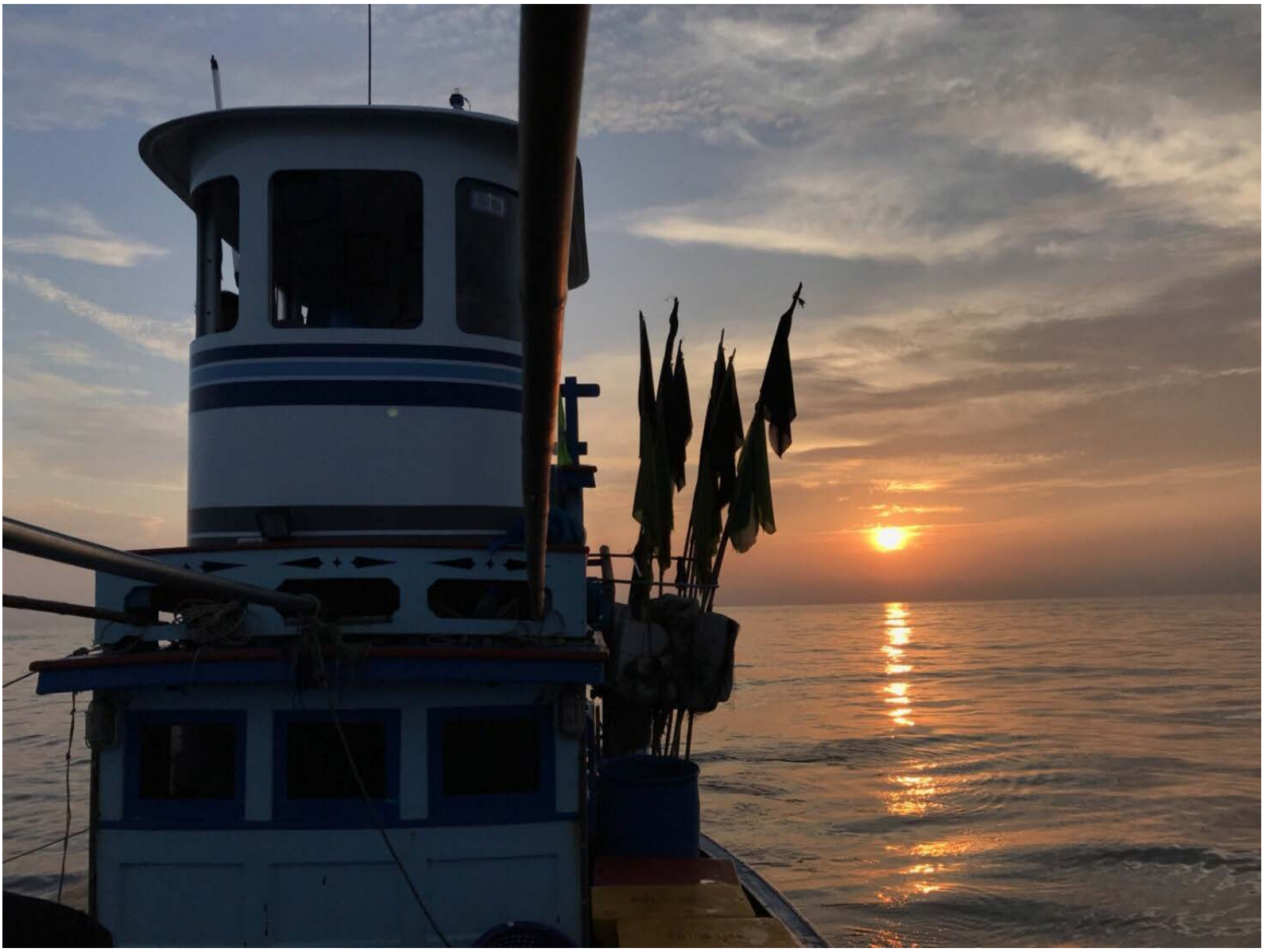
BEST MODELS FOR SUSTAINABLE FISHERIES MANAGEMENT



MAST THAILAND

www.masthuman.org

SO JIN KIM
DILLON RAJAKARIER
DORNNAPHA SUKKREE

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ABBREVIATIONS

BMSY	Biomass Maximum Sustainable Yield
BSBLCP	The Black Sea Biodiversity and Landscape Conservation Protocol
BSIMAP	Black Sea Integrated Monitoring and Assessment Program
CBD	Convention on Biological Diversity
CBM	Community-Based Management
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CFP	The Common Fisheries Policy
EAF	Ecosystem Approach to Fisheries
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
F_{MSY}	Fishing Mortality Maximum Sustainable Yield
GAO	Government Accountability Office
GFCM	General Fisheries Commission for the Mediterranean
GT	Gross Tonnage
HELCOM	The Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	The International Council for the Exploration of the Sea
IOTC	Indian Ocean Tuna Commission
ITQs	Individual Transferable Quotas
IUU Fishing	Illegal, Unreported and Unregulated Fishing
kW	Kilowatt
LFI	Large Fish Indicator
LOA	Letter of Authorization
MCS	Monitoring, Control and Surveillance
MLS	Minimum Landing Size
MPA	Marine Protected Areas
MSC	Marine Stewardship Council
MSFD	Marine Strategy Framework Directive
MSY	Maximum Sustainable Yield
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	Northeast Atlantic Fisheries Commission
NWW	North Western Waters
NWWAC	North Western Waters Advisory Council
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PSMA	Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing
QSR	Quality Status Report
RECOFI	Regional Commission for Fisheries
RFMO	Regional Fisheries Management Organizations
SEAFO	Southeast Atlantic Fisheries Organization
SIOFA	Southern Indian Ocean Fisheries Agreement
SOFIA	State of World Fisheries and Aquaculture
SPRFMO	South Pacific Regional Fisheries Management Organization
STECF	Scientific, Technical and Economic Committee for Fisheries
SWWAC	South Western Waters Advisory Council
TAC	Total Allowable Catch
TURF	Territorial Use Rights in Fisheries
UN BBNJ	Intergovernmental Conference on marine Biodiversity of Areas Beyond National Jurisdiction
UNCLOS	United Nations Convention on the Law of the Sea
US GAO	U.S. Government Accountability Office
VMS	Vessel Monitoring System

ACKNOWLEDGEMENTS

This book was conceived for the purpose to serve NGOs and Governments as resource to consult with when planning and implementing sustainable fisheries management in different countries. It contains best policies and practices from various countries, institutions, and conventions, such as the EU, FAO, and UNCLOS, to help understand the issues and possible solutions for sustainable fisheries management in the years to come. We would like to express our sincere appreciation to *So Jin Kim* and *Dillon Rajakarier* for their marvelous contributions that made this book possible.

MAST HUMAN
May 2021

Bangkok, Thailand.

MAST HUMAN is a nonprofit organization based in Bangkok, Thailand, that established with the aims to address the root causes of human trafficking and IUU fishing in the Southeast Asia fishing sector with a collaborative, constructive approach. Our goal is to create thriving fisher communities that promote sustainable fishery, providing consumers with ethically sourced seafood that is free from forced and slave labor.

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CHAPTER 1: OVERVIEW

FISHERY MISMANAGEMENT

How much fish do you eat per year?

In 2016, the estimation showed that an average person eats 20.3 kilogram of fish per year with worldwide consumption of 151.2 million tonnes.[1] As our population increased, so has our fishing, expanding the market demand, which in turn increased threats to species and their habitats. We are taking more fish than what nature can replenish, or overfishing, thereby causing imbalance between stock and catch with about 30% of fish stocks overfished.[2] William Forster Lloyd, M.A. in 1833, introduced the phenomenon called the "*Tragedy of the Commons*." This phenomenon was the basis on which Garrett Hardin relied on to explain the result of mismanagement caused by people overusing or overtaking limited resources. This mismanagement poses a threat to the living resources in the oceans, thereby depriving the coastal states of their dependent livelihoods.

The ramifications of overfishing are also compounded by climate change (warming oceans are harming certain fish species)[3] and the problem of bycatch of about 38.5 million tonnes each year.[4] Bycatch is when non-target species, such as dolphins and turtles, are caught while trying to capture the target fish.[5] This is caused by non-selective fishing gear and methods, such as the practice of trawling. In trawling, large nets are dragged across the ocean floor, capturing everything in their path, while also damaging coral reefs.[6] Although this may seem an insignificant issue, "40% of fish catch worldwide is unintentionally caught and is partly thrown back into the sea, either dead or dying."[7]

Fishery "consists of the fishing activity focused on certain fish, shellfish species, or a group of species, often in a certain geographic area."[8] However, the definition of fishery developed to also refer to the actual fish stock or a population of fish in a geographic area.[9] Failing to manage the fish stock or failing to manage the fishing activities in order to maintain a healthy amount of fish stock, therefore, is referred to as fishery mismanagement. The seriousness of fishery mismanagement has long been experienced only at a final stage when such mismanagement produced devastating results of job loss and depletion of fish stocks. This was because there

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[1] FAO (2018). *The State of World Fisheries and Aquaculture 2018: Meeting the Sustainable Development Goals*. [pdf] Rome: FAO, p. 4. Available at: http://www.fao.org/3/i9540en/I9540EN.pdf [Accessed 12 Feb. 2020].

[2] FAO (2014). *The State of World Fisheries and Aquaculture 2014*. [pdf] Rome: FAO, p. 7. Available at: http://www.fao.org/3/a-i3720e.pdf [Accessed 12 Feb. 2020].

[3] Gibbens, S. (2019). *Climate change is depleting our essential fisheries* [online]. Available at: https://www.nationalgeographic.com/environment/2019/02/climate-change-is-shrinking-essential-fisheries/ [Accessed 12 Feb. 2020].

[4] Davies, R.W.D. et al. (2009). Defining and estimating global marine fisheries bycatch. *Marine Policy*, [online] 33(4), pp. 661-672. Available at: https://d2ouvy59p0dg6k.cloudfront.net/downloads/bycatch_paper.pdf [Accessed 12 Feb. 2020].

[5] Marine Stewardship Council, *What is bycatch and how can it be managed?*. [online] Available at: https://www.msc.org/en-au/what-we-are-doing/our-collective-impact/sustainable-fisheries/what-is-bycatch-and-how-can-it-be-managed [Accessed 12 Feb. 2020].

[6] World Wide Fund for Nature (WWF), *Threat: Bycatch: Overview*. [online] Available at: https://www.worldwildlife.org/threats/bycatch [Accessed 12 Feb. 2020].

[7] Cox, Z. (2019). *Effects of Bycatch From Fishing*. [Blog] Olive Ridley Project. Available at: https://oliveridleyproject.org/blog/effects-of-bycatch-from-fishing [Accessed 12 Feb. 2020].

[8] Yumiko, K. et al. (2004). *Fishing for Answers: Making Sense of the Global Fish Crisis.* [pdf] Washington, D.C.: World Resources Institute, p. 2. Available at: http://pdf.wri.org/fishanswer_fulltext.pdf [Accessed 12 Feb. 2020].

[9] Id.

was no instrument or practicable measures to know how many fish stock remain in the different waters globally, as well as how much fishing occurs to remove how many amounts of fish each year.

EFFECTS OF FISHERY MISMANAGEMENT

Such practices of fishery mismanagement led to declines in fish stocks worldwide, posing threat to the future of food security, which ensures that "all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life."[10] This is especially so considering that 3 billion people use the ocean as their primary protein source.[11]

One example is the Bluefin tuna, often used for sushi, where its spawning population is now estimated to be at only 21-29% of its 1970 population due to overfishing.[12] Such decreases wreak havoc on the ecosystem—if prey species are overfished, then predator species also decline due to lost food sources; if predator species are overfished then prey species may multiply unchecked. "Extreme overfishing of Bluefin tuna might be one of the reasons we're seeing an explosion in squid populations; it could also be contributing to toxic algae blooms."[13]

The threat also applies to the livelihoods of people as an estimation of 200 million jobs worldwide are linked to the fishery industry.[14] The consequence of unsustainable fishing on the economy has been evidenced in Newfoundland Canada. Through decades of fishery mismanagement, the northern cod population collapsed, with only 1% of previous fish stocks remaining. This necessitated a ban on cod fishing, which led to a layoff of 38,000 jobs, one of the largest single layoff in Canada's history of employment. The collapse of the fishing industry led to 14% of the population of people leaving Canada due to the lack of job opportunities.[15]

In 2018, almost 90% of worldwide marine fish stocks were fully exploited at their biological limit that would have allowed natural replenishment to ensure safe reproduction.[16] The exploitation is also referred to as being "fully fished," meaning that the "fishing effort do not significantly increase the amount of fish harvested, but substantially increase the risk of overfishing."[17] Prolonged overfishing then leads to the depletion of the fish stock, thereby "collapsing" the fish population to a serious level at which recovery becomes very difficult.[18] And the significance of this overfishing has evidently effected our oceans and economy, calling for serious efforts against such fishery mismanagement and pursues sustainable fishery management that would both sustain and protect aquaculture.

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[10] International Food Policy Research Institute (2020). *Topic: Food Security*. [online] Available at: http://www.ifpri.org/topic/food-security [Accessed 12 Feb. 2020].

[11] United Nations, (2019). *Goal 14: Conserve and sustainably use the oceans, seas and marine resources*. [online] Available at: https://www.un.org/sustainabledevelopment/oceans/ [Accessed 12 Feb. 2020].

[12] National Geographic Society, (2019). *Sustainable Fishing*. [online] Available at: https://www.nationalgeographic.org/encyclopedia/sustainable-fishing/12th-grade/ [Accessed 12 Feb. 2020].

[13] Hancock, L. (2018). *Plastic is not the biggest problem for oceans: How overfishing threatens our seas and life within them.* [online] World Wide Fund for Nature (WWF). Available at: https://www.worldwildlife.org/pages/plastic-is-not-the-biggest-problem-for-oceans [Accessed 12 Feb. 2020]

[14] Mukhisa, K. and Thomson, P. (2018). *90% of fish stocks are used up – fisheries subsidies must stop emptying the ocean*. [online] World Economic Forum. Available at: https://www.weforum.org/agenda/2018/07/fish-stocks-are-used-up-fisheries-subsidies-must-stop/ [Accessed 12 Feb. 2020].

[15] Murphy J. (2017). *Can cod comeback keep a Canadian fishery afloat?.* [online] BBC News. Available at: https://www.bbc.com/news/world-us-canada-40252481 [Accessed 12 Feb. 2020].

[16] Mukhisa, K. and Thomson, P. (2018). Note 14.

[17] Yumiko, K. et al. (2004). p.4. Note 8.

[18] Id.

SUSTAINABLE FISHERY MANAGEMENT

Fishery Management is defined by the FAO (Food and Agriculture Organization of the United Nations) as "*the integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and the accomplishment of other fisheries objectives*."[19] Such management with the objective of producing sustainable fisheries can prevent overfishing and reduce bycatches, among other associated issues, mitigating ecological and economic effects and the threat to food security. The successful management measures promoted most generally is "stock assessment, community-based management (CBM), individual transferable quotas (ITQs), marine protected areas (MPAs) and territorial use rights in fisheries (TURFs)."[20] Moreover, the ideal approach is to combine these measures "into a whole, balanced, and functioning unit."[21] As a result, "a well-managed fishery should remove fish at a rate that does not exceed that of replacement" and "aim to maintain the stock at [the point at which MSY is produced]."[22]

In 2015, the UN (United Nations) adopted seventeen SDGs (Sustainable Development Goals) as part of the '2030 Agenda for Sustainable Development' and identified "Conserve and sustainably use the oceans, seas and marine resources for sustainable development" as the fourteenth goal.[23] Goal 14 urged the UN Member States to adopt a global framework and develop international instruments to protect and sustain marine ecosystems against IUU (Illegal, Unreported and Unregulated) fishing. According to the 2019 SDG Report, "59 States and one member organization—the European Union representing its 28 member States" signed the Agreement on Port State Measures (entered into force in June 2016). The Agreement is the first binding international agreement on IUU fishing that boosted international efforts to curb IUU fishing through "effective monitoring, control and surveillance, and supplemented by market access and trade measures."[24]

While there are pending improvements in order to restore the declined proportion of fish stocks within biologically sustainable levels, interconnected cooperation and accountability in implementing uniform practices and policies have been observed among many countries majorly involved in the fishing industry.

Hundred and sixty-eight coastal states that are signatories to UNCLOS (United Nations Convention on the Law of the Sea) made commitments to take interconnected effort to manage conserve their exploration and exploitation of the resources in their relevant EEZs. Under UNCLOS, the Member States aim to implement their "rights and duties with respect to the protection and preservation of the marine environment" into their domestic laws, as well as scientific research policies and other recommended programs and measures that are deemed appropriate.[25]

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[19] FAO (1997). Fisheries Management. *FAO Technical Guidelines For Responsible Fisheries, (4),* p. 82; FAO (2020). *Key Concepts: Fisheries management.* [online] Available at: http://www.fao.org/in-action/vulnerable-marine-ecosystems/key-concepts/en/ [Accessed 12 Feb. 2020].

[20] Cochrane K. L. and Garcia S. M. ed. (2009). *A Fishery Manager's Guidebook*, 2nd ed. Rome: FAO and Wiley-Blackwell, p. 10.

[21] Id. p.11.

[22] Id. p.27.

[23] The General Assembly (2015). A/RES/70/1. In: Transforming our world: the 2030 Agenda for Sustainable Development. [online] New York: United Nations, p.9, para. 33. Available at: https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf [Accessed 12 Feb. 2020].

[24] United Nations (2019). *The Sustainable Development Goals Report 2019*, p.51. [pdf] Available at: https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf [Accessed 12 Feb. 2020].

[25] MRAG Ltd. (2013). *Costs and benefits arising form the establishment of maritime zones in the Mediterranean Sea: Final Report*, p. 5. [pdf] Available at: https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/body/maritime-zones-mediterranean-report_en.pdf [Accessed 12 Feb. 2020].

With FAO Code of Conduct for Responsible Fisheries (1995) adopted by 194 FAO Member States to encompass all the elements of the ecosystem approach, the Member States aim to achieve balance in the human consumptive demands on fish resources that conflict with the constraint of maintaining low risk of depletion. Other existing legal instruments are the Precautionary Principle, the Convention on Biological Diversity (CBD), and Ecosystem Approach to Fisheries (EAF). Other international conventions regulate different maritime territories that are categorized as either EU-regulated or the High Seas.

CHAPTER 2: GENERAL TECHNICAL MEASURES AND REGULATIONS

While there are different measures and regulations applicable to their pertinent maritime territories, there are technical measures and regulations that are generally and uniformly applicable. Certain fishing methods or fishing stock measures are entirely prohibited or set at a specific limitation. EU fisheries management is conducted under the Common Fisheries Policy (CFP) and is managed by the European Commission. The CFP is achieved through several methods, the most relevant expanded upon below.[26]

TACS AND QUOTAS

Fishing limits, or TACs (Total Allowable Catches) are annual or biennial catch limits (in tonnes or numbers of fish) set for most commercial fish stocks "on the basis of available scientific advice, taking into account biological and socioeconomic aspects."[27] The EU regulation requires TACs to ensure "fair treatment between fishing sectors, as well as having regard to the opinions expressed during the consultation with stakeholders."[28] Therefore, between EU countries, TACs are measured based of different national quotas and each stock is allocated based on percentage per EU country.[29] This quota is then further divided amongst the country's fishermen. When the quota for a fishery is reached, it must be closed.[30]

FISHING CAPACITY

The EU fleet fishing capacity is balanced against fishing opportunities over time through fleet limitations for each EU country in kilowatts (kW) and gross tonnage (GT). New vessels are introduced to the fleet only when a corresponding capacity (in kW and GT) is removed. For fleets with overcapacity, vessels may need to be decommissioned. In accordance with the EU regulations, the EU countries must annually report on the balance according to the registered fleet compiled by Member States.[31]

DISCARDING AND LANDING OBLIGATION

"The landing obligation requires all catches of regulated commercial species on-board to be landed and counted against quota"[32] or the MLS (minimum landing size) quotas. Prohibited species must be returned to the sea,

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[26] European Commission (2020). *The Commission Fisheries Policy (CFP).* [online] European Union. Available at: https://ec.europa.eu/fisheries/cfp_en [Accessed 12 Feb. 2020].

[27] European Commission (2011). Proposal for a COUNCIL REGULATION establishing the fishing opportunities for anchovy in the Bay of Biscay for the 2011/-2012 fishing season. [pdf] Brussels: European Commission, p. 2. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011PC0426&from=hr [Accessed 12 Feb. 2020].

[28] European Commission (2020). *Fishing quotas*. [online] European Union. Available at: https://ec.europa.eu/fisheries/cfp/fishing_rules/tacs_en [Accessed 12 Feb. 2020].

[29] Id.

[30] Id.

[31] European Commission (2020). *Management of fishing capacity - fishing fleet*. [online] European Union. Available at: https://ec.europa.eu/fisheries/cfp/fishing_rules/fishing_fleet_en [Accessed 12 Feb. 2020].

[32] European Commission (2020). *Discarding and the landing obligations*. [online] European Union. Available at: https://ec.europa.eu/fisheries/cfp/fishing_rules/discards_en [Accessed 12 Feb. 2020].

having been recorded their discarding in a logbook for scientific species monitoring.[33] The obligation was introduced in order to prevent the wasteful practice of discarding, which was a practice of "returning unwanted catches to the sea, either dead or alive, because they are undersized, due to market demand, the fisherman has no quota or because catch composition rules impose this."[34]

Case Study: Republic of Korea

Fisheries Act (2012)

Some measures: licensing fisheries, clean-up of fishing grounds, restrictions on fishing periods and mesh size, and temporary closures of fishing areas. The two most important measures taken by the Korean government are the reduction in number of fishing vessels and the introduction of the TAC system.[1]

The Special Measures for Agriculture and Fishery Development Act Law No. 6223 para. 1 No. 1 (Kor.) provides, the Ministry of Maritime Affairs and Fisheries has the authority to devise policies and assistance measures adjusting the number of fishing vessels to protect living marine resources and to increase fisheries' competitiveness. Article 52 of the Fisheries Act Law No. 6656 para. 1 No. 2 (Kor.) also provides that, for the adjustment of fisheries, the number of fisheries vessels can be limited by Presidential Order. On the basis of these provisions, in 1993, the Marine Fisheries Structure Reorganization Plan was made. Under this plan, 13 kinds of marine fisheries vessels and unlicensed vessels, including surrounding net, long bag set net, stow net vessels and bottom trawl vessels, were chosen as the objects of reduction. These were the kinds of fisheries that were thought to deplete living resources and expected to experience hardship when the marine products market opened to the foreign fisheries industries. For the reduced vessels, 100 percent compensation for the vessels' residual value was given from national funds. Fishermen who abandoned fisheries as their businesses were compensated 50 percent of three years' average revenues from national funds. [2]

Upon the legal basis of the Fisheries Act, the TAC Deliberation Committee sets up the tentative TAC and the plan for the management of the TAC. The tentative TAC and plan for management are then transferred to the Central Marine Products Adjustment Committee, a deliberating and advisory organization for the Minister of Maritime Affairs and Fisheries. This Committee then finally decides the TAC.[3]

In the process of deliberation and decision of the TAC by the two committees, the National Fisheries Research and Development Institute provide scientific assessment of the resources that are the objects of TAC. Reasons for poor outcome of lack of preserving and recovering marine resources: [4]

- As pointed out above, TACs of many species have exceeded their ABCs.
- The TAC system is not properly linked with other traditional methods of fisheries control. In preserving and recovering living resources, relying only on the TAC may cause a "race-to-fish" scenario, which is the very competitive fishing among fishermen to exhaust the allotted TAC ahead of others.
- The scientific estimation of the amount of living stocks is still imprecise. Presently, five different levels of data are used to figure out ABC and TAC. However, because the necessary data for the determination of ABC and TAC are not well enough accumulated, ABC and TAC of most species are decided on the basis of low-level data.

[1] Lee, S. and Lee, H. (2016). The Making of International Law in Korea: From Colony to Asian Power. Boston: Brill Nijhoff, p.192.

[2] Id. pp.192-193.

[3] Id. p.195.

[4] Id.

[33] Id.

[34] Institute for Government (2018). *Common Fisheries Policy*. [online] Available at: https://www.instituteforgovernment.org.uk/explainers/common-fisheries-policy [Accessed 12 Feb. 2020].

GEAR REGULATIONS IN THE EUROPEAN UNION

PROHIBITED FISHING GEAR AND METHODS

The Regulation 2019/1241 of the European Parliament and of the Council of 20 June 2019[35] mandates that these following methods for catching or harvesting marine species are prohibited:

- Toxic, stupefying, or corrosive substances,
- Electric current except for the electric pulse trawl, except for scientific research…and in the North Sea (see the use of electric pulse trawls in ices divisions 4b and 4c),
- Explosives,
- Pneumatic hammers or other percussive instruments,
- Towed devices for harvesting red coral or other type of corals or coral-like organisms,
- St Andrew's cross and similar grabs for harvesting, in particular, red coral or other type of corals and coral-like species,
- Any type of projectile, with the exception of those used to kill caged or trapped tuna and of hand-held spears and spear guns used in recreational fishing without an aqualung, from dawn until dusk."

WHY ARE SUCH GEAR AND METHODS BANNED?

The prohibition on toxic, stupefying or corrosive substances are due to their harmful effects. One such example is the effect of cyanide fishing. The practice of crushing cyanide tablets and squirting the subsequent powder to stun and capture live coral reef fish inadvertently kills coral reefs and the organisms that depend on them.[36] An example of its lethal affect is seen in aquarium fish, which are often captured using the technique, which develop cancer within a year of being caught. The high price of live reef fish, lack of enforcement and corruption are among reasons that cyanide fishing is still practiced.[37]

Pulse fishing, a technique that emits electricity from electrodes on nets to stun fish- causing them to float upwards, has dangerous side effects. As the net's electric field affects all surrounding organisms, damage can be caused to non-target catch. Such damage includes breaking fish spines in species such as cod, haddock, and Pollock, reducing the cod egg hatching rate, and killing a quarter of young cod.[38] The exception to the

Figure 1: Pulse Fishing (Stichting De Noordzee)

[35] The European Parliament and the Council of the European Union (2019). *REGULATION (EU) 2019/1241 of the European Parliament and of the Council of 20 June 2019*. [pdf] Official Journal of the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R1241&from=EN [Accessed 12 Feb. 2020].

[36] Scheer, R. and Moss, D. ed. (2011). *Sustainability: How Dangerous Is It to Use Cyanide to Catch Fish?.* [online] Scientific American. Available at: https://www.scientificamerican.com/article/cyanide-fishing/ [Accessed 12 Feb. 2020].

[37] Rinkesh (2011). *What is Illegal Fishing?.* [online] Conserve Energy Future. Available at: https://www.conserve-energy-future.com/methods-causes-illegal-fishing.php [Accessed 12 Feb. 2020].

[38] Ma, A. (2019). *'Electric pulse fishing' is illegal and it's turning the ocean into a graveyard — here's why fishermen are doing it anyway***.** [online] Business Insider. Available at: https://www.businessinsider.com/electric-pulse-fishing-hurts-marine-life-used-just-off-uk-2018-12 [Accessed 12 Feb. 2020].

ban on pulse fishing for scientific research[39] and in certain areas will be invalid from mid-2021, after campaigns against its use.[40]

The use of explosives to kill large amounts of fish at once, maximizing catch compared to other methods such as using simple nets, is called blast fishing. As well as killing unintended fish in its blast radius, the practice also, destroy fish habitats such as underwater coral systems.[41] "It's the three-dimensional structure that really provides a lot of habitat and space for fish eggs and larvae and juveniles to hide from predators and as a feeding habitat…Blasting literally physically destroys the three-dimensional structure of the reef."[42]

This damages the ecosystem, reducing fish diversity and quality. The practice is commonly used as explosives are easily accessed and affordable, and blast fishing is highly profitable- in Tanzania, "one blast can lead to a catch of up to 400kg… and a profit of $1,800 (£1,093)."[43]

The reasoning behind prohibition of percussive instruments can be expressed through the effects of Muro Ami.[44] This fishing practice entails pounding coral reef with large stones or cement blocks to scare fish into a large net. Instead, the fish are forced out, as the pounding destroys their coral habitat, leaving the net as the only place for refuge.[45] As expected, overtime the coral is extremely damaged due to repeated smashing. The corals take years to recover, with the worst-case scenario being the coral never grows back.[46]

The ban on towed devices, St Andrew's crosses (heavy wooden crosses attached to nets), and similar grabs may ostensibly be because "these tangle-net dredges work by breaking the corals from the seabed (along with any other epifauna) and so, like bottom trawls, operate indiscriminately and are very damaging to benthic life."[47] Additionally the methods may prevent coral recovery as they tear off the coral.[48] Red coral is particularly sought after as it is used in jewelry and "can today go for as much as $1,000 a gram."[49]

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[39] Fleming, A. (2018). *Pulse fishing: Is it OK to 'electrocute' fish?.* [online] BBC News. Available at: https://www.bbc.com/news/world-europe-42692924 [Accessed 12 Feb. 2020].

[40] Fortuna, G. (2019). *MEPs confirm electronic fishing ban, despite eleventh-hour Dutch effort*. [online] EURACTIV. Available at: https://www.euractiv.com/section/agriculture-food/news/meps-confirm-electric-fishing-ban-despite-eleventh-hour-dutch-effort/ [Accessed 12 Feb. 2020].

[41] Rinkesh (2011). Note 37.

[42] Actman, J. (2016). *Watch Fishermen Bomb Their Catch Out of the Water: A horrific practice uses explosives to catch fish*. [online] National Geographic. Available at: https://www.nationalgeographic.com/news/2016/06/blast-fishing-dynamite-fishing-tanzania/ [Accessed 12 Feb. 2020].

[43] Njoroge, G. (2014). *Blast fishing destroying Tanzania's marine habitats*. [online] BBC News. Available at: https://www.bbc.com/news/world-africa-29049264 [Accessed 12 Feb. 2020].

[44] Rinkesh (2011). Note 37.

[45] Leisurepro (2012). *3 Destructive Fishing Practices and Their Effects on Marine Ecosystems*. [Blog] AquaViews: Online Scuba Magazine. Available at: https://www.leisurepro.com/blog/ocean-news/3-destructive-fishing-practices-effects-marine-ecosystems/ [Accessed 12 Feb. 2020].

[46] Overfishing Campaign (2014). *MURO AMI: FISHERMEN FREEDIVING IN THE PHILLIPPINES*. [online] Available at: https://overfishingcampaign.wordpress.com/2014/05/28/muro-ami-fishermen-freediving-in-the-phillippines/ [Accessed 12 Feb. 2020].

[47] Roberts, J. M., Wheeler, J., Freiwald, A. and Cairns, S. (2009). *Cold-Water Corals: The Biology and Geology of Deep-Sea Coral Habitats*. New York: Cambridge University Press, p. 251.

[48] Hounet, Y. B. ed (2018). *Law and Property in Algeria: Anthropological Perspectives*. Leiden: Brill Publishers. p.71.

[49] Brown, R. (2017). *Underwater Cave Discovery Features Stunning Red Coral Garden*. [online] National Geographic. Available at: https://www.nationalgeographic.com/news/2017/02/mediterranean-coral-cave-discovery-conservation/ [Accessed 12 Feb. 2020].

TOWED GEAR RESTRICTIONS

Towed gears refer to bottom fishing gears that catches fish without target, thereby also catching non-target species, such as organisms at the bottom of the sea. By dragging the nets underneath the water with other supporting gears, like trawls or dredges, the gears catch fish without target. This towed gear has been the cause of bycatch and discarding, or accidental catches that are later thrown back into the ocean, dead or alive, as wastes. Such method of fishing goes beyond exploiting individual species to damaging the entire marine habitat by damaging the sea plants and the seabed in the process.[50] Therefore, there were many developments of regulations that restricted the use of towed gears in certain parts of the waters that would be most negatively affected by them.

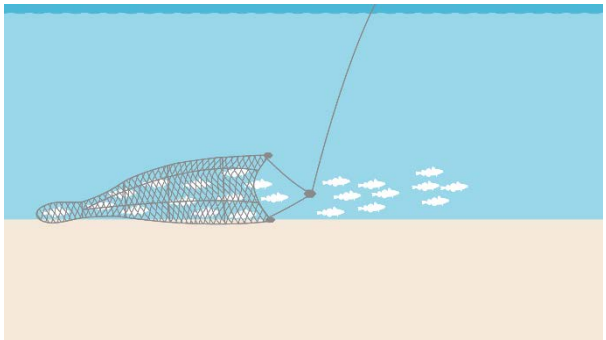

Figure 2: Bottom Trawling (Marine Stewardship Council)

In 2004, the European Community prohibited the fishing vessels from using bottom trawls or other towed nets that made contact with the seabed. NEAFC closed four areas of the sea to rid them of bottom trawling for three years to protect vulnerable deep-sea habitats.[51]

When multiple nets are towed simultaneously by one or more fishing vessel, "each net must have the same nominal mesh size."[52] Additionally, using or carrying on board devices that obstruct or diminish "the mesh size of the codend or any part of a towed gear" is prohibited.[53]

When dredges are on board, it is prohibited to:

- Retain on board or land any quantity of marine organisms unless at least 85 % of the live weight thereof consists of mollusks and/or Furcellaria lumbricalis in the Baltic Sea.
- [Except in the Mediterranean Sea] It is be prohibited to retain on board or land any quantity of marine organisms unless at least 95 % by live weight thereof consists of bivalve mollusks, gastropods and sponges."[54]
- This does not apply to unintended catches of species subject to the landing obligation. Such unintended catches are landed and counted against quotas."

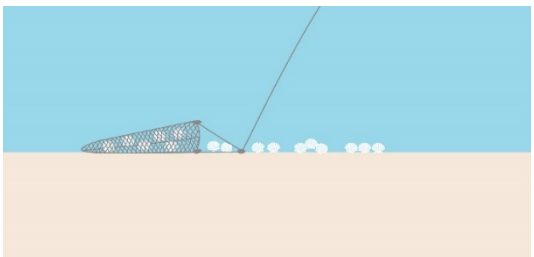

Figure 3: Dredge fishing gear (Marine Stewardship Council)

[50] Marine Conservation Society (2008). *Bottom towed fishing gear: position statement and background paper*. [pdf] p.6. Available at: https://www.mcsuk.org/downloads/fisheries/MCS%20policy%20&%20position%20papers/MCS%20bottom%20towed%20fishing%20gear%20position%20statement%20and%20background%20(November%202008).pdf [Accessed 12 Feb. 2020].

[51] Id. p.8.

[52] The European Parliament and the Council of the European Union (2019). p.119. Note 35.

[53] Id.

[54] Id. pp.118-119.

STATIC GEAR RESTRICTIONS

Another fishing gear that causes bycatches of non-target species and discarding is a static gear that includes, gill nets, lining and pots and traps. Static gear catch fish by allowing fishes attracted by bait into the net and then catch the attracted fishes. Drift nets enmesh or entangle the attracted fish into the net that is left drifting with the tide while afloat at the pelagic level. Traps lure fish or shellfish through the funnels with limited escape route and jigging lures fish directly to hooks. A gillnet is a fine line of netting that is anchored on the seabed and vertically supported to catch fish swimming above the seabed level. When the fish swims through the invisible net, its gills are caught in the meshes. Trammel nets are like gillnets that are layered with more than one net with diverse mesh shapes.

These gears would be strategically used based of what species of fish is targeted based on which column of water—the pelagic, demersal and on the seabed. The total length of drift nets must not be greater than 2.5 km and cannot be used or carried in the Baltic Sea.[55] Additionally, they cannot be used to fish for listed species.[56]

Bottom set gillnets, entangling nest and trammel nets must not be used where the charted depth is greater than 200m, unless in the Mediterranean Sea, or in (certain) ICES divisions,[57] where the charted depth is between 200 and 600 m and only if the following gear and practices are used:

- "Bottom set gillnets used for directed fishing for hake of a mesh size of at least 80 mm in ICES division 8c and ICES sub-area 9 and 100 mm in all remaining areas and no more than 100 meshes deep, where the total length of all nets deployed does not exceed 25 km per vessel and the maximum soak time is 24 hours.
- Entangling nets used for directed fishing for anglerfish of a mesh size of at least 250 mm and no more than 15 meshes deep, where the total length of all nets deployed does not exceed 100 km and the maximum soak time is 72 hours.
- Trammel nets in ICES sub-area 9 used for directed fishing for anglerfish of a mesh size of at least 220 mm and no more than 30 meshes deep, where the total length of nets deployed does not exceed 20 km per vessel and the maximum soak time is 72 hours."[58]

Additionally, for bottom set gillnets, entangling nest and trammel nets[59] listed species catching restrictions apply.[60]

RESTRICTIONS ON THE USE OF AUTOMATIC GRADING EQUIPMENT

Such equipment that grades herring, mackerel, or horse mackerel by size or sex is prohibited from being carried and used unless:

- Towed gear of mesh size "less than 70 mm or one or more purse seines or similar fishing gear"[61] is not being carried/used.

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[55] Id.

[56] Id. p. 143.

[57] Id. pp. 156, 161, 163, 167 & 172.

[58] Id. p. 172.

[59] Id. p. 120.

[60] Id.

[61] Id. p. 133.

- The entire catch is frozen, "graded fish are frozen immediately after grading and no graded fish are returned to the sea,"[62] the equipment is installed and located to ensure immediate freezing and no marine species return to the sea.
- Any vessel authorized to fish in the… Belts or the Sound may carry automatic grading equipment in the Kattegat if a fishing authorization has been issued. The fishing authorization (must) define the species, areas, times and any other required conditions applicable to the use and carriage on board of the grading equipment.
- The above restrictions do not apply in the Baltic Sea."[63]

This restriction is concerned with preventing high grading: the practice of "discarding low-priced fish even though they should legally be landed."[64] The practice results in vessels fishing greater amounts of fish, as due to high grading they have not officially met their quota, and hence result in increased young stock being returned to the sea, often dead or with a low chance of survival. Decreased young stock reduces the species' reproductive capability and future stock size. Prohibiting grading equipment is one method to prevent this practice.[65] Mandate concerning freezing and the freezing equipment specifications is another method, as is the need for fishing authorization.

PRODUCT REGULATIONS

ON-BOARD PROCESSING

On-board processing means fish handling on the fishing vessel directly after catch. On-board processing comprises of a "physical or chemical processing of fish to produce fish-meal, fish-oil, or similar products" or transshipping catches for such processes on the fishing vessel.[66] The process is generally prohibited, unless it is offal processing or transshipment, or surimi production.[67]

U.S. Senator Maria Cantwell stated, "By eliminating the 'race for fish,' as I mentioned before, we effectively slow the pace of fishing, meaning commercial fishermen can optimize onboard processing facilities. The result is an increase in the product recovery rate per pound of fish caught, meaning they can use more parts of the fish and make wiser and more efficient use of our precious ocean resources. A slower pace also decreases bycatch and promotes ownership of the fishery, which will facilitate a conservation mindset in the fishermen."[68]

According to the FAO (1973) report, it was "recommended that fish should be cooled down to the temperature of melting ice," or zero Celsius, "as quickly as possible."[69]

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[62] Id.

[63] Id.

[64] Elefterie K. A. (2018). *New fisheries rules: add a ban on electric pulse fishing, say MEPs*. [online] European Parliament. Available at: https://www.europarl.europa.eu/news/en/press-room/20180112IPR91630/new-fisheries-rules-add-a-ban-on-electric-pulse-fishing-say-meps [Accessed 12 Feb. 2020].

[65] Young, J. A. (2002). Chapter 3: Marketing Fish. In: J. B. H. Paul and D. R. John ed*., Handbook of Fish Biology and Fisheries: Fisheries*, Volume 2. U.K.: Wiley-Blackwell, pp.53-54.

[66] The European Parliament and the Council of the European Union (2019). p.132. Note 35.

[67] Id.

[68] 111 Cong. Rec. 1609 (2009) (statement of Sen. Maria Cantwell).

[69] Martin, A. M., ed. (1994). *Fisheries Processing: Biotechnological applications.* Wiltshire: Springer-Sciene+Business Media, B.V., p.7.

SCIENTIFIC RESEARCH

The restrictions outlined for commercial fishing vessels do not apply to fishing operations conducted for the purpose of scientific investigations. However, such operations are subject to the conditions below: [70]

- The operation must have been carried out with permission and under the authority of the flag Member State.
- The planned fishing operation must be informed to the Commission and the Member State, whose sovereignty or jurisdiction covers the waters where the fishing operations will take place, at least two weeks in advance. The information must consist of the intention to conduct such fishing operations with the details of the vessels that will be used and the scientific investigations about to be undertaken.
- The vessel or vessels conducting the fishing operations must valid fishing authorization.
- In the case where the coastal Member State requires that its observer on-board the vessels of the flag Member State during such fishing operations, unless this is not possible for security reasons, the requirement must be met.
- The fishing operations conducted by commercial vessels for the purpose of scientific investigation must be limited in time.
- In the case of electric pulse trawl, vessels conducting scientific research must follow a specific scientific protocol as part of an ICES or STECF reviewed or validated scientific research plan, as well as a system for monitoring, control, and surveillance (MCS).

Marine species caught for scientific purposes may be sold, stored, displayed or offered for sale, provided that they are counted against quotas and:[71]

- They meet the minimum conservation reference sizes…
- They are sold for purposes other than direct human consumption."

DIRECT RESTOCKING AND TRANSPLANTATION

For fishing operations that only conduct direct stocking or transplantation of marine species, the regulations in this EU chapter do not apply, provided such operations are permitted by the relevant Member State(s) that have a "direct management interest."[72]

ORGANISM INTERACTION REGULATIONS

INTERACTIONS WITH FISH, SHELLFISH SPECIES AND OTHERS

Certain interactions with fish, shellfish species, and other species are prohibited if the species are listed unless they are certain bryophytes or the national authorities permit such interactions.[73] If such species are accidently caught, they must be quickly released, unharmed. Scientific research may be conducted on accidently killed species.[74]

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[70] The European Parliament and the Council of the European Union (2019). p.128. Note 35.

[71] Id.

[72] Id. p. 129.

[73] Id. pp. 139-142.

[74] Id. p. 121.

INTERACTIONS WITH MARINE MAMMALS, SEABIRDS, MARINE REPTILES AND OTHERS

Interactions with marine mammals, seabirds, marine reptiles, and other organisms are also prohibited if the species are listed.[75] If such species are accidently caught, they must be quickly released, unharmed. Species accidently harmed when caught are allowed to be retained on board, transshipped or landed for their recovery and scientific research may be conducted on accidently killed species, provided national authorities are informed promptly.[76]

INTERACTIONS WITH DEEP-WATER SHARKS

"Directed fishing for deep-water sharks in charted depths of less than 600 m is prohibited… When accidentally caught, deep-water sharks classified as prohibited… (must) be recorded, unharmed to the extent possible, and must be promptly released. Deepwater sharks subject to catch limits… (must) be retained on board. Such catches … (must) be landed and counted against quotas. Where accidental catches of Deepwater sharks by the vessels of any Member State exceed 10 tonnes then those vessels may no longer avail of the derogations"[77] for bottom set gillnets, entangling nest and trammel nets (see above exceptions).

[75] Id. pp. 107 & 121.

[76] Id. p. 121.

[77] Id. pp. 157, 167 & 172.

CHAPTER 3: SPECIFIC REGIONAL MEASURES AND REGULATIONS

MESH SIZE RESTRICTIONS

MESH SIZE RESTRICTIONS FOR TOWED GEAR

In the North Sea, North Western Waters, South Western Waters and Baltic Sea, specific minimum mesh size must be used in each territory.[78] In the Baltic Sea, the mesh must also be constructed to certain specifications.[79] For example, in the North Sea "Vessels… (must) use a mesh size of at least 120 mm or at least 90 mm in Skagerrak and Kattegat."[80]

There are however, two exceptions, when smaller mesh sizes may be used. The first exception entails specific mesh sizes used in particular areas with strict conditions (the activities, equipment and species fished). This is provided that by catches of specific fish "do not exceed 20 % (in the Baltic sea it is 10%)[81] of the total catch in live weight of all marine… (organisms) landed after each fishing trip."[82] For instance, in the North Sea "vessels may use smaller mesh sizes… (as listed in a table below) provided that… (the conditions in the table) are complied with, and by-catches of cod, haddock, and saithe do not exceed 20 % of the total catch in live weight of all marine… (organisms) landed after each fishing trip."[83]

The second exception is if STECF assessed and EU Commission approved selectivity, modifications are used. These modifications must "result in the same or better selectivity characteristics" for the specific fish (mentioned in the by catches regulation) as the usual minimum mesh size.[84] In the North Sea "those selectivity modifications… (must) result in the same or better selectivity characteristics for cod, haddock, and saithe as that of 120 mm."[85]

Regarding the Mediterranean Sea, Black Sea, Union waters in the Indian Ocean and the West Atlantic and the NEAFC Regulatory Area, there is no general mesh size or exceptions. Instead, there is specific mesh sizes used in particular areas with strict conditions,[86] such as in the Mediterranean Sea:[87]

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[78] Id. pp.151, 160, 169 & 173.

[79] Id. p.173.

[80] Id. p.151.

[81] Id. p.173.

[82] Id. pp.151, 160, 169 & 173.

[83] Id. p.151.

[84] Id. pp.151, 161, 169 & 173.

[85] Id. p.151.

[86] Id. pp.179 & 182-184.

[87] Id. p.179.

Mesh Size	Geographical Areas	Conditions
At least 40 mm square mesh codend	Whole area	A diamond mesh codend of 50 mm may be used as an alternative to the 40 mm square mesh cod end at the duly justified request of the vessel owner
At least 20 mm	Whole area	Directed fishing for sardine and anchovy

(Note: the above table does not show specifications listed in the footnotes of the legislation)

MESH SIZE RESTRICTIONS FOR STATIC NETS AND DRIFTNETS

In the North Sea, North Western Waters, South Western Waters and Baltic Sea, specific minimum mesh sizes for static nets and driftnets must be used in each territory (the Baltic Sea has slightly different terms to the other regions due to specifications for salmon),[88] however only the first exception exists. The exception's by-catches terms for static nets and driftnets are identical to the towed gear exception.[89] As in the case of towed gear, in the Mediterranean Sea, Black Sea, Union waters in the Indian Ocean and the West Atlantic and the NEAFC Regulatory Area there are no general mesh size restrictions, only specific ones for static nets.[90]

CLOSED OR RESTRICTED AREAS

Closed or restricted areas, conveyed to fishermen by areas "enclosed by sequentially joining with rhumb lines…coordinates… measured according to the WGS84 coordinate system" (sometimes in conjunction with specific geographical landmarks)[91] have a variety of regulations. However, for ease, the regulations will be classified across EU maritime regions by what they are most concerned with, namely:

- Species
- Equipment
- Time
- Specific countries

Species

Across the maritime regions, the restrictions vary, permitting or prohibiting the fishing or directed fishing of specific species, often only with certain gear, during set dates or conditions concerning both, in select areas. For example in the North Sea "Fishing for sandeel with any towed gear with a codend mesh size less than 32 mm is prohibited within" a preset area, or "Directed fishing for Norway lobster (Nephrops norvegicus) and associated species…is prohibited from 1 May to 31 May each year within" an area in North Western Waters.[92] In some areas, directed fishing is permitted only so long as the species does not exceed its percentage limit of the total onboard catch live weight.[93] For vessels carrying certain species in set areas,[94] there are conditions such as operational systems that alert the area master, speed, frequency of location data transmissions and gear storage.[95]

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[88] Id. p.174.

[89] Id. pp.153, 161, 170 & 174

[90] Id. pp.179 & 182-184.

[91] The European Parliament and the Council of the European Union (2019). pp.139, 153, 154, 156, 162-166, 170, 171, 175, 185-188 & 198. Note 35.

[92] Id. p.153.

[93] Id. p.163.

[94] Id. p.166.

[95] The European Parliament and the Council of the European Union (2009). *Regulations: Council Regulation (EC) No 1224/2009 of 20 November 2009.* [pdf] Official Journal of the European Union, p.22. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009R1224&from=EN [Accessed 12 Feb. 2020].

By catches of certain species may be permitted to remain onboard in some areas,[96] whilst the retention of others, either completely or if caught during specific times, is prohibited.[97] Certain by catches may be retained provided they are landed and counted against quotas.[98] Other by catches of species may be retained so long as they do not exceed a certain weight[99] or a percentage limit of the total retained catch live weight.[100] The weight limits may also necessitate action if reached,[101] such as informing the authorities, cease fishing and exiting the area.[102]

There are also regulations unique to certain species, for example in the NEAFC Regulatory Area, "Masters of fishing vessels engaged in the fishery outside the Redfish Conservation Area… (must) transmit… (a) catch report… on a daily basis"[103] subject to certain specifications.[104] Failure to do so renders the vessel's fishing license invalid.[105] Additionally, "The conversion factor to be applied to the gutted and headed presentation, including the Japanese cut presentation, of redfish caught in this fishery.. (is) 1,70." In the North Sea,[106] it is prohibited to interact with salmon and sea trout.[107]

Equipment

Equipment restrictions in certain areas cover beam trawls, trawls, Danish seines or similar towed nets, towed gear (some with certain coend mesh sizes), as well as fishing with static gear such as bottom set gillnets and bottom set longlines.[108] For instance, in the North Sea "fishing with any towed gear with a codend mesh size of

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[96] The European Parliament and the Council of the European Union (2019). p.175. Note 35.

[97] Id. p.177.

[98] Id. p.172.

[99] Id. p.165.

[100] Id. p.177.

[101] Id. p.165.

[102] Id. p.197.

[103] Id. p.185.

[104] Id. p.185 ("Such specifications include:

- Reports on the quantities held on board when entering the Regulatory Area. Such reports must be transmitted no earlier than 12 hours and no later than 2 hours before each entry into the Regulatory Area.
- Reports on weekly catches. Such reports must be transmitted for the first time no later than the end of the seventh day following the entry of the vessel into the Regulatory Area or, when fishing trips take more than 7 days, no later than Monday noon for catches taken in the Regulatory Area during the preceding week ending at midnight on Sunday. This report shall include the number of fishing days since the start of fishing, or since the last catch report.
- Reports on catches on board when exiting the Regulatory Area. Such reports must be transmitted no earlier than 8 hours and no later than 2 hours before each departure from the Regulatory Area. Such reports shall include, where appropriate, the number of fishing days and the catch taken in the Regulatory Area since the start of fishing, or since the last catch report.
- Reports on the quantities on-loaded and off-loaded for each transhipment of fish during the vessel's stay in the Regulatory Area. Donor vessels shall make this report no later than 24 hours before the transhipment, and receiving vessels no later than 1 hour after the transhipment. The report shall include the date, time and geographical position of the planned transhipment as well as the total round weight by species which are to be off-loaded or which have been on-loaded in kilograms and the call signs of the donor and receiving vessels. Without prejudice to Chapter IV, at least 24 hours before any landing, the receiving vessel shall report the total catch on board, the total weight to be landed, the name of the port and the estimated date and time of landing, regardless of whether the landing is to take place in a port inside or outside the Convention Area.")

[105] The European Parliament and the Council of the European Union (2019). p.188. Note 35.

[106] Id.

[107] Id. p.156.

[108] Id. pp.156, 163, 170, 172 & 189.

less than 32 mm or static nets less than 30 mm mesh size… (is) prohibited within geographical areas enclosed by rhumb lines" during specific periods for each area.[109] In South Western Waters "Fishing with any trawl, Danish seine or similar towed net… (is) prohibited within… geographical areas enclosed by sequentially joining rhumb lines… (to) coordinates during certain time periods."[110]

Particular allowances for depths of less than 600 meters exist in the North Sea, North Western Waters and South Western Waters for hake and anglerfish; "it… (is) permitted to use the following gear in these waters with a charted depth of less than 600 m:

- Bottom set gillnets used for directed fishing for hake of a mesh size of at least 100 mm and no more than 100 meshes deep, where the total length of all nets deployed does not exceed 25 km per vessel and the maximum soak time is 24 hours
- Entangling nets used for directed fishing for anglerfish of a mesh size of at least 250 mm and no more than 15 meshes deep, where the total length of all nets deployed does not exceed 100 km and the maximum soak time is 72 hours"[111] in the North Sea and North Western Waters.

In the North Sea, there are vehicle restrictions, either on the activities carried out by ships of a certain length or engine power. When using beam trawls such vehicles' "beam length, or the aggregate length of combined beam trawls measured as the sum of the length of each beam, …(must) not be greater than or able to extend to a length of greater than 9 m" unless using "a mesh size between 16 and 31 mm."[112] Another exception exists for "vessels whose primary activity is fishing for common shrimp (Crangon crangon)," subject to the use of a "mesh size between 80 and 99 mm" and an additional fishing authorization.[113]

For the Gulf of Riga in the Baltic Sea, vessels must be included on a publically available list on the internet. This entails fulfilling requirements such as holding a fishing authorization and having "an engine power that does not exceed 221 kW at any time."[114]

In the Mediterranean Sea, Black Sea and NEAFC Regulatory Area, equipment restrictions have no area specifications. Instead, their use at specified depths and sizes are controlled.[115] One example is the EU banning "the use of trawls or dredges at depths beyond 1,000 m" in the Black Sea.[116] It is also prohibited to have on board more than a certain amount of equipment, such as "250 pots or creels per vessel to catch deepwater crustaceans" in the Mediterranean Sea.[117] There are also, on pelagic vessels,[118] catch handling and discharge restrictions in the NEAFC Area.[119]

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[109] Id. p.156.

[110] Id. p.170.

[111] Id. p.198

[112] Id. p.155

[113] Id.

[114] Id. p.175

[115] Id. pp.180-182.

[116] Id. p.182.

[117] Id. p.198.

[118] Id. p.132.

[119] Id. ("Such restrictions include:

- The maximum space between bars in the water separator on board pelagic fishing vessels targeting mackerel, herring and horse mackerel is 10 mm.
- The bars must be welded in place.
- If holes are used in the water separator instead of bars, the maximum diameter of the holes must not exceed 10 mm. Holes in the chutes before the water separator must not exceed 15 mm in diameter.

Time

Such restrictions exist in the North Sea, North Western Waters and the Black Sea, and they regulate the use of certain equipment during certain times, often months in duration. For example, "It is prohibited to deploy towed gear with a codend mesh size of less than 32 mm from 1 July to 15 September in the waters situated within three nautical miles of the baselines in the Skagerrak and Kattegat unless carrying out directed fishing for Northern Prawn (Pandalus borealis)" in the North Sea.[120]

Specific countries

Regulations with countries at their core, in the North Sea, North Western Waters, and Union waters in the Indian Ocean and the West Atlantic, covers beam trawl usage on the coast of the United Kingdom and Ireland, as well as fishing activities around Mayotte. For both the UK and Irish coasts, "Vessels… (are) prohibited from using any beam trawl inside the areas within 12 nautical miles of the coast of the United Kingdom, measured from the baselines of the territorial waters (unless):

- The engine power of the vessels does not exceed 221 Kw and their overall length does not exceed 24 m and
- The beam length or aggregated beam length is no more than 9 m, or cannot be extended to a length greater than 9 m, except when directed fishing for common shrimp (Crangon crangon) with a minimum mesh size of less than 31 mm.
- Additionally, in certain regions the "the use of any beam trawl of mesh size less than 100 mm is prohibited."[121]

Within 24 nautical miles of the coast of Mayotte, "vessels are prohibited from using any purse-seine on tuna and tuna-like schools of fish."[122]

- Pelagic vessels are prohibited from discharging fish under their water line from buffer tanks or refrigerated seawater (RSW) tanks.
- Drawings related to the catch handling and discharge capabilities of pelagic vessels targeting mackerel, herring and horse mackerel in the NEAFC Convention Area which are certified by the competent authorities of the flag Member States, as well as any modifications thereto, must be sent by the master of the vessel to the competent fisheries authorities of the flag Member State. The competent authorities of the flag Member State of the vessels must carry out periodic verifications of the accuracy of the drawings submitted. Copies must be carried on board the vessel at all times.")

[120] Id. p.156.

[121] Id. p.155 & 166.

[122] Id. p.183.

MEASURES REDUCING INCIDENTAL CATCHES OF SENSITIVE SPECIES

CETACEANS

Vessels of 12 meters or longer must use active acoustic deterrent devices while using the specified gear in the set areas in the table below:[123]

Area	Gear
Baltic Sea Area delimited by a line running from the Swedish coast and, Area delimited by a line running from the eastern coast of Sweden.	Any bottom-set gill net or entangling net
Baltic Sea sub-division 24 (except for the area covered above)	Any bottom-set gill net or entangling net
ICES sub-area 4 and ICES division 3a (only from 1 August to 31 October)	Any bottom-set gill net or entangling net, or combination of these nets, the total length of which does not exceed 400 m
	Any bottom-set gillnet or entangling net ≥ 220 mm
ICES divisions 7e, 7f, 7g, 7h and 7j	Any bottom-set gillnet or entangling net
ICES division 7d	Any bottom-set gillnet or entangling net

SEABIRDS

If scientific data suggests seabirds are being caught at a level that would threaten their conservation status, then vessels must either use bird scaring/ weighted lines or set longlines, where practical and useful, when it is dark with the minimum deck lighting required for safety.[124]

MARINE TURTLES

In Union waters in the Indian Ocean and the West Atlantic, vessels fishing for Shrimps (Penaeus spp., Xiphopenaeus kroyeri) must use a turtle excluder device while using any shrimp trawl.[125]

SPECIES FOR SELECTIVITY PERFORMANCE INDICATORS[126]

North Sea	North Western Waters	South Western Waters	Baltic Sea	Mediterranean Sea
Cod	Cod	Hake	Cod	Hake
Haddock	Haddock	Whiting	Plaice	Red Mullet
Saithe	Saithe	Megrim		
Whiting	Whiting			
Plaice	Plaice			

[123] Id. pp.198-199.

[124] Id. p.199.

[125] Id. p.200.

[126] Id. p.201.

PROTECTION FOR SENSITIVE HABITATS

Marine ecosystem is dependent on habitat for survival and reproduction, thereby making protection and restoration of fish habitat crucial and essential to help maintain productive fisheries and rebuild depleted fish stocks.

NORTH WESTERN WATERS

The regulations concern the following areas:

- Belgica Mound Province
- Hovland Mound Province
- North-West Porcupine Bank Area I
- North-West Porcupine Bank Area II
- South-West Porcupine Bank.

Deploying "bottom trawls or similar towed nets, bottom set gillnets, entangling nets or trammel nets, and bottom set longlines" is prohibited.[127] Pelagic vessels that are fishing in the above areas must have solely pelagic gear onboard, including board trawls with a codend mesh size from 16-79 mm, and a regulation compliant Vessel Monitoring System (VMS) used to make VMS reports each hour. They must also have a fishing authorization and be on a list of authorized vessels. When entering an area for the protection of vulnerable deep-sea habitats, they must give notification of their intention to enter, and the quantity of fish retained on board four hours in advance to the Irish Fisheries Monitoring Centre (FMC). On leaving the area, they must also inform the Irish FMC, providing the quantity of fish retained on board. Within the Darwin Mounds, another area for protection, deploying bottom trawls or similar towed nets is prohibited.

SOUTH WESTERN WATERS

El Cachucho

Deploying "bottom trawls, bottom set gillnets, entangling nets or trammel nets and bottom set longlines"[128] in set areas is prohibited.

"Vessels that conducted directed fisheries with bottom set longlines in 2006, 2007 and 2008 for greater forkbeard (Phycis blennoides) may continue to fish in the area south of 44°00.00' N provided they have a fishing authorization."[129] Such vessels must have a regulation compliant VMS while fishing in the area.

Madeira and the Canary Islandsy

Deploying "bottom set gillnets, entangling nets and trammel nets at depths greater than 200m or bottom trawls or similar towed gear"[130] in set areas is prohibited. Azores Deploying "bottom set gillnets, entangling nets and trammel nets at depths greater than 200m or bottom trawls or similar towed gear" in set areas is prohibited.

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[127] Id. p.139.

[128] Id. p.141.

[129] Id.

[130] Id.

Azores

Deploying "bottom set gillnets, entangling nets and trammel nets at depths greater than 200m or bottom trawls or similar towed gear" in set areas is prohibited.[131]

MINIMUM CONSERVATION REFERENCE SIZES

SPRFMO (South Pacific Regional Fisheries Management Organization)

- The Organization was formed by 17 coastal states to take legal steps to manage straddling species, such as jack mackerel, and discrete high seas stocks of species such as orange roughly, in an area that stretches from the most eastern part of the South Indian Ocean through the Pacific Ocean beyond areas of national jurisdiction of States in South America.[132]

[131] Id. p.142.

[132] FAO (n.d.). *Regional Fishery Bodies Summary Descriptions: South Pacific Regional Fisheries Organization (SPRFMO).* [online] Available at: http://www.fao.org/fishery/rfb/sprfmo/en [Accessed 12 Feb. 2020].

CHAPTER 4: THE EU-REGULATED MARITIME TERRITORIES

Composed of 28 member countries, the EU regulates the largest maritime territory (including outlying regions)[133] and EEZ (Exclusive Economic Zone) that extends up to 22 million square kilometers around the globe. Jointly with other nations and organizations, the EU regulates seven maritime territories: the North Sea, the Arctic Ocean, the Atlantic Ocean, the Mediterranean Sea, the Black Sea, the Baltic Sea, and the Indian Ocean.[134] While each of these territories is EU-regulated, the coastal states claiming their relevant EEZs have jointly made commitment to protect and conserve the relevant maritime territories.[135]

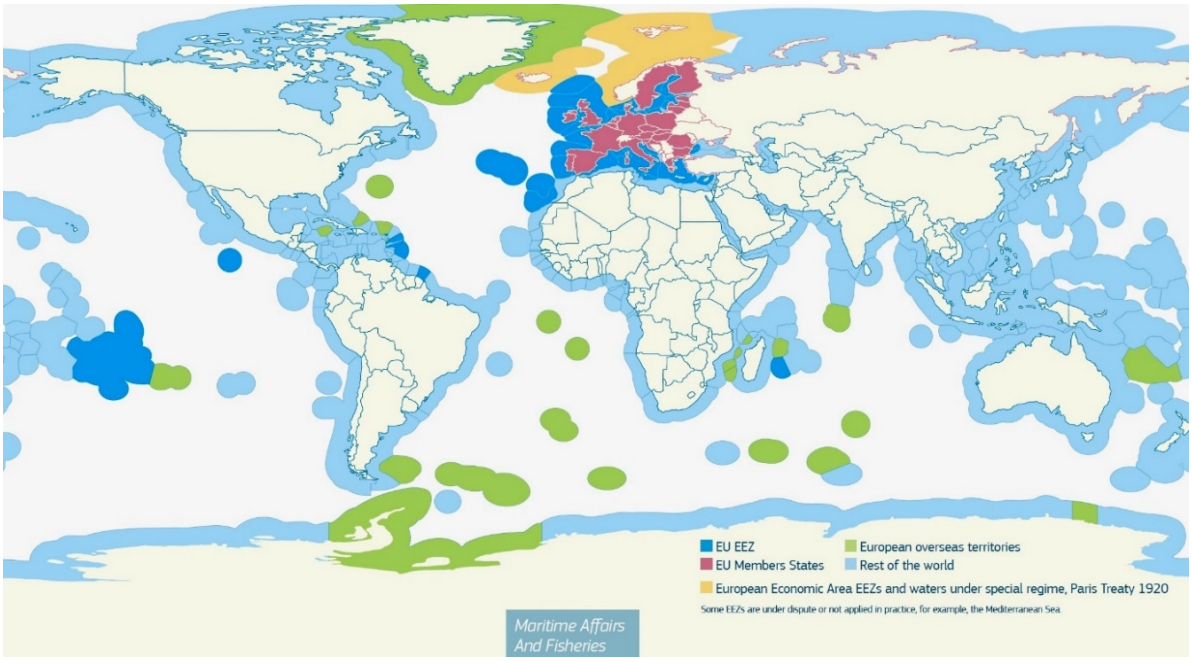

Figure 4: IOC-UNESCO

[133] European Commission (2020). *Facts and Figures*. [online] European Union. Available at: https://ec.europa.eu/maritimeaffairs/documentation/facts_and_figures_en [Accessed 12 Feb. 2020].

[134] IOC/Unesco (2020). *European Union*. [online] Available at: http://msp.ioc-unesco.org/world-applications/europe/european-union/ [Accessed 12 Feb. 2020]; MarineRegions (2020). *Map interface.* [program] Available at: http://www.marineregions.org/eezmapper.php [Accessed 12 Feb. 2020].

[135] European Commission (2020). *Sea basin regional strategies*. [online] European Union. Available at: https://ec.europa.eu/maritimeaffairs/policy/sea_basins/atlantic_ocean_en [Accessed 12 Feb. 2020].

THE NORTH SEA

While the North Sea is connected to many other bodies of water, such as the Atlantic Ocean, Norwegian Sea, and the Baltic Sea through the Kattegat and the Danish straits, it is also closely surrounded by many countries, such as the United Kingdom, Denmark, Norway, Germany, the Netherlands, Belgium and France.[136] Due to its location, the North Sea has long been "Europe's most productive fisheries" and "a prominent shipping zone among European countries."[137] In addition, its shallow sea basin and the constant mixing of water allowed it to produce a plentiful supply of nutrients for numerous animal and plant plankton. This plankton provides for a great number and variety of fish, thereby sustaining the abundance of fish stock.[138]

FISHING ACTIVITY

- Fishing effort has declined by an estimated 50%.
- Fishing techniques have shifted: beam trawling is being replaced by "pulse beam trawling, sum-wing, twin-rigging, and flyshooting, gear types that all require less fuel."[139]

MAIN SPECIES FISHED[140]

- Cod
- Haddock
- Herring
- Saithe
- Plaice
- Sole
- Norway Pout
- Sand eel
- Mackerel
- Sprat
- Blue Whiting

[136] Alexander, L. M. (2020). *North Sea: Region, Atlantic Ocean*. [online] Britannica. Available at: https://www.britannica.com/place/North-Sea [Accessed 12 Feb. 2020].

[137] Id.

[138] Johns, D. G. and Reid, P. C. (2001). An Overview of Plankton Ecology in the North Sea.[pdf] SAHFOS, pp.2 & 7. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/197335/TR_SEA2_Plankton.pdf [Accessed 12 Feb. 2020].

[139] ICES Advice (2018). *ICES Ecosystem Overviews Greater North Sea Ecoregion*. [pdf] ICES, p.5. Available at: https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/GreaterNorthSeaEcoregion_EcosystemOverview.pdf [Accessed 12 Feb. 2020].

[140] Alexander, L. M. (2015). *Economic Aspects: Fisheries*. [online] Britannica. Available at: https://www.britannica.com/place/North-Sea/Economic-aspects#ref33271 [Accessed 12 Feb. 2020]; Quintana, M. M., Motova, A., Lawrence, S. (2019). *Economics of the UK Fishing Fleet 2018*. [pdf] Edinburgh: Seafish, p.9. Available at: https://seafish.org/media/Economics_of_the_UK_Fishing_Fleet_2018.pdf [Accessed 12 Feb. 2020].

MAJOR FISHING NATIONS INCLUDE[141]

Major fishing nations are the United Kingdom, Norway, Denmark, and the Netherlands.

OVERFISHING:

- The fishing mortality reduced for shellfish, demersal, and pelagic fish stocks since the late 1990s. Overall, the spawning-stock biomass increased since 2000. A number of stocks, such as that of mackerel, blue whiting, sole Solea solea, and some Nephrops stocks, still are under a relatively high fishing pressure. [142] "The large fish indicator (LFI) index (describing the proportion -by weight of the demersal fish community catch on surveys that is larger than regional length thresholds) can be used to monitor changes in the fish populations. In the Greater North Sea, the LFI index declined in the mid-1980s and has been relatively stable with annual changes since 2004."[143]

- After the Cod population almost collapsed, between the early 1970s and 2006, a Cod Recovery Plan was implemented by the European Commission.[144] In 2017, the cod stock seemed to have risen and The Marine Stewardship Council (MSC) awarded 3 fisheries sustainable status to.[145] However in September 2019, the certification was suspended as stocks had reduced to a critical level[146] after fish stock numbers were overestimated by scientists.[147]

BYCATCHES AND DISCARDS:

- Discarding in the North Sea peaked around 1990, with almost 510,000 tonnes to an estimated 267,000 tonnes of fish discarded in 2010.[148]
- However, discard estimates still predict "10,500 tonnes of dead fish by the end of 2019."[149]
- "Despite zero TACs or prohibited listings for…species, several elasmobranchs are caught as bycatch in some fisheries. Bycatch in bottom-set gillnets is…affecting population abundance of harbour porpoises Phocoena phocoena in the North Sea. Bycatch of seabirds in the North Sea occurs but is not believed to be a large pressure on the seabird populations."[150]

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[141] Id.

[142] ICES Advice (2018). Note 139.

[143] Id. p.6.

[144] Sherwood, H. (2019). *Where did all the cod go? Fishing crisis in the North Sea*. [online] The Guardian. Available at: https://www.theguardian.com/business/2019/aug/18/where-did-all-the-cod-go-fish-chips-north-sea-sustainable-stocks [Accessed 12 Feb. 2020].

[145] Id.

[146] BBC (2019). *North Sea cod certification suspended by Marine Stewardship Council*. [online] Available at: https://www.bbc.com/news/uk-scotland-49815287 [Accessed 12 Feb. 2020].

[147] Cook, R. (2019). *North Sea cod should never have been labelled sustainable in the first place*. [online] The Conversation. Available at: https://theconversation.com/north-sea-cod-should-never-have-been-labelled-sustainable-in-the-first-place-124305 [Accessed 12 Feb. 2020].

[148] University of Exeter (2019). *Millions of seabirds rely on discarded fish.* [online] ScienceDaily. Available at: https://www.sciencedaily.com/releases/2019/11/191107202557.htm [Accessed 12 Feb. 2020].

[149] Weston, P. (2019). *Thousands of tonnes of dead fish illegally thrown into UK seas every year, investigation finds*. [online] Independent. Available at: https://www.independent.co.uk/environment/north-sea-cod-dead-fish-overfishing-discarded-a9171431.html [Accessed 12 Feb. 2020].

[150] ICES Advice (2018), p.7. Note 139.

INTRODUCTION OF INVASIVE SPECIES:

- The North Sea has 247 species not native to the area or of unknown origin.

- "The majority (142 species) arrived between 1950 and 1999, with 60 species arriving since the beginning of the 21st century. Since 2000, 21 new species have been recorded, all of which are new to Europe. The main vector for primary introductions is vessels, either through ballast water or through hull fouling, followed by aquaculture. Natural spread from neighboring countries is considered to account for a third of the introduced species. The observed ecological impacts include significant reductions in…several important native species and changes to the physical and chemical composition of both sediments and the water column." [151] Additional impact includes, "[o]ut-competing native commercial species, fouling of aquaculture and fishing gear, and fish kills through toxin production."[152]

CLIMATE CHANGE:

- Climate change has been responsible for decreasing fish stocks, fish size, and changing fish distributions in the North Sea by warming the seas, thereby contributing to the cod crisis, as less juvenile cod reached adulthood.[153]

- The decrease of "seven major North Sea species, including cod and haddock, by 34.6% since 1930" has largely been blamed on rising temperatures in the North Sea decimating Plankton, reducing fish food supply.[154]

- A study from Rutgers University and the U.S. National Oceanic and Atmospheric Administration recently found that "Warming can also modify the availability of key prey species. For example, if warming causes zooplankton – small invertebrates at the bottom of the ocean food web – to bloom early, they may not be available when juvenile fish need them most."[155]

- Another study in 2014 that researched on the decline of fish length in the North Sea, found that "the maximum body length of fish including haddock, whiting, herring, plaice, and sole has fallen by as much as 29% over 38 years." [156] This finding coincided "with an increase in water temperatures of between 1C and 2C," even accounting for food availability and fishing pressure.[157] This is because "fish are cold-blooded animals their metabolic rates are determined by the ambient temperature. In general, fish grow more rapidly during their early life when temperatures are warmer. The consequence of rapid juvenile growth (due to rising temperatures) is that they become mature at a smaller length and therefore don't grow as large as they would have in colder waters."[158]

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[151] Id.

[152] Id.

[153] Marine Stewardship Council (2019). *North Sea cod to lose sustainability certification.* [online] Available at: https://www.msc.org/media-centre/press-releases/north-sea-cod-to-lose-sustainability-certification [Accessed 12 Feb. 2020].

[154] Bawden, T. (2019). *How global warming is decimating some fish populations and helping others*. [online] inews.co.uk. Available at: https://inews.co.uk/news/environment/how-global-warming-is-decimating-some-fish-populations-and-helping-others-505062 [Accessed 12 Feb. 2020].

[155] Free, C. (2019). *Ocean warming has fisheries on the move, helping some but hurting more.* [online] The Conversation. Available at: https://theconversation.com/ocean-warming-has-fisheries-on-the-move-helping-some-but-hurting-more-116248 [Accessed 12 Feb. 2020].

[156] BBC (2014). *Climate change 'could be making fish smaller' say Aberdeen researchers*. [online] Available at: https://www.bbc.com/news/uk-scotland-north-east-orkney-shetland-25926111 [Accessed 12 Feb. 2020].

[157] Id.

[158] Id.

HABITAT DEGRADATION AND ENVIRONMENTAL PRESSURES DUE TO HUMAN ACTIVITY:

- Human produced sound, mainly from shipping, pile driving of wind farm foundations and oil exploration, is disruptive to many aquatic species as they rely on sound for survival, mating and hunting.[159]

- "The North Sea benthic habitats are impacted by bottom trawling, sand and gravel extraction, and recently also the growing introduction of offshore renewable energy structures such as wind farms, leading to pressures of abrasion, smothering, habitat loss, and selective extraction of non-living resources."[160]

KEY CONVENTIONS AND ORGANIZATIONS OF THE NORTH SEA

The North Sea Fishers Convention (International Convention for Regulating the Police of the North Sea Fisheries outside Territorial Waters, 1882)

- Legally binding convention comprised of 35 articles that applies to the Mediterranean Sea Area that requires the contracting parties to take proper measures and implement the provisions into their national legislation.

THE NORTH WESTERN WATERS

As the body of water covering the west coast of Ireland and Scotland, comprised of twelve ICES (International Council for the Exploration of the Sea) Divisions and three OSPAR regions, the North Western Waters is connected to three countries, United Kingdom, Ireland, and France.[161] The North Western Waters is particularly rich with species of cetaceans because of "availability of prey and high productivity along the Atlantic margin of the NWW, which is caused by a warm oceanic current called the North Atlantic Drift."[162]

FISHING ACTIVITY

"Total landings of wild capture fisheries from the NWW area for 2013 were around 1.3 million tonnes."[163] However "[i]f fish stocks were well managed, catches could increase by 87%, or 200,000 tonnes."[164]

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[159] Ocean Care (2020). *Underwater Noise: Consequences.* [online] Available at: https://www.oceancare.org/en/our-work/ocean-conservation/underwater-noise/underwater-noise-consequences/ [Accessed 12 Feb. 2020]; Discovery Channel Southeast Asia (2016). *Songs of Whales Drowned By Man Made Noise: Sonic Sea*. [video]. Available at: https://www.youtube.com/watch?v=9Zfx2YgI2hs [Accessed 12 Feb. 2020].

[160] ICES Advice (2018), p.10. Note 138.

[161] Popescu, I. (2019). *Multiannual plan for fisheries in the Western Waters*. [pdf] European Parliamentary Research Service (EPRS), p.2. Available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/625122/EPRS_BRI(2018)625122_EN.pdf [Accessed 12 Feb. 2020].

[162] Dransfeld, L., Maxwell, H.W., Moriarty, M., Nolan, C., Kelly, E., et al. (2014). *North Western Waters Atlas (3rd ed).* [pdf] Marine Institute, p.2. Available at: http://www.nwwac.org/_fileupload/MI_NWWAC_North_Western_Waters_Atlas_3rd-Edition_low%20res.pdf [Accessed 12 Feb. 2020].

[163] Id. p.73.

[164] Oceana (2017). *North Western Water: Status and Potential Productivity of Fish Stocks.* [pdf] p.1. Available at: https://mx.oceana.org/sites/default/files/status_and_potential_productivity_of_north_western_waters_fish_stocks.pdf [Accessed 12 Feb. 2020].

MAIN SPECIES FISHED[165]

Main species fish in the North Western Waters are Mackerel, Horse Mackerel, Blue Whiting, Hake, Saithe, Ling, Monkfish, Haddock, Nephrops, Crabs, Scallops, Megrim, and Whelk.

MAJOR FISHING NATIONS IN THE NORTH WESTERN WATERS[166]

Major fishing nations are United Kingdom, France, Ireland, Norway, and Netherlands.

OVERFISHING:

- "49% of fish stocks are overfished" and "77% of fish stocks have an unhealthy level of biomass."[167]
- "Only a small number of fish stocks—10 stocks out of 47—(21%) are considered in line with the Common Fisheries Policy (CFP) commitments. This means having a biomass above healthy levels ($B>B_{msy}$) and fishing mortality not subject to overfishing ($F<F_{msy}$)."[168]
- The status of fish stocks in North Western Waters region is not in a good condition as a significant proportion of the stocks are below healthy level and fishing mortality rates are above sustainable levels.
- The status would drastically change and could lead to a significant increase of 87% in sustainable catches, with positive socio-economic benefits for the fishing sector, if in a recovery and well managed scenario.

KEY CONVENTIONS AND ORGANIZATIONS OF THE NORTH WESTERN WATERS

NWWAC (North Western Waters Advisory Council)

- The Council carries a purpose "to provide strategic advice from the stakeholders (fishing industry and civil society) to the European Commission and the Member States on sustainable fisheries management."[169]

THE SOUTH WESTERN WATERS

The South Western Waters is the body of water covering France, Spain and Portugal, the southern part of the Western Waters. Because South Western Waters is close to the Atlantic Ocean where marine aquaculture is abundant, "coastal and maritime tourism are also important social and economic activities along the Atlantic coast of the SWW region."[170] This attachment to the Atlantic Ocean also makes the South Western Waters attractive to fishing operations trying to catch Atlantic species.

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[165] Dransfeld, L., Maxwell, H.W., Moriarty, M., Nolan, C., Kelly, E., et al. (2014). Note 162.

[166] Id. p.75.

[167] Oceana (2017). p.1. Note 164.

[168] Id.

[169] NWWAC (n.d.). *Welcome to the North Western Waters Advisory Council.* [outline] Available at: http://www.nwwac.org/english [Accessed 12 Feb. 2020].

[170] Borges, M.F., Mendes, H., Bloomfield, H.J., Raakaer, J., Pinho, M.R., et al. (2011). *Fisheries Ecosystem Plan: South Western Waters.* [pdf] Making the European Fisheries Ecosystem Plan Operational (MEFEPO): Work Package 7 Report, p.23. Available at: https://www.liverpool.ac.uk/media/livacuk/mefepo/pdf/South,Western,Waters,Fisheries,Ecosystem,Plan.pdf [Accessed 12 Feb. 2020].

FISHING ACTIVITY[171]

- Purse seine fishery
- Mixed demersal trawl fishery
- Mixed demersal line fishery
- Nephrops

MAIN SPECIES FISHED[172]

Main species fished are Yellowfin tuna, European pilchard, Skipjack tuna, Chub mackerel, Atlantic horse mackerel, Mackerel, Atlantic herring, and Blue whiting

MAJOR FISHING NATIONS[173]

Major fishing nations are France, Spain, Portugal, United Kingdom, and Netherlands.

OVERFISHING:

There have been reported failures of the Common Fisheries Policy (CFP). Fish stocks were overfished in response to "intensive competition from freshwater and marine aquaculture production" and "a lack of political will and ability among Member States to reduce fishing efforts and alter the present management path."[174]

GOVERNANCE CHALLENGES:

Many studies, however, believe the shortcomings to the present CFP are:

- "Lack of clear principles and long-term objectives.
- Mismatch between the scale of the governance and ecological systems.
- A tendency to apply one-size-fits-all solutions.
- Micro-management trap.
- Low legitimacy among fishermen.
- The type of co-management introduced has not led to responsible behavior among fishermen.
- Problems of 'implementation drift' and inconsistent enforcement exist in the member states.
- Discrepancies in the ways administrators and fishermen view the goals and means of the management regime."[175]

[171] Id. p.7.

[172] Id. p.3.

[173] Id.

[174] Id. p.8.

[175] Id.

KEY CONVENTIONS AND ORGANIZATIONS OF THE SOUTH WESTERN WATERS

SWWAC (South Western Waters Advisory Council)

- The Council aims to "achieve the sustainable fishing objectives set by the Common Fisheries Policy, integrating the ecosystemic approach and based on the precautionary principle."[176] The Council is comprised of representatives from the fishing sector in five Member States, as well as members of the civil society. Together, the members share opinions and initiate cooperation through consultations organized by the European Commission.[177]

THE MEDITERRANEAN SEA

Semi-enclosed, highly oxygenated, poor in nutrients and the saltiest of Europe's seas, the Mediterranean Sea is highly biodiverse.[178] Due to the great number of species, the marine ecosystem is complex, as is its management. Bordered by a large number of countries, most of the Sea is classed as international waters, with fish stocks shared between numerous countries- EU and non-EU. Hence, for the greatest chance of sustainable success the EU is working with non-EU countries.[179]

FISHING ACTIVITY

The fishing fleet in the Mediterranean Sea has decreased as countries have reduced their fleet to match available resources.

Vessel types operating in the area:

- Multipurpose vessels: 77.8%.
- Trawlers (LOA over 6M): 8.6%.
- Purse seiners and pelagic trawlers (LOA over 6M): 4.8%
- Other fleet segments (all lengths): 8.8%.
- Multipurpose vessels are "generally crewed by artisan fishers who use traditional methods to target a variety of species."[180]
- Small-scale fishers constitute 83% of the Mediterranean fishing fleet.[181]

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[176] SWWAC (n.d.). *Who Are We?*. [online] European Union. Available at: http://www.cc-sud.eu/index.php/en/contact-swwac?id=50 [Accessed 12 Feb. 2020].

[177] Id.

[178] European Commission (2020). *Mediterranean Sea*. [online] European Union. Available at: https://ec.europa.eu/fisheries/cfp/mediterranean_en [Accessed 12 Feb. 2020].

[179] European Commission (2020). *What is the EU doing?*. [online] European Union. Available at: https://ec.europa.eu/fisheries/cfp/mediterranean/what-eu-doing_en [Accessed 12 Feb. 2020].

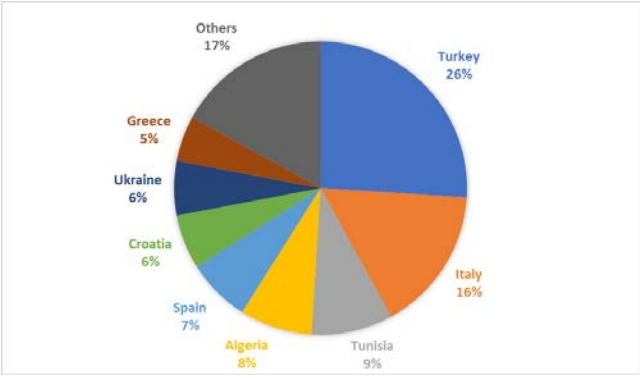
[180] SoMFi 2018 (2018). *The State of Mediterranean and Black Sea Fisheries 2018*. [pdf] FAO, p.6. Available at: http://www.fao.org/3/ca4074en/ca4074en.pdf [Accessed 12 Feb. 2020].

[181] Id.

MAJOR FISHING NATIONS[182]

Countries contributing to at least 5 percent of total captures in the GFCM area of application, average landings in 2014-2016:

- Turkey: 26%
- Others: 17%
- Italy: 16%
- Tunisia: 9%
- Algeria: 8%
- Spain: 7%
- Croatia: 6%
- Ukraine: 6%
- Greece: 5%



OVERFISHING:

In 2018, the Mediterranean Sea was the most overfished in the world according to the SOFIA (State of World Fisheries and Aquaculture) Report.[183] About 60% of the sea's fish stocks have been at a serious level of being depleted, while it is one of the world's most important seas located between three continents, Africa, Asia and Europe.[184]

- The Mediterranean Sea was alerted with urgency for bold political action to curb "bottom-trawling fishing, safeguarding areas where fish grow, and setting annual fish catch limits in line with scientific advice."[185] In conjunction with pollution and climate change, overfishing has led to decreasing fish stocks.[186]
- Rising to a peak of over 1 million tonnes in 1994, landings have since decreased to 830,000 tonnes in 2018.
- Although a decrease from 88% in 2014, 78% of Mediterranean and Black Sea stocks in 2018 were exploited.
- Almost 50% of Mediterranean stocks have a low biomass. This may be due to long term overfishing, reducing their ability to replenish.
- "The most seriously overexploited priority species is European hake in the Mediterranean, which – due to its presence in most trawl fisheries – shows an overexploitation rate 5.8 times higher than the target."[187] This is followed by Horse mackerel.
- However, for priority species overexploitation indexes are decreasing, apart from hake.

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[182] Id.

[183] Oceana (2018). *UN alert: Mediterranean is world's most overfished sea.* [online] Available at: https://eu.oceana.org/en/press-center/press-releases/un-alert-mediterranean-worlds-most-overfished-sea [Accessed 12 Feb. 2020].

[184] Oceana (2019). *Mediterranean Sea at Risk*. [online] Available at: https://eu.oceana.org/en/our-work/mediterranean-sea-risk/overview [Accessed 12 Feb. 2020].

[185] Oceana (2018). Note 184.

[186] European Commission (2020). Note 178.

[187] SoMFi 2018 (2018). pp.17-18. Note 180.

BYCATCHES AND DISCARDS:

"Annual discards are estimated at around 230, 000 tonnes, equivalent to about 18 percent of the total catch landed."[188]

- Trawlers are responsible for the majority of discards with discard rates over 40% in certain areas.
- Small-scale fisheries usually have discard rates below 10% "for the main gear types (trammels, gillnets and small longlines)."[189]
- Bycatches of vulnerable species in the Mediterranean and Black Sea are rare. Although sea turtles constitute the majority of bycatches in the Mediterranean and Black Sea, they can usually be released alive.[190]

POLLUTION AND HABITAT DEGRADATION:

"Two hundred thousand tons of plastic is dumped each year, representing more than 60 percent of all the trash we find at the bottom of the sea."[191] [192]

- Items such as synthetic ropes, fishing nets, cotton and clothing, metal cans and food packaging also contribute to the pollution.[193]

- "Plastic pollution kills aquatic wildlife, damages natural systems, and contaminates marine food chains. Globally today, over 700 marine species, including sea mammals and birds, are impacted by plastic through ingestion, entanglement, or habitat degradation."[194]

- "The international maritime and fisheries industries abandon, lose or discard gear (nets, lines, traps, pots, etc.) and other equipment at sea. This damages marine habitats and kills wildlife, including through a phenomenon known as 'ghost fishing (lost or abandoned fishing gear catching and killing fish).'"[195]

- Exposure to oil and chemicals due to the high volume of transport through the Sea, as well as concentration of heavy metals "which presents high levels of mercury, cadmium, iron, and zinc" are also dangerous pollutants.[196]

- Exacerbating the issue is the almost completely enclosed nature of the Mediterranean Sea, which causes "weak tidal and current movements."[197] The slow movement of water leads to pollution

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[188] Id. p.15.

[189] Id.

[190] Id. p.16.

[191] Eurocean (2019). *Mediterranean is Europe's most polluted sea*. [online] Available at: http://www.eurocean.org/np4/1190.html [Accessed 12 Feb. 2020].

[192] Dalberg Advisors, et al. (2019). *Stop the Flood of Plastic: How Mediterranean countries can save their sea*. [pdf] World Wide Fund for Nature (WWF), p.10. Available at: http://awsassets.panda.org/downloads/a4_plastics_reg_low.pdf [Accessed 12 Feb. 2020].

[193] Ifremer (2019). *Marine waste in the Mediterranean: a moderate rise and a mission in progress*. [online] Available at: https://wwz.ifremer.fr/Espace-Presse/Communiques-de-presse/Dechets-marins-en-Mediterranee-une-hausse-moderee-et-une-mission-en-cours [Accessed 12 Feb. 2020].

[194] Dalberg Advisors, et al. (2019). p.12. Note 193.

[195] Id.

[196] MED-O-MED (2019). *The impact of climate change in the Mediterranean*. [Blog] Available at: https://medomed.org/2019/the-impact-of-climate-change-in-the-mediterranean/ [Accessed 12 Feb. 2020].

[197] Mostafa, S. and Boxer, B. (2019). Mediterranean Sea. [online] Britannica. Available at: https://www.britannica.com/place/Mediterranean-Sea/Hydrologic-features-and-climate [Accessed 12 Feb. 2020].

accumulation in pockets near to discharge areas with "strong human concentration and improper waste treatment."[198]

- Both tourism and increasing populations are factors in habitat degradation. Tourism is mainly concentrated along the costal strip and peaks during the summer. This in conjunction with increasing populations amplifies environmental impacts. The combination "intensifies the pressure on coastal… (environments) due to construction(,)… water resources in periods of water stress, and increases the generation of waste and (untreated) wastewater discharges from domestic and industrial sources and the over-exploitation of natural resources (agriculture/water, energy/oil, fisheries/biodiversity, etc.). The effect of all these pressures leads to environmental degradation."[199]

INTRODUCTION OF INVASIVE SPECIES:

This presents a major threat to the biodiversity, structure, functioning, and stability of the Mediterranean Sea due to increased invasive marine species flowing through the expanded Suez Canal.[200] For instance in the 1970s, 21 percent of Israeli trawler catch were invasive species, in 2016 the number was over 50 percent.[201] Invasive species include:

- Rabbitfish has "become a dominant component of the total fish biomass in the southernmost part of the eastern Mediterranean," where there are temperate waters.[202] This phenomenon, where "the non-native species occupy a new ecosystem," posed threats to the originally dominant algal forests, as they were rapidly consumed and denuded without enough time to recover.[203]

- Poisonous Silverside puffer fish-consumed 20-33 percent of fish caught on long-line hooks, chewed trawler nets- reducing their lifespan from 15 years to months, preyed on staple foods such as squid, octopus and cuttlefish- depleting populations.

- Venomous nomad jellyfish- large groups pose threats to divers and beach goers, jeopardized Atlantic Bluefin tuna eggs in the Straits of Sicily- a fishery near collapse.[204]

- Carnivorous and venomous lionfish- although there have been no major impacts in the Mediterranean Sea, in the Caribbean they demolished the herbivorous fish population that "keep algae and seaweed levels under control (which) led to unprecedented growth of seaweed, killing the coral reefs…. The lionfish population boom in the Caribbean coincided with a 65 percent decline in native fish populations over the course of two years."[205] Hence, there are obvious concerns for their future impact on the

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[198] European Commission (2020). Note 178.

[199] European Environment Agency (2014). Horizon 2020 Mediterranean report. [pdf] Luxembourg: European Union, p.49. Available at: http://wedocs.unep.org/bitstream/handle/20.500.11822/9423/-Horizon_2020_Mediterranean_Report-2014EN_EEA_Horizon2020Mediterraneanreport_2014.pdf.pdf?sequence=5&isAllowed=y [Accessed 12 Feb. 2020].

[200] Id. p.40.

[201] Bishop, R. D. (2016). *Our Mediterranean, Our Survival*. [online] The New York Times. Available at: https://www.nytimes.com/2016/01/30/opinion/our-mediterranean-our-survival.html?_r=1 [Accessed 12 Feb. 2020].

[202] Floyd, Mark (2014). *Study finds tropical fish moving into temperate waters*. [online] Phys.org. Available at: https://phys.org/news/2014-12-tropical-fish-temperate.html [Accessed 12 Feb. 2020].

[203] Floyd, Mark (2014). *Study finds tropical fish moving into temperate waters*. [online] Phys.org. Available at: https://phys.org/news/2014-12-tropical-fish-temperate.html [Accessed 12 Feb. 2020].

[204] Id.

[205] Quigley, A. (2016). *How an invasive fish is threatening the Mediterranean Sea*. [online] Christian Science Monitor. Available at: https://www.csmonitor.com/Science/2016/0628/How-an-invasive-fish-is-threatening-the-Mediterranean-Sea [Accessed 12 Feb. 2020].

Mediterranean Sea.[206] The issue for plans to reduce the lionfish population is that the large Mediterranean predators, such as Groupers, that would have consumed lionfish have been overfished. Therefore, fishing of lionfish has been encouraged by the government.[207]

CLIMATE CHANGE:

The Mediterranean region is especially vulnerable to this risk, with average temperatures already rising by 1.4°C.[208]

- Risks to the natural ecosystem and biodiversity include "acidification of sea water (which has already started to occur),[209] increasing heatwaves in combination with drought and land-use change."[210]

- Already, due to rising sea temperatures, it has contributed to the increase in invasive species, such as the lionfish, previously unable to inhabit the Mediterranean Sea due to its colder temperatures.[211]

KEY CONVENTIONS AND ORGANIZATIONS OF THE MEDITERRANEAN

The Barcelona Convention (Convention for the Protection of the Marine Environment and Coastal Regions of the Mediterranean, 2004)

- Legally binding convention comprised of 35 articles that applies to the Mediterranean Sea Area that requires the contracting parties to take proper measures and implement the provisions into their national legislation. The Convention adopted protocols that carried specific requirements to comply with anti-dumping practices to protect the Mediterranean Sea and other nearby waters from pollution.[212]

GFCM (General Fisheries Commission for the Mediterranean, 1949)

- The GFCM is an institution that establishes agreements and institutional instruments to mandate "conservation and sustainable use, at the biological, social, economic, and environmental level of living marine resources, as well as the sustainable development of aquaculture in the area of application."[213]

RECOFI (Regional Commission for Fisheries)

- The purpose of the Agreement was "to promote the development, conservation, rational management and best utilisation of living marine resources, as well as the sustainable development

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[206] Rinat, Z. (2019). *Invasive Devil Firefish Are Infesting the Mediterranean Sea*. [online] Haaretz. Available at: https://www.haaretz.com/israel-news/.premium-invasive-devil-firefish-are-infesting-the-mediterranean-sea-1.8013345 [Accessed 12 Feb. 2020].

[207] Quigley, A. (2016). Note 206.

[208] European Environment Agency (2014). p.32. Note 200.

[209] European Commission (2018). *Worrying effects of accelerating climate change on the Mediterranean Basin*. [online] European Union. Available at: https://ec.europa.eu/jrc/en/science-update/worrying-effects-accelerating-climate-change-mediterranean-basin [Accessed 12 Feb. 2020].

[210] University of Exeter (2019). *Climate change impact in Mediterranean region.* [online] ScienceDaily. Available at: https://www.sciencedaily.com/releases/2018/10/181026102625.htm [Accessed 12 Feb. 2020].

[211] Quigley, A. (2016). Note 205.

[212] The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean 1995

[213] FAO (2016). *Basic texts of the General Fisheries Commission for the Mediterranean of the FAO*. [pdf] art 2. Available at: http://www.fao.org/3/a-i5450e.pdf [Accessed 12 Feb. 2020].

of aquaculture in the Region."[214] Therefore, the Agreement formulated and recommended appropriate measures to pursue its purpose by regulating fishing methods, setting minimum size of catch concerning specified species and regulating the total amount of catch.

The ICCAT Convention (International Convention for the Conservation of Atlantic Tunas, 1969)

- The Convention played a key role in regulating and managing the Tuna fishing industry in the "Convention area," or "all waters of the Atlantic Ocean including the adjacent seas," that includes the Mediterranean Sea.[215] The Agreement aims to maintain the populations of tuna and tuna-like species at levels that will promote the maximum sustainable catch for food. The EU has been a party to this Agreement since 1997 with most of the Mediterranean coastal States.

THE BLACK SEA

The world's largest inland basin, the Black Sea is semi-enclosed with restricted water exchanges with the Mediterranean Sea. Due to low oxygen concentrations at depths of below 150 to 200 meters,[216] at lower depths the Black Sea is considered a 'dead zone' for marine life.

FISHING ACTIVITY

The fishing fleet in the Black Sea has decreased as countries have reduced their fleet to match available resources. Small-scale fishers constitute 91% of the Black Sea fishing fleet.

Vessel types operating in the area:

- Multipurpose vessels: 91.3%.
- Trawlers (LOA over 6M): 8.6%.
- Purse seiners and pelagic trawlers (LOA over 6M): 4.8%
- Other fleet segments (all lengths): 8.8%.
- Multipurpose vessels are "generally crewed by artisan fishers who use traditional methods to target a variety of species."[217]
- "Anoxic conditions in the Black Sea cause demersal resources to only inhabit shallow areas (up to 60–100 m depth) and the ecosystem being dominated by small pelagic species, hence a dominance of small-scale vessels and pelagic trawlers."[218]

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[214] FAO (2020). *Regional Commission for Fisheries (RECOFI)*. [online] Available at: http://www.fao.org/fishery/rfb/recofi/en [Accessed 12 Feb. 2020].

[215] FAO (2020). *Atlantic Ocean and Adjacent Seas.* [online] Available at: http://www.fao.org/3/w1310e/w1310E02.htm [Accessed 12 Feb. 2020].

[216] European Environment Agency (2018). *Ocean governance* [online] Available at: https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/ocean-governance/ocean-governance#regional-sea-characteristics-and-management [Accessed 12 Feb. 2020].

[217] SoMFi 2018 (2018). p.6. Note 180.

[218] Id.

OVERFISHING:

In 1982 the total Black Sea catch was almost 2 million tonnes; similar total catch levels continued until a sudden decline, starting in 1989 due to the collapse of pelagic fisheries.

- Since then landings have fluctuated, with a drastic low point in 2014 of 300,000 tonnes. In 2016 landings reached 390,000 tonnes.
- Although a decrease from 88% in 2014, 78% of Mediterranean and Black Sea stocks in 2018 were exploited.
- Almost 50% of Mediterranean stocks have a low biomass. This may be due to long term overfishing, reducing their ability to replenish.
- Turbot is the most overexploited species in the Black Sea. This is followed by Horse mackerel.
- "In the Black Sea, while overexploitation remains serious, a decrease in its (overexploitation) index has been particularly marked for turbot; with only sprat showing a steady rise in recent years."[219]

BYCATCHES AND DISCARDS:

"Annual discards are estimated at around 45,000 tonnes, equivalent to about 10-15 percent of the total catch landed."[220]

- Trawlers are responsible for the majority of discards with discard rates over 40% in certain areas.
- Small-scale fisheries usually have discard rates below 10% "for the main gear types (trammels, gillnets and small longlines)."[221]
- Bycatches of vulnerable species in the Mediterranean and Black Sea are rare. Although sea turtles constitute the majority of bycatches in the Mediterranean and Black Sea, they can usually be released alive.[222]

POLLUTION AND HABITAT DEGRADATION:

The Black Sea is the most polluted sea in Europe, with the marine litter (number of floating items per square kilometer) double that of the Mediterranean.[223] It's highly sensitive to this issue due to it's almost enclosed nature. Annually, "about 350 cubic kilometres of river water pours into the Black Sea."[224] Rivers are the main source of pollution for the Black Sea, with the rivers Danube, Dniester and Dnipro acting as the largest contributors.

- The water was so polluted, in Ukraine people were advised not to swim during the summer of 2019 in the sea as it largely did not meet water safety standards.

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[219] Id. p.19.

[220] Id. p.15.

[221] Id.

[222] Id.

[223] Abdurasulov, A. (2019). *The Black Sea: Can Europe's most polluted sea be saved?* [video] Available at: https://www.bbc.com/news/av/science-environment-50578326/the-black-sea-can-europe-s-most-polluted-sea-be-saved [Accessed 12 Feb. 2020].

[224] UN Environment Programme (2020). *The Black Sea* [online] Available at: https://www.unenvironment.org/explore-topics/oceans-seas/what-we-do/working-regional-seas/regional-seas-programmes/black-sea [Accessed 12 Feb. 2020].

- Samples taken from the sea floor have contained microplastics, while water samples have shown traces of caffeine, medicine, and illicit drugs. The presence of antibiotics is a particular issue as, due to their interactions with bacteria in the sea, they are contributing to bacterial resistance.[225]

- "On average, some 85% of the litter found in the Black Sea is plastic. Of the most common types of litter that are brought into the Black Sea from rivers, around 20% are plastic bottles, while plastic bags and containers, two other key polluters, account for 10% and 9% respectively."[226]

- Eutrophication is when "Excessive amounts of nutrients encourage the growth of algae and other aquatic plants, which in turns leads to multitude of negative effects such as extensive growth of algae (algae blooms) and oxygen depletion in the sea."[227] Fertilizers and waste dumped into the sea has caused this, leaving anoxic portions of water, killing aquatic life.[228]

- The degradation of water quality due to raw sewage has reduced, largely due to measures such as EU funded waste treatment plants along the river Danube. Such plants have reduced raw sewage into the Danube, and consequently the Black Sea, from 50%-95-96% in 2010.[229]

- There are signs that the Sea is recovering, such as the presence of species that act as indicators to the Sea's health.[230]

INTRODUCTION OF INVASIVE SPECIES:

An infamous example of this is the invasion of the comb jellyfish from North America (*Mnemiopsis leidyi*) from ballast water (water loaded onto ships for balance and stability when cargo is low. Released when ships pick up new cargo at another port).

- Arriving on ships from the American Atlantic coast in 1982, the jellyfish increased dramatically, due to a lack of predators, "accounting for 90% of the total biomass in the Black Sea" in the mid-1990s.[231]

- The jellyfish consumed zooplankton, the diet of fish in the Black Sea, as well as their eggs and larvae. "The invasion contributed to the near collapse of Black Sea commercial fisheries within a few years. Anchovy fisheries in the Azov Sea, already under stress from pollution and overfishing, have completely collapsed….Dolphin numbers in the Black and Azov Seas also dropped dramatically, as the fish they used to feed on disappeared. The entire ecosystem has been disrupted - the (jellyfish) have even reduced the amount of oxygen in the Black Sea."[232]

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[225] Abdurasulov, A. (2019). Note 224.

[226] EU Neighbours (2019). *The Black Sea is contaminated with plastic – but how can we reduce the damage?* [online] Available at: https://www.euneighbours.eu/en/east/eu-in-action/stories/black-sea-contaminated-plastic-how-can-we-reduce-damage [Accessed 12 Feb. 2020].

[227] WWF (2020). *Eutrophication* [online] Available at: https://wwf.panda.org/knowledge_hub/where_we_work/baltic/threats/eutrophication/ [Accessed 12 Feb. 2020].

[228] Abdurasulov, A. (2019). Note 224.

[229] Id.

[230] Id.

[231] WWF International (2009). *Silent Invasion: The spread of marine invasive species via ships' ballast water.* [pdf] Gland: WWF. Available at: https://mobil.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/Study_Silent_Invasion.pdf [Accessed 12 Feb. 2020].

[232] Leitzell, K. (2019). *Invasion of the ctenophores.* [online] Available at: https://earthdata.nasa.gov/learn/sensing-our-planet/invasion-of-the-ctenophores [Accessed 12 Feb. 2020].

CLIMATE CHANGE:

Climate change may be warming the middle water layer (cold intermediate layer) of the Black Sea. This layer separates the oxygenated water layer above, anoxic water layer below.

- Warming of the middle layer is causing it to mix with the other layers, which "could enable the water masses from the deeper layers of the sea to eventually infiltrate the top layer, which would have unknown impacts on the sea's marine life….If this trend continues, it could potentially change the stratification of the sea... Restructuring the layers could bring sulfides, corrosive and noxious chemicals at the bottom of the sea, up to the surface, impacting marine wildlife and tourism."[233]

KEY CONVENTIONS AND ORGANIZATIONS OF THE BLACK SEA

The Bucharest Convention (The Convention for the Protection of the Black Sea, 1992)

- The Convention is one of the four European Regional Sea Conventions ratified by all six Black Sea countries.[234] It was drafted as the legal framework for the protection of the coastal and marine environment through regional cooperation. The Black Sea Commission, the implanting body of this Convention, is represented by each of the six Parties: Russia, Turkey, Ukraine, Georgia, Bulgaria and Romania. Through this Convention, the Black Sea Integrated Monitoring and Assessment Program (BSIMAP) was stipulated to protect the Sea against pollution from 2017 to 2022.[235] The program aimed to establish scientific and technical cooperation and monitoring system for the Black Sea through the Commission.

BSBLCP (The Black Sea Biodiversity and Landscape Conservation Protocol)

- The protocol was drafted as a practical approach born out of the Bucharest Convention with the objective "to prevent appearance of new threatened species and to halt the losses of known threatened species by 2010; increase and improve management of protected areas, in particular marine protected areas; and to restore and rehabilitate damaged areas of previously high biodiversity value."[236]

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[233] ScienceDaily (2019). *Warmer winters are changing the makeup of water in Black Sea.* [online] Available at: https://www.sciencedaily.com/releases/2019/08/190815120650.htm [Accessed 12 Feb. 2020].

[234] European Commission (2019). *Our Oceans, Seas and Coasts.* [online] European Union. Available at: https://ec.europa.eu/environment/marine/international-cooperation/regional-sea-conventions/bucharest/index_en.htm [Accessed 12 Feb. 2020].

[235] Commission on the Protection of the Black Sea Against Pollution (2002). *Black Sea Integrated Monitoring and Assessment Program (BSIMAP).* [pdf] p.4. Available at: https://ec.europa.eu/environment/marine/international-cooperation/regional-sea-conventions/bucharest/pdf/BSIMAP_2017_to_2022_en.pdf [Accessed 12 Feb. 2020].

[236] Oral, N. (2012). State of the Black Sea. *The Legal Framework of Cooperation for Protection of Marine Biodiversity in the Black Sea*, 37(2), p.265. Available at: https://www.cairn.info/revue-revue-juridique-de-l-environnement-2012-2-page-255.htm# [Accessed 12 Feb. 2020].

THE BALTIC SEA

Semi enclosed, with low salinity, the Baltic Sea is relatively shallow[237] and the one of our largest bodies of brackish water.[238] Except for Russia, all Baltic costal states are EU Members. However, in 2006, a bilateral framework fisheries agreement was agreed to between the EU and Russia.[239]

FISHING ACTIVITY

- Baltic fisheries only target a few stocks: cod, herring and sprat make up 95% of the total catch. Cod fisheries largely use demersal trawls and gillnets, "while herring and sprat are mainly caught by pelagic trawls….

- Longline fisheries target cod, salmon, and sea trout in the western and central Baltic Sea, and eel in coastal areas. Following the ban on driftnets, longlines have become the most important gear in the offshore salmon fishery."[240]

MAIN SPECIES FISHED[241]

Main species fished are Cod, Herring, Sprat, Flounder, Plaice, Flatfish, and Salmon

MAJOR FISHING NATIONS[242]

Major fishing nations are Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden, and Russia.

OVERFISHING:

Since 2003, landings have been stable, and a small number of stocks are currently fished at or above a sustainable rate.

- The stocks being overexploited include "eastern and western cod, herring stocks in the central and in the western Baltic, as well as sprat in the Baltic Sea, plaice (Pleuronectes platessa)…, and sole (Solea solea)."[243] Due to impending Cod stock collapse, the EU implemented a ban on fishing Cod from the 23

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[237] European Environment Agency (2018). Note 200; Mutton, A. F. A. (2019). *Coastal features.* [online] Britannica. Available at: https://www.britannica.com/place/Baltic-Sea/Coastal-features [Accessed 12 Feb. 2020].

[238] WWF (2020). *About the Baltic Sea.* [online] Available at: https://wwf.panda.org/knowledge_hub/where_we_work/baltic/area/ [Accessed 12 Feb. 2020].

[239] HELCOM (2020). *Basic Facts.* [online] Available at: http://www.helcom.fi/action-areas/fisheries/basic-facts [Accessed 12 Feb. 2020].

[240] ICES Advice (2019). *Baltic Sea Ecoregion – Fisheries overview*. [pdf] ICES, p.11. Available at: https://www.ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/BalticSeaEcoregion_FisheriesOverviews.pdf [Accessed 12 Feb. 2020].

[241] Id. p.6.

[242] Id. p.2-5.

[243] Id. p.12.

July 2019-31 of December 2019.[244] The European Commission implemented stricter rules regarding Cod, including the closure of the Eastern Baltic cod fishery.[245]

BYCATCHES AND DISCARDS:

As sprat and herring are target species and other bycatch is landed, pelagic discards are low. "The discard rates are minor for static coastal gears and even lower for pelagic trawls."[246]

POLLUTION AND HABITAT DEGRADATION:

Eutrophication in the Baltic Sea is a pressing issue, "as coastal waters of the Baltic have been starved of oxygen to a level unseen in at least 1,500 years largely as a result of modern human activity…. Nutrient run-off from agriculture and urban sewage are thought to be to blame."[247]

- "The main pathways for nutrients are the five main rivers - the Neva, Nemunas, Daugava, Vistula and Oder."[248]
- Fertilizers used in agriculture seep into ground, river, and then ocean water. Hence they release nitrogen and phosphorous into the sea for algal growth.[249]
- The creation of these dead zones reduces aquatic life, including Baltic fish stocks.[250]
- Additionally, the semi-enclosed nature of the Baltic, as well as "its restricted water exchange with the North-east Atlantic and high volume of river run-off" makes it particularly vulnerable to such pollution.[251]
- "Another problem is that much of the phosphorus already released to the Baltic Sea is now stored as an environmental liability in the sediments of the deeper parts of the basin. Anoxic (oxygen-free) zones enhance the release of phosphorus from the sediment – so called "internal loading" – and that in turn encourages algal blooms."[252]
- Fishing gear left in the sea, either lost or discarded, is another pollutant endangering fish stocks. Such gear continues to catch and kill fish, long after it has been abandoned.[253]

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[244] EURACTIV (2019). *EU bans cod fishing in Baltic Sea*. [online] Available at: https://www.euractiv.com/section/agriculture-food/news/eu-bans-cod-fishing-in-baltic-sea/ [Accessed 12 Feb. 2020].

[245] Holland, J. (2019). *Brussels proposes financial aid for Baltic cod fishers.* [online] Available at: https://www.seafoodsource.com/news/supply-trade/brussels-proposes-financial-aid-for-baltic-cod-fishers [Accessed 12 Feb. 2020].

[246] ICES Advice (2019). p.8. Note 241.

[247] Davis, N. (2018). *Baltic Sea oxygen levels at '1,500-year low due to human activity.'* [online] The Guardian. Available at: https://www.theguardian.com/environment/2018/jul/05/baltic-sea-oxygen-levels-at-1500-year-low-due-to-human-activity [Accessed 12 Feb. 2020].

[248] WWF (2020). Note 239.

[249] Heinemeier, E. (2018). *The Baltic Sea needs an intervention.* [online] ScienceNordic. Available at: https://sciencenordic.com/denmark-farming-the-oceans/the-baltic-sea-needs-an-intervention/1455257 [Accessed 12 Feb. 2020].

[250] Davis, N. (2018). Note 248.

[251] European Environment Agency (2018). Note 200.

[252] WWF (2020). Note 238.

[253] ICES Advice (2019). p.8. Note 241.

INTRODUCTION OF INVASIVE SPECIES:

"Over 120 non-native aquatic species have been recorded in the Baltic Sea to date (in 2008), 80 of which have established viable, self-reproducing populations in at least some parts of the region". Most species arrived through ballast water. These invasive species include:

- The Ponto-Caspian water flea (*Cercopagis pengoi*) - clogged fish gills and fishing nets, while competing with herring larvae for zooplankton prey. This behavior disrupted fishing in the eastern Baltic in the 1990s.[254]

- The round goby (*Neogobius melanostomus*) - increasing in population, in many coastal areas, the species is the most numerous fish species and "poses strong predatory pressure…on epibenthic mollusks"[255] and may have "depleted previously dense blue mussel (Mytilus edulis) banks."[256] Where abundant, it may have become important prey to both bird and fish predators.

CLIMATE CHANGE:

The effects of climate change are occurring at an accelerated pace in the Baltic Sea due to its relatively small volume and, due to its semi-enclosed nature, limited water exchange with the sea.

- While the Ocean temperature over the past 30 years has risen by 0.5°C, the Baltic temperature has risen by 1.5°C. Anoxic areas have increased by a factor of ten in the past 100 years and Ocean acidification is at levels not expected in other regions before the coming century.[257]

- Since the 1950s, sea ice cover has decreased drastically, and is expected to continue its decline. While precipitation is estimated to increase over the next century, snow season is expected to shorten.

- Other effects could "include higher air and water temperatures, lower salinity, decreased oxygen levels, and shifts in habitats and species distribution."[258]

- Animals have fallen out of sync with their prey. For example, increasing temperatures have caused herring to hatch early, before their prey, small crustaceans, has grown. Another instance is geographical separation between Cod and their prey. While Cod has concentrated in the southern Baltic, escaping oxygen dead zones, Sprat has moved to cooler northern waters. Although Cod still has access to a limited food source, higher competition is decreasing their size.[259]

KEY CONVENTIONS AND ORGANIZATIONS OF THE BALTIC SEA

The HELCOM Convention (The Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1992)

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[254] WWF International (2009). Note 232.

[255] ICES Advice (2019). p.8. Note 241.

[256] Id.

[257] Stubgaard, K. (2018). *Baltic Sea a model for the consequences of climate change.* [online] Technical University of Denmark (DTU). Available at: https://www.dtu.dk/english/news/2018/06/baltic-sea-a-model-for-the-consequences-of-climate-change?id=b45aeaae-5914-4561-bc7a-cb62aa07181f [Accessed 12 Feb. 2020].

[258] Strempel, R. (2019). *Towards a climate-resilient Baltic Sea.* [online] HELCOM. Available at: https://helcom.fi/towards-a-climate-resilient-baltic-sea/ [Accessed 12 Feb. 2020].

[259] Beck, L. (2018). *The Baltic Sea offers a preview of what's to come with global warming.* [online] The Washington Post. Available at: https://www.washingtonpost.com/world/europe/the-baltic-sea-offers-a-preview-of-whats-to-come-with-global-warming/2018/11/29/f52f470a-95c3-11e8-818b-e9b7348cd87d_story.html [Accessed 12 Feb. 2020].

- The Convention is one of the four European Regional Sea Conventions and it is consisted of seven Baltic coastal states with the objective to protect the Sea from pollution.[260] The Helsinki Commission, or the Baltic Marine Environment Protection Commission, is the governing body of the Convention that is represented by Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden, with EU. The four areas of priority adopted in 2007 under the HELCOM Baltic Sea Action Plan are—Eutrophication, Hazardous substances, Biodiversity, and implementations of environmental friendly maritime activities.[261]

THE INDIAN OCEAN

The Indian Ocean is the third largest of the world's five oceans that stretches between the southern tips of Africa and Australia, almost 7 times the size of the U.S.[262] Its name was originated from the name of the country, India, which makes up much of the northern border of the Indian Ocean. The Indian Ocean is connected with four very significant waterways, which are "Suez Canal (Egypt), Ban el Mandeb (Djibouti-Yemen), Strait of Hormuz (Iran-Oman), and Strait of Malacca (Indonesia-Malaysia)."[263] The climate throughout the year is frequently comprised of monsoons and tropical cyclones. [264] The question relating to the definition of the oceanic limits of the Indian Ocean continues to be in dispute or left unsettled, except its border with the Atlantic Ocean.[265]

FISHING ACTIVITY

"The contribution of coastal and marine capture fisheries (finfish, shellfish and molluscs) from the Indian Ocean (average of 11.01 million tons annually) to the global landings is third after the Pacific Ocean (average of 48.3 million tons annually) and the Atlantic Ocean (average of 11.03 million tons annually) based on the 2003, 2011, and 2012 FAO estimates (FAO, 2014)."[266] EIO and WIO together contributed 28 per cent of the total global marine catches of finfish, shellfish, and molluscs in 2011 (FAO, 2014). The fishing activity is greater in the Western Indian Ocean than is in the Eastern Indian Ocean, due to the increase in catches may be due to expansion of fishing to new area or species, and the improved recording of fish landing statistics over time.[267]

MAIN SPECIES FISHED[268]

Tuna species: Skipjack, Kawakawa, Yellow-fin, Southern Bluefin, Frigate, Bullet, Bigeye

Other species: Finfish, Shellfish, Molluscs

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[260] European Commission (2019). Note 35.

[261] HELCOM Ministerial Meeting (2007). *HELCOM Baltic Sea Action Plan*. [pdf] Krakow: HELCOM, p.12. Available at: https://helcom.fi/media/documents/BSAP_Final.pdf [Accessed 12 Feb. 2020].

[262] Central Intelligence Agency. (2020). *The World Factbook: Indian Ocean.* [online] Available at: https://www.cia.gov/library/publications/the-world-factbook/geos/print_xo.html [Accessed 12 Feb. 2020].

[263] Id.

[264] Id.

[265] Verlaan, P. A., Kanayev, V. F. and Morgan, J. R. (2020). *Indian Ocean.* [online] Available at: https://www.britannica.com/place/Indian-Ocean [Accessed 12 Feb. 2020].

[266] Ruwa, R. and Rice, J. (2016). *Chapter 36E. Indian Ocean.* [pdf] United Nations, p.5. Available at: https://www.un.org/Depts/los/global_reporting/WOA_RPROC/Chapter_36E.pdf [Accessed 12 Feb. 2020].

[267] Id.

[268] ICES Advice (2019). p.6. Note 241.

MAJOR FISHING NATIONS[269]

Eastern: Australia, India

Western: Kenya, Madagascar, Mauritius, Mayotte (France), Mozambique, Seychelles, South Africa, and United Republic of Tanzania

OVERFISHING:

- With the increase of tuna and other tuna-like fishes in the Indian Ocean, there also was increase in major fisheries exploitation aimed at those specific species. In 2014, the IOTC Working Party concluded through assessments that longtail tunas were subject to heavy overfishing. Overall, "9 per cent of the principal market tunas (2 of 22 populations) are considered to be overfished and experiencing overfishing."[270]

INTERACTIONS:

- Through Kleiber (1994), interactions were restricted to resource-mediated interactions that aim to exclude "possible competition in marketing or interference between gears" among the deep-sea fisheries.[271] However, there exist tuna fishery interactions among small-scale fisheries that are concerning in the Indian Ocean. Countries like Taiwan, Japan, France, Korea, Pakistan, Spain and USSR have used gears, such as purse seine, longline, drift gillnet, trolling, hand-line, to catch yellowfin bigeye, skipjack, seerfish, longtail, and kawakawa.[272] Efforts to conserve these species are made by banning interactions.

IUU FISHING:

- The deep waters of the Indian Ocean and its abundance of tuna-like species attract many IUU fishing vessels. Moreover, the challenge lies in effectively implementing MCS measures because of "insufficient financial resources."[273]

KEY CONVENTIONS AND ORGANIZATIONS OF THE INDIAN OCEAN

IOTC (Indian Ocean Tuna Commission)

- As an intergovernmental organization, IOTC mandates effective management of tuna and tuna-like species in the Indian Ocean. The Commission promotes "the conservation and optimal utilization of tuna and tuna-like stocks covered by the IOTC Agreement," thereby encouraging sustainable development of fisheries in the Indian Ocean and its adjacent seas.[274]

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[269] Id. p.2-5.

[270] Restrepo, V., Juan-Jorda, M. J., Collette, B. B., Fredou, F. L. and Rosenberg, A. (2016). *Chapter 41: Tunas and Billfishes.* [pdf] United Nations, p.5. Available at: https://www.un.org/Depts/los/global_reporting/WOA_RPROC/Chapter_41.pdf [Accessed 12 Feb. 2020].

[271] Bertignac, M. and Ardill, D. (n.d.). *Some interaction issues in the fisheries for tunas and tuna-like fishes of the Indian Ocean.* [online] Sri Lanka: Indo-Pacific Tuna Programme. Available at: http://www.fao.org/3/w3628e0a.htm [Accessed 12 Feb. 2020].

[272] Id. p.14.

[273] Id.

[274] FAO (n.d.). *Regional Fishery Bodies Summary Descriptions: Indian Ocean Tuna Commission (IOTC).* [online] http://www.fao.org/fishery/rfb/iotc/en [Accessed 12 Feb. 2020].

Convention for the Conservation of Southern Bluefin Tuna

- The Convention tackles the interactions in southern Bluefin fisheries, thereby ensuring "through appropriate management, the conservation, and optimum utilization of southern bluefin tuna."[275] Under the Convention, the Commission for the Convention annually evaluates and makes decisions based on scientific evidence, current needs, and other contributing factors to establish recommendations for the Parties to implement.[276]

Agreement for the Establishment of the Indian Ocean Tuna Commission

- The Agreement aims to ensure "the conservation and optimum utilization of stocks" in the Indian Ocean.[277] The Parties to the agreements are required to adhere to the reviews and evaluations provided by the Commission of the Agreement with regards to the "conditions and trends of the stocks" protected under the Agreement.[278] However, the Agreement upholds the rights of the coastal states under the international law of the sea to explore and exploit "within a zone of up to 200 nautical miles under its jurisdiction."[279]

THE NORTH EAST AND WEST ATLANTIC

The North Atlantic Ocean is the Northern area of the Atlantic Ocean that is the second largest ocean in the world place between Africa, Europe, the Arctic Ocean, the Americas, and the Southern Ocean, with an account for 25% of the global catch in 2016.[280] The Northeast Atlantic area covers "the Bay of Biscay, the Iberian waters and the waters around the Azores, Madeira and the Canary Islands."[281]

FISHING ACTIVITY

The Northeast Atlantic region produces 10% of the global catch, composed of haddock, saithe (Pollock), Blue Whiting, herring and mackerel, and Northwest Atlantic region produces 2% of the global catch, composed of sea scallops, prawns, lobster, herring, and menhaden.[282] Many of the species fished are "long-lived, slow growing, have low fecundity and mature at a late age."[283] In 2015, the North-West Atlantic accounted for 0.9% of total

[275] United Nations (1994). *Convention for the Conservation of Southern Bluefin Tuna.* [pdf] Australia, art 3. Available at: https://treaties.un.org/doc/Publication/UNTS/Volume%201819/volume-1819-I-31155-English.pdf [Accessed 12 Feb. 2020].

[276] Id. art 8.

[277] FAO (1996). *Agreement for the establishment of the Indian Ocean Tuna Commission.* [pdf] p.333, art 5. Available at: https://www.cia.gov/library/publications/the-world-factbook/geos/zh.html [Accessed 12 Feb. 2020].

[278] Id.

[279] Id. p.340, art 16.

[280] Central Intelligence Agency (2020). *The World Factbook: Atlantic Ocean.* [online] Available at: https://treaties.un.org/doc/Publication/UNTS/Volume%201819/volume-1819-I-31155-English.pdf [Accessed 12 Feb. 2020].

[281] Madina, M. and Lawson, C. (2018). *EU Parliament votes to overfish the Atlantic Ocean.* [online] Oceana. Available at: https://eu.oceana.org/en/press-center/press-releases/eu-parliament-votes-overfish-atlantic-ocean

[282] Id.

[283] FAO (2008). *The Atlantic Ocean and Adjacent Seas.* [pdf] p.11. Available at: http://www.fao.org/3/i1116e/i1116e02a.pdf [Accessed 12 Feb. 2020].

catch, with the North-East Atlantic being the primary area for EU's catches.[284] The species caught were pelagic fish, Atlantic mackerel, and European sprat.[285]

MAIN SPECIES FISHED

Main species fished are Tuna, Shrimp, Shad, Mackerel, Sardinellas, Sardines, Skipjack, Cephalopods, and Small pelagic fish.

MAJOR FISHING NATIONS INCLUDE[286]

Major fishing nations are Belgium, France, Germany, Ireland, Netherlands, Portugal, Spain, and United Kingdom

MARINE POLLUTION

- ocean dumping, waste disposal, and oil spills;
- deep sea mining;
- oil pollution in Arabian Sea, Persian Gulf, and Red Sea;
- coral reefs threatened due climate change, direct human pressures;
- loss of biodiversity;
- endangered marine species include the dugong, seals, turtles, and whales.

IUU FISHING:

- As of 2018, West African piracy has doubled to 85 attacks, including high jacking of six ships and firing 13 out of 18 vessels on the West African waters. Based on the report provided by the Office of Naval Intelligence, 72 incidents of piracy and armed robbery at sea were reported as of 2019. In the same year, there were reports of 15 kidnappings for ransom and 3 highjacks in the Gulf of Guinea.[287]

- "More than 100,000 tonnes of Northeast Arctic cod and 30,000-40,000 tonnes of haddock were estimated to be illegally fished in the Barents Sea in 2005."[288] The fishing effort has been 25 percent higher from 2002 to 2003. Nevertheless, in 2007, IUU fishing by non-contracting parties have been drastically reduced by the control of transshipment activities through the newly implemented port state controls.[289]

STOCK:

- In 2005, the deep-sea species in the North East Atlantic was the most exploited and considered to be harvested unsustainably. The stock assessment in 2006 showed that the most deep-sea species were at a very low rate that called for a reduced TAC compared to that of previous years or to simply stop fishing such species.[290]

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[284] European Commission (2015). *4. Fisheries and aquaculture production: 4.1 Catches*. [online] Available at: https://ec.europa.eu/fisheries/4-fisheries-and-aquaculture-production_en [Accessed 12 Feb. 2020].

[285] Id.

[286] Central Intelligence Agency (2020). *The World Factbook: Indian Ocean.* [online] Available at: https://www.cia.gov/library/publications/the-world-factbook/geos/xo.html [Accessed 12 Feb. 2020].

[287] Id.

[288] FAO (2008). p.22. Note 284.

[289] Id.

[290] Id.

The OSPAR Convention (The Convention for the Protection of the Marine Environment in the North-East Atlantic, 1992)

- As legal instrument for the protection of the marine environment of the North-East Atlantic, the Convention aims to promote international obligation and commitment among the relevant coastal states to implement shared strategies. The Convention established cooperation with many international organizations regionally to conserve, protect, and sustain the quality of the North-East Atlantic ecosystems.[291] Some of the cooperation established is OSPAR North-East Atlantic Environment Strategy and the EU Marine Strategy Framework Directive (MSFD).[292]

- Through indicator-based assessment, the Convention divided the North-East Atlantic into five regional strategies to assess each regional waters concerning their stock, qualities, and challenges. The Convention also published the Quality Status Report (QSR) 2010 that collected scientific observations and reports from the different regions of the North-East Atlantic. Through this report, the Convention achieved a scientific approach to ocean governance to ensure a clean, healthy, and biologically diverse sea and its resources.[293]

[291] OSPAR Commission (2010). *Quality Status Report 2010.* [online] Available at: https://qsr2010.ospar.org/en/index.html [Accessed 12 Feb. 2020].

[292] European Commission (2019). Note 35.

[293] OSPAR Commission (2010). Note 292.

CHAPTER 5: THE HIGH SEAS

The high seas are a mass of saltwater that covers 70% of the earth that is not part of the territorial seas, or the EEZs claimed by their respective coastal states.[294] Because the high seas are international waters that are not subject to any national sovereignty, the "freedom of the high seas" principle of international law allows "freedom of navigation, fishing, the laying of submarine cables and pipelines, and overflight of aircraft."[295]

While the coastal states claim their EEZs and depend their livelihood on the living resources found there, there is underlying reliance for continuous production of fish stock on the high seas. From within the high seas, the fish stocks flourish, migrate, reproduce, and thereby sustain their population and allow the coastal states to fish in their respective EEZs that are interconnected with the high seas. Many IUU fishing occurs often in the high seas, as they are international waters not subject to any national jurisdiction that is beyond the EEZ. However, fishing rampage in the high seas gravely effects the EEZs and their shortage of fish stock. Therefore, it is crucial that the high seas are also regulated

In 2014, it was estimated that 4.4 million metric tons of fishes were caught in the high seas with a revenue of $7.6 billion.[296] "Five countries alone accounted for 64% of the global high-seas fishing revenue: China (21%), Taiwan (13%), Japan (11%), South Korea (11%), and Spain (8%)." However China, Taiwan and Russia "alone account for 51% of the total high-seas catch."[297]

FISHING ACTIVITIES OF THE MAJOR FISHING COUNTRIES

- **China:**

  The Northwest Pacific is where China operates most profitably globally. Longlining and bottom trawling resulted in an estimated average profit (before subsidies) of $325 million and $111 million. Chinese fishery is most unprofitable in the Southwest Atlantic with an estimated fishing cost that is four times greater than near mainland China. Bottom trawling there exhibited an average net loss (even after subsidies are taken into account) of $98 million. China's squid fishing was consistently unprofitable, and subsidies made it profitable only off Peru's EEZ.[298]

- **Taiwan:**

  Similar to mainland China, Taiwan's high-seas fisheries in the Northwest Pacific are its most profitable with longlining and squid jigging among the most profitable high-seas fisheries globally without subsidies (average profit $193 million and $63 million, respectively). Taiwanese longlining in the Western Central Pacific and Eastern Central Pacific results in average annual losses of $65 million and

[294] National Geographic (2010). *Ocean Overview*. [online] Available at: https://www.nationalgeographic.com/environment/oceans/explore/ocean-overview/ [Accessed 12 Feb. 2020].

[295] Britannica (2020). *High seas.* [online] Available at: https://www.britannica.com/topic/high-seas [Accessed 12 Feb. 2020].

[296] Sala, E., Mayorga, J., Costello, C., Kroodsma, D., Palomares, M. L. D., Pauly, D., et al. (2018). The economics of fishing the high seas. *Science Advances* 4(6). Available at: dhttps://advances.sciencemag.org/content/4/6/eaat2504 [Accessed 12 Feb. 2020].

[297] Id.

[298] Id.

$63 million, respectively. Similar to China, only after assuming low labour costs does high seas fishing produce profits.[299]

- **Japan:**

  In contrast to China and Taiwan, Japanese fishing in the high seas was mostly profitable in the Eastern Central and Western Central Pacific with longlining, amounting at $205 million and $113 million before subsidies respectively. The Japanese pole and line fishing was profitable in the South Atlantic and Eastern Indian Ocean with longlining even without subsidies. The Northwest Pacific, which is close to Japan, however, is the least profitable Japanese tuna fishing, with net economic losses unless subsidies make that fishery profitable.[300]

- **Spain:**

  Spain's most profitable fishery was longlining in the Western Indian Ocean, followed by longlining in the Southeast Pacific, off West Africa, and the Southwest Pacific. However, Spain's purse seining in the Eastern Central Pacific, the Western Indian Ocean, and the Eastern Central Atlantic (West Africa) would not be profitable at current rates without subsidies. Purse seining in the Southeast Pacific was not profitable even with subsidies, and current bottom trawling effort everywhere in the high seas was unprofitable without subsidies.[301]

- **South Korea:**

  South Korea profits the most in the Western Central Pacific fishing with longlining ($173 million on average before subsidies). South Korea profits the most by bottom trawling in Atlantic Antarctic ($129 million) and profits ($91 million before subsidies) by squid jigging in the EEZ of Argentina and off the Falkland Islands (Malvinas). The least profitable high-seas fishery was bottom trawling in Southeast Atlantic, where costs exceeded revenue even after subsidies were subtracted, and the Southeast Pacific, where longlining was the second most unprofitable of South Korean fisheries.[302]

KEY CONVENTIONS AND ORGANIZATIONS OF THE HIGH SEAS

UN BBNJ (Intergovernmental Conference on Marine Biodiversity of Areas Beyond National Jurisdiction)

- The Conference brought the State Parties together to draft an agreement to establish international cooperation, shared principles, and precautionary measures for the purpose of conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction.

- The objective of this Agreement is to ensure the [long-term] conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction through effective implementation of the relevant provisions of the Convention and further international cooperation and coordination.[303]

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[299] Id.

[300] Id.

[301] Id.

[302] Id.

[303] General Assembly (2019). A/CONF.232/2020/3. In: Revised draft text of an agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. [online] New York: United Nations, art 2. Available at: https://undocs.org/en/a/conf.232/2020/3 [Accessed 12 Feb. 2020].

UN Fish Stocks Agreement (1995)

- The Agreement sets forth "principles, legal tools, and mechanisms" to "maintain sustainable levels of high seas fish stocks."[304] It "introduced the precautionary approach and strengthened the ecosystem components originally laid out in the UN Convention on the Law of the Sea."[305]
- The Agreement aims to ensure that the fishing fleets comply with the adopted conservation and management measures by mandating on-board inspections of vessels and allowing only such vessels to fish in the north Atlantic.
- Through NAFO (Northwest Atlantic Fisheries Organization)[306] and NEAFC (North-East Atlantic Fisheries Commission),[307] the Agreement mandates that the vessels should have a satellite-tracked transponder, or VMS (Vessel Monitoring System), in order for tuna fishing vessels to fish in the eastern Pacific.
- By blacklisting vessels, the privileges to fish can be denied at the entrance of the member's ports. This effective reduction of non-contracting fishing vessels from twenty-six down to two in the northeast Atlantic was regulated by NEAFC.

The Convention on the High Seas (1958)

- The Convention establishes an equitable international regime over the freedom of navigating, fishing, laying pipelines and flying over the high seas. However, based on the core concerns raise by the Committee at the conference concerning the protection of the marine environment, the Convention also aims to layout international principles for the conservation of the seabed, ocean floor and the subsoil beyond the limits of the territorial seas.
- The Convention addresses the question of preferential rights of coastal States concerning fishing and the conservation of the living resources of the high seas. It gives "every state" the "right to sail ships under its flag on the high seas."[308]

The Convention on Fishing and Conservation of the Living Resources of the High Seas (1958)

- The Convention grants all States the right to fish on the high seas but requires the States to be "subject (a) to their treaty obligations, (b) to the interests and rights of coastal States," and "(c) to the provisions contained in the following articles concerning conservation of the living resources of the high seas."[309]

The Convention on the Territorial Sea and the Contiguous Zone

- The Convention requires the coastal States to exercise control over the zone of the high seas contiguous to its territorial sea to enforce the regulations and principles within the Convention.[310]

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[304] UN Departments of Public Information (2010). Resumed Review Conference on the Agreement Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks: Marketing the Fish Stocks Agreement Work. [pdf] United Nations, p.2. Available at: https://www.un.org/depts/los/convention_agreements/reviewconf/FishStocks_EN_F.pdf [Accessed 12 Feb. 2020].

[305] Id. p.3.

[306] NAFO (n.d.). *North-East Atlantic Fisheries Organization.* [online] Available at: https://www.nafo.int/ [Accessed 12 Feb. 2020].

[307] NEAFC (n.d.). *North-East Atlantic Fisheries Commission*. [online] Available at: https://www.neafc.org/ [Accessed 12 Feb. 2020].

[308] *The Convention on the High Seas 1958*, art 4.

[309] *The Convention on Fishing and Conservation of the Living Resources of the High Seas 1958*, art 1(1).

[310] *The Convention on the Territorial Sea and the Contiguous Zone 1958*, art 24(1).

- The Convention acknowledges State sovereignty beyond the land territories of the coastal States and their "internal waters, to a belt of sea adjacent to its coast, described as the territorial sea."[311] It also provides the principles to the limitation of the territorial sea and the "right of innocent passage" of foreign fishing vessels, while requiring the vessels to abide to the laws and regulations the coastal States have the right to implement.[312]

[311] Id. art 24(2).

[312] Id. arts 5 & 16.

CHAPTER 6: COMBATING IUU FISHING

As one of the pillars to uphold effective fishery management, deterring illegal, unreported, and unauthorized fishing (IUU fishing) is an essential policy to establish effective and accurate recording and monitoring system for all fishing vessels and their catches. IUU fishers do not follow through with the reporting system concerning where they fished, what they fished, and how much they fished, thereby constantly leaving the fishery management with inaccurate data of how much fish stock there is in any of the waters. Therefore, the objective of deterring IUU fishing is to regulate fishing "in such a way as to avoid the risk of conflict, among fishers using different vessels, gear and fishing methods" according to FAO Code of Conduct paragraph 7.6.5.[313]

While many IUU fishing activities are criminal, such as in fishing without license or in unauthorized waters, IUU fishing activities are also evolved into transnational crimes that involve "illegal immigration, human trafficking, and drug trafficking and even modern slavery."[314]

Moreover, according to UN Food and Agriculture Organization, IUU fishing costs the global economy up to $23 billion USD each year. "It is difficult to measure the volume of IUU fishing taking place across the world's oceans, but experts estimate that IUU fishing costs the global economy up to $23 billion annually, which represents around 20% of the global seafood catch."[315]

DEFINITION OF IUU FISHING:

IUU fishing consists of fishing activities that break fisheries laws and regulations, thereby fishing without authorization or license. Some other examples of IUU fishing are; fishing with prohibited gear or vessel, fishing in unauthorized waters, fishing during unauthorized timeframe, fishing over a quota and fishing prohibited species.

WHAT IS IUU FISHING?[316]

- Fishing without appropriate authorization.
- Using unauthorized fishing vessel
- Using unauthorized fishing equipment/method
- Fishing in unauthorized zone/jurisdiction
- Fishing during unauthorized time
- Fishing beyond the limitation set by the TACs
- Not reporting/misreporting fishing activity in violation of the relevant national laws and regulations

[313] *FAO Code of Conduct for Responsible Fisheries 1995*, para.7.6.5; Cochrane K. L. and Garcia S. M. ed. (2009). p.361. Note 20.

[314] The Pew Charitable Trusts (2013). *FAQ: Illegal, Unreported, and Unregulated Fishing.* [online] Available at: https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2013/08/27/faq-illegal-unreported-and-unregulated-fishing [Accessed 12 Feb. 2020].

[315] Id.

[316] FAO (2020). *What is IUU fishing?* [online] Available at: http://www.fao.org/iuu-fishing/background/what-is-iuu-fishing/en/ [Accessed 12 Feb. 2020].

CASE STUDY: Andrey Dolgov (STS-50 / Sea Breez 1)

'Andrey Dolgov' was an IUU vessel that plundered the oceans under the operation suspected to have been linked to Russian organized criminal network. Andrey Dogov looted fish up to an estimated worth of $50m for over 10 years by committing identity fraud "by repeatedly falsifying their registry."[1] It changed its flags in accordance to the jurisdiction of the ocean they were fishing, even when the relevant states denounced it. It was in 2018, when the authorities finally identified Andrey Dolgov, as it provided "false International Marine Organization number."[2] However, Andrey Dolgov slipped away even after when an inspection team detained the vessel and seized its documents, thereby instigating a global chase that took several days. It was only when the fleeing vessel entered into the Malacca straits, where Indonesia was aggressively targeting IUU fishing vessels, the long chase of the notorious IUU vessel was met with a successful result. Through further investigation, many of the crew was suspected as victims of forced labour and a wider criminal network was revealed to have been operating Andrey Dolgov.[3]

[1] Gray, R. (2019). *The hunt for the fish pirates who exploit the sea*. [online] Available at: https://www.bbc.com/future/article/20190213-the-dramatic-hunt-for-the-fish-pirates-exploiting-our-seas [Accessed 12 Feb. 2020].

[2] Id.

[3] Id.

HOW TO DEAL WITH IUU FISHING?

- Legislate laws to strictly penalize IUU fishing and provide clear definition of IUU fishing.
- Effective enforcement of domestic laws and regulations to punish owners, operators, and fishermen engaged in such illegal activities.[317]
- Establish mechanism to effectively monitor and regulate fishing vessels within the EEZ, about their fishing activities, catches and fishing equipment.

EU EXTERNAL FISHING FLEET

- European Parliament and the Council have adopted a new Regulation on the sustainable management of external fishing fleets.
- Replace "Fishing Authorizations Regulation" 1006/2008.
- Cover all EU vessels fishing outside EU waters + third-country vessels fishing in EU waters.
- Improve monitoring and transparency of the EU external fishing fleet.[318]
- Extended scope of the authorization system to include practices (private agreements between EU companies and third countries).

[317] Caddell, R. and Molenaar E. J. ed. (2019) *Strengthening International Fisheries Law in an Era of Changing Oceans*. Oxford: Hart Publishing. p. 278.

[318] Sanchez, N. (2017). *EU's external fishing fleet to become the most transparent, accountable and sustainable globally following legal reform.* [online] Oceana. Available at: https://eu.oceana.org/en/press-center/press-releases/eus-external-fishing-fleet-become-most-transparent-accountable-and [Accessed 12 Feb. 2020].

REGULATIONS COMBATING IUU FISHING

PSMA (Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing):[319]

- *Article 2 (Objective)*
    - *Prevent, deter, and eliminate IUU fishing through the implementation of effective port State measures.*
- *Article 9 (Port entry, authorization or denial)*
    - *(1) IUU fishing or fishing related activities in support of such fishing, each Party shall decide whether to authorize or deny the entry of the vessel into its port and shall communicate this decision to the vessel or to its representative.*
- *Article 11 (Use of ports)*
    - *(1) a Party shall deny, pursuant to its laws and regulations and consistent with international law, including this Agreement, that vessel the use of the port for landing, transshipping, packaging and processing of fish that have not been previously landed and for other port services, including, inter alia, refueling and resupplying, maintenance and drylocking, if:*
        a. *Finds that the vessel does not have a valid and applicable authorization to engage in fishing or fishing related activities required by its flag State*
        b. *Finds that the vessel does not have a valid and applicable authorization to engage in fishing or fishing related activities required by a coastal State in respect of areas under the national jurisdiction of that State*
        c. *Party receives clear evidence that the fish on board was taken in contravention of applicable requirements of a coastal State in respect of areas under the national jurisdiction of that State*
        d. *The flag State does not confirm within a reasonable period of time, on the request of the port State, that the fish on board was taken in accordance with applicable requirements of a relevant regional fisheries management organization taking into due account paragraphs 2 and 3 of Article 4.*
        e. *Party has reasonable grounds to believe that the vessel was otherwise engaged in IUU fishing or fishing related activities in support of such fishing, including in support of a vessel referred to in paragraph 4 of Article 9.*
- *Article 20 (Role of flag States)*
    - *(1) Each Party shall require the vessels entitled to fly its flag to cooperate with the port State in inspections carried out pursuant to this Agreement.*

[319] FAO (2016). *Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing.* [pdf] Available at: http://www.fao.org/3/i5469t/I5469T.pdf [Accessed 12 Feb. 2020].

Council Regulation (EC) No. 1005/2008:[320]

- The bilateral agreement between Member States to actively notify about questionable vessels "will ensure the effectiveness of controls and avoid unnecessary delays in ports. The prior notification of landing must consist of the following information:
  - Vessel identification
  - Name of designated port and purpose of landing or other operation
  - Fishing authorization or where appropriate, authorization to transship
  - Dates of the fishing trip
  - Estimated time of arrival in port
  - Quantities of species and catch
  - The zone where the catch was made or transshipment took place
  - Quantities to be landed or transshipped"[321]
- *Article 7 (Authorization to enter ports in the Community)*
  - *Third country fishing vessels will be granted authorization to land or to transship where complete prior notice has been given and a validated catch certificate accompanies the fishery products.*
- *Article 8 (Recording of landing and transshipment operations)*
  - *Masters of third country fishing vessels have to submit to the EU Member State port authority, prior to landing or transshipment, a declaration indicating: (1) the quantity of fishery products by species to be landed or transshipped, and (2) the date and place of each catch.*
- *Articles 9 and 10 (Inspection of fishing vessels)*
  - *EU Member States will carry out inspections of at least 5% of all landings and transshipments by third country fishing vessels each year and by using benchmarks based on harmonized criteria for risk management. However, vessels will systematically be inspected in cases of suspicion or findings of non-compliance with conservation and management measures.*
- *Article 11 (In the event of infringements)*
  - *No authorization will be given to land or transship catches in an EU Member State port if the inspection shows evidence that the vessel engaged in IUU fishing activities.*
  - *If the suspected IUU activity was carried out on the high seas or in the waters of a coastal State, the inspecting EU Member State will cooperate with the flag or coastal State concerned in carrying out an investigation and if given permission by that flag or coastal State, even sanctions the fishing vessel accordingly.*
- *Article 27 – 30 (The Community IUU Vessel List)*
  - *The European Commission will notify a flag State if a fishing vessel flying its flag are presumed to carry out IUU activities. In addition, it will officially request the flag State to investigate the case and to take appropriate measures to prevent the continuation of the illegal practice.*
- *Article 44 – 46 (Sanctions)*
  - *The IUU Regulation therefore consists of a system of effective, proportionate and dissuasive sanctions for serious infringements in respect of natural and legal persons.*
- *Article 48 and 49 (Sightings at Sea)*
  - *Sightings of fishing vessels possibly engaged in IUU activities can be done by an EU Member State's authority or by either EC or third country fishing vessels. Sightings by authorities together with the outcome of possible investigations will be communicated to the RFMO and flag State concerned for follow-up.*

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[320] European Commission (2009). Handbook on the practical application of Council Regulation (EC) No. 1005/2008 of 29 September 2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing. [pdf] Available at: https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/handbook_original_en.pdf [Accessed 12 Feb. 2020].

[321] Id. p.14.

CASE STUDY: SINGAPORE

Fisheries Act (2012)[1]

The Act restricts use of poison or explosives to catch fish and penalizes anyone who either uses such device or even possesses it to an imprisonment of "no less than 3 months and not exceeding 3 years."

The Act also prohibits any use of trawl nets within the territorial waters of Singapore. In response to any offence against the regulations set forth in the Act, the penalties confiscate the fishing vessels and gears used to violate the regulations. The jurisdiction of the court to enforce this law is based in the Criminal Procedure Code.

The Act stretches out to enforce itself upon Singapore citizens, residents, and fishing vessels registered in Singapore that commits the listed offences outside the territorial waters of Singapore. Such reach of the legal enforcement to combat IUU fishing establishes national accountability and monitoring system for each national government is watchful over their own national IUU fishing.

[1] *Fisheries Act 2002* (Singapore), art 12(1).

SOLUTIONS TO DETER IUU FISHING

SOLUTION 1: TRACKING AND RECORDING SYSTEM FOR FISHING VESSELS

Fishery management is always "data-hungry," where data collection of species composition, TAC, authorized fishing vessels and time and location of fishing activities must be consistently in order to maintain and monitor successful fishery management. The different components of a fishery are as follows:[322]

- Economic category
- Spatial Dimension
- Seasonal Profile
- Home Port
- Landing Port
- Fishing Gears
- Vessel Size
- Targeted Species
- Product Types
- Markets

Interconnected efforts by EU was to cooperate with INTERPOL (The International Criminal Police Organization) to keep track of the fishing vessels through Combined IUU Vessel Fishing Vessel List maintained by Trygg Mat Tracking,[323] from which Spyglass obtain data to map out the criminal activities of fishing vessels all around the

[322] Cochrane K. L. and Garcia S. M. ed. (2009). p.76. Note 20.

[323] Trygg Mat Tracking (TMT) (2020). *Combined IUU Vessel List*. [online] Available at: https://www.iuu-vessels.org/ [Accessed 12 Feb. 2020].

world.[324] Spyglass documents any illegal activities, ranging from human trafficking, use of forbidden gear, underreported catch or fishing in unauthorized location or timeframe.[325]

- Tracking to keep the fishing activities and vessels accountable.
- EU framework for collecting and managing fisheries data in JRC (Joint Research Centre), where the Member States "collect, manage and make available a wide range of fisheries data needed for scientific advice."[326]

SOLUTION 2: EMPOWERING WHISTLEBLOWERS

US GAO (Government Accountability Office) (National Whistleblower Center):[327]

- **Anonymity:** Allows attorneys for the whistleblowers to submit their information to law enforcement without revealing the identity of the whistleblowers.
- **Confidentiality:** Allows information to be provided to law enforcement without informing the public. Ensure that law enforcement's actions will not allow anyone to backtrack or otherwise figure out the whistleblower's identity.
- **Rewards:** Law enforcement distribute a portion of any civil or criminal penalties recovered to the whistle blower. Provide for restitution to be paid to the communities harmed by the IUU fishing.
- **Anti-Retaliation:** Prohibiting companies from retaliating against the whistleblower for their actions in blowing the whistle.

SOLUTION 3: PENALIZING IUU FISHING

INTERPOL (International Criminal Police Organization) acted as a neutral platform for the global exchange of law enforcement information, while also providing guidance, coordination, and assistance to all its member countries. INTERPOL actively worked to prevent and fight crimes in the entire fisheries sector that ranged from "money laundering, document fraud, tax evasion, forced labour, and human trafficking."[328] Through these crimes, the criminals maximized their profit from the unauthorized captures and global trade in fisheries products. The CCAMLR provided the regulation to define what was disruptive illegal fishing activity and 15 member states took the initiative to investigate, conduct operations and contribute intelligence to arrest criminal IUU fishing network.[329]

INTERPOL Global Fisheries Enforcement

- Through the Global Fisheries Enforcement, the INTERPOL member countries identified, deterred, and disrupted transnational fisheries crime and associated crimes.[330]
- The fishing activity of the vessel itself is always subject to the jurisdiction of the flag state, and coastal state or port state, depending on where it is fishing or landing. It is in the port state that the vessel can

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[324] Ecotrust Canada (2018). *Global Fishing Crimes Map*. [program] Spyglass. Available at: https://spyglass.fish/ [Accessed 12 Feb. 2020].

[325] IUU Watch (2019). *New tool helps fisheries enforcement track criminal fishing around the world*. [online] Available at: http://www.iuuwatch.eu/2019/11/new-tool-helps-fisheries-enforcement-track-criminal-fishing-around-the-world/ [Accessed 15 Jan. 2020].

[326] European Commission (2020). *Welcome to the Join Research Centre (JRC) fisheries data collection web site*. [online] European Union. Available at: https://datacollection.jrc.ec.europa.eu/ [Accessed 12 Feb. 2020].

[327] National Whistleblower Center (2019). *Conserve Ocean Fisheries Threatened by Illegal Fishing*. [online] Available at: https://www.whistleblowers.org/illegal-fishing-iuuf/ [Accessed 12 Feb. 2020].

[328] INTERPOL General Secretariat (2018). *Global Fisheries Enforcement*. [ebook] INTERPOL, p.3. Available at: file:///D:/Downloads/Global%20Fisheries%20Enforcement%20-%20Prospectus.pdf [Accessed 12 Feb. 2020].

[329] Id. p.12.

[330] INTERPOL (n.d.). *Fisheries crime*. [online] Available at: https://www.interpol.int/en/Crimes/Environmental-crime/Fisheries-crime [Accessed 12 Feb. 2020].

be thoroughly inspected for compliance with fisheries related laws and nationally or internationally determined IUU risk factors. The member countries, thereby, are encouraged to issue color-coded notices for INTERPOL to investigate and monitor.[331]

FCWG (Fisheries Crime Working Group)

- FCWG supported Global Fisheries Enforcement and assisted in developing broad capacity building and intelligence initiatives, by engaging "with fisheries and tax authorities, customs, police, navies, and coastguards, as well as the private sectors and non-governmental organizations to coordinate operations."[332]

NEST (National Environmental Security Task Forces)

- As a multi-disciplinary team of experts from multiple national agencies including police, customs, environmental ministries and other specialized agencies, and the prosecutor's office who work together to maintain national environmental security.[333]

RIACM (Regional Investigative and Analytical Case Meetings)

- The meetings were conducted between member countries to exchange information on specific cases and discuss enforcement opportunities. Through these meetings, the regional threats were documented on a map to develop effective strategies to combat global and interconnected nature of fisheries crime, demonstrating why an international multi-agency is necessary. "INTERPOL convened a RIACM with authorities from the relevant countries to discuss the evidence, prosecution, and continuing investigations."[334]

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[331] Id.

[332] Id.

[333] INTERPOL (2013). *National Environmental Security Task Force.* [pdf] p.2. Available at: https://www.interpol.int/content/download/5100/file/National%20Environmental%20Security%20Task%20Force%20%28NEST%29.pdf [Accessed 12 Feb. 2020].

[334] INTERPOL (2019). *Fighting illegal, unreported and unregulated fishing*. [online] Available at: https://www.interpol.int/News-and-Events/News/2019/Fighting-illegal-unreported-and-unregulated-fishing [Accessed 12 Feb. 2020].

CASE STUDY: NEW ZEALAND

New Zealand, as a Contracting State to CCAMLR to protect the Southern Ocean, has been continuously proactive in international cooperation to deter and prosecute IUU fishing. In the January of 2015, Royal New Zealand Naval Patrol spotted vessels fishing tooth fish with gill nets in an area regulated by the CCAMLR where such fishing methods are prohibited. The vessels have traveled together, changed their names, national registration, and tried to avoid detection. New Zealand issued a Purple Notice to INTERPOL, providing information on the modi operandi of the suspicious vessels. The vessels were investigated and discovered to be IUU fishing vessels.[1]

In November 2019, INTERPOL collaborated with the Thai maritime operations to capture "one of the world's most wanted rogue vessels off the coast of Phuket."[2]

INTERPOL experts gave technical guidance on the vessel's shipborne communication and navigation equipment in order to ensure thorough collection of investigative data.[3]

[1] INTERPOL (2015). *New Zealand requests INTERPOL Purple Notice to identify networks behind illegal fishing*. [online] Available at: https://www.interpol.int/News-and-Events/News/2015/New-Zealand-requests-INTERPOL-Purple-Notices-to-identify-networks-behind-illegal-fishing [Accessed 12 Feb. 2020].

[2] INTERPOL (2019). *Fisheries crime: INTERPOL supports Thai maritime operations*. [online] Available at: https://www.interpol.int/News-and-Events/News/2015/New-Zealand-requests-INTERPOL-Purple-Notices-to-identify-networks-behind-illegal-fishing [Accessed 12 Feb. 2020].

[3] INTERPOL (2019). *Fighting illegal, unreported and unregulated fishing*. [online] Available at: https://www.interpol.int/News-and-Events/News/2019/Fighting-illegal-unreported-and-unregulated-fishing [Accessed 12 Feb. 2020].

CHAPTER 7: COMBATING HUMAN TRAFFICKING AT SEA

Around the world, an estimate of 40.3 million people was in modern slavery in 2016, with 24.9 million in forced labour.[335] Forced labour included works in domestic homes, on construction sites, in clandestine factories, on farms and fishing boats, in other sectors, and in the sex industry.[336] The majority amounting to 16 million were exploited in the private economy, with 11 percent being agriculture and fishing.[337] Asia and the Pacific carry the most number of 16. 5 million people in forced labour among the total of 24.9 million, which includes other regions such as Africa, Europe, Middle East and America.[338]

Victims of forced labour in agriculture, forestry, and fishing were 11% with male victims being the majority as 60% within that particular sector of labour.[339] With about 38 million employed, the fishing industry became one of the largest employers in the world with the increase in demand for fish over the decades.[340] This massive trade of globally exported fish reached the weight of 57 million tons in 2010 and value of US$125 billion in 2012.[341]

However, such rapid growth in the fishing sector gave rise to the issues of overfishing, illegal fishing, and declining fish stocks, which then negatively affected the working conditions of the fishing industry. Then through the media reports in 2014, modern slavery that has been long brewing under the shadows of seemingly successful fishing operations acting as supply chains for international companies was exposed.[342] An investigation took place for 6 months, revealing fishing industries in Thailand involved with slavery, or forced labour, to produce supply of shrimps to overseas supermarkets, such as Walmart, Carrefour, Costco and Tesco.[343] The reported revealed that some of the deep-sea fishing vessels in the Asian regions exercised physical brutality and even loss of life against the victims who were coerced into forced labour.[344]

FACTORS CONTRIBUTING TO FORCED LABOUR IN THE FISHING INDUSTRY

Studies analyzing different countries and their fishing businesses found that there were some shared features in the fishing industry that were contributory to forced labour:

> "High levels of harmful capacity-enhancing subsidies, likely leading to excess fishing capacity, increased competition and reduced per-vessel profitability; low catch value per individual

[335] International Labour Office (ILO) (2017). *Global Estimates of Modern Slavery: Forced Labour and Forced Marriage*. [pdf] Geneva: International Labour Organization and Walk Free Foundation, pp.9-10. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_575479.pdf [Accessed 12 Feb. 2020].

[336] Id.

[337] Id. pp.10-11.

[338] Id. p.19.

[339] Id. p.32.

[340] International Labour Office (2013). *Caught at Sea: Forced labour and trafficking in fisheries*. [pdf] p.4. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---declaration/documents/publication/wcms_214472.pdf [Accessed 12 Feb. 2020].

[341] Global Slavery Index (2018). *Fishing*. [online] Minderoo Foundation. Available at: https://www.globalslaveryindex.org/2018/findings/importing-risk/fishing/ [Accessed 12 Feb. 2020].

[342] Hodal, K., Kelly, C. and Lawrence, F. (2014). *Revealed: Asian slave labour producing prawns for supermarkets in US, UK*. [online] The Guardian. Available at: https://www.theguardian.com/global-development/2014/jun/10/supermarket-prawns-thailand-produced-slave-labour [Accessed 12 Feb. 2020].

[343] Id.

[344] Murphy, D. (2019). *Hidden Chains: Rights Abuses and Forced Labor in Thailand's Fishing Industry*. [online] Human Rights Watch. Available at: https://www.hrw.org/report/2018/01/23/hidden-chains/rights-abuses-and-forced-labor-thailands-fishing-industry [Accessed 12 Feb. 2020].

fisher, suggesting downward pressure on wages; high levels of undocumented fishing activity, implying poor monitoring and enforcement of vessel operations at sea; and a reliance on fishing far from home in the waters of other countries where regulatory violations may be more likely to go undetected by domestic agencies."[345]

COMPETITION IN THE FISHING INDUSTRY

The competition in the fishing industry intensified in response to increased global demand for fish despite the fish stock depletion, the fishing vessels were put under a lot of economic pressure. Therefore, many fishing vessels were forced to travel farther into the distant deep-waters, which in turn resulted in extended trips, increased industry costs, such as fuel and labour, and incentivized illegal operations, in order to make profit.[346] In order to make proper profit, the fishing vessels began compensating their operational costs from lowered wages of their fishermen, thereby committing a serious crime of forced labour. The distant fishing trips also allowed these vessels to avoid authorities and intensify their mistreatments of the victims on board with no way of protecting themselves.[347]

ECONOMIC PROFIT

According to the estimation by the ILO, more than 20 million individuals have been trafficked into forced labour, thereby allowing illegal fishing operations to generate $150 billion in profits each year.[348] Illegal fishing operations use forced labour most primarily because it greatly reduced the cost incurred from long distance fishing and mass fish processing. This was especially true with high-seas fisheries, such as those in Thailand, Taiwan and China, where business would be economically profitable only after assuming government subsidies and low labour costs.[349] Some lights were shed on the effect of subsidies in exacerbating illegal fishing operations and forced labour of migrant workers.[350] Heavily subsidized fleets in the midst of competitive fishing due to depleted fish stock caused many fishing vessels to struggle economically. As a response, many small and ill-equipped fishing vessels used illegal means, such as forced labour and unauthorized fishing, to push through the competition in violation of the existing regulations.[351]

MIGRANT WORKERS

Generally, economic factors are the primary factor that leads the victims of forced labour to the fishing industry where many of the vessel owners use undocumented migrants to cut costs and to evade the attention of law

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[345] Tickler, D., Meeuwig, J. J., Bryant, K., David, F., Forrest, J. A. H., et al. (2018). 'Modern slavery and the race to fish.' *Nature Communications,* 9(1), p.5. Available at: https://www.researchgate.net/publication/328790188_Modern_slavery_and_the_race_to_fish [Accessed 12 Feb. 2020].

[346] International Labour Organization (2013). *Employment practices and working conditions in Thailand's fishing sector.* [pdf] p.16. Available at: https://www.ilo.org/dyn/migpractice/docs/184/Fishing.pdf [Accessed 12 Feb. 2020].

[347] Id. p.x.

[348] Sutton, T. Siciliano, A. (2016). *Seafood Slavery: Human Trafficking in the International Fishing Industry*. [pdf] Center for American Progress, p.4. Available at: https://cdn.americanprogress.org/content/uploads/2016/12/14121123/SeafoodSlaveryReport-PDF.pdf [Accessed 12 Feb. 2020].

[349] Sala, E., Mayorga, J., Costello, C., Kroodsma, D., Palomares, M. L. D., Pauly, D., et al. (2018). Note 297.

[350] Harper, S. and Sumaila, U. R. (2019). *Distributional impacts of fisheries subsidies and their reform: Case studies of Senegal and Vietnam*. [pdf] London: IIED, p.18. Available at: https://pubs.iied.org/pdfs/16655IIED.pdf [Accessed 12 Feb. 2020].

[351] Love, P. (2010). "Hooked on Handouts?", in *Fisheries: While Stocks Last?*. [pdf] Paris: OECD Publishing, p.96. Available at: https://www.oecd-ilibrary.org/docserver/9789264079915-7-en.pdf?expires=1581909665&id=id&accname=guest&checksum=8B2A7FD7F15A6255CA1EBB8E56F879FD [Accessed 12 Feb. 2020].

enforcement authorities.[352] Therefore, many of the victims of forced labour in the fishing industry are migrant workers who are from neighboring foreign countries, do not speak the local language, and are easily made blind to their exploited situation. Because these fishing operations are out of reach from law enforcement, they carry risks of abuse involving debt bondage, physical threat, physical and sexual abuse and sometimes murder. 51% of the victims are in forced labour under debt bondage.[353]

The trafficked victims of bonded labour from Cambodia, Myanmar, and Laos in the fishing industry of Indonesia, the mechanisms for control and coercion involved other abusive tactics, such as withholding wages, denying freedom of movement and seizure of documents like identification certificates.[354]

While the foreign migrants are sought after in these illegal fishing operations, many foreign migrants seeking for a better job across the border seek out recruitment agents that would exploit their vulnerability and request high brokerage fees. These brokerage fees would become personal debts that must be repaid through deductions from wages for these deceived migrant workers. Moreover, because the labour brokerage was informal, the workers would not have a proper employment contract, which then would expose them to considerable risk of threat and abuse.[355]

For example in Indonesia, among many reasons, seeking for a better job was the prominent reason for many of the migrants from Cambodia, Myanmar, and Laos entered into the Indonesian fishing industry between 2011 and 2015.[356]

PLANS TO DETER FORCED LABOUR IN THE FISHING INDUSTRY

While combating forced labour in the fishing industry is a well-understood issue of violation against human rights, the complicated nature of forced labour requires thorough analysis of key definitions, facts and policies in order to effectively tackle the issue. The IOM office in Seoul, Republic of Korea, recognized how different issues existed at all levels in forced labour. The foreign workers in Korea were drawn to fishing industries that were easily accessible for employment but very difficult to quit due to large raked up debts, thereby becoming extremely vulnerable to forced labour.[357] Such cases of forced labour were not only found in Korea but in many countries where the desperate fishing vessels were exploiting the vulnerable status of migrant workers while avoiding IUU regulations that are not strictly enforced. In response to the complicated layer of contributing factors within the issue of forced labour, three strategic plans or pillars must be effectively implemented by countries trying to tackle the issue to improve their overall fishing industry.

PILLAR #1: CLOSING LEGAL LOOPHOLES IN EXISTING LAWS

While general Anti-Human Trafficking laws may exist in countries abiding to the international human rights standards, there is continuous need for evaluation, implementation, enforcement, and amendments of those laws to combat human trafficking that is rapidly developing in method and form. Forced labour, especially, involves many complicated issues of debt bondage, restricted freedom of movement and the fishing vessels utilizing slaves avoiding detection by the authorities. Therefore, in order to further combat against forced labour

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[352] International Labour Office (2013), p.35. Note 336.

[353] Id. pp.10-11.

[354] International Organization of Migration (2018). *Report on Human Trafficking, Forced Labour and Fisheries Crime in the Indonesian Fishing Industry.*[pdf] p.66. Available at: https://www.iom.int/sites/default/files/country/docs/indonesia/Human-Trafficking-Forced-Labour-and-Fisheries-Crime-in-the-Indonesian-Fishing-Industry-IOM.pdf [Accessed 12 Feb. 2020].

[355] Id.

[356] International Organization of Migration (2018). p.43. Note 355.

[357] Ock, H. (2016). *Migrant fishermen vulnerable to abuse.* [online] The Korean Herald. Available at: http://www.koreaherald.com/view.php?ud=20160825001007 [Accessed 12 Feb. 2020].

in the fishing industry, Anti-Human Trafficking laws must aim to mend any loophole that overlooks proactive human right standards in the importation of seafood, IUU fishing regulation, and rights of immigrants.

The U.S. Congress responded to the reports of slavery in "Thailand's $7.3 billion seafood industry" most effectively by banning its companies from importing such seafood products that were produced by supply chains involved in forced labour.[358] The legal loopholes were found in the US Tariff Act of 1930, where goods produced by slaves were allowed importation "if consumer demand cannot be met without them."[359] By heightening the ethical standard in the import of seafood products, the U.S. effectively triggered an international effort to begin investigations in unchecked fishing industries. Interests in monitoring IUU Fishing for deterring forced labour in the fishing industry also elevated. Although the EU IUU Regulation does not address human trafficking or forced labour in the fishing industry,[360] the U.S. Congress pass a bill "to amend the Trafficking Victims Protection Act of 2000" to be "cited as the Human Trafficking and IUU Fishing Act."[361]

The Royal Thai Government, after ratifying the Forced Labour Convention No. 29 and its Protocol in 2014, worked to mend the legal loopholes found within its own domestic laws against human trafficking, especially forced labour. It aimed to align Thai legislation with the Convention and the Protocol.[362] In 2018, Thailand announced that it was "drafting Prevention and Elimination of Forced Labour Act as a implementing legislation for the Protocol of 2014" and that it will "focus on improving the effectiveness of measures to prevent and suppress forced labour."[363] The draft became the Royal Decree of 2019 that aimed to combat human trafficking and forced labour that posed threats against migrant workers in Thailand, especially migrants from "Myanmar, Cambodia and the Lao People's Democratic Republic."[364]

PILLAR #2: DETERRING IUU FISHING

As more and more IUU fishing vessels are found to be deeply involved with and by circumstance prone to committing forced labour, many organizations and countries began to recognize a "a strong interrelation between illegal fishing and forced labor of crews aboard fishing boats."[365] One of the reasons was the higher costs in the fishing operation as fish stock depleted due to overfishing and the vessels were forced to fare farther into the distant waters. In order to compensate for the higher costs and fish profitably, the fishing vessels hired cheap labor to reduce labor cost, which then led the vessel to violate proper registration processes and avoid authorities. The Taiwan Fisheries Agency published a report that "21,994 Indonesian fishers were working on Taiwanese coastal and distant-waters fishing vessels as of June 2019" and the Indonesian migrant fishers were

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[358] Milman, O. (2016). *Obama to sign law banning US imports of fish caught by slave labor.* [online] The Guardian. Available at: https://www.theguardian.com/us-news/2016/feb/16/obama-ban-fish-imports-slavery [Accessed 12 Feb. 2020].

[359] Id.

[360] European Commission (2019). *Questions and Answers – Illegal, Unreported and Unregulated (IUU) fishing in general and in Thailand.* [online] European Union. Available at: https://ec.europa.eu/commission/presscorner/detail/en/MEMO_19_201 [Accessed 12 Feb. 2020].

[361] 115 Cong. 2d Sess. H. R. 6834 (2018) (A Bill to amend the Trafficking Victims Protection Act of 2000 to include the Secretary of Commerce on the Interagency Task Force to Monitor and Combat Trafficking, and for other purposes).

[362] Human Rights Watch (2018). *Joint Civil Society Statement concerning Implementation of the Protocol of 2014 to the Forced Labour Convention, 1930.* [online] Available at: https://www.hrw.org/news/2018/09/28/joint-civil-society-statement-concerning-implementation-protocol-2014-forced-labour [Accessed 12 Feb. 2020].

[363] Ministry of Foreign Affairs of the Kingdom of Thailand (2018). *Press Release: Thailand's Ratification of Protocol of 2014 to the Forced Labour Convention 1930.* [online] Available at: http://www.mfa.go.th/main/en/news3/6886/90312-Thailand%E2%80%99s-Ratification-of-Protocol-of-2014-to-the.html [Accessed 15 Feb. 2020].

[364] IOM Thailand (2019). *Thailand, Partners Plan Implementation of New Law to Combat Forced Labour, Human Trafficking.* [online] Available at: https://thailand.iom.int/news/thailand-partners-plan-implementation-new-law-combat-forced-labour-human-trafficking [Accessed 12 Feb. 2020].

[365] Gokkon, B. (2020). *Deadly conditions for Indonesian migrant crews tied to illegal fishing.* [online] MONGABAY. Available at: https://news.mongabay.com/2020/01/deadly-conditions-for-indonesian-migrant-crews-tied-to-illegal-fishing/ [Accessed 12 Feb. 2020].

deceived by "false seafarers' papers by the hiring agencies."[366] They were vulnerable to physical and sexual abuse, even to death, while wages were withheld and debt bondage kept them confined.

Another reason for IUU fishing vessels actively exploit their workers is that the waters they run their fishing operations are unmonitored, thereby making it easier for IUU fishing vessels to escape regulations and detections.[367] As part of such strategy to avoid detection by authorities, the IUU fishing vessels used transshipment vessels to keep the vessels carrying the exploited labourers onboard, while a secondary vessel transported the catch back and forth between the main vessel and the port.[368]

CASE STUDY: THAILAND

Yellow Card warning was issued to countries that did not implement appropriate regulations over their rampant IUU fishing practices, and as a result, the human rights violations of force labour in the fishing industry. This warning was detrimental to countries that relied on their fishing industries for export, as the warning would put the country at a status where "it could face a ban on exporting seafood to the European Union."[1] In 2015, EU have issued a yellow card warning against Thailand for its failure to implement proper IUU fishing regulations after when the Thai fishing vessels were exposed for their involvement in the exploitation of migrant workers, or forced labour, at sea.[2]

In 2019, however, the European Commission rescinded the yellow card warning on Thailand, after confirming that the Thai authorities made recognizable efforts to deter forced labour in the fishing industry and ratified the International Labour Organization's Convention No. 188 on Working in Fishing (C188).[3]

[1] Human Rights Watch (2018). *Thailand: Forced Labor, Trafficking Persist in Fishing Fleets: Reforms Fall Short of Addressing EU, US Concerns.* [online] Available at: https://www.hrw.org/news/2018/01/23/thailand-forced-labor-trafficking-persist-fishing-fleets [Accessed 12 Feb. 2020].

[2] Id.

[3] Holland, J. (2019). *Thailand's yellow card for actions against illegal fishing lifted.* [online] SeafoodScource. Available at: https://www.seafoodsource.com/news/environment-sustainability/thailands-yellow-card-for-actions-against-illegal-fishing-lifted [Accessed 12 Feb. 2020].

PILLAR #3: BETTER PROTECTION FOR THE MIGRANT WORKERS

As one of the contributing factors to forced labour, vulnerable legal status of the migrants, make them the target population for exploitation in the fishing industry. Migrants are considered to be the "most vulnerable to being forced into modern slavery" because they are dislocated from familiar community support structure "without

[366] Id.

[367] Chen, K. (2018). *Saltwater Empires: Slavery in the Thai Fishing Industry*. [online] Harvard Political Review. Available at: https://harvardpolitics.com/world/saltwater-empires-slavery-in-the-thai-fishing-industry/ [Accessed 12 Feb. 2020].

[368] Greenpeace Southeast Asia (2016). *Turn the Tide: Human Rights Abuses and Illegal Fishing in Thailand's Overseas Fishing Industry*. [pdf] pp.4 & 9. Available at: https://storage.googleapis.com/planet4-southeastasia-stateless/2019/04/a99d5300-a99d5300-turn-the-tide.pdf [Accessed 12 Feb. 2020].

access to legitimate forms of employment, legal status or social protection."[369] These conditions would worsen if the countries where forced labour takes place exercises restrictive migration policies and make it difficult for the migrants to seek legal remedies or protection from the exploitations.[370] Therefore, governments must make effort to overcome their lack of prioritization of "oversight in high risk industries," lack of funding or resource to provide migrant support, and damaging laws, like those that "make it illegal for migrant workers to organize or join unions." [371] The recommendations for governments are to establish protective laws that prohibit recruitment fees, restrictions on mobility and withhold identification documents, thereby promoting labour rights of the migrants.[372] In addition, it is crucial that transparent regulations "reduce perpetrators' control of recruitment processes," where many of the migrants without access to legitimate information are coerced and deceived into forced labour.[373]

INTERNATIONAL LEGAL FRAMEWORKS AGAINST FORCED LABOUR

The issue of forced labour arose from the devastations the World War II left behind. And the cruelty of forced labour immediately called for the international community to cooperate in effort to fight against forced labour through the Forced Labour Convention, 1930 (No. 29).[374] However, through further extensive international inquiries presented by the UN-ILO ad hoc Committee in the 1950s,[375] anther convention, the Abolition of Forced Labour Convention, 1957 (No. 105),[376] was adopted next. Most recently in 2014, a landmark protocol, or the Protocol to the Forced Labour Convention, 2014 (No. 203),[377] entered into force and enhanced the effectiveness of the Forced Labour Convention of 1930 through clearer "effective measures to prevent forced labour and provide victims with protection and access to remedies, including compensation."[378]

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[369] IOM (2019). *Safe Migration Pathways Key to Tackling Human Trafficking, Modern Slavery, Forced Labour.* [online] Available at: https://www.iom.int/news/safe-migration-pathways-key-tackling-human-trafficking-modern-slavery-forced-labour [Accessed 12 Feb. 2020].

[370] Id.

[371] David, F., Bryant, K. & Larsen, J. J. (2019). *Migrants and their Vulnerability: To Human Trafficking, Modern Slavery and Forced Labour.* [pdf] Geneva: International Organization for Migration, p.66. Available at: https://publications.iom.int/system/files/pdf/migrants_and_their_vulnerability.pdf [Accessed 12 Feb. 2020].

[372] Id. p.67.

[373] Id.

[374] *Forced Labour Convention, 1930 (No. 29).* [online] Available at: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO:12100:P12100_INSTRUMENT_ID:312174:NO [Accessed 12 Feb. 2020]; International Labour Conference (2007). *Genearl Survey concerning the Forced Labour Convention, 1930 (No. 29), and the Abolition of Forced Labour Convntion, 1957 (No. 105)*. [pdf] Geneva: International Labour Office, p.6. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_089199.pdf [Accessed 12 Feb. 2020].

[375] International Labour Conference (2007). Note 375.

[376] *Abolition of Forced Labour Convention, 1957 (No. 105).* [online] Available at: https://www.ilo.org/dyn/normlex/en/f?p=1000:12100:0::NO::P12100_ILO_CODE:C105 [Accessed 12 Feb. 2020].

[377] *Protocol of 2014 to the Forced Labour Convention, 2014 (No. 203).* [online] Available at: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:P029 [Accessed 12 Feb. 2020].

[378] International Labour Organization (2014). *Strengthening the global fight against all forms of forced labour: The Protocol to the Forced Labour Convention.* [pdf] p.2. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---declaration/documents/publication/wcms_321414.pdf [Accessed 12 Feb. 2020].

FORCED LABOUR CONVENTION 1930 (NO.29)

- **Forced Labour Convention, 1930 (No. 29)**
  - Aims "to suppress the use of forced or compulsory labour in all its forms within the shortest possible period."[379]
  - Defines forced labour as, "all work or service which is exacted from any person under the menace of any penalty and for which the said person has not offered himself voluntarily."[380]

- **Protocol to the Forced Labour Convention, 2014 (No. 203)**
  - "Legally-binding instrument that requires States to take measures regarding prevention, protection and remedy in giving effect to the Convention's obligation to suppress forced labour." [381]
  - Requires the Member States to take effective measures to prevent forced labour and provide victims with protection and access to remedies, including compensation. (Article 3 and 4(2)).[382]
  - Ensures victims' access to appropriate and effective remedies, such as compensation, irrespective of their presence or legal status in the territory. (Article 4(1)).
  - Article 2 reflect research and experience by setting forth "an overall strategy for the prevention of forced labour and outlines measures that member States must put in place in several specific areas."[383]

- **The Forced Labour (Supplementary Measures) Recommendation, 2014 (No. 203)[384]**
  - Provides non-binding practical guidance in the areas of prevention, protection of victims and ensuring their access to justice and remedies, enforcement and international cooperation.
  - Supplements both the Protocol and the Convention

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[379] Forced Labour Convention, 1930 (No. 29). art 1, para 1. Note 375.

[380] *Id.* art 2, para 1.

[381] International Labour Organization (2014). Note 379.

[382] Id. p.3.

[383] International Labour Organization (2018). *Ending forced labour by 2030: A review of policies and programmes.* [pdf] Geneva, p.5. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---ipec/documents/publication/wcms_653986.pdf [Accessed 12 Feb. 2020].

[384] International Labour Organization (2014). *R203 – Forced Labour (Supplementary Measures) Recommendation, 2014 (No. 203).* [online] Available at: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_INSTRUMENT_ID:3174688 [Accessed 12 Feb. 2020].