources accessible in English. This implies that the report does not cover sources and datasets in other languages and which are not internationally accessible. Our focus is on the major data sources that analysts and policymakers can draw on. Given the breadth of the concept of maritime crime and the fact that a wide range of agencies address the issue, a major challenge in surveying data sources is that there is a tendency for the data to be fragmented across multiple places, and hence the risk that data is available but not easily accessible is high.

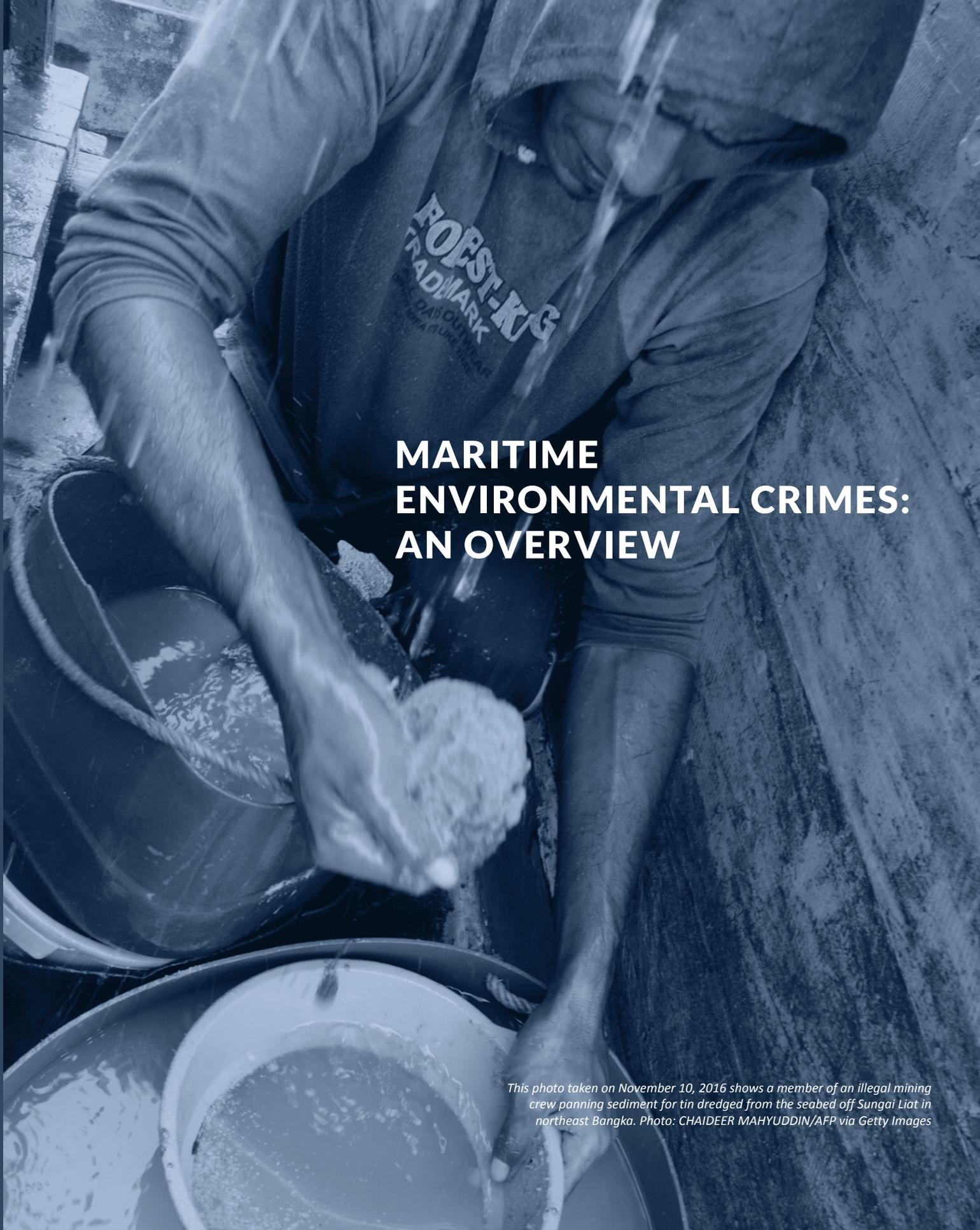
Relatedly, much of the data available about maritime environmental crime is based on the harm caused rather than the criminal activity itself. Considering maritime pollution as a key example, it is certainly the case that such crimes take place and that systems for monitoring pollution capture the damages caused. Often, however, it is unclear whether such damages are the direct outcomes of criminal behavior and if and how they are linked to accidents or negligence. Data on the aggregate result of these different issues is available in some places, but that is not the same as direct information about maritime crime specifically.

## KEY MESSAGES

- Maritime environmental crime constitutes any illegal activity that causes significant harm to the marine environment. While this encompasses many different crimes, three of the most common and most significant are maritime pollution, illegal dredging and seabed mining, and illegal, unregulated, and unreported (IUU) fishing.
- Available data about maritime environmental crime is fragmented by issue and geography, and most typically focuses on the aggregate results of the crimes rather than direct monitoring of criminal activity. That is, there is more data available about, e.g., the prevalence of pollution in the ocean than about the potentially illicit incidents that cause that harm.
- Efforts to improve data collection and release—and in particular, efforts to coordinate different data sources across issue areas and geography to allow for a comprehensive assessment of environmental criminal activity—are needed to improve our collective understanding of maritime environmental crime.



*Workers collect leaked oil at the beach in Riviere des Creoles on August 15, 2020, due to the oil leaked from vessel MV Wakashio, belonging to a Japanese company but Panamanian-flagged, that ran aground near Blue Bay Marine Park off the coast of south-east Mauritius.  
Photo: FABIEN DUBESSAY/AFP via Getty Images*

A high-angle, monochromatic photograph of a person wearing a hoodie with 'ROBST-KIG' and 'TRADEMARK' printed on it. The person is leaning over a large bucket, using their hands to pan sediment from a smaller white bucket. The scene is set outdoors, possibly on a wooden platform or boat deck, with rain falling around them. The overall tone is somber and industrial.

## MARITIME ENVIRONMENTAL CRIMES: AN OVERVIEW

*This photo taken on November 10, 2016 shows a member of an illegal mining crew panning sediment for tin dredged from the seabed off Sungai Liat in northeast Bangka. Photo: CHAIDEER MAHYUDDIN/AFP via Getty Images*

## II. MARITIME ENVIRONMENTAL CRIMES: AN OVERVIEW

For the purposes of this paper, we define maritime environmental crimes as comprising:

*. . . activities that cause significant harm to the marine environment, where humans are often only second order victims. Such crimes take place, in the sea, in the sense of the exploitation or degradation of the resources, fauna, cultural heritage, and infrastructures located in the oceans themselves. They are, as such, crimes of the anthropocene, in the sense that they take place in the context of human activities that engage and interact with the environment of the oceans themselves.*<sup>1</sup>

Conceptually, this definition encompasses all crimes that damage the marine environment significantly. These can range from small-scale activities such as recreational divers damaging coral reefs to large-scale industrial activities such as systemic illegal fishing. The breadth of these potential crimes poses a challenge for the study of maritime environmental crime: they represent activities often captured under different legal regimes and having correspondingly broad research and data that speak to them available.

However, three categories of environmental crime make up the most significant examples of maritime environmental crime in terms of the current international attention, legal resources, and extant data. As such, this report focuses specifically on these three categories: 1) marine pollution (including illegal dumping, oil spills, and illegal bunkering); 2) illegal mining, resource extraction, and dredging; and 3) fisheries crimes. This section will briefly introduce each of these.

### Marine Pollution

Marine pollution as a maritime crime encompasses those activities that cause harm to the marine environment through the dumping or releasing of toxic material into

the ocean. This includes the intentional or direct dumping of waste and other toxic substances, such as heavy oil, into the ocean. It also potentially concerns pollution on land, such as in cases where rivers are polluted or where the illegal use of chemicals causes runoff into a waterway. Because of the frequency and significant impact of oil spills and their particular association with the crime of bunkering, this section also considers them specifically as an example of marine pollution.

The dumping of industrial or other waste into the oceans was a common and legal activity for much of history, including the dumping of nuclear waste starting in the 1940s. Acknowledging the increasing human and environmental impacts of this practice, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 was adopted in 1972 and came into force in 1975.<sup>2</sup> More commonly known as the London Convention, this was updated in 1996 as the London Protocol, and forbade the dumping of harmful waste into the ocean except in the rare cases where any other form of dumping would be more harmful. Despite this convention, relatively loose monitoring and enforcement mean that large-scale dumping still takes place.<sup>3</sup> A 2019 enforcement operation by Interpol found at least 3,000 maritime pollution crimes in 17,000 inspections and concluded that the most common reason for these crimes was an attempt to avoid the costs associated with safe and legal dumping.<sup>4</sup>

*A 2019 enforcement operation by Interpol found at least 3,000 maritime pollution crimes in 17,000 inspections and concluded that the most common reason for these crimes was an attempt to avoid the costs associated with safe and legal dumping.*

Such dumping is not the only pathway to ocean pollution. The ocean is also the final terminal for waste such as plastic dumped inland, as it transits through waterways, and for other sources of terrestrial pollution into waterways, such as runoff from farms or other sources which ultimately arrive at the ocean. These make up a more significant source of marine pollution than intentional criminal dumping: a 2015 assessment of plastic waste estimated that between 1.7 and 4.6 percent



*A father and son (L) on a makeshift boat made from styrofoam paddle through a garbage filled river as they collect plastic bottles that they can sell in junkshops in Manila on March 19, 2015. Photo: NOEL CELIS/AFP via Getty Images*

of all plastic waste created in coastal states ended up in the ocean,<sup>5</sup> and models of the garbage patches found in oceans suggest that the majority of trash is from land-based sources.<sup>6</sup> Even so, dumping still endangers critical habitats, and ocean currents can still spread toxins around the world.<sup>7</sup>

Due to the centrality of oil and petrochemicals in the global economic system and the associated centrality of these goods in maritime transport, oil spills can be considered as a special category of maritime pollution. Oil spills can happen anywhere oil is drilled, transported, or used, and are more common than is often recognized. The majority of spills are small, and can happen, for example, during the refueling of a ship. Larger spills are inevitably more problematic, and tend to happen when pipelines break, oil tanker ships sink, or drilling operations go wrong.<sup>8</sup> These forms of pollution may or may not be criminal, depending on the specifics of the incidents involved.

Another major common cause of oil pollution is linked to oil bunkering. While oil bunkering generically refers to the storage and supply of fuel to ships, in the criminal context it has become an umbrella term relating to the criminal theft or diversion of oil. Illegal oil bunkering activities can range from illegal tapping of pipelines to the seizure or illegal transfer of oil. The nature of bunkering as a criminal activity means that the actors involved may or may not be familiar with safe oil transfer procedures and are certainly operating outside of legal oversight. Hence, bunkering is often associated with oil spills, and the majority of these incidents happen when a fuel tank overflows during the bunkering process or during ship-to-ship transfers. The fuel which is released typically is heavy fuel, which is composed of heavier hydrocarbon fractions which do not dissipate as easily and require more extensive cleanup efforts.<sup>9</sup>

The research team was not able to identify any formal reporting systems or reporting requirements for illegal dumping or oil bunkering. As will be discussed in more

depth, there are systems in place in several countries for reporting legal dumping activities and for releasing information about oil spills, including those caused by legal accidents and illegal activities. There are also a number of entities which voluntarily maintain data sources relating to ocean debris and trash, and one-off reports, investigations, and research activities by both academic and governmental agencies that present information about specific assessments of various maritime environmental crimes. However, there is, to the best of our determination, no international entity formally tasked with collecting and reporting data about illegal dumping, illegal pollution, or oil bunkering.

## Illegal Mining, Resource Extraction, and Dredging

The seabed includes a number of potential resources that may be attractive to illegal actors. This includes sand, which has been accessed through seabed dredging for millennia, but increasingly also includes minerals and natural resources accessed via the developing technology of seabed mining. Seabed mining is a relatively new phenomenon and is currently limited mostly to shallow waters, but there is developing interest in deep-sea mining.<sup>10</sup>

Extraction of these resources is not inherently illegal: like any natural resource, the laws surrounding extraction rely on the national laws governing resource extraction in territorial waters, Exclusive Economic Zones, and continental shelves. For waters under national jurisdiction, this means that illegal activity occurs when extracting actors fail to follow the respective laws and regulations. In areas beyond national jurisdiction, the development and extraction of seabed resources is overseen by the International Seabed Authority (ISA), which has the authority to grant licenses for extraction. The majority of current development contracts are for exploitation of polymetallic nodules found on the seabed,<sup>11</sup> but deep-sea mining is slowly developing as a potential additional extraction approach as the technology improves.<sup>12</sup>

Occasionally and in some areas, dredging and mining may be fully banned for environmental reasons; Bahrain, for example, banned dredging in its waters in 2019 to allow the seabed to recover from damage caused by previous dredging.<sup>13</sup> In most cases, however, the distinction

between legal and illegal activity relies on questions of legal authority and the approval (or lack thereof) of specific projects. This in turn means that questions of the legality of mining or seabed dredging can inherit contested and unclear legal regimes. This is particularly relevant in the case of seabed dredging, where dredging by Chinese companies, for example, has been a feature of several contested territorial areas. In 2019, a vessel engaged in dredging for black sand ran aground in the Philippines, with unclear and contested information about whether the vessel had been operating legally, illegally, or in a grey area of national approval or with approval from a national entity but in the face of local resistance.<sup>14</sup>

*Questions of the legality of mining or seabed dredging can inherit contested and unclear legal regimes.*

Dredging and seabed mining are environmentally risky. Depending on the technology used to extract the materials, the process can risk “direct removal of seafloor habitat and organisms; alteration of substrate and its geochemistry; modification of sedimentation rates and food webs; release of suspended sediment plumes; release of toxins and contamination from extraction and removal processes; noise pollution; light pollution; and chemical leakage from mining machinery.”<sup>15</sup> When conducted illegally, the risks are even higher because these activities often take place without proper regulation or safeguards. Dredged waste comprises approximately 80 percent of all waste dumped into the ocean, about 10 percent of which is polluted with heavy metals, which can poison the water, marine organisms, and seafood.<sup>16</sup>

As with pollution, there are several systems in place for reporting on legal mining and dredging activities: the ISA provides full transparency around any authorization given for seabed exploitation in international waters, and countries with regulatory structures in place for approving dredging or seabed mining typically have systems of oversight and accountability, even if these do not rise to the level of full public release of data. Similarly, companies involved in legal dredging or mining, especially publicly traded companies, may include information in their annual reports about dredging activities. However, as with pollution, the research team

was unable to identify any formal, mandated reporting systems for illegal dredging or mining. There are examples of researcher-driven or open-source identification of illegal dredging; in particular, satellite imagery has been used to identify dredgers operating illegally or in areas of unclear legal provenance.<sup>17</sup>

## Fisheries Crimes

Fisheries crimes currently have the highest political salience of the three categories of crime. Fisheries crimes are under scrutiny by the United Nations,<sup>18</sup> have been implicated in territorial disputes and geopolitics,<sup>19</sup> and are a focus of law enforcement internationally. The concept of “fisheries crime” covers any crime connected to the fisheries sector, including crimes occurring within the fisheries sector on shore or at sea and covering illegal activities and practices that include both environmental and non-environmental crimes.<sup>20</sup>

One subset of fisheries crime is illegal, unreported, and unregulated (IUU) fishing. These are three distinct but related phenomena. Illegal fishing is, as the name suggests, fishing that takes place in direct contravention of national or international law around where, what, or how fishing can take place. Unreported fishing is fishing that may or may not be illegal in its methods or practices,

but where fish taken are not reported to the relevant reporting bodies. Unregulated fishing is fishing that takes place in waters where there is not the legal authority or regulatory capacity for fishing to be effectively regulated or reported, regardless of the nominal legal requirements.<sup>21</sup>

IUU fishing damages ecosystems by both the overfishing of limited fish stocks and through the use of methods of fishing that are legally barred due to their excessive bycatch or damage to the marine environment. IUU fishing is common internationally: a 2017 estimate found that it was responsible for 20 percent of all fish taken from the ocean, including 32 percent of all fish landed commercially in the United States,<sup>22</sup> while the UN Food and Agriculture Organization (FAO) estimates that IUU fishing is a US\$10 to \$23 billion annual enterprise.<sup>23</sup> At such scale, IUU fishing contributes directly and significantly to the already struggling efforts to prevent overfishing and the loss of potentially sustainable fisheries resources. This means that when considering maritime environmental crimes, there is perhaps no crime quite as significant in its potential global impact as IUU fishing: global fisheries are already profoundly overexploited, and without the ability to effectively regulate fishing and enforce these regulations, there is the real possibility of a global collapse of all food fish to the point where fishing is no longer feasible.<sup>24</sup>



Navy officers stand guard on the M/V Farley Mowat as it navigates near San Felipe, in the Gulf of California, Baja California state, northwestern Mexico, on March 8, 2018, as part of the Sea Shepherd Conservation Society's operation "Milagro IV" to save the critically endangered vaquita porpoise. Photo: GUILLERMO ARIAS/AFP via Getty Images

IUU fishing also has impacts on non-fished species. Fishing regulation typically includes a ban on fishing methods that have unacceptable environmental impacts on secondary species or other environmental domains. These can include requirements that fisheries use methods that limit “bycatch,” or aquatic animals captured as a side effect of catching the intended fish, or bans on exceptionally environmentally destructive methods such as bottom trawling. These regulations attempt, not always successfully, to mitigate the environmental impact of legal fishing on species other than the targeted fish and on their environments. By definition, IUU fishing is acting outside of the law, and as a result is more likely to use these destructive techniques.

IUU fishing is also significantly implicated in serious non-environmental crimes. These range from document forgery and tax avoidance to crew exploitation and forced labor and slavery. Such crimes are not limited to fishing or illegal fishing, but they do appear to be particularly prevalent in this environment due to the nature of the work and the maritime labor structure.<sup>25</sup> IUU fishing has also been implicated in other maritime crimes including human trafficking, and appears to be a key node operating at the intersection of many different maritime crimes.<sup>26</sup>

Unlike the other two maritime crime categories discussed, formal reporting systems do exist for IUU fishing. The Food and Agriculture Organization collects extensive information about fishing and fisheries through subsidiary bodies. This data includes IUU Fishing Vessel lists, which have detailed information provided by governments about vessels caught in IUU fishing. In addition, several civil society organizations collect and release information about IUU fishing activities based

on either governmental reporting or on satellite or AIS data. These systems certainly increase the data available relative to other categories of maritime crime, but the data available are almost often incomplete, fragmented across multiple data sources, and often are made up of self-reported data subject to bias.

## Other Maritime Environmental Crime

These three crimes—illegal pollution, illegal seabed dredging or mining, and fisheries crime—make up the most significant categories of maritime environmental crime. However, the definition of environmental crime used for this report explicitly would also include activities such as damage caused to biodiversity by the release of ballast water, looting of underwater archeological sites, tampering with undersea waste deposits, direct damage to the maritime environment as a byproduct of unsafe or illegal recreation, and any other human activity carried out illegally in ways that damage the marine environment. Even so, the three crimes described represent, in our assessment, the most significant categories currently.

These crimes create ripple effects which extend much farther than the impacts of any one crime on its own. For example, illegal dumping activities can destroy biodiversity and marine health, making fishing grounds less productive and profitable for legitimate fishers, and, by extension, undermining livelihoods and food security and increasing motivations for illicit fishing. No one of these crimes should be considered in a vacuum—though, as we identify in the following sections, this is precisely how data collection and analysis efforts are currently conducted.

# DATA COLLECTION ON MARITIME ENVIRONMENTAL CRIME



*Lacey Malarky, an Oceana campaign manager on illegal fishing and transparency, monitors the GPS position of a fishing boat in the Atlantic ocean from her computer at the headquarters of the NGO Oceana on June 10, 2019 in Washington, DC. Photo: ERIC BARADAT/AFP via Getty Images*

### III. DATA COLLECTION ON MARITIME ENVIRONMENTAL CRIME

This section represents an overview of organizations that are either mandated to collect and release data on maritime environmental crime or those organizations which have voluntarily adopted this as a goal. The research team conducted a series of searches that paired keywords related to the different environmental crimes described above with keywords relating to data, including multiple variations of “data base” or “data set” and keywords such as “monitoring” or “record.” In cases where returns were dominated by a major organization such as the FAO, these searches were duplicated with those organizations removed from the search to help identify smaller entities. As discussed above, this method likely did not capture institutions and data presented solely in languages other than English. It did capture both ongoing data collection and open-ended datasets as well as specific reports and flashbulb data projects that capture a specific moment in time. While all data below is cited, links are provided in text and in Annex 1 to those data which are continuing to be updated or are otherwise ongoing in their collection and public release. Static data and data which are not publicly available are not linked directly.

#### Organizations With A Global Focus

##### *UN System*

##### *Food and Agriculture Organization*

The FAO is a specialized agency of the United Nations that leads international efforts to defeat hunger. Under this mandate, the organization’s Fisheries Division is tasked with undertaking the worldwide collection, compilation, analysis, and diffusion of data and information on fisheries, as well as coordinating the international collaboration and cooperation necessary to achieve this goal. Primarily through the division’s Coordinating Working Party on Fishery Statistics, the FAO has worked to develop and standardize international concepts, definitions, classifications, and methodologies for the collection and collation of fisheries statistics.<sup>27</sup>

Although international in scope, the FAO collects and organizes the majority of its fisheries data regionally—specifically via its extensive and complex system of Regional Fishery Bodies (RFBs) and Regional Fisheries Management Organisations (RFMOs). RFBs and RFMOs are a mechanism through which states or organizations which are parties to an international fishery agreement work collectively towards the conservation, management, and/or development of fisheries. As such, RFBs and RFMOs collect and distribute regional fisheries data to the FAO, which lists over 50 RFBs as direct partners.<sup>28</sup> The FAO also collects data at the national level directly from states themselves.

Once collected, fisheries information is made available through several different data-driven resources, all managed by the FAO and built around the organization’s FIGIS data storage and dissemination system.<sup>29</sup> The Fisheries Division’s [extensive statistics database](#) contains information on total global production, global aquaculture production, global capture production, global tuna catches by stock, global number of fishers, tuna and billfish catches, and consumption of fish and fishery products, as well as more specific regional capture statistical collections. The datasets are publicly available to access as an online query, as a downloadable .csv file, or via the FAO’s FishStatJ software.<sup>30</sup> Data is searchable by country, region, fishing area, species, and time.

Additional resources, such as [the FIRMS portal](#), are available to help convey and visualize data on the global monitoring and management of fishery-related marine resources. FIRMS partners with 17 institutions across 21 RFBs to produce an interactive map of available fisheries sites and resources.<sup>31</sup> For those who prefer a narrative approach, the FAO also publishes its annual Fishery and Aquaculture Statistics yearbook, with reports available up to 2018.<sup>32</sup> IUU Fishing Vessel lists are also available; again, disaggregated by region and based on RFB reporting.<sup>33</sup> Each RFB records as much information as possible about the IUU vessel in question, including the name, flag state, IMO number, call sign, owner, photos, and a description of the IUU activities in question.

##### *Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection*

The GESAMP is an advisory body of the UN established in 1969 that advises on the scientific aspects of marine

## Organizations Collecting Data on Maritime Environmental Crime



### Organizations with a Global Focus



#### UN System

Food and Agriculture Organization

Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection

United Nations Environment Programme



#### Other IGOs

Interpol



#### Civil Society Organizations

Global Fishing Watch

International Seafood Sustainability Foundation

International Tanker Owners Pollution Federation Ltd.

IUU Fishing Index

Litterbase

Monterey Bay Aquarium

Ocean Conservancy

TIDES

Global Ghost Gear Initiative

Pew Charitable Trusts

Spyglass

The Sea Around Us

Trygg Mat Tracking

Conservation International



### Organizations with a Regional Focus



#### European Union

European Union Action to Fight Environmental Crime

European Marine Observation and Data Network

Marine Litterwatch



#### Govt or IGOs

Japan Agency for Marine-Earth Science and Technology

The Pacific States-British Columbia Oil Spill Task Force



#### Civil Society Organizations

SkyTruth

Stop Illegal Fishing

WildAid

The Australian Marine Debris Database



### Organizations with a Domestic Focus

Such as



#### Governmental Departments



#### Civil Society Organizations

environmental protection. Although it is not a database, GESAMP conducts research through its various working groups and task teams and publishes [extensive annual reports](#) on trends and key findings related to marine environmental protection. Key areas of focus include trends in coastal pollution, plastics and microplastics in the ocean, impacts of mining wastes, sea-based sources of marine litter, and biofouling management.<sup>34</sup>

### United Nations Environment Programme

The UNEP maintains an extensive [“World Environment Situation Room” data downloader](#) which serves as a

hub and aggregator of multiple different datasets.<sup>35</sup> These include several datasets with information relevant to maritime environmental crime, including data about oversight of fisheries and maritime pollution. The database is global in scope and can be queried across popular indicators and filtered by country, UN Environment Region (Africa, Asia, Asia and the Pacific, Europe, Latin America and the Caribbean, North America, West Asia, and World), Sustainable Development Goals Region, and Other Region (European Union, Northern Africa, Organisation of Islamic Cooperation, OECD, and Western Africa).

Data of particular relevance to maritime environmental crimes includes Oceans and Coastal Environment (including fish stocks and catch and marine pollution information), Climate Change (including fisheries and artisanal fishing opportunity data from the Ocean Health Index), and Consumption and Production (Ocean Health Index data on biodiversity, carbon storage, mariculture, and species).

### *Other International Governmental Organizations*

#### *Interpol*

In 2018, Interpol carried out its first Operation 30 Days at Sea—a month-long global enforcement operation targeting illicit marine pollution through increased inspection of vessels with a focus on illegal pollution. Based on lessons learned from this first operation, Interpol carried out a second in 2019—Operation 30 Days at Sea 2.0—to take a broader tactical approach in targeting not only pollution at sea, but also waste trafficking through ports, as well as an enhanced focus on plastic pollution. Interpol has published briefing documents elaborating on global- and regional-level key findings and outcomes, including the exposure of 3,789 maritime pollution-related offenses worldwide.<sup>36</sup> These operations and the documents that have come out of them are useful in benchmarking several key facets related to maritime

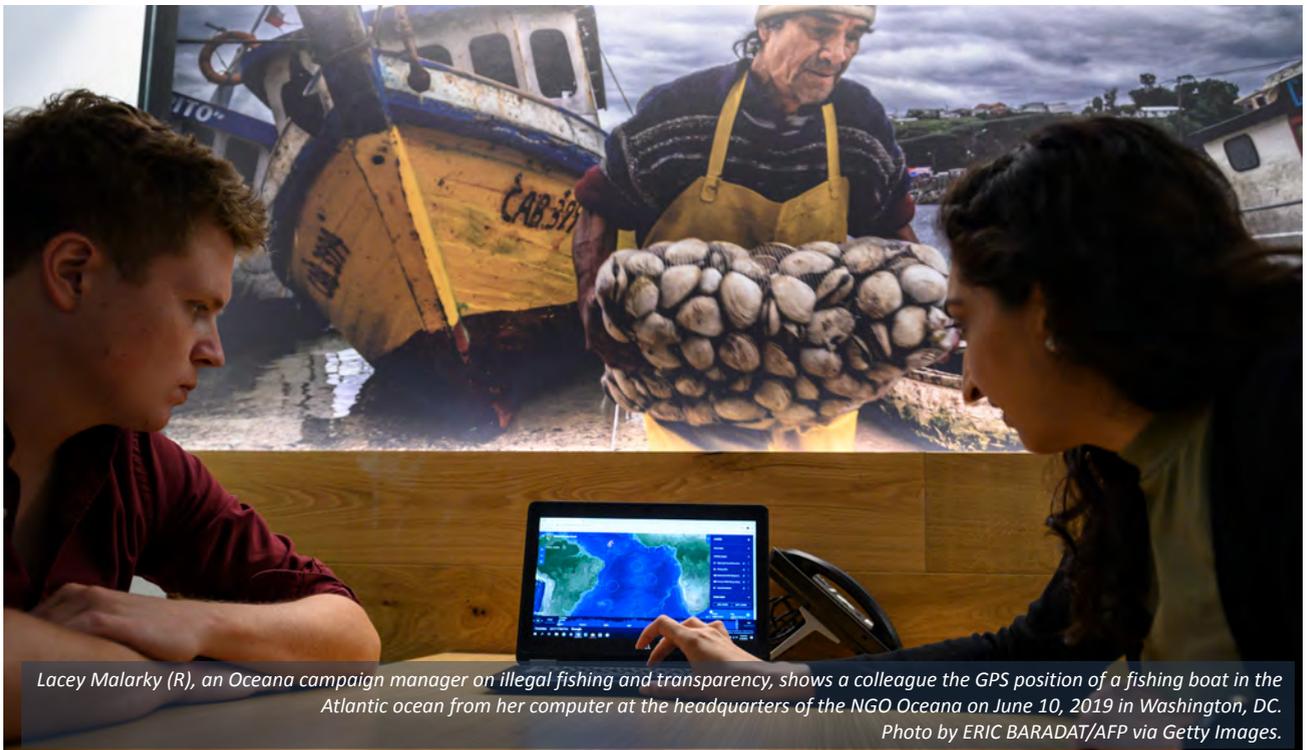
environmental crime, including the outstanding volume of pollutants. However, they represent assessments of single moments of time rather than regularly updated data.

Interpol publishes several guides, studies, and reports pertaining to fisheries crime, though the majority of this data is not publicly available. It is also home to a Fisheries Crime Working Group, which initiates and leads a number of projects to detect and combat fisheries crime, particularly in the West African coastal states. The group has four strategic goals, focusing on enhancing capacity and cooperation to address fisheries crime, providing direct technical support to countries interested in enforcement, improving networks and technical information among fisheries enforcement agencies, and to “encourage and assist the exchange of information and intelligence related to fisheries crime among member countries.” The latter suggests that it may be an important first step towards the establishment of a dedicated fisheries crime database, even if no such database currently exists.<sup>37</sup>

### *Civil Society Organizations*

#### *Global Fishing Watch*

Global Fishing Watch is an NGO originally established as a partnership between several other marine-focused NGOs with the goal of increasing transparency around ocean



*Lacey Malarky (R), an Oceana campaign manager on illegal fishing and transparency, shows a colleague the GPS position of a fishing boat in the Atlantic ocean from her computer at the headquarters of the NGO Oceana on June 10, 2019 in Washington, DC.*

*Photo by ERIC BARADAT/AFP via Getty Images.*

activity. Global Fishing Watch maintains [several datasets](#) using data such as satellite imagery and AIS data to show where fishing vessels are operating, including a [constantly updated map display](#) of global fishing vessels. These data are publicly available, can be used to track fishing activity across the world, and can identify differences between non-fishing vessels (such as tugs, tankers, and sailboats) and fishing vessels (such as trawlers, longliners, and purse seiners).<sup>38</sup> The data can also be used to identify whether a vessel is actively fishing.<sup>39</sup> Several nations have signed agreements with Global Fishing Watch to make their vessel tracking data publicly available in an effort to both encourage information sharing and boost transparency.

### *International Seafood Sustainability Foundation*

ISSF'S [ProActive Vessel Register](#) (PVR) provides a verified resource to support and encourage sustainable fishing. The PVR can be used to research vessels and inform seafood sourcing decisions, and can be searched and filtered by vessel name, type, flag, and other characteristics, and downloaded as a .csv file.<sup>40</sup> Rather than highlighting illicit fishing events, this particular dataset amplifies and rewards licit fisheries activity in an effort to drive seafood purchasing in a more sustainable direction. It aims to deter IUU fishing and other illegal fisheries activity via market-based incentives rather than the identification of wrongdoing.

### *International Tanker Owners Pollution Federation Ltd.*

The ITOPF is a London-based not-for-profit organization focused on providing advice on responses to ship pollution. They maintain [a database of oil spills from tank vessels](#), including combined carriers, Floating Production Storage and Offloading vessels, and barges. Information is gathered from published sources such as specialist publications, shipping press, vessel owners, and insurers, and from first-hand knowledge from ITOPF staff. The raw data is not publicly available, but the statistics and key findings are updated annually, and are published both on the website with a number of visual aids and in the ITOPF's annual report.<sup>41</sup>

### *IUU Fishing Index*

The [IUU Fishing Index](#) is a joint project of Poseidon Aquatic Resource Management Ltd., a for-profit consultancy firm, and the Global Initiative Against

Transnational Organized Crime, a nonprofit organization. The index assesses activities countries can undertake to address IUU fishing based on their role as either coastal, flag, port, or general states engaging with the fishing sector. It assesses performance in addressing IUU fishing using a number of open-source indicators which are weighed and aggregated to generate a final score for 152 countries internationally.<sup>42</sup>

### *Litterbase*

Run by the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, [Litterbase](#) combines a number of different data sources including quantitative datasets, GIS, and more qualitative peer-reviewed literature to visualize the global distribution of marine litter. The database summarizes results from 2,738 scientific studies and includes information on the amount of litter present on beaches and shorelines, in the water column, and on the seafloor, as well as in rivers, lakes, and inland waters.<sup>43</sup>

### *Monterey Bay Aquarium*

In 2018, the Monterey Bay Aquarium's Seafood Watch program, which is known for its red, yellow, and green sustainable food-rating scheme, released a [Seafood Slavery Risk Tool](#) in partnership with Liberty Asia and the Sustainable Fisheries Partnership. The database is designed to help corporate seafood buyers assess the risk of forced human labor, including fisheries slavery, for the seafood they purchase. In its initial iteration, it assessed the potential risk of forced labor in the production chain for seafood caught by vessels registered to different countries internationally. As of March 2020, Seafood Watch is in private beta ahead of the launch of the next iteration of the tool.<sup>44</sup>

### *Ocean Conservancy*

The Ocean Conservancy is a US-based nonprofit focused on ocean environmental issues, and operates several projects built around data availability.

### *TIDES*

The Ocean Conservancy operates the [TIDES database](#), which catalogues and collects litter found on beaches and shorelines and in the water column. The database includes information on the total mass of trash collected,

total area covered, and total number of trash bags filled. It also includes itemized lists of trash collected, broken down by categories such as fishing gear, packaging materials, and personal hygiene products. Although data is publicly available, there is no database management protocol.<sup>45</sup>

### *Global Ghost Gear Initiative*

The [Global Ghost Gear Initiative](#), which is also operated by the Ocean Conservancy, works to find fishing gear that has been lost, abandoned, or otherwise discarded. Data is available from US and European coasts as well as the Asia-Oceania Pacific region, and includes information about different types of “ghost gear” (including nets, lines, pots, and traps), as well as the location, dates collected, and gear class. Data is collected by volunteers and partners who utilize the GGGI Ghost Gear Reporter app to upload their findings. All data is available upon creating a GGGI account.<sup>46</sup>

### *Pew Charitable Trusts*

The Pew Trusts’ Ending Illegal Fishing project is focused on “building a global system to combat illegal fishing by working with governments, fisheries management bodies, enforcement authorities, and the seafood industry to adopt and implement international agreements and regulations, and form multi-State coalitions that will safeguard and protect their waters.”<sup>47</sup> Under this umbrella, and working in partnership with Satellite Applications Catapult (a UK government initiative), Pew launched a Virtual Watch Room aimed at increasing monitoring and enforcement of marine reserves. The Watch Room compiles data from VMS, SAR, AIS, and Optical Satellite Sensors in order to help stakeholders identify suspicious activities.<sup>48</sup> Though innovative, the Watch Room site appears to not have been updated since 2015, but Pew continues to fund and execute extensive work on tracking and modeling IUU fishing. Pew commissioned a study to measure countries’ exposure to IUU fishing through the lens of domestic adherence to the Port State Measures Agreement, and it was released in 2020.<sup>49</sup> Pew has published a visualization of the data collected for this study, including information on port states, ports, flag states, and the top 99 ports by number of foreign vessel visits (2017). Similarly, a 2020 report funded by Pew modeled how sharing information between states may affect IUU fishing.<sup>50</sup>

### *Spyglass*

[Spyglass](#) publishes data and an interactive map visualization designed to expose illegal fishing operations worldwide. The map includes data on a multitude of fishing and transshipment crime categories, including unauthorized fishing and bycatch and species-related, gear-related, zone/season-related, quota-related, and underreporting-related offenses. Spyglass collects information from government agencies, news reports, eyewitnesses, and other sources, and holds records pertaining to over 7,000 ships and 2,000 companies involved in illegal fishing around the world.<sup>51</sup>

### *The Sea Around Us*

The [Sea Around Us](#) is a research initiative of the University of British Columbia that assesses the impact of fisheries on marine ecosystems around the world. Their data visualization tool provides time-series of all marine fisheries catches within a country’s Exclusive Economic Zone since 1950 for all countries in the world, disaggregated by sector (industrial, artisanal, subsistence, or recreational).<sup>52</sup> The organization also provides estimates of unreported catches based on other catch. This is an invaluable tool for benchmarking a state’s annual catch, as well as for informing conversations and policymaking around the role of fisheries at both the national and international levels.

### *Trygg Mat Tracking*

Norwegian nonprofit TMT provides fisheries intelligence, analysis, and capacity support to national authorities and relevant international institutions. Their [Combined IUU Fishing Vessel List](#), which is publicly available and easily accessible online, provides a comprehensive list of fishing vessels which appear on lists of IUU vessels published by RFBs, RFMOs, and other related organizations.<sup>53</sup> Data provided by TMT is updated frequently and serves as a single reference point to identify whether a vessel has been IUU listed.

### *Conservation International*

Conservation International’s [Ocean Health Index](#) is a first-of-its-kind policy tool and framework which scientifically measures key elements of biological, physical, economic, and social health in order to guide decision-makers toward sustainable use of the ocean.<sup>54</sup> OHI is updated

annually, utilizes information from over 120 different databases, and calculates scores for 221 countries and territories. It measures progress on 10 “human goals,” including artisanal fishing opportunities, carbon storage, clean waters, and biodiversity, which are particularly relevant when analyzing maritime environmental crime.

## Organizations With A Regional Focus

### European Union

#### *European Union Action to Fight Environmental Crime*

EFFACE was a 40-month EU-funded research project which assessed the impacts of environmental crime as well as effective and feasible policy options for combating it from an interdisciplinary perspective. Though the project ended in 2016, its reports are still available online to download, and contain quantitative analyses of several issues related to maritime environmental crime, disaggregated by region, including the Baltic Sea, Black Sea, Mediterranean Sea, Arctic Sea, and the North Sea and English Channel. Issues covered include fisheries, protected areas, and extensive coverage of marine pollution.<sup>55</sup>

#### *European Marine Observation and Data Network*

EMODnet Chemistry produces a pan-[European Marine Litter Database](#) which contains data on beach and seafloor litter from a variety of sources, including data submitted by EU member states and international and regional sea conventions. The database also contains separate data on floating micro-litter, for which monitoring and management are more fragmented. Both sets of data are publicly available, either for download or to visualize via the website’s map viewer.<sup>56</sup>

#### *Marine Litterwatch*

Operated by the European Environment Agency, the [Marine LitterWatch](#) database tracks litter on the coastlines of most of Europe, including a total count and itemized breakdown of all items collected and observed (including plastic, cloth/textile, and glass/ceramics). The data in Marine LitterWatch is all publicly available; however, it is also captured by the communities involved in cleanup activities with no further vetting before being uploaded to the system, meaning further vetting of the

data would be necessary before it could be used for scientific or statistical analyses.<sup>57</sup>

### Government or International Governmental Organizations

#### *Japan Agency for Marine-Earth Science and Technology*

JAMSTEC operates the [Deep-Sea Debris Database](#), which is a composite of filmed and photographed debris found on the seafloor off the coast of Japan and in the Pacific Ocean. Data includes information on location; the type of debris (plastic, glass, rubber, cloth, etc.); the date it was observed; whether organisms were interacting with or seen near the debris; quantity of debris by type, location, and depth; and the characteristics of the sediment near the debris. While some of the data is labeled as unavailable for public reuse, the majority is open and available to all for scientific and educational purposes.<sup>58</sup>

#### *The Pacific States-British Columbia Oil Spill Task Force*

This task force was originally established in 1989 with a mission to improve the Pacific Coast’s prevention of, preparedness for, response to, and recovery from oil spills. The group now includes Alaska, Washington, Oregon, California, Hawaii, and British Columbia. Their [Oil Spill Data Project](#) serves as a regional oil spill database, collecting data on all reported spills of one barrel or larger, as well as some data for small spills under one barrel. Data is publicly available and based on the submitting agency’s best information at the time of submission, and no additional independent investigations are conducted to ensure data quality.<sup>59</sup>

### Civil Society Organizations

#### *SkyTruth*

Focused mostly on the waters surrounding the United States, SkyTruth’s Oceans project includes work to document various aspects of maritime environmental crime, including oil spills, vessel pollution at sea, and fishing activity. Project Cerulean is the organization’s systematic endeavor to curb bilge dumping based on using machine learning tools to automate identification of dumping vessels.<sup>60</sup> It is bolstered by other ongoing work to map offshore infrastructure, thereby identifying areas that are at high risk for pollution events from oil

and gas drilling and shipping.<sup>61</sup> SkyTruth uses satellite data as well as AIS to detect and map vessels and oil and gas infrastructure with a goal to ultimately automate the detection of marine oil pollution.

### *Stop Illegal Fishing*

Stop Illegal Fishing is an African-based nonprofit which works to combat illegal fishing in partnership with governments, civil society, NGOs, intergovernmental organizations, and the fishing industry. They host an online platform to collect photographs of vessels in order to establish identity, as well as a database of information on fishing vessels, focusing on those known to operate in the African region, though the data they collect is not publicly available.<sup>62</sup>

### *WildAid*

WildAid has developed an app—the Officer Fishery Information Sharing Hub, or O-FISH—that is available for Android, iOS, and with desktop accessibility, and which is intended to be used by rangers who enforce fishing restrictions in dozens of marine protected areas, thereby allowing them to search for and enter information about unlawful fishing, even when in remote areas. The app and the data it connects to make enforcement activities more efficient and allow rangers to more easily identify repeat offenders and learn whether a vessel has a history of having weapons on board.<sup>63</sup> As of May 2021, the app does not appear to be hosted on the iOS or Android app stores, but WildAid has made the source code for the app available on GitHub, allowing organizations to implement it directly.<sup>64</sup>

### *The Australian Marine Debris Database*

Organized by an Australian NGO called the Tangaroa Blue Foundation, the [Australian Marine Debris Database](#) collects information on beach litter, mostly on the Australian coasts, with some additional information from the Asia Pacific and Oceania regions, as well. Data is collected from volunteers and organizations who run beach cleanup events, count and itemize litter based on set specifications, and submit reports with approximate weight and length of area of cleanup (with optional photographs). The information is then vetted before approval and acceptance into the system. Data is publicly available upon request.<sup>65</sup>

## **Organizations With A Domestic Focus**

As with the global and regionally focused organizations, organizations with a domestic focus that report information about maritime environmental crime can include formal governmental departments (including those relating to law enforcement as well as the maritime sector) as well as civil society organizations acting as watchdogs.

As is a theme of this brief, the breadth of maritime environmental crimes means that the data available about the overall picture of environmental crime is fragmented in both its thematic and geographic coverage. Similarly, the nature of environmental crime means that many of the tracking and reporting systems report the symptoms rather than the crime itself. To illustrate both of these issues, consider three data sources in the United States. The Office of Response and Restoration (OR&R) at the National Oceanic and Atmospheric Administration (NOAA) maintains a continuously updated, raw, downloadable database of incidents reported to the organization. It covers selected oil spills in US coastal waters and other incidents where the OR&R provided scientific support for the spill response. Data is searchable by open date (the date NOAA was notified of the incident), location, threat type, commodity, and ID number, and also contains more detailed descriptions of each event.<sup>66</sup> Separately, NOAA manages the US-focused MDMAP, which is an initiative to compile a record of the amount and types of debris in the environment. Through regular monitoring, NOAA hopes to track the progress of existing marine debris-prevention initiatives and identify targets for future mitigation efforts. This is a citizen science initiative which engages partner organizations and volunteers, and includes a Marine Debris Tracker App, which is available for both Android and iOS.<sup>67</sup> Similar data is provided by the Coastal Observation and Seabird Survey Team (COASST) at the University of Washington, which focuses on beach litter and ingested litter in Washington and Oregon. The database provides information on numbers as well as item types (color, material, size, floppiness, loops, logos, brands, etc.), and sources its information from trained citizen-scientist volunteers who collect data following the standard protocols developed by COASST. Although the raw data is normally unpublished, the data is available upon request.<sup>68</sup>

The first of these sources reports on oil spills, providing information about the event itself, including the actors involved. These spills are not necessarily crimes, although they can result from criminal acts. The second and third report information only about the relative prevalence of ocean litter, and do not directly provide data about the crimes that generated this litter.

*At the national level, the varying legal regimes and civil society organizations mean that there are varying sources for data about different specific crimes, but in general, this area remains significantly underdeveloped in terms of the frequency of the updates of the data.*

At the national level, the varying legal regimes and civil society organizations mean that there are varying sources for data about different specific crimes, but in general, this area remains significantly underdeveloped in terms of the frequency of the updates of the data. The prevalence and sourcing of maritime pollution is an active area of research, with many different universities generating specific estimates or models of the sources of such pollution. However, ongoing data collection and release at the national level remains underdeveloped and idiosyncratic, relying largely on civil society and voluntary reporting—especially around ocean pollution.

*French fishermen fish scallops after a three-year ban on October 30, 2012 off Quiberon, western France. Photo: FRED TANNEAU/AFP via Getty Images*

# ANALYSIS



## IV. ANALYSIS

### Analysis and Summary

Overall, what we know about maritime environmental crime is fragmented and inconsistent. In some issue domains, most notably illegal fishing, and to a lesser extent, oil spills and marine litter, relevant data is increasingly collected in a systematic fashion and made publicly available. In others, most notably illegal mining and dredging and oil bunkering, there is little data available. In all cases, there are regional gaps where some areas have well-developed systems and others have less-developed systems. Exacerbating this fragmentation is the fact that maritime environmental crime is not a generally accepted category of analysis so far, with specific issues being siloed in different legal regimes within and across states and international organizations. Fisheries management and fisheries data are often captured in wholly different regulatory and oversight bodies than mining data (even seabed mining), while pollution is typically overseen by further separate environmental entities.

### Data Availability

The amount and types of data available on maritime environmental crime have been growing in recent decades, but still vary widely by both issue area and region. Data collection on illegal mining, dredging, and oil bunkering is minimal. Datasets on oil spills and marine litter are relatively abundant, yet are typically gathered from state-level reporting, with additional data from the occasional piece of peer-reviewed literature or crowdsourced beach cleanup efforts (which sometimes is not as scientifically robust a form as other methods). These data are notable in that they quantify and track illegal activity after the fact. As such, the information in this space generally tends to be reactive rather than preventive in terms of its efficacy for policymakers. Additionally, what little data is collected on oil spills does not usually capture the intent behind the spill, thereby obscuring the criminality or other circumstances of such activities.

When it comes to fisheries, international, regional, and national-level authorities collect, report, and store large

amounts of data. The information available is often difficult to locate, technically dense, and awkward to manipulate. While data collected on fisheries is perhaps the most extensive available for the crimes considered here, it focuses on IUU fishing, or on benchmarking existing fish stocks and catch values. The High Level Panel for a Sustainable Ocean Economy has also acknowledged that the current “scientific output and data on criminality in the fisheries sector speak almost exclusively to illegal or unreported fishing, which does not take into account the range of criminal offences that occur throughout the fisheries value chain.”<sup>69</sup> The data that is collected is still insufficient to adequately measure and map the wide range of maritime environmental crimes at play.

When compared with the amount of data related to fisheries crime and oil spills, the dearth of information on illegal extraction, oil bunkering, and dredging is striking. Intermittent data on all three issues does exist, but only in the form of short news stories and one-off peer-reviewed articles, frequently focusing on one state and issue in particular—such as illegal bunkering off the coast of Nigeria, or illicit dredging efforts underway in the South China Sea.

*When compared with the amount of data related to fisheries crime and oil spills, the dearth of information on illegal extraction, oil bunkering, and dredging is striking.*

Geographically, the existence and quality of data available tend to follow a loose pattern: the majority of comprehensive data tends to come from states in the Global North, while gaps and inconsistencies tend to be the norm in states across the Global South. The United States and the European Union—and their regional RFMOs as well as several RFMOs focused on the Pacific (including the WCPFC and SEAFDEC)—consistently collect relatively high-quality data and make that data readily available to the general public. It is likely not a coincidence that states with more resources collect and report on more datapoints related to maritime environmental crime.

Even within the regions and organizations that publish the most data related to environmental crime, there is

a universal acknowledgement that more data collection and dissemination is needed to effectively combat illicit activities. A 2016 EU-sponsored *Report on Environmental Crime* notes that the “most likely sources of consolidated data are international institutions (such as Conventions and the EU). However, even here data are often limited.” It also notes that this gap likely contributes to both an underestimation of the seriousness of such crimes and an “inadequate awareness on their dramatic effects, which consequently is followed by a lack of political will to invest resources in the fight against them.”<sup>70</sup>

Overall, the information collected is publicly available more often than not, although occasionally access requires the creation of an account and/or the downloading of an app. Where information is not available, this typically is a result of the fact that no data has been collected, or, as in the case of Interpol, the data is restricted due to its sensitive nature. *Access to the data*, however, is a separate matter from that of the *accessibility of the data*, which can form another barrier to understanding: depending on the nature of the stakeholders involved, for example, internet-based or aggregate data may not be accessible. In other cases, the data may be technically accessible but not available in the languages most relevant to specific audiences, or the existence of the data may not be widely known or communicated.

## Diversity and Disaggregation of Data

The diversity of potential data across different forms of environmental crime complicates collection and aggregation. Organizations tend to compartmentalize different forms of environmental crime, which obscures convergences and synergies. Efforts to aggregate data, where they do exist, tend to be one-off individual studies and reports which pull data from across multiple sources, but rarely in a continuing or systematic way. For example, a 2018 article titled “Modern Slavery and the Race to Fish,” published in the journal *Nature Communications*, explored labor abuses in the fisheries sector. The authors took an innovative approach, leveraging fisheries and seafood trade data from The Sea Around Us with country-level slavery data from the Global Slavery Index and international fish trade data from the UN’s COMTRADE database in order to formulate a clearer picture of countries’ risk of experiencing slavery in the fisheries

industry. Ultimately, they identified “a correlation between the prevalence of modern slavery within a country and proxies for poor fisheries accountability . . . and low profitability . . . in the industrial fisheries of the major fishing countries.”<sup>71</sup> This is an excellent example of how much could be possible if more and better data on maritime environmental crime were collected and analyzed. Unsurprisingly, one of the report’s key recommendations was to conduct further research into modern slavery in the fisheries sector.

This diversity is a problem even within issue areas. In the case of fisheries crimes, regional organizations (such as the RFBs, RFMOs, the EU, and regionally focused NGOs) do most of the lifting, collecting, and collating of all information related to IUU fishing vessels and activity, as well as fish stocks and catch data. However, the presentation and availability of data from RFBs is not standardized—even within and across the FAO’s online system. Data collection on illegal mining, bunkering, and dredging is not collected in any kind of standardized, systematic way, let alone stored in a central repository.

Much of the available data for pollution is not maritime-specific. Specific to illegal dumping, data on marine litter tends to be stored alongside information regarding land-based dumping, which may further complicate data extraction and convoluted analysis.

## Compliance and Reporting

With the limited exception of reporting around fisheries to the FAO, the quality of official marine environmental data is not high. In particular, there are significant gaps in formal reporting requirements for issues relating to pollution and illegal dredging activities. The significant efforts made by NGOs in monitoring environmental crimes using a variety of different measures suggests that this is ultimately a failure of political will as well as resource availability and capacity. It is clearly possible to develop systems for tracking the impact of maritime environmental crimes, and in many cases for direct identification of the perpetrators as well. However, such systems are not well-developed internationally: many countries, including many developed countries, do not regularly monitor maritime environmental crimes or publicly report on their prevalence.

## Looking Forward

A clearer picture of maritime environmental crime as a whole will be beneficial to relevant agencies and law enforcement efforts to address these crimes, identify weaknesses in countermeasures, and address their root causes and intersections.

In particular:

- Data gaps should be identified and acknowledged to help guide future collection and in order to overcome the current imbalance towards collecting data on certain forms of maritime crime.
- Building national capacity and developing political willingness is required to ensure

these (often less-prioritized) crimes are more comprehensively monitored and reported.

- More efforts should be made to aggregate data, especially around different forms of pollution and various fisheries crimes, to better recognize convergences and synergies.
- NGOs and communities have the potential to contribute significantly to these datasets and ameliorate some data availability problems, including under- or non-reporting by individual states. There should be greater engagement with these and more collaboration between them.



Workers place oil absorbent booms on the beaches of Taboga Island in Panama on June 10, 2021. - A oil liquid spill has affected the beaches of the tourist island of Taboga, informed the Panama Maritime Authority. Photo by LUIS ACOSTA/AFP via Getty Images

## ANNEX: DATA SOURCES RELEVANT TO MARITIME ENVIRONMENTAL CRIME

The below list includes active and ongoing data sources that are relevant to maritime environmental crimes.

**Australian Marine Debris Database:** <http://amdi.tangaroablue.org/>

**AWI Litterbase:** <https://litterbase.awi.de/litter>

**Combined IUU Fishing Vessel List:** <https://www.iuu-vessels.org/>

**European Environment Agency Marine LitterWatch:** <https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/marine-litterwatch/data-and-results/marine-litterwatch-data-viewer>

**European Marine Litter Database:** <https://www.emodnet-chemistry.eu/marinelitter>

**FAO Fisheries and Resources Monitoring System (FIRMS):** <http://firms.fao.org/firms/about/en>

**FAO Global Production Database:** <http://www.fao.org/fishery/statistics/global-production/en>

**FAO Yearbooks of Fisheries Statistics:** <http://www.fao.org/fishery/publications/yearbooks/en>

**GESAMP publications:** <http://www.gesamp.org/publications>

**Global Ocean Health Index:** <http://www.oceanhealthindex.org/>

**Global Fishing Watch Datasets:** <https://globalfishingwatch.org/datasets-and-code/>

**Global Fishing Watch Map:** <https://globalfishingwatch.org/our-map/>

**Global Ghost Gear Initiative:** <https://globalghostgearportal.net/login.html>

**ISSF ProActive Vessel Register:** <https://iss-foundation.org/knowledge-tools/public-vessel-lists/proactive-vessel-register/>

**ITOPF Oil Tanker Spill Statistics:** <https://www.itopf.org/knowledge-resources/data-statistics/statistics/>

**JAMSTEC Deep-Sea Debris Database:** <https://internationalwasteplatform.org/jamstec-deep-sea-debris-database/>

**Ocean Conservancy TIDES Database:** <https://www.coastalcleanupdata.org/>

**Oil Spill Task Force Oil Spill Data Project:** <http://oilspilltaskforce.org/ourwork/data-project/>

**The Sea Around Us:** <http://www.seaaroundus.org/data/#/eez>

**Seafood Slavery Risk Tool:** <https://libertyshared.org/ssrt-beta>

**Spyglass:** <https://spyglass.fish/>

**UNEP World Environment Situation Room Data Downloader:** <https://uneplive.unep.org/downloader>

## ENDNOTES

- 1 Christian Bueger and Timothy Edmunds, “Blue Crime: Conceptualising Transnational Organised Crime at Sea,” *Marine Policy* 119 (2020), DOI 104067, <https://www.sciencedirect.com/science/article/pii/X20300270>.
- 2 Gian Maria Farnelli and Attila Tanzi, “Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 and 1996 Protocol,” in *Elgar Encyclopedia of Environmental Law* (Edward Elgar Publishing Limited, 2017), 175–83, [https://www.elgaronline.com/view/nlm-book/9781786436986/b-9781783477210-V\\_16.xml](https://www.elgaronline.com/view/nlm-book/9781786436986/b-9781783477210-V_16.xml).
- 3 Olav Schram Stokke, “Beyond Dumping? The Effectiveness of the London Convention,” *Yearbook of International Co-Operation on Environment and Development (YBICED) 1999* (1998): 39–49.
- 4 “Marine Pollution: Thousands of Serious Offences Exposed in Global Operation,” Interpol, December 16, 2019, <https://www.interpol.int/en/News-and-Events/News/2019/Marine-pollution-thousands-of-serious-offences-exposed-in-global-operation>.
- 5 Jenna R. Jambeck, Roland Geyer, Chris Wilcox, Theodore R. Sieglar, Miriam Perryman, Anthony Andrady, Ramani Narayan, and Kara Lavender Law, “Plastic Waste Inputs from Land into the Ocean,” *Science* 347, no. 6223 (2015): 768–71.
- 6 L. Lebreton, B. Slat, F. Ferrari, B. Sainte-Rose, J. Aitken, R. Marthouse, S. Hajbane et al., “Evidence That the Great Pacific Garbage Patch Is Rapidly Accumulating Plastic,” *Scientific Reports* 8, no. 1 (March 22, 2018): 4666, <https://doi.org/10.1038/s41598-018-22939-w>.
- 7 “Ocean Pollution,” MarineBio, <https://marinebio.org/conservation/ocean-dumping/>.
- 8 “Oil Spills,” National Oceanic and Atmospheric Administration, <https://www.noaa.gov/education/resource-collections/ocean-coasts/oil-spills>.
- 9 Alvin Forster, “Preventing Bunker Spills,” Safety4Sea, 2018, <https://safety4sea.com/preventing-bunker-spills/>.
- 10 “Seabed Mining,” The Ocean Foundation (blog), August 7, 2010, <https://oceanfdn.org/seabed-mining/>.
- 11 “Exploration Contracts—International Seabed Authority,” International Seabed Authority, accessed April 29, 2021, <https://www.isa.org.jm/exploration-contracts>.
- 12 “Seabed Mining,” The Ocean Foundation.
- 13 Shane McGinley, “Bahrain Bans Sand Dredging in Order to Repair Seabed - Report,” *ArabianBusiness.com*, September 1, 2019, <https://www.arabianbusiness.com/culture-society/426914-bahrain-bans-sand-dredging-in-order-to-repair-seabed-report>.
- 14 H. I. Sutton, “Satellites Show Scale of Suspected Illegal Dredging in South China Sea,” *Forbes*, May 12, 2020, <https://www.forbes.com/sites/hisutton/2020/05/12/satellites-show-scale-of-suspected-illegal-dredging-in-south-china-sea/>.
- 15 “Deep Sea Mining,” Ocean Unite, accessed April 27, 2021, <https://www.oceanunite.org/issues/deep-sea-mining/>.
- 16 “Ocean Pollution,” MarineBio.
- 17 Hongtao Duan, Zhigang Cao, Ming Shen, Dong Liu, and Qitao Xiao, “Detection of Illicit Sand Mining and the Associated Environmental Effects in China’s Fourth Largest Freshwater Lake Using Daytime and Nighttime Satellite Images,” *Science of The Total Environment* 647 (January 10, 2019): 606–18, <https://doi.org/10.1016/j.scitotenv.2018.07.359>.
- 18 United Nations General Assembly, “Sustainable Fisheries, Including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and Related Instruments,” Pub. L. No. A/RES/63/112 (2008).
- 19 Michael Sinclair, “The National Security Imperative to Tackle Illegal, Unreported, and Unregulated Fishing,” Brookings (blog), January 25, 2021, <https://www.brookings.edu/blog/order-from-chaos/2021/01/25/the-national-security-imperative-to-tackle-illegal-unreported-and-unregulated-fishing/>.
- 20 Emma Witbooi, Kamal-Deen Ali, Mas Achmad Santosa, Gail Hurley, Yunus Husein, Sarika Maharaj, Ifesinachi Okafor-Yarwood et al., “Organized Crime in the Fisheries Sector Threatens a Sustainable Ocean Economy,” *Nature* 588, no. 7836 (December 2020): 48–56, <https://doi.org/10.1038/s41586-020-2913-5>.
- 21 “What Is IUU Fishing? Illegal, Unreported and Unregulated (IUU) Fishing,” Food and Agriculture Organization of the United Nations, 2021, <http://www.fao.org/iuu-fishing/background/what-is-iuu-fishing/en/>.
- 22 “Up to 1 in 5 Fish Sold Is Caught Illegally—and Other Surprising Illegal Fishing Facts,” Pew Charitable Trusts, November 13, 2017, <http://pew.org/2zGMZTo>.

- 23 “Illegal, Unreported and Unregulated (IUU) Fishing,” Food and Agriculture Organization of the United Nations.
- 24 Boris Worm, Edward B. Barbier, Nicola Beaumont, J. Emmett Duffy, Carl Folke, Benjamin S. Halpern, Jeremy B.C. Jackson et al., “Impacts of Biodiversity Loss on Ocean Ecosystem Services,” *Science* 314, no. 5800 (November 3, 2006): 787–90, <https://doi.org/10.1126/science.1132294>.
- 25 Melissa Marschke and Peter Vandergeest, “Slavery Scandals: Unpacking Labour Challenges and Policy Responses within the Off-Shore Fisheries Sector,” *Marine Policy* 68 (June 1, 2016): 39–46, <https://doi.org/10.1016/j.marpol.2016.02.009>.
- 26 Bueger and Edmunds, “Blue Crime.”
- 27 “Fisheries Statistics and Information,” Food and Agriculture Organization of the United Nations, <http://www.fao.org/fishery/information/en>.
- 28 “RFB Fact Sheets,” Food and Agriculture Organization of the United Nations, <http://www.fao.org/fishery/rfb/search/en>.
- 29 “About FIGIS,” Food and Agriculture Organization of the United Nations, <http://www.fao.org/fishery/topic/18043/en>.
- 30 “Global Production,” Food and Agriculture Organization of the United Nations, <http://www.fao.org/fishery/statistics/global-production/en>.
- 31 “Fisheries and Resources Monitoring System,” Food and Agriculture Organization of the United Nations, <http://firms.fao.org/firms/about/en>.
- 32 “Publications,” Food and Agriculture Organization of the United Nations, <http://www.fao.org/fishery/publications/yearbooks/en>.
- 33 “Illegal, Unreported and Unregulated (IUU) Fishing,” Food and Agriculture Organization of the United Nations, <http://www.fao.org/iuu-fishing/regional-mechanisms/rfb-iuu-vessels-lists/en/>.
- 34 “Our Work,” Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection, <http://www.gesamp.org/work/groups>.
- 35 “Data Downloader,” UN Environment Programme, <https://uneplive.unep.org/downloader>.
- 36 “Key Findings Report: Operation 30 Days at Sea 2.0 (2019),” Interpol, 2019, [https://www.google.com/url?q=https://www.interpol.int/en/content/download/16122/filePublic%20KEY%20OF%20REP%20OP%2030%20Days%20at%20Sea%202.0%202019%20FINAL.PDF&sa=D&source=editors&ust=1617732970756000&usg=AOvVaw1436ETyduSz\\_7ZD4y9BjuO](https://www.google.com/url?q=https://www.interpol.int/en/content/download/16122/file/Publication%20KEY%20OF%20REP%20OP%2030%20Days%20at%20Sea%202.0%202019%20FINAL.PDF&sa=D&source=editors&ust=1617732970756000&usg=AOvVaw1436ETyduSz_7ZD4y9BjuO).
- 37 “Fisheries Crime Working Group,” Interpol, <https://actionguide.info/m/orgs/429/>.
- 38 “Our Dataset – Now Available,” Global Fishing Watch, 2018, <https://globalfishingwatch.org/research/dataset-now-available/>.
- 39 “Vessel Tracking Map,” Global Fishing Watch, <https://globalfishingwatch.org/map>.
- 40 “ProActive Vessel Register (PVR),” International Seafood Sustainability Foundation, <https://iss-foundation.org/knowledge-tools/public-vessel-lists/proactive-vessel-register/>.
- 41 “Oil Tanker Spill Statistics 2020,” International Tanker Owners Pollution Federation, 2020, <https://www.itopf.org/knowledge-resources/data-statistics/statistics/>.
- 42 “Methodology for IUU Fishing Index,” IUUFishingIndex.net, 2018.
- 43 “Distribution of Litter Types in Different Realms,” Litterbase, <https://litterbase.awi.de/litter>.
- 44 “Seafood Slavery Risk Tool,” <https://libertyshared.org/ssrt-beta>.
- 45 “TIDES,” Ocean Conservancy, <https://www.coastalcleanupdata.org/>.
- 46 “Data Portal,” Global Ghost Gear Initiative, <https://global-ghostgearportal.net/dp/usermanagement/login.php>.
- 47 “Ending Illegal Fishing,” Pew Charitable Trusts, <https://www.pewtrusts.org/en/projects/ending-illegal-fishing-project>.
- 48 “The Virtual Watch Room,” Pew Charitable Trusts, <https://www.pewtrusts.org/en/research-and-analysis/factsheets/2015/01/virtual-watch-room>.
- 49 “Port Activity Study Reveals Potential for Illegal Fish to Enter Markets,” Pew Charitable Trusts, 2020, <https://www.pewtrusts.org/en/research-and-analysis/data-visualizations/2020/port-activity-study-reveals-potential-for-illegal-fish-to-enter-markets>.
- 50 Cebr, *An Agent-Based Model of IUU Fishing in a Two-State System with Information Sharing*, a Cebr report for the Pew Charitable Trusts (London: Centre for Economics and Business Research, 2020).
- 51 “Spyglass: Fishing Vessels’ Criminal Records,” a project of Ecotrust Canada, <https://spyglass.fish/>.
- 52 Sea Around Us, <http://www.seaaroundus.org/data/#/eez>.
- 53 “Combined IUU Vessel List,” Trygg Mat Tracking, <https://www.iuu-vessels.org/>.
- 54 Ocean Health Index, <http://www.oceanhealthindex.org/>.

- 55 “EFFACE – A Research Project on Environmental Crime,” EFFACE, <https://efface.eu/#:~:text=EFFACE%20%2D%20short%20for%20%E2%80%9CEuropean%20Union,month%20EU%20funded%20research%20project.&text=EFFACE%20assessed%20the%20impacts%20of,It%20ended%20in%20March%202016>.
- 56 “Marine Litter,” EMODnet, <https://www.emodnet-chemistry.eu/marinelitter>.
- 57 “Marine LitterWatch Data Viewer,” European Environment Agency, <https://www.eea.europa.eu/themes/water/eu-ropes-seas-and-coasts/assessments/marine-litterwatch/data-and-results/marine-litterwatch-data-viewer>.
- 58 “International Waste Platform,” JAMSTEC, <https://internationalwasteplatform.org/jamstec-deep-sea-debris-database/>.
- 59 “Oil Spill Data Project,” The Pacific States-British Columbia Oil Spill Task Force, <http://oilspilltaskforce.org/ourwork/data-project/>.
- 60 “Tech Tools: Right-sizing Our Data Pipeline to Detect Polluters,” SkyTruth, 2020, <https://skytruth.org/2020/06/right-sizing-our-data-pipeline-to-detect-polluters/>.
- 61 “Offshore Drilling and Infrastructure: Why Should I Care?,” SkyTruth, <https://skytruth.org/offshore-drilling-and-infrastructure/>.
- 62 “VISIBLE,” Stop Illegal Fishing, <https://stopillegalfishing.com/initiatives/visible/>.
- 63 “Tracking Illegal Fishing? There’s (Finally) an App for That,” WildAid, 2020, <https://wildaid.org/tracking-illegal-fishing-theres-an-app-for-that/>.
- 64 *WildAid/O-Fish-Realm*, JavaScript (2020; repr., WildAid, 2021), <https://github.com/WildAid/o-fish-realm>.
- 65 “Australian Marine Debris Database,” Tangaroa Blue and the Australian Marine Debris Initiative, <http://amdi.tangaroablue.org/>.
- 66 “Raw Incident Data,” National Oceanic and Atmospheric Administration, <https://incidentnews.noaa.gov/raw/index>.
- 67 “Marine Debris Monitoring and Assessment Project,” National Oceanic and Atmospheric Administration, <https://marinedebris.noaa.gov/research/marine-debris-monitoring-and-assessment-project>.
- 68 The Coastal Observation and Seabird Survey Team, “COASST’s Explore Data App,” <http://3.223.50.225:3838/Explore-data/>.
- 69 Emma Witbooi, Kamal-Deen Ali, and Mas Achmad Santosa, “Organised Crime in the Fisheries Sector,” High Level Panel for A Sustainable Ocean Economy, 2020, <https://oceanpanel.org/sites/default/files/2020-09/Organised%20Crime%20Associated%20with%20Fisheries.pdf>.
- 70 “Report on Environmental Crime,” EnviCrimeNet, 2016, <http://www.envicrimenet.eu/images/docs/envicrimenet%20report%20on%20environmental%20crime.pdf>.
- 71 David Tickler, Jessica J. Meeuwig, Katharine Bryant, Fiona David, John A.H. Forrest, Elise Gordon, Jacqueline Joudo Larsen et al., “Modern Slavery and the Race to Fish,” *Nature Communications* 9 (2018), <https://www.nature.com/articles/s41467-018-07118-9>.

## SAFE SEAS

*safeseas.net* 

SafeSeas is a network of research organisations that investigate maritime security. The focus is on maritime threats and 'blue crimes', and responses in the form of law enforcement & policing, capacity building, or environmental and sustainable development.

## STABLE SEAS

*stableseas.org* 

Stable Seas, a program of One Earth Future, engages the international security community with novel research on illicit maritime activities such as piracy and armed robbery, trafficking and smuggling in persons, IUU (illegal/unregulated/unreported) fishing, and illicit trades in weapons, drugs, and other contraband. These activities perpetuate organized political violence and reinforce each other to threaten economic development and the welfare of coastal populations.

## ONE EARTH FUTURE

*oneearthfuture.org*



ONE EARTH FUTURE fosters sustainable peace by partnering with innovative world leaders, global development agencies and communities to see complex problems at the root of armed conflict in new ways and solve them together through orchestrated collaboration.

---

## CONTACT US

 [stableseas@oneearthfuture.org](mailto:stableseas@oneearthfuture.org)

---