APRIL 2014 | NUMBER 011

THE CENTER FOR INTERNATIONAL ENVIRONMENT & RESOURCE POLICY

WATER AND OCEANS PROGRAM

THE FLETCHER SCHOOL | TUFTS UNIVERSITY

Charting a New Course for the Oceans

A report on the state of the world's oceans, global fisheries and fisheries treaties, and potential strategies for reversing the decline in ocean health and productivity

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Acknowledgements

This report was prepared by Prof. William Moomaw and Sara Blankenship of the Center for International Environment and Resource Policy at The Fletcher School, Tufts University. The report was prepared for release at the Global Oceans Action Summit for Food Security and Blue Growth that took place in The Hague, the Netherlands from 22-25 April 2014. The authors express their appreciation to the Netherlands Ministry of Economic Affairs (formerly, Ministry of Agriculture, Nature and Food Quality) for its support of this project.

We also wish to thank Anna McCallie for her extensive contributions to editing and updating the report, Katherine Nolan for her contributions to editing an earlier version of the report, Elizabeth Mathai for her initial work in developing the Annex of Fisheries Treaties, and Mieke van der Wansem, Associate Director of the Center for International Environment and Resource Policy for her contribution to the logistics of preparing this report. The cover photograph was taken by William Moomaw at the Tokyo Fish Market in November 2012.

This report is available on-line at http://fletcher.tufts.edu/CIERP/Publications/.

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The Water and Oceans Program (WO) gratefully acknowledges the support of the Netherlands Ministry of Economic Affairs.

The views expressed in this report do not necessarily reflect the views of any of the supporting institutions.

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The Fletcher School at Tufts University was established in 1933 as the first graduate school of international affairs in the United States. The primary aim of The Fletcher School is to offer a broad program of professional education in international relations to a select group of graduate students committed to maintaining the stability and prosperity of a complex, challenging, and increasingly global society.

The Center for International Environment and Resource Policy (CIERP) was established in 1992 to support the growing demand for international environmental leaders. The Center provides an interdisciplinary approach to educate graduate students at The Fletcher School. The program integrates emerging science, engineering, and business concepts with more traditional subjects such as economics, international law and policy, negotiation, diplomacy, resource management, and governance systems.

The Water and Oceans Program (WO) works jointly through the interdisciplinary Water: Systems, Science, and Society program at Tufts to identify technologies, policies, and measures that can offer the multiple essential services that water provides. We study the ocean as a source of food, energy, and other resources, including its role in the climate system and transportation, and its cultural value.

Table of Contents

Figures and Case Studies

Acronyms

bn	Billion
CCAMLR	The Convention on the Conservation of Antarctic Marine Living Resources
CFC	Chloroflurocarbon
CFP	Common Fisheries Policy
CO_2	Carbon Dioxide
EEZ	Exclusive Economic Zones
EC	The European Commission
EU	The European Union
FIFG	Financial Instrument for Fisheries Guidance
FAO	The United Nations' Food and Agriculture Organization
FOC	Flags of Convenience
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Seas
IMO	International Maritime Organization
IPOA-IUU	International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing
IPOF	Intergovernmental Panel on Oceans and Fisheries
IUU	Illegal, Unreported, and Unregulated Fishing
MPA	Marine Protected Areas
MSY	Maximum Sustainable Yield
NATO	North Atlantic Treaty Organization
NGO	Non-Governmental Organization
OY	Optimal Yield
RFMO	Regional Fisheries Management Organization
UN	The United Nations
UNCLOS	The UN Convention on the Law of the Sea
UNEP	United Nations Environment Program
US	The United States
UV	Ultra-Violet Radiation
WTO	World Trade Organization

Executive Summary

The health of the world's oceans is deteriorating and global fisheries are unable to keep up with the increasing demand for marine food sources. In this report we identify direct and indirect causes of fisheries decline. Decades of ineffective management practices have already resulted in the collapse of many fisheries as well as reports that many species continue to decline or edge closer to commercial extinction. These trends continue despite global collective knowledge of why current ineffective management practices persist and how the overuse of ocean resources is occurring.

International fisheries treaties struggle to maintain commercially viable stocks. In this report, we list 65 fisheries treaties plus a dozen additional ocean management and protection agreements and their operational characteristics in a comprehensive Annex. We identify treaty strengths and weaknesses, including the dearth of scientifically informed decision-making and the difficulty of integrating science into the social and economic dimensions of fisheries. The report identifies several types of actions that need to be implemented in order for these treaties to become more effective.

However, even if these changes are enacted, evolving knowledge of the oceans now shows that an irreversible fisheries tipping point may be closer than anticipated. Fisheries are no longer threatened only by overfishing, but by a decline in overall oceanic productivity as well. The myriad compounding threats include: destructive fishing practices, management by species rather than by ecosystems, oceanic and terrestrial-based pollution, the rising aquaculture industry, invasive species, human population growth and development, UV radiation, climate change, and ocean acidification. Therefore, the "fisheries problem" is no longer just a sector problem, but rather a component of a vast interconnected, multifaceted network of global environmental issues and unsustainable practices that require the inclusive approach of Sustainable Development Diplomacy. Alternative methods and practices to reverse the trend of fisheries decline are available. The report makes multiple recommendations that address both the direct and indirect causes of fisheries decline. The recommendations are grouped under four broad areas for improvement: Increase Coordination, Alter Current Practices, Engage Relevant Parties, and Experiment Broadly.

It is important to note that we have not yet reached the tipping point for irreversible decline in marine living resources. There is still time to start reversing the destructive trends impacting the oceans, but it must be done in a comprehensive, holistic, adaptive, and innovative manner.

Introduction

Covering over 70% of Earth's surface and reaching depths of up to 11,000 meters, the oceans seem vast and infinite. Unexplored and unknown, the oceans' power, resources, and sheer size generated the near universal, millennia-old belief that they are invulnerable and that humans cannot harm or deplete them. Nowhere is this belief more robustly practiced than with fishing. The oceans are the ultimate global commons. Vast seas do not readily or easily obey terrestrially based, human-designed concepts of surveyance, metes and bounds, or ownership. Great stocks of fish, especially globe-spanning, pelagic predators, do not respond to treaties or territories laid out on maps. Increasing demand has led to an escalating assault on a declining resource that undermines the sustainable provision of food and protein needed for a growing global population.

Wild capture fisheries and aquaculture are a large global business valued at $217.5bn in 2010. Marine aquaculture is a growing fraction of total fish production, and is valued at $36bn, while the value of wild marine capture is $86bn. Total trade in fish and fish products amounted to $111.8bn, up 12% from the year before, and up by 86% since 2000. The European Union (EU) is the largest importer of fish, accounting for 40% of world imports, valued at $44.6bn. The United States (US) is the largest single nation importer, bringing in 60% of its total consumption, while Japan is second, importing 50% of its consumption. China is the largest processor and exporter of fish. In 2010, developed countries imported 58% of all traded fish products, which represented 76% of total value (FAO 2012). The economics of the fishing industry are distorted by the extensive role of subsidies provided by most fishing nations.

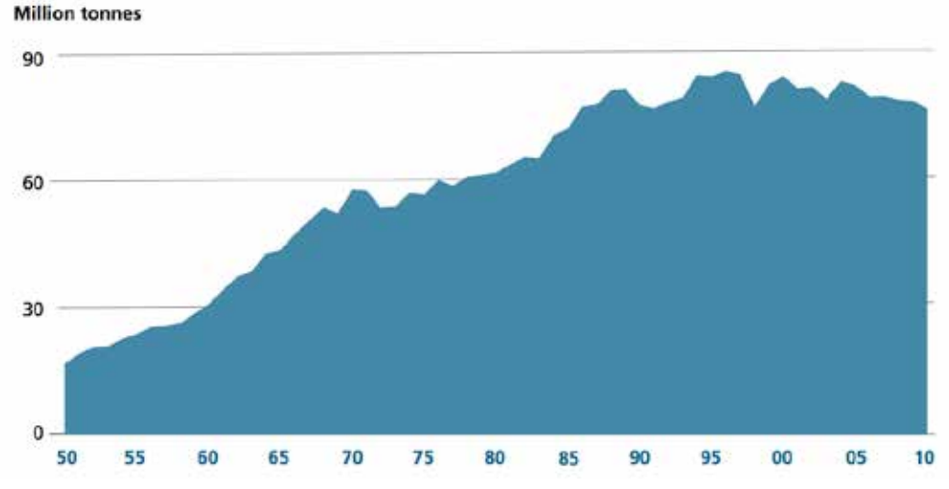
But it is not only the powerful pressures of fishing that are decreasing the stocks of marine organisms and degrading the underlying biodiversity of ocean ecosystems. Additional human forces are directly and indirectly reducing the productivity of the oceans' living resources as well. Some of these forces are global, such as climate change, ocean acidification, and stratospheric ozone depletion. Others are more local or regional, such as pollution of coastal regions and the high seas from oil spills, plastics, and other pollutants. The loss of breeding grounds for marine organisms through the destruction of coastal wetlands, mangroves and coral reefs, the damming of rivers, and the creation of dead zones from eutrophication account for a major decline in the reproductive rates of many species.

Predictions of global fisheries collapse now serve as the backdrop for debates over fishing practices and management while the continuous conveyor belt of commerce moves ocean resources onto land (Biello 2006). Unfortunately, these predictions of global fisheries collapse are not entirely unfounded. As one analysis concluded, we analyze current trends from a fisheries and conservation perspective. In 5 of 10 well-studied ecosystems, the average exploitation rate has recently declined and is now at or below the rate predicted to achieve maximum sustainable yield. *Yet 63% of assessed fish*

stocks worldwide still require rebuilding, and even lower exploitation rates are needed to reverse the collapse of vulnerable species (emphasis added) (Worm et al. 2009). Nor can collapse be solved by only restructuring current fisheries practices and regimes, as the analysis of fisheries treaties and declarations in this report demonstrates.

Food and Agriculture Organization of the UN (FAO) data on marine fisheries shows a significant increase in wild catch, from 17.3 million tonnes[1] in 1950 to a peak of 85 million in 2004 followed by a decline to 78.9 million tonnes in 2011 (FAO 2012). In fact, the 2011 level is roughly the same as it was in 1987, so there has been essentially no increase in the total take for the past 25 years. See Figure 1.

Figure 1: Marine Wild Catch 1950-2011 (metric tonnes)

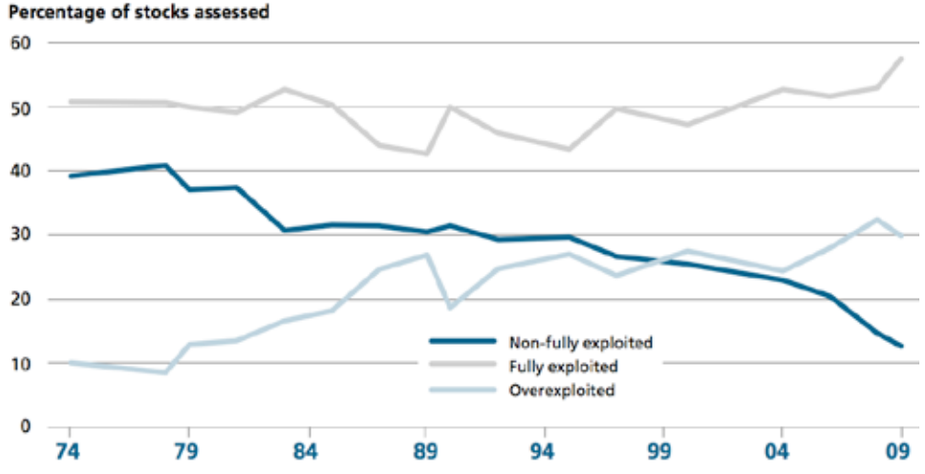


Source: FAO 2012

Of equal concern is that over-exploited stocks have increased from 10% to 30% between 1974 and 2009, while fully exploited stocks have increased from 50% to nearly 60% and non-fully exploited stocks have decreased nearly in half, from 40% to just over 20%. See Figure 2.

1 In this report, "tonnes" will be used for metric tons, while "tons" will be used for short tons.

Figure 2: Degree of exploitation of total marine fishing stocks



Source: FAO 2012

This report will document both the overexploitation of marine resources and the limitations on that resource because of decreasing ocean productivity. It will also identify the factors that are reducing oceanic productivity, and serve as a compass so that coordinated policy action can better chart the course for improving the health, resilience, and state of the oceans.

This report is divided into four sections: Section 1 summarizes the current state of fisheries management, nationally and internationally, and the role of fisheries treaties. Section 2 places fisheries within an ecological context, and demonstrates how alterations to marine ecosystems indirectly determine the productivity and resiliency of fisheries. The multiple direct and indirect factors affecting marine life and their interconnections are shown in Figure 3.

Section 3 describes declining ocean productivity and the implication for fisheries and examines two areas of concern in the ocean that serve as both an indicator of a problem and a threat to future oceanic productivity. Section 4 presents analysis and concludes with 16 recommendations for addressing the direct effects of fishing policies and practices and halting the decline in ocean productivity that is also limiting the yield of fisheries. At the end of this report is an Annex of Fisheries Treaties and related maritime laws and declarations that summarizes the institutional and operational characteristics of each.

Section 1: The State of Fisheries Management

The most immediate threats to fisheries are overfishing and ineffectual management policies and practices. The main tools for addressing these direct impacts are a set of international fisheries treaties and national laws that were established to regulate the taking of specific species or groups of species. This section examines the status of fisheries management by examining the treaties and their effectiveness.

Most coastal nations have national sovereignty over a band of ocean that extends to a maximum of 12 nautical miles from shore. The UN Convention on the Law of the Sea (UNCLOS) created Exclusive Economic Zones (EEZs) that provide economic sovereignty out to 200 nautical miles from a maritime nation's shoreline. The responsibility and legal authority for managing fishing stocks within these waters resides with the coastal nation. Fishing in the ocean beyond 200 nautical miles is regulated by a set of international treaties. Some of these treaties also address species that are found within national EEZs (see Annex).

This report identifies and catalogues in the Annex 76 international treaties — including updates, annexes, and principle framework agreements — dedicated to fisheries and ocean management and health. Sixty-seven of the 76 identified treaties and agreements address specific fish stocks and/or marine species. One of those 67 treaties terminates an existing treaty.[2] Of the remaining 65 fisheries treaties, six address marine living resources generally; 12 address dolphins, cetaceans, turtles, seals, and polar bears individually as species or as groups, and the remaining 47 treaties directly address fish.

Despite intensification of fishing effort, annual global marine capture production, measured by weight, has remained stagnant at approximately 80 to 90 million tonnes from the mid-1980s through 2011, and appears to be declining (FAO 2012). No longer is the annual catch growing, despite the expansion of fleets into previously inaccessible regions and the deeper ocean, increasingly effective technology for locating and catching fish, and "fishing down the line," in which lower trophic-level species are more heavily exploited to fill the gaps left by depleted stocks of larger, predator fish.

A general, heuristic way to assess effectiveness is to weigh the treaties in question against identified characteristics of successful treaties. Effective fisheries treaties include a Secretariat, transparent treaty enforcement mechanisms or an "Enforcement Committee," and Scientific Advisory Council (Reeve 2002). Of the 76 treaties and agreements, nearly all contain a Secretariat. However, only 12 have both a Secretariat and enforcement mechanisms that go beyond "self-enforcement," and 13 contain a Secretariat and some form of Scientific Advisory Council. It can be concluded using this analysis that the structure of most fisheries treaties does not lead to effective outcomes.

2 The 1969 Convention on the Conservation of the Living Resources of the South East Atlantic was terminated in 1990 by a Protocol to the Convention as agreed to by all member parties.

The treaties are all listed and grouped by their structural components in the Annex with links to the Secretariat and to the treaty text, where applicable.

Case Study 1: *Atlantic Bluefin Tuna*

Even where fisheries agreements do contain critical components, Parties to the agreement often either disregard them or do not implement the provisions effectively. A well-known example is that of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Established in 1969 and consisting of 48 member countries, ICCAT is responsible for Atlantic Bluefin fishery management. Bluefin fishery management has been ineffective due primarily to dramatic differences in the sustainable yield measurements advocated by its scientific panel and the policies actually pursued. Science can only inform the decision-making process, and political and economic factors usually overwhelm scientific recommendations. ICCAT has consistently set catch quotas for stocks of Atlantic Bluefin well above levels recommended by its Standing Committee on Research and Statistics (Strickland 2010; CITES 2009). In fact, an independent review commissioned by ICCAT found that "ICCAT contracting parties' performance in managing fisheries on Bluefin tuna particularly in the eastern Atlantic and Mediterranean Sea is widely regarded as an international disgrace" (CITES 2009). The report went on to state, "The Panel found the management of fisheries on Bluefin tuna in the eastern Atlantic and Mediterranean and the regulation of Bluefin farming to be unacceptable and not consistent with the objectives of ICCAT" and "Referring to illegal fishing pushing annual catches to twice the quota levels and four times scientific recommendations." The report concluded, "It is difficult to describe this as responsible fisheries management" (ibid.).

However, since the time of the 2008 report, ICCAT has made an effort to more closely follow the recommendations of the scientific panel as well as address situations that have the potential to place extreme stress on the stock. For example, the 2011 uprising in Libya and the ensuing NATO intervention rendered Libyan waters, which include critical spawning and nursery grounds for Bluefin in the Mediterranean, all but impossible to regulate. Fearing that poaching would become rampant in Libya's now lawless waters, the EU called for ICCAT to suspend Libya's fishing rights (Reuters 2011). Yet despite ICCAT member nations' approval of reduced quotas and calls for collective action to regulate Libyan waters, the amount of Bluefin traded on the global market exceeded the 2010 quota by 141% (PCT 2011a).

As the Atlantic Bluefin example shows, though an international treaty or agreement may contain the necessary components and the best intentions, it will not be effective if these components simply remain on the paper and are not meaningfully put into

practice. Furthermore, a treaty must not be merely signed, ratified, and then forgotten. Parties should meet to review treaties and agreements as often as is prudent. One positive example of this is the Marine Strategy Framework Directive of the EC, which was passed in 2008. The Directive uses an "adaptive management approach," which mandates that the Strategies must be reviewed every six years (EC 2008). As such, a conference was held in March 2014. Quotas should not be considered permanently fixed numbers and policies should not be set in stone. The flexibility to make changes given current science and practices is absolutely essential for treaties and agreements to be effective.

It should be noted, however, that given the complexity of ocean ecosystems, the difficulty of marine resource management, the economic pressure from fishermen and the fishing industry, and the ad hoc nature of these treaties, it is no easy task to determine how effective and successful treaties are, especially in the short term. Successful fisheries treaties and policies must be consistent with the manner in which natural systems function. For that reason, it is much easier to recognize policy failures than successes, since failures are dramatic and occur within a more "human-political" time scale (for example, the complete collapse of the Northwest Atlantic cod fishery within a few years) rather than successes that occur over a longer, more "ecological" time scale (for example, the rebuilding of a stock over several decades). What the previous "effectiveness test" intends to point out is that many of these treaties do not have the necessary foundation to be effective in the short term or the long term unless they are substantially revised.

The role of the scientific panels is to understand the factors that determine the quantity of fish that can be taken without causing a decline in that fishery over time — the maximum sustainable yield (MSY). This is a complex task, the art and science of which is hard to perfect. There is currently a "science gap" between fisheries science and marine conservation science that must be reconciled. There is movement in this direction, with one noteworthy example being the collaboration on fisheries research between Boris Worm, a top marine conservation scientist, and Ray Hilborn, a leading fisheries scientist (Worm et al. 2009). They are attempting to reconcile conflicting assessments of fish stocks between marine conservation science and fisheries science.

Ocean policy is also becoming more integrative and inclusive, as policymakers at the local, state, regional, and national levels advance policies grounded in ecosystem-based, adaptive management and marine spatial planning (Obama 2010). With the transition to these more holistic policies, there is a considerable increase in stakeholder involvement and stronger efforts to improve coordination and communication among agencies, sectors, and economic interests. Furthermore, there is an increase in the interdisciplinary awareness and scope of policymaking, making effective use of the best available science, economic analyses, management innovation, and improvements in technology.

It is evident that there are numerous issues with regard to the design, implementation, and enforcement of fisheries management that must be addressed by changes in fisheries policies. Illegal, unreported, and unregulated (IUU) fishing is extensive and is often practiced by vessels flying flags of convenience (FOCs) of countries that do not enforce fisheries agreements (FAO 2002). Governments continue to provide large subsidies to support too many boats chasing too few fish. The extension of the EEZ under UNCLOS seems to have hastened the decline. Many governments provided incentives to expand their own fleets and some developing country governments sold access to their EEZ to wealthy nations' distant fishing fleets with few restrictions or little enforcement.[3] This unsustainable practice reduces fish stocks and economically harms commercial and local fishermen alike (LaFraniere 2008).

The open access nature of the oceans continues to plague fisheries policies and marine management as well. High seas fisheries are universally exploited. Ships flying FOCs continue to poach marine resources by taking regulated species illegally, and efforts to adequately enforce regulations continue to be drowned out in a literal sea of detrimental, non-reversible actions. Bycatch cannot be un-caught, exploited finned sharks cannot be re-finned, tossed catch shares cannot be re-landed. Fisheries policy and management must begin to examine and incorporate preventative measures that provide strong deterrents to IUU fishing.

Finally, business-as-usual fisheries management approaches that consider only single species or stocks on just one date annually are failing because they are unrealistic. A stock of fish does not exist in isolation. It is inherently connected to its marine ecosystem, to other species within the ecosystem, and to the physical and chemical conditions of its habitat. Few treaties take an ecosystem perspective or consider factors such as trophic structure — the feeding structure that supports a specific species or the primary productivity of the oceans. The loss of high trophic-level species is occurring in some cases even when quotas are observed because the populations of species on which they depend are unregulated and are being depleted.

There is no doubt that a large portion of the fisheries problem is fishery policy. Some researchers argue that "sustainability, however defined, rarely if ever occurred as a result of an explicit policy, but rather as result of our inability to access a major part of exploited stocks" (Pauly et al. 2009). To avoid near term collapses, however, treaties need to be revised so as to include monitoring, reporting and verification, and effective implementation of actions that are in conformance with scientific, economic, and political realities. In addition, merely addressing these issues through fisheries treaties will not entirely solve the fisheries problem.

3 For an idea of the range and influence of the European Community's distant fishing fleets see EC 2011.

Section 2: Direct Causes of Declining Fisheries

There are numerous policies and practices that have led to the decline in fisheries yield. Some of the most significant ones are identified in this section.

2.1 MEASUREMENT METRICS

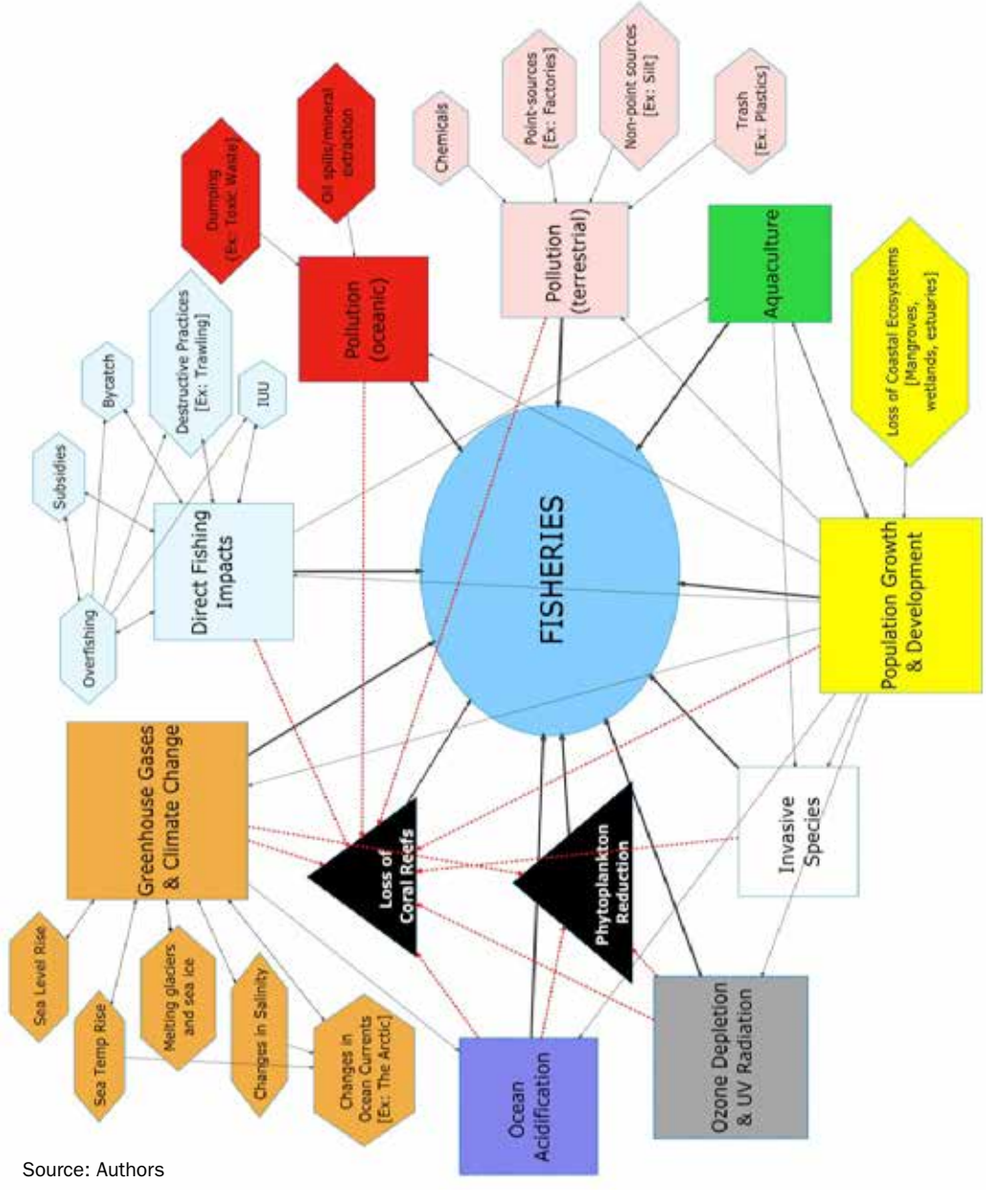
The catch of fish from the oceans reported in Figure 1 and the state of fish stocks documented in Figure 2 are measured by total biomass weight. This metric conceals the shift in species caught as specific stocks are depleted. Total biomass weight of specific species also hides the decline in size and reproductive stage of caught fish (Trippel 1999). Studies of cod demonstrate that older, heavier females produce many more eggs per unit of weight than do younger, smaller fish. Hence, "the reproductive capacity of the stock appears not to be properly measured by the absolute volume of spawning biomass, as generally assumed" (FRCC 1997). The artificial truncation of the age pyramid decreases the potential fecundity of the population by removing the most productive members while counting them as equal by weight to several less productive individuals. Since nets are designed to capture larger individuals, this also biases the catch to remove genetically larger members of the species (Longhurst 2002).

2.2 OVERFISHING

Eighty-seven percent of global fish stocks are fully exploited, over-exploited, depleted, or recovering from depletion (FAO 2012). Studies find that the biomass of large ocean predators such as tuna has declined 52% (Juan-Jordá et al. 2011). This suggests that the vast majority of these treaties are either not effective or not being implemented. It is important to note that this sobering statistic only considers individual stocks that are deemed commercially valuable and does not consider the amount of environmental degradation and ecosystem destruction that accompanies overfishing. The FAO also estimates that "oceans are cleared at twice the rate of forests" (FAO 2009a). Overfishing is linked directly to multiple destructive fishing practices, as indicated in Figure 3. Subsidies encourage overfishing by supporting fleets that are over capacity in terms of number of ships, technology, and effort. Overfishing also arises from the continuation of destructive fishing practices, such as bottom trawling, that affect the targeted stocks and degrade ocean seafloors. In addition, regardless of whether or not the fishing technique is harmful, overfishing often correlates with large amounts of bycatch as increased effort is translated directly into unintentionally catching non-targeted species. Overfishing also occurs because recommendations by scientific bodies are often overruled, and because of IUU fishing, as fleets profit from catches, regardless of their legality. There is also haphazard enforcement by governments and minimal inspections at landing or on the open ocean.

Figure 3: Direct impacts on fisheries, and indirect influences from declining ocean productivity

Squares represent threats to fisheries. Light blue indicates direct causes of fisheries decline; other colored squares indirect threats to fisheries arising from decreasing ocean productivity. Hexagons indicate contributions to the threat and black triangles ecosystem components critical to the productivity of oceans and fisheries.



Source: Authors

Case Study 2: *Fishing Down the Food Chain*

As the world's fisheries continue to be exploited and, in some cases, collapse, heavily subsidized fleets around the world are driven to pursue other species that feed more economically valuable, higher trophic-level species such as Bluefin tuna, swordfish, and salmon (Kaufman 2011). This phenomenon of "fishing down the food chain" was first identified in 1998 (Pauly et al. 1998). According to this study, "...global fisheries have shifted in the last 45 years from large piscivorous fishes toward smaller invertebrates and planktivorous fishes especially in the Northern Hemisphere" (ibid.). In other words, statistics since 1950 have shown that due to the shift in target fish, the world's fisheries have shifted from harvesting large, upper trophic-level predator species to smaller, previously less economically valuable, lower trophic-level species. Using FAO data, studies have determined that globally, trophic levels decrease by 0.1 per decade (ibid.) To put this statistic in perspective, one can compare a highly economically valuable fish for human consumption — the Alaska Pollock — with a relatively high trophic level of 3.8 (±0.24) to primary producers (essentially plankton), which have a trophic level of 1 (ibid.). According to the study, global marine fisheries' trophic levels declined from 3.3 in 1950 to less than 3.1 by the 1990s, with some regional fisheries, such as the Northwest and Western Central Atlantic, contributing disproportionately to the decline (Pauly et al. 1998). This decline is important not only in terms of the health of marine ecosystems and fisheries management, but also because, as a species, humans can only "fish down" a certain amount before reaching the base of the food chain (Stevens 1998). More recent studies confirm these findings and, based upon model results, suggest that reducing the taking of lower trophic-level fish in half would protect marine ecosystems and maintain 80% of MSY (Smith et al. 2011).

It is important to note that in addition to fishing lower trophic-level species, overall landings have decreased over the years (Pauly et al. 1998). By some estimates, "global fisheries are declining by about 500,000 metric tons per year from a peak of 80 to 85 million tons in the late 1980s" (Pauly et al. 2003). This means that despite going after previously untapped stocks in more remote areas and depths and using an unprecedented level of technological capacity, the world's fishing fleets annually land less and less economically valuable seafood.

Overfishing at lower trophic levels is a threat not only to those particular fisheries, but to higher trophic-level fisheries that rely upon these species for feed, to vital ecosystem services, and to the health of the ecosystem overall (Worm et al. 2006). Studies have found that unlike terrestrial food webs, which are generally pyramidal in shape with clearly delineated interactions, marine food webs are much more fluid and dynamic (NAS 2008). The role a species plays depends very much on its lifecycle stage, its geographic location, and temporal factors (ibid.). This implies that the ramifications from fishing down the chain may be much more complex and, therefore, more catastrophic than in simpler food chains where the predator-prey links are stronger and less variable. However, treaties ignore food webs and other ecological considerations when establishing allowable yields, and permit the taking of higher trophic-level stocks without regard to the consequences elsewhere in the food web. Recent decisions in the US that have set limits on taking small forage fish, such as menhaden, because they are food for valuable higher trophic-level species may represent an initial attempt at managing the oceanic food web (Eilperin 2012, Blankenship 2011).

Many scientists, conservationists, and even chefs are arguing for a refocusing on lower trophic-level species for direct human consumption instead of converting them into fishmeal for livestock or aquaculture (Duchene 2009). Advocates for eating lower on the chain cite ecologic, social, and economic benefits, since these fish are healthy for direct human consumption, and does not require overfishing them. Duchene, quoting Dr. Daniel Pauly, states: "You could in principle argue that the amount we catch doesn't have to increase if instead of feeding it to chickens and salmon we eat it directly" (ibid.). In changing human consumption patterns, current low trophic-level fisheries could continue and new ones could also emerge. For instance, in the US, the West Coast's recovering sardine, mackerel, and anchovy fisheries are re-emerging as chefs and consumers look to support sustainable, local fisheries (NOAAa, CDFG).

2.3 SUBSIDIES

Fisheries subsidies contribute significantly to overfishing, bycatch, destructive fishing practices, and IUU fishing. In the case of destructive practices, money from subsidies sometimes directly supports these practices, thus encouraging and even institutionalizing them. However, subsidies are primarily known for resulting in the over-capacity of fishing fleets, leading to greater fishing capacity. It is estimated that the fisheries sector receives $14bn to $20.5bn annually, which equates to roughly one-quarter of fishery revenues (WTO). In many fisheries, especially those most in peril, a fleet's viability relies heavily on subsidies. These perverse subsidies encourage fleets to continue fishing despite evidence that the stock is depleted.

A group of developed and developing nations are calling for an end to subsidies in hopes of ending their deleterious effects on the world's fisheries (ibid.). However, many other nations reject this call for a variety of economic and political reasons (ibid.). This debate has been taken up by the WTO and is currently being negotiated through the Doha Round (ibid.). It would certainly be ironic if an effective means of addressing incentives for overfishing would come from a trade treaty rather than a fisheries agreement.

For the EU, the main source of fisheries subsidies is the Financial Instrument for Fisheries Guidance (FIFG). During the period from 2000-2006, EU fisheries received €5.6bn in subsidies (IEEP 2002). €3.7bn came directly from the EU, with funding from individual nations making up the remainder (ibid., PCT 2011a). These subsidies are twice as much as those from the previous period (1994-1999), increasing the reliance upon subsidies to sustain themselves (IEEP 2002). However, in 2013, the EU agreed to

phase out subsidies for "most" new boats between 2014 and 2020. Many other subsidies remain (Harvey 2013). If this policy change were implemented, it would set a new direction for eliminating subsidies more broadly.

2.4 BYCATCH

One out of every four fish (or, more accurately, one-fourth of the weight of fish) caught is bycatch (MBAb). Bycatch is generally defined as "The capture of non-target species (and discarded juveniles of targeted species)" (WWF 2014a). Fishing will always result in some level of bycatch. However, some fishing methods and practices result in higher bycatch levels than others. Bycatch levels are exceptionally high in cases of destructive, non-discriminatory, non-targeted fishing practices such as bottom trawling, and in the use of long-lines, drift nets, and large purse seines. Overfishing naturally exacerbates the problem of bycatch, as does IUU fishing.

Much attention has been given to fisheries that trawl for shrimp, since they are by far the most wasteful and environmentally destructive. For every pound of shrimp caught, anywhere from 2 to 10 times that amount of bycatch is caught (MBAb). This bycatch frequently contains higher trophic-level species, sea turtles, and marine mammals. Shrimp nets also damage corals.

Globally, efforts to contain bycatch have been few and generally ineffective. One attempt has come from the Common Fisheries Policy (CFP) by the European Parliament, which recently voted to ban bycatch, or "discards." The first of two bans (covering pelagic fisheries) is scheduled to take effect on the first of January 2015, with the second ban following one year later (DEFRA 2013). If the bans are successful, they will be seen as exemplars, and would set a high standard for fisheries councils the world over.

2.5 DESTRUCTIVE FISHING PRACTICES

Destructive fishing practices are techniques that are disproportionately harmful to marine life and ecosystems. They include the use of explosives to kill fish around coral reefs and the use of cyanide to capture stunned fish for the aquarium and live fish for food trade. These practices, which occur mostly in Southeast Asia, kill many non-target organisms, devastate coral reefs, and destroy future habitats for many species (Martin 2002).

Case Study 3: *Bottom Trawling*

The most damaging and widespread of these destructive fishing practices is bottom trawling (Gianni 2004). Bottom trawling directly targets highly productive ocean floor ecosystems, including those in the deep ocean. It is estimated that more than half a million species inhabit deep ocean ecosystems, but the upper bound is unknown (ibid.). This huge range illustrates just how little is known about the natural environment in the deep ocean, let alone the consequences of bottom trawling.

As a fishing method, bottom trawling is highly efficient in capturing the vast majority of sea life living in the demersal zone along the surface of the continental shelf. However, economically it is highly inefficient in that many of the organisms captured are either not economically valuable or are so badly damaged while being caught that they cannot be sold as an unprocessed, higher-quality seafood. It has been found that trawl fisheries for shrimp and demersal finfish represent around 22% of total global landings but account for over 50% of total estimated discards (FAO 2005). Ocean floors are so significantly "cleaned" and altered by trawling that satellite images have clearly captured "trawl lines" and sediment plumes along the world's coasts (Skytruth 2014).

The European Parliament has taken action here as well, recently voting to ban trawling in the most sensitive ecosystems, though they stopped short of a full ban on deep-sea trawling (Jolly 2013). It is certainly a step in the right direction, but more sweeping bans are urgently needed.

2.6 ILLEGAL, UNREPORTED, UNREGULATED (IUU) FISHING

IUU fishing threatens fisheries worldwide. IUU fishing includes such practices as fishing without a license, fishing in closed areas, fishing with illegal gear, misreporting catches, and taking undersized fish (Eftec 2008). In 2008, the EU accepted the FAO's internationally agreed-upon definition of IUU, which clearly delineated all three types of fishing.

The FAO definition (FAO 2001) of IUU fishing is:

"3.1 Illegal fishing refers to activities:
3.1.1 conducted by national or foreign vessels in waters under the jurisdiction of a State, without the permission of that State, or in contravention of its laws and regulations;

3.1.2 conducted by vessels flying the flag of States that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the States are bound, or relevant provisions of the applicable international law; or

3.1.3 in violation of national laws or international obligations, including those undertaken by cooperating States to a relevant regional fisheries management organization.

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

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

3.3 Unregulated fishing refers to fishing activities:
3.3.1 in the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization;"

It is estimated that IUU fishing accounts for 30% of total catches for some fisheries (WWF 2014b). In addition, IUU fishing makes up 15-20% of global high seas fishing, which in 2005 was worth $1bn (FAO 2009b).

IUU is such a major threat to global fisheries that in 2001, under the auspices of the FAO, the International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing (IPOA-IUU) was adopted within the framework of the Code of Conduct for Responsible Fisheries (FAO 2001). The IPOA-IUU is a non-binding, voluntary agreement that advocates for effective measures against IUU fishing to be carried out by various States and Regional Fishery Management Organizations (RFMO) (ibid.). The IPOA-IUU also calls for these measures to be adopted and implemented in accordance with WTO agreements, the differing capacity levels of developing nations (thereby incorporating the concept of "common but differentiated responsibilities," an important component of international environmental treaties), and according to the State's role as a Port State, Coast State, or Flag State in global fisheries management and trade (ibid.).

Though the problem of IUU fishing is well documented, and formal (though non-binding) international efforts are being developed, deterring or ending IUU fishing has proven extremely difficult. IUU fishing exists because of the inherent "global commons" nature of the oceans, disparities between countries in how they manage their territorial waters, very strong economic incentives, and the overall failure to implement and enforce fisheries regulations. Due to the widespread, chronic nature of IUU fishing, there exist a number of international instruments to address it. However, it has been found that these instruments are so far ineffective due to a lack of resources, low prioritization, and no effective system of enforcement (ibid.).

Two species greatly affected by IUU fishing are Bluefin tuna and Patagonian toothfish (ibid.). Bluefin tuna, as detailed previously, are currently the most valuable top predator fish in the world. It is therefore no surprise that the fishery is plagued by IUU fishing. In addition, due to its extremely high value, Bluefin tuna catch has been known to be laundered, with unregistered or flags of convenience (FOC) ships catching Bluefin through IUU fishing, then transferring them to the refrigerated ships that form a vital part of high seas fishing fleet infrastructure (ibid.).

The global Patagonian toothfish fishery is also subject to IUU fishing. Like Bluefin tuna, Patagonian toothfish is highly sought-after. Efforts to manage the fishery and reduce IUU fishing have increased over the years, primarily under the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) (FAOa). Major Patagonian toothfish fishery countries such as Chile and Argentina want to ensure this profitable fishery survives, while member importing countries such as the United States, Japan, and the EU want to ensure this highly desirable species stays on the market. However, not all CCAMLR member parties enforce agreed-upon provisions to combat IUU fishing (ibid.). Data collected by CCAMLR seems to show that IUU fishing has been nearly eliminated in the Antarctic waters off the Argentine and Chilean coasts, but wildlife conservation NGOs are concerned that the IUU fishing has just shifted to more remote waters that are harder to regulate and monitor (ibid.). There has also been disagreement over IUU fishing data and continued concern that IUU fishing continues to compound fisheries management issues (TRAFFIC 2008).

Case Study 4: *Flags of Convenience*

Large-scale fishing ships registered under a FOC carry out a large proportion of IUU fishing. Since ships first entered the ocean, they have flown the flag of the territory or nation from which they hail. Therefore, under international law, ships are considered an extension of national territory and sovereignty on the high seas. With the pronounced rise in merchant marine and fishing fleets over the years, new policies have arisen, some of which undermine this concept of sovereignty. Now, for instance, ships from one country can register under a different country's flag, and they often choose nations that charge the lowest price for registration. This has resulted in FOC countries, or countries that are known for cheap registration and lax regulation over what activities are conducted by ships registered under their flag. IUU fishing is one of the activities that benefits the most from this system.

In 2005, 1200 large-scale fishing ships were registered under a FOC (Gianni & Simpson 2005). An even larger proportion of the world's large-scale fishing ships are listed as having "unknown" flags, which makes these ships and their activities all the more difficult to monitor and regulate (ibid.). According to a 2005 independent report commissioned in part by the Australian government, the top FOC countries for fishing ships were Belize, Honduras, Panama, and St. Vincent and the Grenadines (ibid.). These countries account for 75% of all fishing ships registered with globally recognized FOC countries (ibid.).

FOC countries profit primarily from the fees ships pay to register. Any activities, be they legal or illegal, carried out by these ships do not benefit the FOC country, but rather whoever owns the ship and/or conducts business with it. It has therefore been found that "EU and Taiwanese companies are the top profiteers of FOC fishing" (ibid.). The prevalence of IUU fishing under FOC is an issue whose causes and effects cut across political, economic, and geographic boundaries. The economic incentives to conduct IUU fishing are driven in large part by the demands of the major economies and markets in the global North and, increasingly, China. On the other side of the equation, the ease of operating under FOC on the high seas and in unsystematically regulated coastal waters is driven by the economic desire of countries primarily located in the global South. IUU fishing is thus a global fisheries problem that affects and undermines all national government and RFMO attempts to accurately regulate, monitor, and control catch shares and fishing practices.

These direct threats to fishery health are pernicious, and mitigation or elimination has proven difficult. It will require a concentrated effort on behalf of many actors in order to move the needle on some of these causes. In Section 4, we propose recommendations for how policymakers might address the issues, clustered into the four broad actions of Increase Coordination, Alter Current Practices, Engage Relevant Parties, and Experiment Broadly.

Section 3: Declining Ocean Productivity and the Implication for Fisheries

In addition to changing fisheries management, the growing list of threats to ocean productivity must be taken into consideration and effectively dealt with if fisheries are to have any hope of surviving in the long term. It is therefore necessary that any future fisheries policy be linked to comprehensive ocean policies.

Fisheries are disconnected from the rest of the oceans in terms of policy, management, and economics. Fish stocks do not exist in a vacuum; they exist in a physical and biological oceanic context that is being rapidly altered by intended and unintended human actions. Actions taken on land and through commerce are having adverse consequences on the oceans as well. Many of these changes are reducing the productivity of the oceans, reducing both species diversity and quantity of fish. In this report, we conclude that the oceans and oceanic resources are, in fact, finite. A boundary has been reached, and it is tightening because the decline in ocean productivity is well underway.

Marine ecosystems are changing because of human actions. Present political systems, policies, and regulations continue to adversely affect the oceans, and are taking a toll on marine and coastal environments. Just as stocks of fish are inherently interconnected to the various biological, physical, and chemical aspects of their environments, threats to fisheries are interconnected as well.

Within the environmental, marine, and fishery policy community, there is a growing awareness and acknowledgment of the many threats faced by the oceans. Leading environmental institutions such as the United Nations Environment Program (UNEP), the Pew Oceans Commission (POC 2003), and the WWF (WWF Deutschland 2008) have issued reports detailing the consequences of multiple human activities on the ocean environment, including fish stocks. For example, UNEP released a report prior to the 2010 Conference of the Parties to the Convention on Biological Diversity (UNEP 2010b) entitled "Global Synthesis," which highlighted threats to the ocean according to region (UNEP 2010a). The International Council for the Exploration of the Seas (ICES), a research institute that advises the EC, has recently called for a major overhaul of fisheries treaties (Malakoff 2011).

In addition to policy and advocacy organizations, the growing body of interdisciplinary scientific research by fisheries and marine scientists, universities, and research institutions is another driving force behind increased awareness of the multi-faceted pressures the oceans and its organisms are enduring. The numerous studies cited in this report are but a snapshot of the larger body of more holistic, ecosystem-based fisheries and marine health studies. Lastly, the complex interplay between human actions and the marine environment that this report illustrates is becoming better understood as essential to addressing fisheries within the context of other important issues.

Solely addressing the direct causes of global fisheries decline will not solve the problem as long as the overall productivity of the oceans is decreasing. Efforts to address the indirect causes of fisheries decline — climate change, ocean acidification, ozone depletion, and pollution — must be strengthened as well. Direct and indirect threats to ocean health together decrease the quantity and diversity of marine species in the oceans.

3.1 CLIMATE CHANGE

Anthropogenic climate change is occurring (IPCC 2007a) and poses a myriad of threats to the oceans. The impacts on fisheries and aquaculture are well documented and summarized by the FAO (FAO 2009a). This report shows how climate change threatens our ability to continue reaping economically and socially valuable marine resources. Perhaps even more alarming are the profound effects of climate change on the oceans' physical, chemical, and biological components, some of which can already be observed. Major identified and directly attributable threats include: increased sea temperature, changes in ocean currents, sea level rise, and changes in ocean salinity.

3.1.1 INCREASED SEA SURFACE TEMPERATURE

The temperature of the oceans is rising. Since 1971, an estimated 93% of the extra heat absorbed by the earth has resided in the ocean. The top 75 meters have increased in temperature by about 0.44°C (IPCC 2013). In addition to the overall warming of surface waters, warmer seawater is reaching greater depths. Findings indicate that warmer water now occurs to depths of 3,000 meters, deeper than it had ever reached before (IPCC 2007a). The side effects of an increasingly warmer ocean are already becoming evident. Marine species at all latitudes are finding it increasingly difficult to cope with higher temperatures as they often result in reduced dissolved oxygen levels (Biello 2007). Therefore, many of these species are slowly migrating towards the poles in an effort to find the ambient temperature in which they have evolved. This migration is having a profound effect on fisheries; for example, well-known historically rich fishing grounds are changing as species migrate into other nations' EEZs. This affects national and regional fishery management plans and economic interests, and marine food webs are losing or gaining species.

3.1.2 OCEAN CURRENTS

Thermohaline circulation, the global pattern of ocean currents, is exceptionally important since it is responsible for the deep-sea currents that influence climate and support the nutrient upwelling zones that support marine life. This continuous global flow of water, energy, and nutrients is reliant upon the oceans having a certain salinity and temperature. Changes in these factors alter the density of regional ocean water.

Less dense warm surface water will not mix readily with deeper, colder water, reducing upwelling. This limits the rise of deeper ocean nutrients to the surface to be utilized by plants in the upper portions of the water column. Many of the greatest fisheries are located along coasts that benefit from upwelling, like the major anchoveta fisheries off the coast of South America.

Case Study 5: A Disappearing Arctic

The Arctic is disappearing — and Earth's physical, biological, and chemical systems are reliant upon a frozen Arctic. The Arctic acts as a storage site for methane (a greenhouse gas) in permafrost and undersea methane hydrates, it provides carbon sequestration and photosynthesis by phytoplankton, and serves as an integral part of the thermohaline belt (ACIA 2004). The dramatic loss of half of the Arctic sea ice in the summer of 2012 exceeded the IPCC's "worst-case scenario" model's predictions (Allison et al. 2009). The opening of Arctic sea ice is allowing access to major oil, natural gas, and other mineral resources, and provides a new, shorter shipping route between Asia and Europe or the American East Coast. A rush to drill for oil and gas in this harsh environment is sure to result in serious oil spills with major negative consequence for Arctic marine life. Perhaps these potential resources should be seen as a reserve to be tapped only if necessary once their safe development is assured.

Increased Arctic accessibility also means increased Arctic fishery accessibility. New fisheries signify new economic opportunities as well as new food sources. However, a warming Arctic also attracts more temperate water species to move northward (Biello 2007). The changing ranges of lower latitude species may place stress and disrupt previously "Arctic only" foodwebs. In addition, increased fishing efforts in the Arctic, if carried out under the current status quo practices, will bring the direct and indirect negative effects of commercial fishing to the region and could ultimately contribute to the collapse of perhaps the last remaining unexploited stocks. Despite this reality, there is growing enthusiasm for fishing the newly opening Arctic Ocean. It is therefore critical that bans be implemented, like the unilateral one by the US north of Alaska and the agreement of five Arctic Nations in February 2014 not to fish in international Arctic waters until an appropriate regulatory regime can be created (Weber 2014).

The effects of a melting Arctic on global fisheries can be categorized as those that are detrimental to nature and those that are preventative. A change that is detrimental to nature is that of the climate change tipping point being reached, resulting in changes in the thermohaline belt's speed and composition. Preventable effects include proper and effective management of more readily accessible Arctic fisheries and natural resources. Negative effects that exist in both realms, being preventable yet in danger of reaching a tipping point, include the increasing levels of entering freshwater and the melting

of permafrost, two natural occurrences that while in and of themselves cannot be directly controlled, can be mitigated through reductions in greenhouse gas emissions. Therefore, changes in the Arctic, occurring at any degree, are driven by and feed back into the overall phenomenon of climate change, and its consequences for fisheries.

3.1.3 SEA LEVEL RISE

The oceans have risen by around 0.19 meters since 1900 (IPCC 2013). Current rates of increase are now nearly double what they were just 50 years ago (IPCC 2007a). Sea level rise can be attributed to two factors: the melting of terrestrial glaciers due to global warming and thermal expansion (ibid.).

Sea level rise is already having profound effects on natural and human environments, including coastal ecosystems. Coastal ecosystems are some of the most productive, diverse, and ecologically important ecosystems in the world (IPCC 2007b). Highly specialized ecosystems such as coral reefs, mangroves, and saltwater wetlands and estuaries are all found in and along the coasts. These areas provide and perform unique ecosystem services such as water filtration, storm surge control, and nutrient uptake, in addition to serving as the spawning and nursery grounds for the vast majority of the planet's marine life. The Gulf of Mexico, for example, serves as the spawning ground for the Western Atlantic Bluefin tuna stock (Braun 2010), previously cited as one of the most economically valuable species in the world (Block 2010).

A rising sea will dramatically disrupt and alter these ecosystems, and species that have evolved and adapted to the particular specificities of these environments will suffer. Flooding in these coastal areas not only alters the geography, but it also changes every aspect of critical dynamic physical, chemical, and biological systems. Areas and, therefore, species facing the most threat are those dependent upon tides and the mixing and interchange of saltwater and freshwater in estuaries. Many important fisheries exist within these intertidal zones, such as the blue crab fishery on the East Coast of the US. Blue crab abundance has plummeted in recent years due to habitat degradation (CBP 2013). However, there is now fear that sea level rise and the resulting saltwater intrusion could be yet another factor reducing the blue crab population (PBS 2009).

Though itself a direct result of a warming climate, sea level rise also has the potential to contribute to climate change. The flooding of highly productive coastal ecosystems, such as mangroves, eliminates their ability to serve as carbon sinks, which aid in mitigating climate change. Therefore, as illustrated in Figure 3, a warmer climate causes sea level rise, which in turn further warms the climate, and directly affects the health and sustainability of fisheries.

3.1.4 CHANGES IN OCEAN SALINITY

There is now growing evidence that polar seas are decreasing in salinity while waters in lower latitudes are becoming saltier (Curry et al. 2003). The culprit is a warmer climate. The "freshening" of polar water is attributed to the melting of glaciers and Antarctic and Greenland ice sheets. As once frozen freshwater melts and enters the ocean, these areas become less saline. Increased "oceanic freshwater" is not immediately globally distributed because the physical and chemical mixing of the oceans' water columns is a slow process. There is strong concern that decreasing salinity levels in polar waters may alter deep-water currents and the thermohaline belt.

At lower latitudes, oceans are experiencing increases in salinity levels. Two reasons for this phenomenon are that freshwater inputs (precipitation) are shifting to higher latitudes, and increasing atmospheric and oceanic temperatures are resulting in higher rates of evaporation (ibid.). Since salt is not a component of the hydrologic cycle, when water evaporates from the ocean, it leaves salt behind. Changes in ocean salinity are therefore connected to changes in ocean temperature and may influence changes in deep ocean currents.

Finally, changes in salinity may also feed back into climate change as changing salinity levels have the capability to alter the composition of marine ecosystems and their effectiveness in acting as carbon sinks.

3.2 OCEAN ACIDIFICATION

Ever-increasing levels of atmospheric CO_2 are resulting in an acidifying ocean, and this acidification is progressing at a rate not seen in at least the past 800,000 years (NAS 2010). A comparison with prior times indicates that in fact, "the current rate of (mainly fossil fuel) CO_2 releases stands out as capable of driving a combination and magnitude of ocean geochemical changes potentially unparalleled in at least the last ~300 million years of Earth history" (Hönisch et al. 2012). By its direct impact on all levels and organisms of marine ecosystems and food webs, ocean acidification poses a serious threat to fisheries, marine ecosystem services, and overall resilience of the oceans.

The oceans absorb a large portion of the world's CO_2 through naturally occurring physical, chemical, and biological processes. The CO_2 levels in the oceans and the atmosphere are therefore always in a state of fluctuating equilibrium. Oceans naturally absorb about a third of atmospheric CO_2. However, what constitutes "a third of atmospheric CO_2" has been increasing, especially since the Industrial Revolution (IPCC 2007a). The "third" the ocean is currently adapting to absorb is a much larger quantity than the "thirds" of the past. This increase in overall quantity absorbed is fueling ocean acidification.

Changes in acidification can be measured on the pH scale, and the results are already detectable (NAS 2010). It has recently been determined that since the beginning of the Industrial Revolution (circa 1750) the global pH of the oceans has decreased from 8.2 to 8.1 (ibid.).

As the oceans continue to acidify, there will be increasing adverse biological consequences on marine ecosystems. There is growing scientific evidence that calcifying organisms — those with shells that contain calcium — such as corals, phytoplankton, oysters, and mussels are particularly vulnerable. These organisms evolved physiologically so that their shells would remain intact in a more alkaline ocean. Any increase in acidity will begin to directly dissolve the calcium these organisms contain or inhibit them from producing sufficient calcium and developing properly. For example, there is evidence that some species of microplankton have already lost a third of the carbonate that their shells usually contain (The Economist 2010).

Calcifying organisms are found at various levels of marine ecosystem food webs, so the impacts of ocean acidification will be felt on a variety of scales. Commercially valuable species, such as mussels and clams, will be directly affected. Many other commercially valuable, non-calcifying species will also be affected as their food sources and critically productive habitats, such as coral reefs, become degenerated and possibly die off.

In addition to disrupting the proper development and growth of calcifying organisms, it is possible that increasingly acidic oceans could be detrimental to all forms of marine life, especially in their early life stages (Baumann et al. 2012). A recent study has shown that fish in the early stages of their life, particularly in their embryonic stage, experienced impaired development of their central nervous systems when in an environment with an increased concentration of CO_2 (ibid.). If these results prove to be accurate, this could have devastating consequences on marine populations, specifically in fish populations, as fish larvae already face a naturally high mortality rate. The potential of having even fewer fish making it to the age of reproduction will make fish stock recovery efforts all the more difficult.

There is also evidence that ocean acidification could alter the availability of other nutrients and minerals in the ocean, such as iron. Iron, like calcium, is sensitive to changes in pH, and thus increasing levels of acidity may result in decreasing availability of soluble iron. Furthermore, iron is a limiting factor in marine phytoplankton growth, so a decrease in oceanic soluble iron content could result in decreased phytoplankton productivity. It is possible that some species may adapt to use less iron to survive (Shi et al. 2010). Unfortunately, however, initial studies show that the iron needs of marine phytoplankton do not change, and thus decreasing levels of iron will impede productivity.

3.3 OZONE DEPLETION AND UV RADIATION

The industrial and commercial use of chemicals, primarily chlorofluorocarbons (CFCs), has led to partial depletion of the ozone layer in the upper atmosphere, resulting in increased ultra-violet (UV) rays reaching the surface of the Earth. In high quantities, UV radiation is very dangerous to living things, destroying and damaging their cells (NASA). In the 1970s, the ozone hole was first discovered. It is centered in the Southern Hemisphere, primarily over Antarctica during the springtime. Therefore, marine organisms in the Southern Ocean in spring experience a warming period crucial for productivity and reproduction while simultaneously being adversely affected by high levels of mid-ultraviolet (UVB) radiation. Studies have shown that increased UV radiation affects critical Antarctic phytoplankton populations resulting in "a minimum 6% to 12% reduction in primary productivity" (Smith et al. 1992). This decrease in productivity could have serious repercussions on other marine organisms, considering that phytoplankton make up the basis of the entire marine food chain.

The Montreal Protocol on Substances that Deplete the Ozone Layer (1987) has had remarkable success in reducing ozone-depleting substances; in fact, a 2010 report released by the UN found that ozone depletion has stopped increasing (AFP 2010b). However, ozone-depleting substances are persistent, and will remain in the atmosphere for decades to more than one century. Though their concentrations may have been reduced enough to prevent further depletion of the ozone layer, their continued existence in the atmosphere may hinder its full recovery. There are still unknowns about the relationship between climate change and a depleted ozone layer (ibid.), so unpredicted consequences may still result as scientists continue to explore climate change. Therefore, UV continues to be a threat to the marine environment despite the landmark advances made in reducing the use of ozone-depleting substances.

3.4 INVASIVE SPECIES

Aquatic invasive species threaten the natural resiliency of marine and coastal ecosystems. Successful invasive species crowd out and can ultimately replace native species, causing environmental and economic harm.

Invasive species have the best "success rate" in marine ecosystems that have already been degraded. This is analogous to a weakened immune system having a higher susceptibility to bacteria and viruses that cause illness. A marine ecosystem that has been trawled, overfished, or polluted, and is experiencing changes in its salinity, temperature, and acidity will be unable to rebound quickly enough to prevent an aggressive invasive species (such as the zebra mussel) from taking over. Though invasive species threaten nearly all marine ecosystems, they thrive in those that are the least robust and resilient. More often than not, this means coastal areas, which, as previously discussed, are among the most vital and productive on the planet.

Invasive species therefore pose a threat to fishery species by either directly competing with them for the same aquatic resources or by indirectly competing, crowding out, or weakening species that make up part of the larger food web for the fishery. One of the most dramatic examples is that of the comb jellyfish in the Black Sea. The Black Sea is a highly unique ecosystem that has been severely degraded by overfishing and agricultural pollution to the point of near collapse (Bayha 2003).

By the late 1960s and early 1970s, the top predators of the ecosystem had been eliminated due to overfishing. This "opening up" of the food chain, coupled with a highly polluted, nutrient-rich water body, was the perfect incubator, allowing lower-level species to thrive. Algal blooms became the norm and the populations of native, lower-rung species, such as jellyfish, that feed off of algae and other plants bloomed as well (ibid.). In 1982, the Black Sea's declining ecosystem health was further exacerbated by the introduction of a non-native comb jellyfish species, Mnemiopsis leidyi, that originates off the Western Atlantic coast, from the US to Argentina (Meinesz 2003). This highly destructive invasive species was brought to the Black Sea through the ballast water of a ship (ibid., Bayha 2003). By 1988, the Mnemiopsis population reached critical levels, thus undermining the entire food web (ibid.). 1993 catch data for upper-level, pelagic fish species shows the devastating results of a destroyed food chain, with horse mackerel catch being the most extreme example: its catch share fell from 4,000 tons in 1984 to zero in 1993 (ibid.). For the comb jellyfish, 1988's explosive growth was its peak. By 1991, the species population collapsed due to a lack of food source. Yet though its numbers have never again reached 1988 levels, the comb jellyfish continues to thrive in the Black Sea, dominate its fragile ecosystem, and spread to other connected water bodies (ibid.).

Untreated ballast water release is a major contributor to the spread of exotic and invasive aquatic species around the world. In fact, ballast water-related invasive species are such a threat to global fisheries and aquatic ecosystems that in 2004, the International Maritime Organization (IMO) developed a treaty that advances treatment and policy measures. These include water sterilization mechanisms, such as the use of UV radiation, and policies that dictate when and where ballast water can be more safely handled and released (EPA 2005).

3.5 HUMAN POPULATION AND DEVELOPMENT

In 2012, the human population passed seven billion people (US Census Bureau, 2013), and each new generation poses a greater strain on increasingly limited fish and seafood. It is estimated that one billion people rely upon fish and seafood as their primary source of protein (FAO 2000). Across the global population, fish and seafood make up 16.6% of all animal protein consumed (FAO 2012). In addition to a growing human population, cultural and societal shifts could also contribute to a greater demand for ocean products. Bettering the lives of the poor includes improving their economic

situation, which in turn means a higher demand for protein. A striking example of this is the rise of the middle class in China, where improved livelihood has drastically increased demand for shark fin soup (Goldman Environmental Prize 2010). Up to 100 million sharks are now killed annually to meet this growing demand resulting in a major decline for many species (ibid.). Yet under current fishing practices and the numerous threats to the ocean environment that have been discussed so far, wild fish populations are seriously imperiled. It will be increasingly difficult for marine life to form the basis of diets (WHOI 2007). Without significant fishery policy reform and a holistic, comprehensive approach to marine ecosystem management, the continuing abuse and mismanagement of wild fish will result in a global food security problem.

A major impact of increased population and development is the destruction of coastal ecosystems.

3.5.1 LOSS OF COASTAL ECOSYSTEMS

It is projected that by 2025, 2.75 billion people will live on coastlines (Earth Institute 2010). Coastal ecosystems are already suffering, as they are trapped between increased levels of development and population growth pushing towards the ocean and a rising sea pushing ever inland (IPCC 2007c). Thus, these coastal, wetland, and estuarine ecosystems are at even greater risk in the future. In the US, for example, recent wetland declines have occurred in intertidal emergent wetland areas, with the loss attributable to the expansion of deep water bay bottoms and open ocean (Dahl 2010). As stated in the previous section on sea level rise, highly specialized, productive, and important ecosystems such as coral reefs, mangroves, and wetlands are found along coastlines, and yet marine and estuarine wetlands are frequently the most vulnerable to the effects of climate change (ibid.). Increasing, unsustainable development results in the direct destruction of these ecosystems. Poor planning, inadequate infrastructure, and the undervaluing of ecosystem services that occurs in coastal and inland communities results in a number of harmful threats along the coast, such as terrestrial-based pollution and the spread of invasive species. And, in general, unsustainable development designed to accommodate more people leads to increases in activities that contribute to climate change and oceanic pollution, increases in unsustainable fishing practices, and increases in poorly regulated aquaculture practices. Consequently, the oceans become increasingly stressed and damaged and decreasingly able to support and foster marine life.

3.6 AQUACULTURE

With the decline of wild fishery stocks, fish farming — or aquaculture — is quickly becoming the method to supply the ever-increasing rate of seafood consumption. If properly managed, with appropriate species, high standards, and proper siting, aquaculture could become a sustainable answer to providing a growing population's

growing demand for seafood. However, if not properly practiced, regulated, and maintained, aquaculture could pose a danger to the health and wellbeing of natural marine and coastal ecosystems and humans (PCT 2007). It is essential that future aquaculture follows the former path, rather than the latter.

Currently, many aquaculture species are the higher trophic-level, carnivorous, economically valuable organisms (FAO 1996) whose natural populations are either over-exploited, have collapsed, or simply cannot meet global demand. Raising these species requires fishing lower trophic-level species to create fishmeal. It is estimated that out of the total industrial catch, about 10% is processed into fishmeal (FAO 2012). Globally, smaller species make up 37% of the world's fisheries (Duchene 2009). So, using this model, the aquaculture industry is widely viewed as unsustainable and delaying the inevitable: a complete global fishery collapse (Pauly et al. 2003).

3.7 POLLUTION (TERRESTRIAL)

Threats to oceans from terrestrial-based pollution take three forms: Nonpoint Source Pollution, Point Source Pollution, and Plastics.

3.7.1 NONPOINT SOURCE POLLUTION

As inland and coastal development continues, the amount of nonpoint source pollution grows and new forms emerge. Nonpoint source pollution is unable to be directly traceable to a single source, but rather is the result of distributed sources and actions. For example, silt is a nonpoint source form of pollution since soil particles erode from multiple locations and accumulate as they wash downstream and ultimately enter the ocean. Sedimentation and silt can affect marine habitats, aquatic plant growth, and levels of photosynthesis, which in turn impact the basis of the marine food webs. Therefore, in order to be successful, efforts to address siltation must target a wide range of actions that result in erosion and sedimentation.

Excess nitrogen and phosphorous from agricultural run-off (usually from the use of agricultural and lawn fertilizer) is also a common form of water pollution. The resulting eutrophication of estuaries (Birch et al. 2011), in which blooms of algae and plant life block out essential sunlight, creates regions of low oxygen resulting in "dead zones." Globally, there are over 400 "dead zones" that directly contribute to a decrease in the productivity of fin and shellfish (Diaz & Rosenberg 2008). This type of pollution also seems to be implicated in toxic tides of algae that kill sea life and produce chemicals that make all marine food unusable. The distributed sources of this form of pollution make it very difficult to mitigate and/or eliminate.

3.7.2 POINT SOURCE POLLUTION

Point source pollution is pollution that can be traced back to a single source. A common example is sewage outfall that empties directly into a water body, thus causing turbidity and adding nutrients and pathogens. Similarly, due to factory waste disposal pipes, there is an unprecedented variety of chemicals and toxins — such as mercury — in the oceans and coastal areas.

Mercury pollution illustrates the extreme dangers pollution poses to both marine and human life. Mercury, like many contaminants, accumulates in the tissues of organisms. Top-level predator species, such as tuna and swordfish, contain very high levels of mercury (DHHS 2004) due to a lifetime of consuming smaller, mercury-contaminated fish. Tragically, the same holds true for humans. Nowhere were the effects of high level, inadvertent mercury consumption more pronounced than in the town of Minamata, Japan in the 1950s (American University 1997). Residents of the community experienced extremely debilitating developmental side effects of what is now known as Minamata's Disease: degeneration of the nervous system, miscarriages, and premature deaths, all as a result of acute mercury poisoning directly attributed to eating seafood caught in industrial waters where mercury was dumped into the ocean (ibid.). The recently negotiated mercury treaty named after this city is an important step in addressing this threat.

It is important to recognize that this is just the story of one pollutant. There is increasing evidence that others are accumulating in marine organisms and may already be causing deleterious consequences in upper trophic-level species, including humans. For example, strong scientific evidence indicates that high levels of the chemical BPA affect fish fertility levels, maturation, and even gender (Brown 2003). Additionally, it has been discovered that some waters contain high levels of hormones and other residues from pharmaceuticals (Boston Globe 2008). Recently, high levels of the drugs ecstasy and cocaine have been found in the waters of Spain's Albufera National Park (AFP 2010a). These pollutants and toxins are accumulating, posing potentially serious threats to the world's fisheries.

As research continues to identify and expose more unnaturally occurring chemicals in our water and the effects they may have on organisms, fisheries markets could further be negatively impacted. For example, in countries where the current consumer trend is towards increased seafood consumption, if the risk of toxins begins to outweigh the health benefits of eating seafood, the trend may slow or even reverse itself. This possible shift in demand driven by consumer fear would have serious consequences on the fishing industry. In addition, there is also the potential for a toxic tipping point for the fish themselves. Could fisheries experience their own "Silent Spring" (Carson 1962; Earle 1995)?

3.7.3 PLASTICS

The oceans are awash with plastic trash that washes up on every shoreline in the world (Hohn 2008). Following the currents, plastic trash also accumulates in gyres, or rotating currents. In 2001, the "Great Pacific Garbage Patch" was discovered within the North Pacific Central Gyre (Moore et al. 2001). Since then, plastic-filled gyres have been found dotting the Atlantic Ocean as well.

Plastics are a physical threat to marine species. Marine life often becomes trapped, entangled, or injured in discarded plastic fishing gear or trash. Creatures also accidentally ingest the plastic, which then accumulates in their digestive systems. Necropsies performed on species ranging from albatrosses (Chameides 2009) to grey whales (Cascadia Research 2010) have discovered that their stomachs were filled with plastic trash, particularly plastic items. A study released in 2010 found that one in three loggerhead turtles in the Adriatic Sea died due to plastic in their stomach and intestines (Simpson 2010).[4]

Plastics are unique in that they can degrade into extremely small particles and still retain their physical composition, and it is not fully known what effects these micro particles have on marine species and ecosystems. Current research efforts focus on identifying and quantifying the amount of micro particles in near-shore waters, how organisms handle micro particles once ingested, and what type of chemicals they contain (Arthur & Bamford 2009).

Like other forms of marine pollution, the sources of this new and emerging subcategory of "micro-plastic pollution" are varied and difficult to trace back to a specific source. Recent studies have found that micro plastic particles from soap products easily pass through existing wastewater treatment processes and wind up in the oceans, but there may be multiple more sources yet to be discovered. Furthermore, the chemical components remain even in these micro plastics (Barry 2009). Just as with other chemicals, marine organisms absorb those originating from plastics, which then accumulate in their tissues, and work their way through marine foodwebs. And, just as with other chemicals, traces of these plastics are finding their way into the human diet (Krimsky 2008).

With the growing ecological, biological, and social concerns of plastics in marine and aquatic environments comes a growing awareness and drive to address this truly man-made problem. Thus, the only limitations on solving this problem are the limitations we create. Comprehensive policies and social changes on how we generate, use, and discard plastics can and will have a significant impact on our health, the health of the terrestrial environment, and the health of oceans and marine life (UNEP 2011).

4 Citing Lazar, B. and R. Gracan. "Ingestion of Marine Debris By Loggerhead Sea Turtles, Caretta caretta, in the Adriatic Sea." Marine Pollution Bulletin. In Press, Corrected Proof, Available online 30 October 2010. "Marine debris averaged 2.2 ± 8.0% of dry mass of gut content, with a maximum of 35% found in a juvenile turtle that most likely died due to debris ingestion. Considering the relatively high occurrence of debris intake and possible sub-lethal effects of even small quantities of marine debris, this can be an additional factor of concern for loggerheads in the Adriatic Sea."

3.8 POLLUTION (OCEANIC)

As far as oceanic pollution goes, the major threats come from dumping and oil drilling or mineral extraction.

3.8.1 DUMPING

The dumping of refuse, sewage, and toxic and radioactive materials into the oceans is a well-recognized threat. In 1972, the international community addressed the global problem of maritime dumping by drafting the "Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter" or "London Convention" (IMO 1996a). Ratified in 1975, the London Convention created a "black list" of materials that could not be dumped (ibid.). In 1996, the Convention was amended, strengthening it by incorporating increasingly recognized international environmental concepts, such as the precautionary principle (IMO 1996b), which states that lack of absolute scientific certainty should not be a reason to take risks and delay action. The 1996 amendments also strengthened anti-dumping policy by replacing the list of banned substances with a much narrower and easier-to-regulate list of allowed substances (ibid.). Finally, the amendments brought the Convention more in line with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (ibid.).

For these reasons, the London Convention contains many components that would appear to make it an effective international treaty. However, the perennial view that the oceans are an open-access dumping ground, combined with disparities between countries in resources (for waste management, regulation, and enforcement), political will, corruption levels, underlying economic interests, and management of their EEZs contributes to the continuation of ocean dumping.

Ocean dumping directly harms fisheries by physically damaging seafloor ecosystems, poisoning ocean waters, and contributing to the spread of invasive species. Additionally, after effects from past dumping continue to pose a threat to the health of marine ecosystems. In "dumped waters," chemicals, oil, toxins, and radioactive wastes continue to seep and leach into the surrounding waters. These wastes also settle into the sediment on the seafloor, permeating it and thus acting as a continually polluting source, essentially in perpetuity (NOAA 2010). The absorption and bioaccumulation of these substances into the tissues of fish and other marine life bring into question the safety of consuming species that have been fished from "dumped waters."

3.8.2 OIL DRILLING AND MINERAL EXTRACTION

Oil drilling and mineral extraction activities are prevalent throughout the oceans. These activities, much like their terrestrial counterparts, can cause serious environmental harm if not executed and regulated properly. In addition, the nature

of the marine environment, especially in areas of deep water beyond the continental shelves, plays a significant role in complicating natural resource extraction projects. Our understanding of deep, remote ocean environments is still largely incomplete. This lack of knowledge coupled with new, often untested technology greatly increases the risk of such extraction ventures. This high degree of risk is exemplified by the BP oil spill in the Gulf of Mexico, in which 11 workers died in an explosion on an offshore drilling platform and an estimated 182 million gallons of oil flowed into the Gulf (Amico 2010). Not only did this spill kill a large amount of marine life, it has also been recently demonstrated to cause defects to the hearts and circulatory systems of large pelagic fish including Bluefin, yellow tuna, and amberjack (Incardona et al. 2014). While oil spills are, unfortunately, nothing new, drilling for oil and gas in Arctic seas is just beginning, and we have no experience in responding to oil spills under such cold, harsh conditions. The impact on sea life could be profound.

It is estimated that 700 million gallons of oil enter the ocean annually (Water Encyclopedia b). The majority of this oil comes from land. So, even though oil may not come directly from leaks or accidents on an oil rig, the oil produced there may eventually make it to the ocean anyway, as it leaks from cars, enters waterways as petroleum-based pesticides, or gets illegally dumped as oil-based wastes. However, though these terrestrial oil sources are the cause of the overwhelming majority of marine oil pollution, the environmental and economic devastation that oceanic oil spills cause should not be ignored. Infrequent though they may be, they are often on such a catastrophic scale that their effects last for decades. Due to the physical, chemical, and biological complexity of ocean systems, there is not yet a complete and comprehensive understanding of how these systems withstand (or don't withstand) such huge inputs of oil. Thus, oil pollution takes two forms: continuous but insidious, and instantaneous but catastrophic.

The deep ocean is the next frontier for mineral extraction. Originally, only the most accessible mineral deposits were extracted. These include resources such as salt, sea floor sand and gravel, limestone, and potassium (Water Encyclopedia a). Many of these resources, excluding sea floor sand and gravel, can be extracted through seawater itself and do not require actual mining. Oceanic mining, like oil drilling, is a very complex and difficult process already, and as technology improves, knowledge of deep ocean dynamics increases. At the same time, terrestrial sources of valuable minerals and elements are becoming depleted or prohibitively difficult to extract, so societies must increasingly turn to the deep ocean for raw materials. While deep ocean mining has the potential to secure new mineral resources, it also has the potential to be a very difficult, politically charged issue. The areas of the ocean with the highest potential to be rich in minerals are the deep, non-territorial high seas. Part XI of UNCLOS attempted to address seabed mining, rights to these resources, and political/economic considerations through the establishment of a seabed mining regime. Despite this attempt, the regime was found to be controversial by many countries including the US, which thereafter refused to ratify UNCLOS. Thus, future seabed mining attempts will

be complicated in terms of technological methods of extraction, politics, questions of State security, sovereignty, and territory, and potential impact on marine environments and other natural resources.

3.9 INDICATORS AND THREATS

Finally, there are two areas of concern in the ocean that serve as both an indicator of a problem and a threat to future oceanic productivity. The first is the immense damage to coral reefs, and the second is the massive and ongoing die-off of phytoplankton. Both of these cases would be detrimental in and of themselves, but they also have larger negative implications for the oceans as a whole. As such, they are given the dual label "Indicator and Threat."

3.9.1 CORAL REEF BLEACHING

Coral reefs are the foundation of entire marine ecosystems, serving as habitats, nurseries, and food sources for hundreds, if not thousands, of species, including humans. Coral reefs are highly productive ecosystems that support up to one quarter of all marine species (Gillis 2010), perform important ecosystem services, and serve as natural, protective barriers against storm surges.

Coral reefs are highly sensitive to changes in their oceanic environment. The unique specialization of coral reefs has resulted in their vulnerability to rapid and significant changes in climate, acidification, and increased UV exposure. In the field of climate change science, this makes corals very important indicator species. Many corals live near the maximum temperature of their range, and as oceans have warmed, El Niño events have led to temperature spikes that exceed their tolerance range. As ocean temperatures continue to climb, these spikes will become even greater, leading to not just temporary bleaching, but major coral die-off (IPCC 2007c).

Corals are also being impacted by ocean acidification (ARC 2010). Like mollusks and clams, they are calcifying organisms, and an increasingly acidic ocean will impair their developmental capabilities.

Population growth and coastal development also threaten corals. Rising coastal development, if poorly implemented, will result in the physical destruction of reefs as sediment and other land-based pollutants degrade the quality of the waters that corals require (EPA 2010). An increase in destructive fishing practices in coral reefs, such as dynamiting and the use of cyanide to stun and/or kill reef fish for human food sources or live trade could occur with population growth. Increased human interaction with reef ecosystems can also result in the spread of invasive species leading to a direct adverse effect on fisheries (ibid.).

3.9.2 PHYTOPLANKTON DIE-OFF

Phytoplankton productivity is an essential component of the oceans' natural systems and the Earth as a whole. It forms the basis of global marine food webs and is responsible for half of the primary production on Earth (Boyce et al. 2010).

Global phytoplankton levels are estimated to have decreased by 40% since the 1950s (ibid.). A recent study has found that increases in ocean temperature have resulted in phytoplankton die-off (ibid.). Changes in ocean acidity (Shi et al. 2010), and increases in ocean salinity and UV radiation (Smith et al. 1992) also contribute to phytoplankton loss and their productivity decline. The potential ramifications of this decrease are dire: a significant drop-off in the base of the food chain for all marine ecosystems will profoundly impact all species. It is entirely possible that species at the top of the food chain are already experiencing the deleterious effects of a decreasing food source, but the full effects are either not yet evident or they are being masked by other factors. If such a substantial decrease in phytoplankton is occurring, every fishery will eventually experience its adverse consequences.

Section 4: Conclusions

There are two main categories of findings in this report. The first relates to direct causes of fisheries decline due to fishing practices, and the demonstrated inadequacy of many methods of fisheries governance as embodied in existing fisheries treaties. The second identifies indirect causes for the declining productivity of the oceans as the result of multiple factors unrelated to fishing itself. The consequences of both are dire.

It is now well documented that current fishing practices have led to significant reductions in stocks for many of the world's fisheries. In some cases, such as Northwestern Atlantic cod, stocks abruptly collapsed to commercial extinction levels within the EEZs of Canada and the US. For fishing stocks that cross into international waters where they are accessible to fishing fleets that roam over the oceans, the response has been to create fisheries management organizations through international treaty systems.

This report has identified 76 treaties, agreements, protocols, and frameworks that address the management of one or more species, fishing practice, or marine resource at global or regional levels. The Annex of Fisheries Treaties provides information and access to each of these agreements. Arranging the treaties by their structure and requirements, one finds the following:

- Not all treaties had a formal secretariat
- Forty-three had a secretariat but no scientific body
- Thirteen had a secretariat and a scientific body
- Only six simultaneously had a secretariat, a scientific body, and specific enforcement mechanisms

Given these findings, it is therefore not surprising that many treaty regimes have been ineffectual in managing marine fisheries.

In addition to the treaties that specifically address fisheries, several treaties address other aspects of the ocean. The UNCLOS is the most overarching of these treaties, covering nearly all uses of the ocean in addition to fisheries. Other agreements include international and regional treaties and agreements that address marine pollution, such as the London Dumping Convention. There are several "soft law" agreements that identify or set goals for fisheries, such as FAO Code of Conduct of Responsible Fisheries, the Rio Declaration on the Environment and Development, and Agenda 21. Agenda 21's chapter on fisheries is of particular importance in that it is a very comprehensive accounting of the state of oceans and fisheries, and addresses some of the indirect effects cited here.

Despite the large number of fisheries treaties, only a few marine fisheries are being harvested in a sustainable manner. Even when scientific bodies make a

recommendation for a specific level of harvest, decisions are often made at a higher level, leading to the frequent overruling of those recommendations. Political and economic factors outweigh scientific assessments in most territorial waters controlled by a single national government as well. The ramifications of a general lack of long-term planning, implementation, and enforcement measures are often exacerbated by policies that are too narrow in scope. Generally, the recommendations of scientific bodies are limited to specific species and do not explicitly take into account larger marine ecosystem factors including the structure of the marine food web.

Even if all fisheries were managed sustainably and fisheries management science was flawless, the MSY would decline over time because of the decreasing productivity of the oceans. This decline is due to many factors, including climate change and associated phenomena such as sea level rise, changes in salinity, and temperature rise; ocean acidification and the loss of coral reefs; increased UV radiation from stratospheric ozone loss; consequences of human coastal modification including damming rivers, draining of coastal wetlands and removal of mangrove forests; pollution and eutrophication of estuaries that create dead zones; aquaculture; alien species; and marine and terrestrial pollution. While fisheries regimes cannot address these problems directly — except in the case of aquaculture and the introduction of alien species — they can take the decline in ocean productivity into account in setting fishing quotas and management. Removal of fish by catching them is not the only factor in determining their populations.

In the following, we make a set of proposals to address both the direct decline in fisheries and the decrease in ocean productivity as it relates to fisheries. Each set is grouped into the four broad categories of Increase Coordination, Alter Current Practices, Engage Relevant Parties, and Experiment Broadly.

SECTION 4.1: RECOMMENDATIONS TO ADDRESS DIRECT CAUSES OF FISHERIES DECLINE

The recommendations for addressing the direct causes of fisheries decline call for improving international cooperation, improving the role of scientific assessment of fish stock dynamics, enhancing the effectiveness of treaties by altering incentives and improving enforcement, shifting to ecosystem management practices, initiating actions by national governments to halt and reverse destructive practices on land and in their territorial waters and EEZs, and halting destructive fishing practices and subsidies.

4.1.1 Increase Coordination

1) Governments and treaty regimes need to work collaboratively with fishers to provide them with appropriate incentives.

2) To enhance the necessary influence of science on fisheries policy, the UNCLOS, or a similar multiparty agreement, should become a coordinating scientific body working with Regional Fisheries Management Organizations. This should ensure that all regions have equal access to the most-up-to-date information so they can make informed decisions regarding fish catches.

4.1.2 Alter Current Practices

1) Treaty regimes need to follow an agreed-upon set of principles that includes management as ecosystems and by population structure rather than as individual species, strong enforcement measures (especially at the point of landing), and a scientific body to increase the technical capacity of the treaty. Treaties and agreements should be reviewed as often as is prudent to ensure that they stay valid and effective.

2) Because many factors alter the size of stocks, and their annual numbers can vary in ways that cannot be predicted, MSY should not be a goal in setting catch quotas. Instead, a margin for error that may vary by species and region should be used to set an optimal yield (OY) that is less than MSY and will be sustainable into the indefinite future. Declining ocean productivity should be factored into the setting of the OY. Using appropriate metrics to measure the remaining breeding stock should be incorporated into management planning, and fishing techniques should minimize the taking of the most productive individuals of a stock and eliminate bycatch.

3) The practice of FOC allows too much IUU fishing, and should therefore be banned. This should be done under the auspices of Article 91 of the UNCLOS treaty, which mandates a “genuine link” between the ship and the State under whose flag it sails. A renewed effort should be made to attempt to ratify the 1986 UN Convention for Registration of Ships, which further defines the concept of “genuine link.” Enforcement of this measure at landing as well as inspection at sea will be essential elements for success.

4) Fishing subsidies that support destructive practices should be eliminated and responsible fishing practices should be rewarded. The World Trade Organization (WTO) may be an effective partner in reducing and eliminating subsidies in support of free trade, while using provisions of the WTO agreement to protect depletable fisheries (Article XX).

4.1.3 Engage Relevant Parties

1) To be effective, it will be necessary to engage the full range of parties of interest. This includes fishers, processors, wholesalers and retailers. Fishing is about livelihoods and food production for consumers. Fishers in particular have first-hand knowledge that needs to be utilized in setting quotas and establishing effective management practices. Joint fact-finding with fisheries management and marine scientists can improve the technical basis for decision-making, build trust, and encourage compliance. Distant fishing needs to be managed and regulations enforced by the fishing nation and at landing destinations.

2) National governments need to take responsibility for actions on land that reduce the productivity of oceans, such as dam construction, wetland removal, agricultural runoff, and aquatic pollution. National governments also need to manage both commercial and non-commercial species within their territorial and EEZ waters to ensure a healthy and productive ocean. Dam removal, restoration of coastal wetlands and mangroves, and protection of lower trophic-level species are critical to restoring sustainable commercial species.

3) Certification programs such as the Marine Stewardship Council (MSC) should work with other NGOs and consumer groups to expand sustainable fishery certification programs and ensure that a majority of seafood on the market is certified sustainable. Efforts should be made to engage all parties in the fishing industry to utilize information about the sustainability of specific species that is provided by MSC, Blue Ocean Institute, Monterey Bay Aquarium, New England Aquarium, and other organizations.

4.1.4 Experiment Broadly

1) A full range of management options should be implemented on a trial basis with opportunities to alter them based upon experience. Some examples:

   - Moving from individual species quotas to a system of ecosystem-based management would ensure that the ecosystem and other species upon which a commercial species depends remain to support it.

   - Marine protected areas (MPAs) are often cited as a way to conserve marine biodiversity hotspots and as an ecosystem-based management practice to restore specific stocks. MPAs may be permanent or temporary or moveable over time, and may be established upon condition of agreements on specific quotas or other management practices. There are many factors that influence the effectiveness of the MPAs; however, studies of specific MPAs have shown that ecosystem and stock recoveries and positive "spill-over" effects beyond the zone can be achieved with appropriate management (Fogarty & Murawski 2005). In 2011, The Republic of the Marshall Islands created a shark sanctuary of 2 million square kilometers (PCT 2011b). In the next two years, this action was followed by four other Pacific island states setting aside their entire EEZ as shark sanctuaries (PCT 2013).

   - To expand on the concept of MPAs, countries should consider a system of rotating MPAs, or temporary ocean zoning, wherein a particular segment of the ocean is "closed" for a number of years while fishing continues around it. This will hopefully allow fish stocks to return, and then the "closed zone" should rotate to a new area whose stocks have been depleted, while fishers return to old zones.

   - Governments must come up with creative ways to mitigate the loss of bycatch. For instance, charging large trawling boats a fee that then supports a smaller boat to sail beside it and attempt to preserve the bycatch that would otherwise be thrown overboard. This could be a possible way of employing fishers who have been put out of work due to the elimination of subsidies or increased commercialization of fishing.

4.2 RECOMMENDATIONS FOR ADDRESSING INDIRECT CONSEQUENCES OF DECLINING PRODUCTIVITY OF THE OCEANS

As this paper demonstrates, there are also many "non-fishing," or indirect factors that are reducing the primary productivity of the oceans. Each of these factors has been identified in previous studies, but this report aggregates them in a single place and demonstrates their cumulative impact. This comprehensive approach identifies underlying unsustainable factors and addresses them, recognizes multiple connections among issues, and finds the interests of state and non-state actors through stakeholder involvement to achieve mutual gains (Bhandary et al. 2014). It is a strategy called Sustainable Development Diplomacy (Hoogeveen & Verkooijen 2010). It is clear that to achieve sustainable fisheries into the future, it will be necessary to use a more comprehensive approach than the current one, which ignores the pressures on the productivity of marine resources.

4.2.1 Increase Coordination

1) Coordinating the vast amount of information about the multiple threats to oceans and fisheries requires an ongoing assessment process similar to the IPCC. An Intergovernmental Panel on Oceans and Fisheries (IPOF) should be formed jointly by UNEP and FAO to provide a major Assessment Report every 5-6 years, and Special Reports on specific topics in between. These reports would utilize data and research from governments, academia, NGOs and industry, and the scientific bodies of the RFMOs. They could report not only on the science of the oceans, but on the ecological, social, and economic impacts, adaptation and technology, policies and measures for mitigating the problems. The IPOF would work directly with the coordinating scientific body created under UNCLOS (4.1.1.2) to ensure open communication between disparate groups.

2) For maximum long-term sustainability, fisheries must shift to a form of adaptive, ecosystem-based management that considers both short and long-term time horizons under continually declining productivity baseline conditions and species populations (FAO 2010). This form of management needs to employ the best scientific data available, which should come from the IPOF proposed in 4.2.1.1.

4.2.2 Alter Current Practices

1) Since fisheries governance and management systems cannot directly address climate change, ocean acidification, oil spills, and loss of coastal wetlands, they should compensate for this by factoring an overall decline in productivity of the oceans into their determination of annual yield. This could be achieved in two ways: First, by setting quotas below MSY by a specified safety margin. Second, by determining a projected declining annual OY that reflects current experience and factoring it into the process of setting catch quotas. For example, if the 40% decline in phytoplankton since 1950 (60 years) proves to be correct, the approved OY would decline by about 0.67% annually. Such a shift would need to be accompanied by economic mitigation actions as the fishing fleet shrinks.

4.2.3 Engage Relevant Parties

1) Information on land-based practices that lead to fisheries decline comes under national and local management responsibilities. National, provincial, and local governments need to be made aware of the consequences of coastal modification, dams, agricultural run-off, and other pollution for fisheries, and include fisheries impacts in environmental impact assessments. Some governments have successfully removed dams, and species have begun to return (Bednarek 2001). A reporting requirement would be helpful, but is difficult to implement.

2) Increased public awareness on the social, economic, and political factors affecting and affected by fisheries management, practices, and consumption will be critical to promoting and advancing the transition to a more holistic form of international fisheries policies and practices. Public awareness campaigns must be launched, starting with small and simple things such as banning nitrogen fertilizer in the summer months, which has been successful in some areas already (Carnathan 2011). After that, campaigns should expand to broader issues and action steps.

4.2.4 Experiment Broadly

1) Innovation should be the norm when it comes to dealing with the impacts of climate change and other factors affecting ocean productivity. Current practices are not working, so new concepts, ideas, and experiments should be encouraged and incentivized.

4.3 SUMMARY

Clearly, we must "Chart A New Course for the Oceans" if a biodiverse, healthy marine ecosystem is to be maintained. Only then can fisheries provide the high protein food resource that a growing human population will require. As evidenced in this paper, myriad threats to the world's fisheries are complex and inextricably linked to one another, and to human society. The challenge of addressing these threats and ensuring the continued existence of viable fisheries in a healthy marine ecosystem, though daunting, is achievable if and only if the scientific, political, legal, economic, and societal foundations already in existence are further refined, coordinated, implemented, and enforced. The world must bring its demand for fish into line with the reality of a more limited and declining supply. Simultaneously, we must start rebuilding the oceans' capacity for producing healthy fish stocks by addressing the multiple assaults taking place within national and international jurisdictions. This can be accomplished only through concerted efforts addressing the manifold causes — both direct and indirect — of fisheries decline.

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Annex of Fisheries Treaties

CONTENT KEY:

The agreements have been organized according to which of three criteria they contain (Secretariat, Scientific Advisory Board, Enforcement Mechanisms), with the treaties having all three criteria at the top and those with fewer near the bottom.

For each entry, we have gathered the following information, where possible:

Treaty Number – Gives a listing number for easy reference

Treaty Name – Gives the treaty or agreement's name. In some instances, the treaty name is enclosed with double asterisks (**NAME**). This signifies that the document is a substantive amendment to the treaty or agreement. According to international law, these types of amendments are effectively a "new" agreement or treaty. This is due to the fact that the amendments are approved using the same consensus-based process that occurred during the formulation of the original treaty and must be ratified by the parties. Depending on the international agreement, these amendments named in a variety of ways including but not limited to: "amendment," "strengthening convention," and "protocol." So as not to confuse these "new" agreements with the original agreement or similarly named agreements, they are listed separately and distinctively. Therefore, double asterisks listings are those agreements that are simultaneously an addition and component of an original treaty or agreement as well as a stand-alone renegotiated agreement in and of themselves. Whenever possible, these "double asterisks treaties" are found directly beneath the original treated from which they originated.

Location and Date – Shows where the treaty negotiations and signing took place, as well as the date the treaty came into force and any reauthorization dates. For instance, the first treaty listed, the "Common Fisheries Policy," contains two dates: the original date it entered into force, 1983, and the year it was reauthorized, 2002.

Secretariat Website – Contains a link to the website of the treaty's Secretariat. Ten of the treaty Secretariats do not have a website. In addition, the Secretariat or relevant office for the treaty may fall under a larger agency, for example UNEP or the FAO.

Treaty Text – Contains a link to the treaty document. Each link was verified on 5 February 2014, and a number were found to have changed in recent years. This "instability" of web sites is a problem that deserves to be addressed for online legal documents and Secretariats.

Treaty Focus – Identifies what the treaty addresses. Due to the fact that treaties were written and designed to address different issues at different scopes, the information in this section can be as specific as an individual species or stock of fish to a broader

focus on fish in general. As evidenced, the overwhelming majority of treaties listed in this initial survey are purely fisheries-focused treaties. There is also a number of "pollution"-focused agreements that are included in the subsection "Outlines of Principles and Other Agreements." This is a purely reference-based designation, since any treaty that addresses pollution can be thought of in practical and ecological terms as any marine ecosystems and species that fall within its geographic scope.

Treaty Region – Lists the geographic scope or range of the treaty. The range of treaties extends from the global to the extremely local, some listing specific latitudes and longitudes the agreement covers.

Member States – Lists countries that are parties to the treaty. Depending on the agreement, some of the lists are subdivided into various groupings of members, such as "ratifiers," and "cooperating parties."

Secretariat, Scientific Advisory Board, Enforcement – Gives information about these the three criteria which make for an effective international agreement: the existence of a Secretariat or other governing body or commission, the inclusion of a Scientific Advisory Board, and the creation and/or application of enforcement mechanisms. A special note on the Enforcement section: Unlike the "Secretariat" and "Scientific Advisory Board" criteria, the "Enforcement" criterion is much more nebulous. For example, the treaty itself may not create any overarching enforcement mechanism, but instead delegate the authority and responsibility to member parties. In these cases, the column will read "self-enforcement" rather than "enforcement." The use of the phrase, "No specific enforcement mechanism" in this column reflects that upon initial review, it could not be easily determined if any type of enforcement, domestic self-enforcement or otherwise, is explicitly outlined in the agreement. This designation also applies to treaties that may be more focused on establishing groups or organizational entities rather than establishing regulatory mechanisms that are more likely to require some form of enforcement to be effective. In addition, more information on the conditions of the enforcement mechanisms or lack thereof is included wherever possible.

Triple Component Treaties
(Secretariat, Scientific Advisory Board, Enforcement)

1 Common Fisheries Policy

1983; 2002 Rome; Lisbon

Secretariat Website: http://ec.europa.eu/fisheries/cfp/index_en.htm

Treaty Text: http://eur-lex.europa.eu/LexUriServ/LexUriServdo?uri=CELEX:32002R2371:EN:NOT

Treaty Focus: All fish

Treaty Region: European Union Waters

Member States: European Union

Secretariat: Under European Commission

Scientific Advisory Board: Community Fisheries Control Agency

Enforcement: Enforcement through EU Inspectorate along with national agencies; currently reforming the fisheries control system.

2 Convention on the Conservation of Antarctic Marine Living Resources

1980 Canberra

Secretariat Website: http://www.ccamlr.org/

Treaty Text: http://www.ccamlr.org/en/document/publications/convention-conservation-antarctic-marine-living-resources

Treaty Focus: All marine organisms including birds found in that area; whales and seals are, however, excluded to the extent that they are covered by other international agreements.

Treaty Region: Antarctica: applies to the area south of 60° S and the area between that latitude and the Antarctic convergence.

Member States: Argentina; Australia; Belgium; Brazil; Bulgaria; Canada; Chile; EU; Finland; France; Germany; Greece; India; Italy; Japan; Korea, Republic of; Mauritius; Namibia; Netherlands; New Zealand; Norway; Peru; Poland; Russia; South Africa; Spain; Sweden; Ukraine; UK; US; Uruguay; Vanuatu

Secretariat: Commission

Scientific Advisory Board: Scientific Advisory Board

Enforcement: Enforcement mechanisms: in the interim and further established later on.

3 Agreement for the Reduction in Dolphin Mortality in the Eastern Pacific Ocean

1992 La Jolla

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://www.paclii.org/pits/en/treaty_database/1992/6.html

Treaty Focus: Dolphin

Treaty Region: Eastern Pacific Ocean

Member States: Colombia; Costa Rica; Ecuador; Mexico; Nicaragua; Panama; Spain; US; Vanuatu; Venezuela

Secretariat: Non-voting Secretariat; Review Panel

Scientific Advisory Board: Scientific Advisory Board

Enforcement: Enforcement. Implementation of Convention will be overseen by the Review Panel.

4 Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area

1996 Monaco

Secretariat Website: http://www.cms.int/species/accobams/acc_bkrd.htm

Treaty Text: http://eelink.net/~asilwildlife/accobams.html

Treaty Focus: Cetaceans

Treaty Region: Global

Member States: Costa Rica; Ecuador; El Salvador; EU, Guatemala; Honduras, Mexico; Nicaragua; Panama, Peru; United States; Vanuatu, Venezuela; *Provisional:* Bolivia; Colombia

Secretariat: Meeting of the Parties; Secretariat; Bureau

Scientific Advisory Board: Scientific Committee

Enforcement: Enforcement

5 Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

2000 Honolulu

Secretariat Website: http://www.wcpfc.int/

Treaty Text: http://www.wcpfc.int/key-documents/convention-text

Treaty Focus: Highly Migratory Fish Stocks

Treaty Region: Western and Central Pacific Ocean: From the south coast of Australia due south along the 141° meridian of east longitude to its intersection with the 55° parallel of south latitude; thence due east along the 55° parallel of south latitude to its intersection with the 150° meridian of east longitude; thence due south along the 150° meridian of east longitude to its intersection with the 60° parallel of south latitude; thence due east along the 60° parallel of south latitude to its intersection with the 130° meridian of west longitude; thence due north along the 130° meridian of west longitude to its intersection with the 4° parallel of south latitude; thence due west along the 4° parallel of south latitude to its intersection with the 150° meridian of west longitude; thence due north along the 150° meridian of west longitude.

Member States: Australia; Canada; China; Cook Islands; EU; Fiji; France; Indonesia; Japan; Kiribati; Korea, Republic of; Marshall Islands; Micronesia; Nauru; New Zealand; Niue; Palau; Papua New Guinea; Philippines; Samoa; Solomon Islands; Tonga; Tuvalu; UK; US; Vanuatu. *Participating territories:* American Samoa, Commonwealth of the Northern Mariana Islands, French Polynesia, Guam, New Caledonia, Tokelau, Wallis and Futuna. *Cooperating non-members:* Belize, Indonesia, Senegal, Mexico, El Salvador

Secretariat: Commission

Scientific Advisory Board: Scientific Committee; Technical and Compliance Committee

Enforcement: Enforcement

6 Convention on the Conservation and Management of Fishery Resources in the South East Atlantic Ocean

2001 Windhoek

Secretariat Website: http://www.seafo.org/welcome.htm

Treaty Text: http://www.seafo.org/AUConventionText.html

Treaty Focus: All fish

Treaty Region: South East Atlantic Ocean: beginning at the outer limit of waters under national jurisdiction at a point 6° South, thence due west along the 6° South parallel to the meridian 10° West, thence due north along the 10° West meridian to the equator, thence due west along the equator to the meridian 20° West, thence due south along the 20° West meridian to a parallel 50° South, thence due east along the 50° South parallel to the meridian 30° East, thence due north along the 30° East meridian to the coast of the African continent.

Member States: Angola; EU; Iceland; Korea, Republic of; Namibia; Norway; South Africa; UK; US

Secretariat: Commission; Secretariat

Scientific Advisory Board: Scientific and Compliance Committee

Enforcement: Enforcement

7 **Convention for the Strengthening of the Inter-American Tropical Tuna Commission** (See IATTC below)

2003 Antigua

Secretariat Website: http://www.iattc.org/HomeENG.htm

Treaty Text: http://www.iattc.org/PDFFiles2/Antigua_Convention_Jun_2003.pdf

Treaty Focus: Tuna and tuna-like fish

Treaty Region: Pacific Ocean: bounded by the coastline of North, Central, and South America and by the following lines: i. the 50°N parallel from the coast of North America to its intersection with the 150°W meridian; ii. the 150°W meridian to its intersection with the 50°S parallel; and iii. the 50°S parallel to its intersection with the coast of South America.

Member States: Belize; Canada; China; Costa Rica; Ecuador; El Salvador; EU; France; Guatemala; Japan; Korea, Republic of; Mexico; Nicaragua; Panama; Peru; US; Venezuela

Secretariat: Commission

Scientific Advisory Board: Scientific Advisory Committee

Enforcement: Some enforcement opportunities

Dual Component Treaties
(Secretariat, Scientific Advisory Board)

8 International Convention for the Regulation of Whaling

1946 Washington, DC

Secretariat Website: http://iwc.int/home

Treaty Text: http://www.iwcoffice.org/commission/convention.htm#convention

Treaty Focus: Whale

Treaty Region: Global

Member States: *Ratifiers:* Argentina; Australia; Brazil; Canada; Chile; Denmark; France; Netherlands; New Zealand; Norway; Peru; USSR; UK; US; South Africa. *Current members:* Antigua and Barbuda; Argentina; Australia; Austria; Belgium; Belize; Benin; Brazil; Bulgaria; Cambodia; Cameroon; Chile; China; Congo, Republic of the; Costa Rica; Ivory Coast; Croatia; Cyprus; Czech Republic; Denmark; Dominica; Dominican Republic; Ecuador; Eritrea; Estonia; Finland; France; Gabon; Gambia; Germany; Ghana; Greece; Grenada; Guatemala; Guinea-Bissau; Guinea; Hungary; Iceland; India; Ireland; Israel; Italy; Japan; Kenya; Kiribati; Laos; Lithuania; Luxembourg; Korea, Republic of; Republic of; Mali, Marshall Islands; Mauritania; Mexico; Monaco; Mongolia; Morocco; Nauru; Netherlands; New Zealand; Nicaragua; Norway; Oman; Palau; Panama; Peru; Poland; Portugal; Romania; Russia; San Marino; St. Kitts and Nevis; St. Lucia; St. Vincent and the Grenadines; Senegal; Slovak Republic; Slovenia; Solomon Islands; South Africa; Spain; Suriname; Sweden; Switzerland; Tanzania; Togo; Tuvalu; UK; US; Uruguay

Secretariat: Commission and Secretariat

Scientific Advisory Board: Scientific Advisory Board

Enforcement: No specific enforcement mechanism in treaty.

9 **Protocol to the International Convention for the Regulation of Whaling**

1956 Washington, DC

Secretariat Website: http://iwc.int/home

Treaty Text: http://www.austlii.edu.au/au/other/dfat/treaties/1959/20.html

Treaty Focus: Whale

Treaty Region: Global

Member States: See International Convention on the Regulation of Whaling

Secretariat: See International Convention for the Regulation of Whaling

Scientific Advisory Board: See International Convention for the Regulation of Whaling

Enforcement: See International Convention for the Regulation of Whaling

10 International Convention for the Conservation of Atlantic Tunas (ICCAT)

1966 Rio de Janeiro

Secretariat Website: http://www.iccat.int/en/

Treaty Text: www.iccat.int/documents/commission/basictexts.pdf

Treaty Focus: Tuna and tuna-like fish

Treaty Region: South Atlantic

Member States: Albania; Algeria; Angola; Barbados; Belize; Brazil; Canada; Cape Verde; China; Egypt; Equatorial Guinea; EU; France (St-Pierre Et Miquelon); Gabon; Ghana; Guatemala; Guinea; Honduras; Iceland; Ivory Coast; Japan; Korea, Republic of; Libya; Mauritania; Mexico; Morocco; Namibia; Nicaragua; Nigeria; Norway; Panama; Philippines; Russia; Sao Tome and Principe; Senegal; Sierra Leone; South Africa; St. Vincent and The Grenadines; Syria; Trinidad and Tobago; Tunisia; Turkey; UK; US; Uruguay; Vanuatu; Venezuela

Secretariat: Commission

Scientific Advisory Board: Scientific Advisory Board

Enforcement: No new enforcement body created. Enforcement provisions are found in Article 9 in which contracting parties shall ensure enforcement of ICCAT. Therefore, self-enforcement.

11 **Protocol to amend paragraph 2 of Article X of the International Convention for the Conservation of Atlantic Tunas**

1992 Madrid

Secretariat Website: http://www.iccat.int/en/

Treaty Text: http://www.fao.org/Legal/treaties/madrid-e.htm

Treaty Focus: Tuna and tuna-like fish

Treaty Region: Atlantic Ocean

Member States: Albania; Angola; Brazil; Canada; Cape Verde; Ivory Coast; Equatorial Guinea; France; Gabon; Ghana; Guatemala; Guinea; Italy; Japan; Korea, Republic of; Libya; Morocco; Portugal; Russia; South Africa; Spain; US; Uruguay; Venezuela

Secretariat: See ICCAT

Scientific Advisory Board: See ICCAT

Enforcement: See ICCAT

12 Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries

1978 Ottawa

Secretariat Website: http://www.nafo.int/

Treaty Text: http://www.nafo.int/about/frames/convention.html

Treaty Focus: All fishery resources of the Convention Area, with the following exceptions: salmon, tunas and marlins, cetacean stocks managed by the International Whaling Commission or any successor organization, and sedentary species of the Continental Shelf, i.e., organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil.

Treaty Region: Northwest Atlantic Ocean – North of 35°00' north latitude and west of a line extending due north from 35°00' north latitude and 42°00' west longitude to 59°00' north latitude, thence due west to 44°00' west longitude, and thence due north to the coast of Greenland, and the waters of the Gulf of St. Lawrence, Davis Strait and Baffin Bay south of 78°10' north latitude.

Member States: Canada; Cuba; Denmark (in respect of Faroe Islands and Greenland); EU; France (in respect of Saint Pierre et Miquelon); Iceland; Japan; Korea, Republic of; Norway; the Russian Federation; Ukraine; US

Secretariat: Council, Commission and Secretariat

Scientific Advisory Board: Scientific Advisory Board

Enforcement: No enforcement: besides previous laws, however there is discussion of the creating enforcement mechanisms if need be

13 Agreement on the Network of Aquaculture Centers in Asia and the Pacific

1988 Bangkok

Secretariat Website: http://www.enaca.org/

Treaty Text: http://library.enaca.org/PDF/NACA-GC14-FINAL.pdf

Treaty Focus: All fish

Treaty Region: Asia-Pacific

Member States: Australia; Bangladesh; Cambodia; China; India; Indonesia; Iran; Korea, Republic of; Malaysia; Myanmar; Nepal; Pakistan; Philippines; Sri Lanka; Thailand; Vietnam

Secretariat: Governing Council

Scientific Advisory Board: Technical Advisory Committee

Enforcement: No specific enforcement mechanism in treaty.

14 Convention for the Conservation of Antarctic Seals

1992 London

Secretariat Website: http://www.ats.aq/index_e.htm

Treaty Text: http://sedac.ciesin.org/entri/texts/antarctic.seals.1972.html

Treaty Focus: Southern elephant seal Mirounga leonina, Leopard seal Hydrurga leptonyx, Weddell seal Leptonychotes weddelli, Crabeater seal Lobodon carcinophagus, Ross seal Ommatophoca rossi, Southern fur seals Arctocephalus sp.

Treaty Region: Antarctic Ocean south of 60° South Latitude

Member States: Argentina; Australia; Belgium; Brazil; Canada; Chile; France; Germany; Italy; Japan; New Zealand; Norway; Poland; Russia; South Africa; UK; US

Secretariat: Antarctic Treaty Secretariat (this treaty is part of the Antarctic Treaty System). Convention establishes a Scientific Committee on Antarctic Research that will carry out duties of calling meetings.

Scientific Advisory Board: Scientific Committee: Scientific Committee on Antarctic Research of the International Council of Scientific Unions (SCAR)

Enforcement: Self-enforcement

15 Agreement for the Establishment of the Indian Ocean Tuna Commission

1993 Rome

Secretariat Website: http://www.fao.org/fishery/rfb/iotc/en

Treaty Text: ftp://ftp.fao.org/FI/DOCUMENT/iotc/Basic/IOTCA_E.pdf

Treaty Focus: Tuna and tuna-like fish

Treaty Region: Indian Ocean

Member States: Australia; Belize; China; Comoros; Eritrea; EU; France; Guinea; India; Indonesia; Iran; Japan; Kenya; Korea, Republic of; Madagascar; Malaysia; Mauritius; Oman; Pakistan; Philippines; Seychelles; Sierra Leone; Sri Lanka; Sudan; Tanzania; Thailand; UK; Vanuatu

Secretariat: Commission

Scientific Advisory Board: Scientific Committee

Enforcement: No specific enforcement mechanism.

16 Convention for the Conservation of Southern Bluefin Tuna

1993 Canberra

Secretariat Website: http://www.ccsbt.org/

Treaty Text: http://www.ccsbt.org/userfiles/file/docs_english/basic_documents/convention.pdf

Treaty Focus: Southern Bluefin Tuna

Treaty Region: Southern Hemisphere

Member States: Australia, Indonesia, Japan, Korea, Republic of; New Zealand

Secretariat: Commission

Scientific Advisory Board: Scientific Committee

Enforcement: No enforcement though includes provisions to create mechanisms for evaluation

17 Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea, with annex.

1994 Washington, DC

Secretariat Website: http://www.afsc.noaa.gov/

Treaty Text: http://www.afsc.noaa.gov/refm/cbs/convention_description.htm

Treaty Focus: Pollock

Treaty Region: Central Bering Sea

Member States: Japan; Korea, Republic of; China; Poland; Russia; US (Penny "Republic of" wasn't in my version. Both semi colons and commas used.)

Secretariat: Annual Conference (Acts as a Commission)

Scientific Advisory Board: Science and Technical Committee

Enforcement: Self-enforcement

18 Convention for the Establishment of the Lake Victoria Fisheries Organization

1994 Kisumu

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://www.fao.org/docrep/w7414b/w7414b0l.htm

Treaty Focus: All fish

Treaty Region: Lake Victoria

Member States: Kenya, Uganda, Tanzania

Secretariat: Council; Multiple Committees; Secretariat

Scientific Advisory Board: Scientific Committee

Enforcement: Self-enforcement

19 Agreement on the international Dolphin Conservation Program, with annexes

1998;2009 Washington, DC

Secretariat Website: http://www.iattc.org/IDCPENG.htm

Treaty Text: www.iattc.org/PDFFiles2/AIDCP-amended-Oct-2009.pdf

Treaty Focus: Dolphin

Treaty Region: Eastern Pacific Ocean

Member States: Bolivia; Colombia; Costa Rica; Ecuador; El Salvador; EU; Guatemala; Honduras; Mexico; Nicaragua; Panama; Peru; US; Vanuatu; Venezuela

Secretariat: IATTC serves the as Secretariat

Scientific Advisory Board: Scientific Advisory Board

Enforcement: Self-enforcement

20 Southern Indian Ocean Fisheries Agreement

2006 Rome

Secretariat Website: http://www.fao.org/fishery/en

Treaty Text: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:22006A0718(01):EN:HTML

Treaty Focus: All fish

Treaty Region: Southern Indian Ocean

Member States: Australia; Comoros; Cook Islands; EU; France; Kenya; Madagascar; Mauritius; Mozambique; New Zealand; Seychelles

Secretariat: Secretariat

Scientific Advisory Board: Scientific Committee

Enforcement: Self-enforcement

Dual Component Treaties
(Secretariat and Enforcement)

21 Convention for the Establishment of an Inter-American Tropical Tuna Commission (IATTC [See Panama Declaration 1995 (below), and Antigua 2003 (above)]

1949 Washington, DC

Secretariat Website: http://www.iattc.org/HomeENG.htm

Treaty Text: http://www.iattc.org/pdffiles/iattc_convention_1949.pdf

Treaty Focus: Yellowfin tuna; skipjack tuna; other fish taken by the tuna vessels

Treaty Region: Eastern Pacific Ocean

Member States: Colombia; Costa Rica; Ecuador; El Salvador; France; Guatemala; Japan; Mexico; Korea, Republic of; Republic of; Nicaragua; Panama; Peru; Spain; US; Vanuatu; Venezuela *Cooperating Non Parties or Cooperating Fishing Entities:* Belize; Canada; China; Cook Islands; EU; Taiwan

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: There is a permanent working group on compliance

22 **Panama Declaration** (Makes IATTC binding)

1995 Panama City

Secretariat Website: http://www.iattc.org/HomeENG.htm

Treaty Text: http://www.iattc.org/PDFFiles2/Declaration_of_Panama.pdf

Treaty Focus: Dolphin

Treaty Region: Eastern Pacific Ocean

Member States: Belize; Colombia; Costa Rica; Ecuador; France; Honduras; Mexico; Panama; Spain; US; Vanuatu; Venezuela

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: Reaffirms La Jolla Agreement and makes IATTC binding. There is a working group for enforcement under IATTC. Additional obligations under the Panama Declaration utilize self-enforcement.

23 International Convention for the High Seas Fisheries of the North Pacific Ocean

1952 Tokyo

Secretariat Website: http://www.npafc.org/new/ipnfc.html

Treaty Text: http://www.npafc.org/new/inpfc/INPFC%20_convention.pdf

Treaty Focus: All fishing stock including halibut, herring, and salmon

Treaty Region: North Pacific Ocean

Member States: Canada; Japan; US

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: Hard law

24 **Protocol amending the International Convention for the High Seas Fisheries of the North Pacific Ocean**

1978 Tokyo

Secretariat Website: http://www.npafc.org/new/ipnfc.html

Treaty Text: http://eelink.net/~asilwildlife/nopacfish.html

Treaty Focus: Anadromous fish species

Treaty Region: North Pacific Ocean

Member States: Canada; Japan; US

Secretariat: Commission

Scientific Advisory Board: Quasi: The Contracting Parties agree to share and coordinate scientific research, facilitiate personnel exchanges between Parties' scientific communities.

Enforcement: Clear mechanisms and provisions to patrol for illegal fishing.

25 Convention on Conservation of North Pacific Fur Seals

1957 Washington, DC

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://sedac.ciesin.columbia.edu/entri/texts/acrc/fur.seals.1957.html

Treaty Focus: North Pacific Fur Seals

Treaty Region: North Pacific Ocean

Member States: Canada, Japan, Russia, US

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: Hard law, clear expectations, rules, enforcement and percentages of dividing the gross number and value among nations (article IX).

26 Convention for the Conservation of Salmon in the North Atlantic Area

1982 Reykjavik

Secretariat Website: http://www.nasco.int/index.html

Treaty Text: http://www.nasco.int/convention.html

Treaty Focus: Salmon

Treaty Region: North Atlantic Ocean

Member States: Canada; Denmark; Greenland; Iceland; Norway; Russia; US

Secretariat: Council; 3 regional commissions; and Secretariat

Scientific Advisory Board: Not specified

Enforcement: Some enforcement: legal measures, however responsibilities of specific states not mentioned.

27 Memorandum of Understanding Concerning Salmonid Research and Enforcement of the International Convention for the High Seas Fisheries of the North Pacific Ocean

1986 Vancouver

Secretariat Website: http://www.npafc.org/new/index.html

Treaty Text: http://www.npafc.org/new/inpfc/INPFC%20_convention.pdf

Treaty Focus: Salmon

Treaty Region: North Pacific Ocean

Member States: Canada; Japan; US

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: Very clear framework for salmon research and enforcement mechanisms among the countries involved.

28 Convention for the Prohibition of Fishing with Long Drift Nets in the South Pacific (and Protocols)

1989 Wellington

Secretariat Website: http://www.ffa.int/about

Treaty Text: http://faolex.fao.org/docs/pdf/mul4973.pdf

Treaty Focus: All fish

Treaty Region: South Pacific

Member States: Australia; Cook Islands (New Zealand); Fiji; France; Kiribati; Marshall Islands; Micronesia; Nauru; New Zealand; Niue (New Zealand); Palau; Samoa; Solomon Islands; Tonga; Tuvalu; US; Vanuatu

Secretariat: FFA

Scientific Advisory Board: Not specified

Enforcement: Enforcement provisions found in Article 4 and are to be carried out by the

Parties. Therefore, it is a mix of self-enforcement and notification to the FFA of ships employing long drift nets.

29 Regional Convention on Fisheries Cooperation Among African States Bordering the Atlantic Ocean

1991 Dakar

Secretariat Website: http://www.fao.org/fishery/en

Treaty Text: http://www.fao.org/fileadmin/user_upload/legal/docs/022t-e.pdf

Treaty Focus: All fish

Treaty Region: Africa; South Atlantic

Member States: Angola; Benin; Cameroon; Cape Verde; Congo, Democratic Republic of; Congo, Republic of the; Ivory Coast; Equatorial Guinea; Gabon; Gambia; Guinea; Guinea-Bissau; Mauritania; Morocco; Nigeria; Senegal; Sierra Leone; Togo

Secretariat: Conference of Ministers; Bureau; Secretariat

Scientific Advisory Board: Not specified

Enforcement: Some enforcement through legal measures. Specific responsibilities of the States not mentioned. The State's enforcement agency's contact information is on the Secretariat's website.

30 Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean, with annex

1992 Moscow

Secretariat Website: http://www.npafc.org/new/index.html

Treaty Text: http://www.npafc.org/new/about_convention.html

Treaty Focus: Anadromous species

Treaty Region: North Pacific Ocean

Member States: Canada; Japan; Korea, Republic of; Russia; US

Secretariat: Commission; Secretariat

Scientific Advisory Board: Not specified

Enforcement: Enforcement

31 Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region

1992 Honiara

Secretariat Website: http://www.ffa.int/about

Treaty Text: http://www.ffa.int/taxonomy/term/451

Treaty Focus: All fish

Treaty Region: South Pacific

Member States: Australia; Cook Islands; Fiji; Kiribati; Marshall Islands; Micronesia; Nauru; New Zealand; Niue; Palau; Papua New Guinea; Samoa; Solomon Islands; Tokelau; Tonga; Tuvalu; Vanuatu

Secretariat: FFA

Scientific Advisory Board: Not specified

Enforcement: Enforcement

32 Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas

1993 Rome

Secretariat Website: http://www.fao.org/fishery/en

Treaty Text: http://www.fao.org/fileadmin/user_upload/legal/docs/012t-e.pdf

Treaty Focus: All fish

Treaty Region: Global

Member States: Albania; Angola; Argentina; Australia; Barbados; Belize; Brazil; Canada; Cape Verde; Chile; Cook Islands; Cyprus; Egypt; EU; Georgia; Ghana; Japan; Korea, Republic of; Madagascar; Mauritius; Mexico; Morocco; Mozambique; Myanmar; Namibia; New Zealand; Norway; Oman; Peru; Saint Kitts and Nevis; Saint Lucia; Senegal; Seychelles; Sweden; Syria; Tanzania; US; Uruguay

Secretariat: FAO

Scientific Advisory Board: Not specified

Enforcement: Enforcement

Single Component Treaties
(Secretariat)

33 Agreement for the Establishment of the Indo-Pacific Fisheries Commission

1948 Baguio

Secretariat Website: http://www.apfic.org/

Treaty Text: ftp://ftp.fao.org/fi/DOCUMENT/apfic/apfic_convention.pdf

Treaty Focus: All fish

Treaty Region: Asia-Pacific

Member States: Australia; Bangladesh; Cambodia; China; France; India; Indonesia; Japan; Korea, Republic of; Malaysia; Myanmar; Nepal; New Zealand; Pakistan; Philippines; Sri Lanka; Thailand; UK; US; Vietnam

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

34 **Amended Agreement for the Establishment of the Indo-Pacific Fisheries Commission.**

1961 Karachi

Secretariat Website: http://www.apfic.org/

Treaty Text: http://www.fao.org/docrep/meeting/011/ag396e/ag396e17.htm

Treaty Focus: All fish

Treaty Region: Asia-Pacific

Member States: See agreement for the establishment of the Indo-Pacific Fisheries.

Secretariat: See agreement for the establishment of the Indo-Pacific Fisheries.

Scientific Advisory Board: See agreement for the establishment of the Indo-Pacific Fisheries.

Enforcement: See agreement for the establishment of the Indo-Pacific Fisheries.

35 Agreements for the Establishment of a General Fisheries Council for the Mediterranean

1949 Rome

Secretariat Website: http://www.gfcm.org/gfcm/en

Treaty Text: ftp://ftp.fao.org/FI/DOCUMENT/gfcm/web/GFCM_Agreement.pdf

Treaty Focus: Living Marine Resources

Treaty Region: Mediterranean

Member States: Albania; Algeria; Bulgaria; Croatia; Cyprus; Egypt; EU; France; Greece; Israel; Italy; Japan; Lebanon; Libya; Malta; Monaco; Montenegro; Morocco; Romania; Slovenia; Spain; Syria; Tunisia; Turkey

Secretariat: Council

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

36 Agreement Concerning Measures for the Protection of the Stocks of Deep Sea Prawn (Pandalus borealis), European Lobsters (Homanus vulgaris), Norway Lobsters (Nephrops norvegicus) and Crabs (Cancer pagurus)

1952 Oslo

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/tre-0100.txt

Treaty Focus: Deep Sea Prawn; European and Norway Lobster

Treaty Region: All waters bounded on the west by a line from Lindesnes Light to Hanstholm Light and on the east by the 13th meridian east of Greenwich

Member States: Denmark; Norway; Sweden

Secretariat: Commission

Scientific Advisory Board: No, however, scientific delegates on commission.

Enforcement: Self-enforcement

37 Convention on Fishing and Conservation of Living Resources of the High Seas

1958 Geneva

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://www.gc.noaa.gov/documents/8_1_1958_fishing.pdf

Treaty Focus: Living Marine Resources

Treaty Region: Global

Member States: Afghanistan; Argentina; Australia; Belgium; Bolivia; Bosnia and Herzegovina; Burkina Faso; Cambodia; Canada; Colombia; Costa Rica; Cuba; Denmark; Dominican Republic; Fiji; Finland; France; Ghana; Haiti; Iceland; Indonesia; Iran; Ireland; Israel; Jamaica; Kenya; Lebanon; Lesotho; Liberia; Madagascar; Malawi; Malaysia; Mauritius; Mexico; Montenegro; Nepal; Netherlands; New Zealand; Nigeria; Pakistan; Panama; Portugal; Senegal; Serbia; Sierra Leone; Solomon Islands; South Africa; Spain; Sri Lanka; Switzerland; Thailand; Tonga; Trinidad and Tobago; Tunisia; Uganda; UK; US; Uruguay; Venezeula

Secretariat: Special Commission and works with FAO

Scientific Advisory Board: Not specified

Enforcement: Self-enforcement based on domestic fisheries policy. Establishes dispute settlement mechanism.

38 North-East Atlantic Fisheries Convention

1959 London

Secretariat Website: http://www.neafc.org/

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/tre-0220.txt

Treaty Focus: Fish stocks

Treaty Region: 1. The area to which this Convention applies (hereinafter referred to as "the Convention area") shall be all waters which are situated: a) within those parts of the Atlantic and Arctic Oceans and their dependent seas which lie north of 36° north latitude and between 42° west longitude and 5° east longitude, but excluding (i) the Baltic Sea and Belts lying to the south and east of lines drawn from Hasenere Head to Gniben Point, from Korshage to Spodsbierg and from Gilbierg Head to the Kullen, and (ii) the Mediterranean Sea and its dependent seas as far as the point of intersection of the parallel of 36° latitude and the meridian of 5°36' west longitude. b) within that part of the Atlantic Ocean north of 59° north latitude and between 44° west longitude and 42° west longitude.

Member States: Denmark (in respect to Faroe Islands and Greenland); EU; Iceland; Norway; the Russian Federation. *Cooperating Non-Contract Parties:* Belize; Canada; Cook Islands; Japan; New Zealand

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

39 Convention Concerning Fishing in the Black Sea

1959 Varna

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/tre-0230.txt

Treaty Focus: All fish

Treaty Region: Black Sea

Member States: Bulgaria, Romania, USSR

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

40 Agreement Concerning Co-operation in Marine Fishing

1962 Warsaw

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/tre-0330.txt

Treaty Focus: All fish

Treaty Region: Regional-Open Sea

Member States: Bulgaria, Cuba, Poland, Romania, Russia

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

41 Fisheries Convention

1964 London

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/BH458.txt

Treaty Focus: All fish

Treaty Region: The coasts of the Contracting Parties to which the Convention applies are the following: Belgium-All coasts; France-The North Sea and the English Channel coasts and the European Atlantic coasts; Federal Republic of Germany-The North Sea coast; Ireland-All coasts; Netherlands-The North Sea coast; Portugal- The Atlantic coast, north of the 36th Parallel, and the coast of Madeira; Spain-The Atlantic coast, north of the 36th Parallel; Sweden-The west coast, north of a line drawn from the Kullen to Gilbierg Head; United Kingdom-All coasts, including those of the Isle of Man and The Channel Islands.

Member States: Austria; Belgium; Denmark; France; Germany; Ireland; Italy; Luxembourg; the Netherlands; Portugal; Spain; Sweden; UK

Secretariat: Establishes an Arbitral Tribunal

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

42 Convention on the Conservation of the Living Resources of the South East Atlantic

1969 Rome

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/BH546.txt

Treaty Focus: All fish

Treaty Region: South East Atlantic Ocean (all waters bounded by a line drawn as follows: Beginning at a point at 6°04'36" South latitude and 12°19'48" East longitude, thence in a northwesterly direction along a rhumb line to the point at the intersection of the meridian 12° East with the parallel 6° South, thence due west along this parallel to the meridian 20° West, thence due south along this meridian to the parallel 50° South, thence due east along this parallel to the meridian 40° East, thence due north along this meridian to the coast of the African continent, thence in a westerly direction along this coast to the original point of departure.)

Member States: Angola; Belgium; Bulgaria; Cuba; France; Iraq; Israel; Italy; Korea, Republic of; Poland; Portugal; Romania; Russia; South Africa; Spain

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: No enforcement: but plan on creating mechanisms

43 **Protocol of Termination of the Convention on the Conservation of the Living Resources of the Southeast Atlantic**

1990 Madrid

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://www.fao.org/fileadmin/user_upload/legal/docs/madrid2-e.pdf

Treaty Focus: Terminates Convention on the Conservation of the Living Resources of the South East Atlantic.

44 Agreement on Conservation of Polar Bears

1973 Oslo

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://sedac.ciesin.org/entri/texts/polar.bears.1973.html

Treaty Focus: Polar bears

Treaty Region: The Arctic Region

Member States: Canada, Denmark, Norway, USSR, US

Secretariat: UNEP

Scientific Advisory Board: Quasi: Cooperation between Parties in exchanging scientific information

Enforcement: Self-enforcement

45 Convention on Fishing and Conservation of the Living Resources in the Baltic Sea and Belts

1973 Gdansk

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://sedac.ciesin.columbia.edu/entri/texts/fishing.baltic.sea.belts.1973.html

Treaty Focus: All fish

Treaty Region: Baltic Sea and Belts (excluding internal waters, bounded in the west by a line as from Hasenore Head to Gniben Point, from Korshage to Spodsbierg and from Gilbierg Head to the Kullen).

Member States: Russia (only state that did not withdraw)

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: No formal enforcement mechanisms: Domestic self-enforcement.

46 South Pacific Forum Fisheries Agency Convention

1979 Honiara

Secretariat Website: http://www.ffa.int/about

Treaty Text: http://sedac.ciesin.columbia.edu/entri/texts/acrc/SPFishAg.txt.html

Treaty Focus: All fish

Treaty Region: South Pacific

Member States: Australia; Cook Islands (New Zealand); Fiji; Kiribati; Marshall Islands; Micronesia; Nauru; New Zealand; Niue (New Zealand); Palau; Papua New Guinea; Samoa; Solomon Islands; Tonga; Tuvalu, Vanuatu

Secretariat: Committee

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

47 Convention on Future Multilateral Cooperation in the North-East Atlantic Fisheries

1980 London

Secretariat Website: http://www.neafc.org/

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/BH794.txt

Treaty Focus: All fish

Treaty Region: North-East Atlantic: (a) within those parts of the Atlantic and Arctic Oceans and their dependent seas which lie north of 360 north latitude and between 42° west longitude and 51° east longitude, but excluding: (i) the Baltic Sea and the Belts lying to the south and east of lines drawn from Hasenore Head to Gniben Point, from Korshage to Spodsbierg and from Gilbierg Head to the Kullen, and (ii) the Mediterranean Sea and its dependent seas as far as the point of intersection of the

parallel of 36° latitude and the meridian of 5°36' west longitude, (b) within that part of the Atlantic Ocean north of 59° north latitude and between 44° west longitude and 42° west longitude.

Member States: Bulgaria; Cuba; Denmark; EU; Iceland; Norway; Portugal; Russia; Spain

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

48 Agreement instituting the Latin American Organization for Fisheries Development

1982 Mexico City

Secretariat Website: http://www.fao.org/fishery/rfb/oldepesca/en

Treaty Text: http://eelink.net/~asilwildlife/OLDEPESCA.html

Treaty Focus: All fish

Treaty Region: Latin America and Caribbean

Member States: Argentina; Bahamas; Barbados; Belize; Bolivia; Brazil; Colombia; Costa Rica; Cuba; Chile; Dominican Republic; Ecuador; Guatemala; Guyana; Haiti; Honduras; Jamaica; Mexico; Nicaragua; Panama; Paraguay; Peru; Suriname; Trinidad and Tobago; Uruguay; Venezuela

Secretariat: Creates OLDEPESCA, a governing board, and organizes a Conference of Ministers (organization's authority)

Scientific Advisory Board: Not specified

Enforcement: Self-enforcement

49 Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest

1982 Nauru

Secretariat Website: http://www.ffa.int/about

Treaty Text: http://www.ffa.int/nauru_agreement

Treaty Focus: All regional fish stocks

Treaty Region: Within the EEZ and fisheries zones of the member parties. (South Pacific)

Member States: Micronesia; Kiribati; Marshall Islands; Nauru; Palau; Papua New Guinea; Solomon Islands

Secretariat: The South Pacific Forum Fisheries Agency (FFA)

Scientific Advisory Board: Not specified

Enforcement: Cooperative self-enforcement. It contains three implementing arrangements to facilitate this.

50 United Nations Convention on the Law of the Sea

1982 Montego Bay

Secretariat Website: http://fletcher.archive.tusm-oit.org/multilaterals/texts/BH794.txt

Treaty Text: http://www.un.org/depts/los/convention_agreements/texts/unclos/closindx.htm

Treaty Focus: All fish

Treaty Region: Global

Member States: Australia; Austria; Bahamas; Barbados; Belgium; Belize; Brazil; Bulgaria; Canada; Cook Islands; Costa Rica; Cyprus; Czech Republic; Denmark; Estonia; EU; Fiji; Finland; France; Germany; Greece; Guinea; Hungary; Iceland; India; Indonesia; Iran; Ireland; Italy; Japan; Kenya; Kiribati; Korea, Republic of; Latvia; Liberia; Lithuania; Luxembourg; Maldives; Malta; Marshall Islands; Mauritius; Micronesia; Monaco; Mozambique; Namibia; Nauru; Netherlands; New Zealand; Nigeria; Niue; Norway; Oman; Palau; Panama; Papua New Guinea; Poland; Portugal; Romania; Russia; Saint Lucia; Samoa; Senegal; Seychelles; Slovakia; Slovenia; Spain; Solomon Islands; South Africa; Sri Lanka; Sweden; Tonga; Trinidad and Tobago; Tuvalu; UK; Ukraine; Uruguay

Secretariat: Council, Commission and Secretariat

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

51 **Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 October 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks**

1995 New York

Secretariat Website: http://www.un.org/depts/los/index.htm

Treaty Text: http://www.un.org/Depts/los/convention_agreements/convention_overview_fish_stocks.htm

Treaty Focus: Straddling and Highly Migratory Fish Stocks

Treaty Region: Global

Member States: Argentina; Australia; Austria; Bahamas; Bangladesh; Barbados; Belgium; Belize; Brazil; Bulgaria; Burkina Faso; Canada; Chile; Cook Islands; Costa Rica; Cyprus; Czech Republic; Denmark; Egypt; Estonia; EU; Fiji; Finland; France; Gabon; Germany; Greece; Guinea; Guinea-Bissau; Hungary; Iceland; India; Indonesia; Iran; Ireland; Israel; Ivory Coast; Italy; Japan; Kenya; Kiribati; Korea, Republic of; Latvia; Libya; Lithuania; Luxembourg; Maldives; Malta; Marshall Islands; Mauritania; Mauritius; Micronesia; Monaco; Morocco; Mozambique; Namibia; Nauru; Netherlands; New Zealand; Nigeria; Niue; Norway; Oman; Pakistan; Palau; Panama; Papua New Guinea; Philippines; Poland; Portugal; Romania; Russia; Saint Lucia; Samoa; Senegal; Seychelles; Slovakia; Slovenia; Solomon Islands; South Africa; Spain; Sri Lanka; Sweden; Tonga; Trinidad and Tobago; Tuvalu; Uganda; UK; Ukraine; US; Uruguay; Vanuatu

Secretariat: Same as Convention on Law of the Sea

Scientific Advisory Board: Not specified

Enforcement: Same as Convention on Law of the Sea

52 Treaty on Fisheries between Governments of Certain Pacific Island States and the United States

1987 Port Moresby

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://www.internationalwildlifelaw.org/PacUSFish.html

Treaty Focus: All fish

Treaty Region: South Pacific

Member States: Australia; Cook Islands; Fiji; Kiribati; Marshall Islands; Micronesia; Nauru; New Zealand; Niue; Palau; Papua New Guinea; Samoa; Solomon Islands; Tonga; Tuvalu; US; Vanuatu

Secretariat: Administrator

Scientific Advisory Board: Not specified

Enforcement: Self-enforcement

53 Palau Arrangement for the Management of the Western Pacific Purse Seine Fishery

1990; 1992; 1994; 1995 Suva

Secretariat Website: http://www.ffa.int/about

Treaty Text: http://www.ffa.int/taxonomy/term/442

Treaty Focus: All regional purse-seine fish stocks. Tuna and tuna-like species, including billfish and bycatch from these fisheries.

Treaty Region: Within the EEZ and fisheries zones of the member parties. (South Pacific)

Member States: Kiribati; Marshall Islands; Micronesia; Nauru; Palau; Papua New Guinea; Solomon Islands; Tuvalu

Secretariat: The South Pacific Forum Fisheries Agency (FFA)

Scientific Advisory Board: No specific Scientific Advisory Board created. There are provisions in the arrangement to collaborate and share scientific data/findings.

Enforcement: Self-enforcement. The Arrangement is carried out in conjunction with the other FAA Agreements, especially the Nauru Agreement.

54 Convention on the Protection of the Marine Environment of the Baltic Sea Area with Annexes

1992 Helsinki

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/22los.txt

Treaty Focus: Living Marine Resources

Treaty Region: Baltic Sea

Member States: Denmark; Estonia; EU; Finland; Germany; Latvia; Lithuania; Poland; Russia; Sweden

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

55 Convention for the Protection of the Marine Environment of the North East Atlantic

1992 Paris

Secretariat Website: http://www.ospar.org/

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/BH1012.txt

Treaty Focus: Living Marine Resources

Treaty Region: North East Atlantic

Member States: Belgium; Denmark; EU; Finland; France; Germany; Iceland; Ireland; Luxembourg; Netherlands; Norway; Portugal; Spain; Sweden; Switzerland; UK

Secretariat: Commission; Secretariat

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

56 Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas

1992 New York

Secretariat Website: http://www.ascobans.org/index0101.html

Treaty Text: http://www.ascobans.org/pdf/Ch_XXVII_09_CertifiedTrueCopiesAgreement.pdf

Treaty Focus: Small Cetaceans

Treaty Region: Marine environment of the Baltic and North Seas, as delimited to the north-east by the shores of the Gulfs of Bothnia and Finland; to the south-west by latitude 48°30' N and longitude 5° W; to the north-west by longitude 5° W and a line drawn through the following points: latitude 60° N/longitude 5° W, latitude 61° N/ longitude 4° W, and latitude 62° N/longitude 3° W; to the north by latitude 62° N; and including the Kattegat and the Sound and Belt passages but excluding the waters between Cape Wrath and St. Anthony Head.

Member States: Belgium; Denmark; Finland; France; Germany; Lithuania; Netherlands; Poland; Sweden; UK

Secretariat: Secretariat; Advisory Committee

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

57 **Amendment to the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas**

2003 Esbjerg

Secretariat Website: http://www.ascobans.org/index0101.html

Treaty Text: http://www.cms.int/species/ascobans/asc_bkrd.htm

Treaty Focus: Small Cetaceans

Treaty Region: Area of the Agreement means the marine environment of the Baltic and North Seas and contiguous area of the North East Atlantic, as delimited by the shores of the Gulfs of Bothnia and Finland; to the south-east by latitude 36°N, where this line of latitude meets the line joining the lighthouses of Cape St. Vincent (Portugal) and Casablanca (Morocco); to the south-west by latitude 36°N and longitude 15°W; to the north-west by longitude 15° and a line drawn through the following points: latitude 59°N/longitude 15° W, latitude 60°N/longitude 5° W, latitude, 61° N/longitude 4° W; atitude 62° N/ longitude 3° W; to the north by latitude 62° N; and including the Kattegat and the Sound and Belt passages.

Member States: Denmark; Finland; France; Germany; Netherlands; Poland

Secretariat: Secretariat; Advisory Committee

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

58 OSPAR Convention

1992 London

Secretariat Website: http://www.ospar.org/

Treaty Text: www.ospar.org/html_documents/ospar/html/ospar_list_of_decsrecs.pdf

Treaty Focus: All marine resources. Initial and primary focus is on dumping and waste handling.

Treaty Region: North-East Atlantic

Member States: Belgium; Denmark; Finland; France; Germany; Iceland; Ireland; Luxembourg; Netherlands; Norway; Portugal; Spain; Sweden; Switzerland; UK

Secretariat: Commission and Secretariat

Scientific Advisory Board: Not specified

Enforcement: Self-enforcement

59 FSM Arrangement

1994; 1995 Honiara

Secretariat Website: http://www.ffa.int/about

Treaty Text: http://www.ffa.int/node/30#attachments

Treaty Focus: Regional fish stocks (South Pacific)

Treaty Region: Within the EEZ and fisheries zones of the member parties (South Pacific)

Member States: Micronesia; Marshall Islands; Nauru; Palau; Papua New Guinea; Solomon Islands

Secretariat: FFA

Scientific Advisory Board: No, but scientific information sharing included and consistent with other FFA Agreements and Arrangements.

Enforcement: Cooperative self-enforcement. The FSM arrangement is consistent with other FFA Agreements and Arrangements.

60 Code of Conduct for Responsible Fisheries

1995 Rome

Secretariat Website: http://www.fao.org/fishery/en

Treaty Text: http://www.fao.org/docrep/005/v9878e/v9878e00.HTM

Treaty Focus: All fish

Treaty Region: Global

Member States: FAO Conference

Secretariat: FAO

Scientific Advisory Board: Not specified

Enforcement: No enforcement. Purely voluntary set of codes.

61 **International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing**

2001 Rome

Secretariat Website: http://www.fao.org/fishery/en

Treaty Text: http://www.fao.org/docrep/003/y1224e/y1224e00.HTM

Treaty Focus: All fish stocks

Treaty Region: Global

Member States: FAO Conference

Secretariat: FAO

Scientific Advisory Board: Not specified

Enforcement: Self-enforcement. Non-binding, voluntary agreement. Exists as under the Code of Conduct for Responsible Fisheries.

62 Memorandum of Understanding Concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa

1999 Dakar

Secretariat Website: http://www.cms.int/species/africa_turtle/AFRICAturtle_bkgd.htm

Treaty Text: http://www.cms.int/species/africa_turtle/AFRICAturtle_mou.htm

Treaty Focus: Marine Turtles

Treaty Region: Atlantic Ocean off coast of Africa

Member States: Angola; Benin; Cameroon; Cape Verde; Congo, Democratic Republic of; Congo, Republic of; Ivory Coast; Equatorial Guinea; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Liberia; Mauritania; Morocco; Namibia; Nigeria; Sao Tome and Principe; Senegal; Sierra Leone; South Africa; Togo

Secretariat: Under UNEP

Scientific Advisory Board: Not specified

Enforcement: Self-enforcement

63 Agreement for the Establishment of the Regional Commission for Fisheries (RECOFI)

1999 Rome

Secretariat Website: http://www.fao.org/fishery/rfb/recofi/en

Treaty Text: http://www.fao.org/fileadmin/user_upload/legal/docs/028t-e.pdf

Treaty Focus: All fish

Treaty Region: Middle East

Member States: Bahrain; Iran; Iraq; Kuwait; Oman; Qatar; Saudi Arabia; United Arab Emirates

Secretariat: Commission

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

64 Agreement for the Establishment of the International Organisation for the Development of Fisheries in Eastern and Central Europe (EUROFISH)

2000 Copenhagen

Secretariat Website: http://www.eurofish.dk/

Treaty Text: http://www.fao.org/fileadmin/user_upload/legal/docs/030t-e.pdf

Treaty Focus: All fish

Treaty Region: Eastern and Central Europe

Member States: Albania; Bulgaria; Croatia; Denmark; Estonia; Hungary; Italy; Latvia; Lithuania; Norway; Poland; Romania; Spain; Turkey

Secretariat: Governing Council

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

65 Agreement Establishing the Caribbean Regional Fisheries Mechanism

2002 Belize City

Secretariat Website: http://www.caricom-fisheries.com/

Treaty Text: www.sice.oas.org/Trade/CCME/fisheries_mechanism_e.pdf

Treaty Focus: All fish

Treaty Region: Caribbean

Member States: Antigua and Barbuda; Barbados; Belize; Grenada; Guyana; Jamaica; Saint Kitts and Nevis; Saint Vincent and the Grenadines; Suriname; Trinidad and Tobago

Secretariat: Ministerial Council; Caribbean Fisheries Forum

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

66 Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing

2009 Rome

Secretariat Website: http://www.fao.org/fishery/en

Treaty Text: ftp://ftp.fao.org/docrep/fao/meeting/018/k6339e.pdf

Treaty Focus: All fish

Treaty Region: Global

Member States: Currently signed by Angola; Australia; Benin; Brazil; Chile; EU; Gabon; Iceland; Indonesia; New Zealand; Norway; Peru; Russia; Samoa; Sierra Leone; US; Uruguay

Secretariat: FAO

Scientific Advisory Board: Not specified

Enforcement: Ratification and Entry Into Force pending.

Single Component Treaties
(Scientific Advisory Board)

Initial Research has not found a treaty that contains only a Scientific Advisory Body.

Single Component Treaties
(Enforcement)

67 Convention on the Conduct of Fishing Operations in the North Atlantic

1967 London

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://faolex.fao.org/cgi-bin/faolex.exe?rec_id=015512&database=faolex&search_type=link&table=result&lang=eng&format_name=@ERALL

Treaty Focus: All fish

Treaty Region: Arctic; North Atlantic

Member States: Belgium; Canada; Denmark; France; Germany; Iceland; Ireland; Italy; Netherlands; Norway; Poland; Portugal; Russia; Spain; Sweden; UK; US

Secretariat: No Commission

Scientific Advisory Board: Not specified

Enforcement: Some enforcement. Annex VI contains rules applying to authorized officers appointed by a Contracting party for enforcement outside of national fishery limits. Self-enforcement of other aspects of the Convention.

Outlines of Principles and other Agreements

68 Convention on the High Seas

1958 Geneva

Secretariat Website: http://www.un.org/Depts/los/doalos_activities/about_doalos.htm

Treaty Text: http://legal.un.org/avl/pdf/ha/gclos/gclos_e.pdf

Treaty Focus: Maritime

Treaty Region: Global

Member States: Afghanistan; Albania; Argentina; Australia; Belarus; Belgium; Bolivia; Bosnia and Herzegovina; Bulgaria; Burkina Faso; Cambodia; Canada; Central African Republic; Colombia; Costa Rica; Croatia; Cuba; Cyprus; Czech Republic; Denmark; Dominican Republic; Fiji; Finland; France; Germany; Ghana; Guatemala; Haiti; Holy See; Hungary; Iceland; Indonesia; Iran; Ireland; Israel; Italy; Jamaica; Japan; Kenya; Latvia; Lebanon; Lesotho; Liberia; Madagascar; Malawi; Malaysia; Mauritius; Mexico; Montenegro; Nepal; Netherlands; New Zealand; Nigeria; Pakistan; Panama; Poland; Portugal; Romania; Russia; Senegal; Serbia; Sierra Leone; Slovakia; Slovenia; Solomon Islands; South Africa; Spain; Sri Lanka; Swaziland; Switzerland; Thailand; Tonga; Trinidad and Tobago; Tunisia; Uganda; Ukraine; UK; US; Uruguay; Venezeula

Secretariat: No Commission

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

69 London Convention and Protocol: Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter

1972; 1996 London

Secretariat Website: http://www.imo.org/OurWork/EnvironmentSpecialProgrammesAndInitiatives/Pages/London-Convention-and-Protocol.aspx

Treaty Text: http://www.imo.org/OurWork/Environment/SpecialProgrammesAndInitiatives/Pages/London-Convention-and-Protocol.aspx

Treaty Focus: Pollution

Treaty Region: Global

Member States: Afghanistan; Antigua and Barbuda; Argentina; Australia; Azerbaijan; Barbados; Belarus; Belgium; Bolivia; Brazil; Bulgaria; Canada; Cape Verde; Chile; China; Costa Rica; Ivory Coast; Croatia; Cuba; Cyprus; Congo, Democratic Republic of; Denmark; Dominican Republic; Egypt; Equatorial Guinea; Finland; France; Gabon; Germany; Greece; Haiti; Honduras; Hungary; Iceland; Iran; Ireland; Italy; Jamaica; Japan; Jordan; Kenya; Kiribati; Libyan Arab Jamahiriya; Luxembourg; Malta; Mexico; Monaco; Montenegro; Morocco; Nauru; Netherlands; New Zealand; Nigeria; Norway; Pakistan; Panama; Papua New Guinea; Peru; Philippines; Poland; Portugal; Korea, Republic of; Russian Federation; Saint Lucia; Saint Vincent and the Grenadines; Serbia; Seychelles; Sierra Leone; Slovenia; Solomon Islands; South Africa; Spain; Suriname; Sweden; Switzerland; Tanzania

Secretariat: International Maritime Organization

Scientific Advisory Board: Technical Cooperation and Assistance program

Enforcement: Hard law.

70 Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention)

1976 Barcelona

Secretariat Website: http://legal.un.org/avl/pdf/ha/gclos/gclos_e.pdf

Treaty Text: http://www.unep.ch/regionalseas/regions/med/t_barcel.htm

Treaty Focus: Pollution

Treaty Region: Mediterranean (Maritime waters of the Mediterranean Sea proper, including its gulfs and seas, bounded to the west by the meridian passing through Cape Spartel lighthouse, at the entrance of the Straits of Gibraltar, and to the east by the southern limits of the Straits of the Dardanelles between the Mehmetcik and Kumkale lighthouses).

Member States: Albania; Algeria; Bosnia and Herzegovina; Croatia; Cyprus; Egypt; EU; France; Greece; Israel, Italy; Lebanon; Libya; Malta; Monaco; Montenegro; Morocco; Serbia; Slovenia; Spain; Syria; Tunisia; Turkey

Secretariat: UNEP

Scientific Advisory Board: Quasi: Cooperation between Parties in exchanging scientific information.

Enforcement: Quasi: Cooperation between Parties in establishing programs for monitoring and dispute settlement mechanisms.

71 Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (Abidjan Convention)

1981 Abidjan

Secretariat Website: http://www.unep.org/AbidjanConvention/about/index.asp

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/BH800.txt

Treaty Focus: Pollution

Treaty Region: West and Central African Region: marine environment, coastal zones and related inland waters falling within the jurisdiction of the States of the West and Central African Region, from Mauritania to Namibia inclusive.

Member States: Benin; Cameroon; Congo; Ivory Coast; Gabon; Gambia; Ghana; Guinea; Liberia; Mauritania; Nigeria; Senegal; Togo

Secretariat: UNEP

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

72 Convention for the Protection of the Marine Environment and Coastal Area of the Southeast Pacific and Agreement

1981 Lima

Secretariat Website: Website Not Available (February 5, 2014)

Treaty Text: http://fletcher.archive.tusm-oit.org/multilaterals/texts/bh809.txt

Treaty Focus: Pollution

Treaty Region: South-East Pacific: sea area and the coastal zone of the South-East Pacific within the 200-mile maritime area of sovereignty and jurisdiction of the High Contracting Parties and, beyond that area, the high seas up to a distance within which pollution of the high seas may affect that area.

Member States: Chile; Colombia; Ecuador; Panama; Peru

Secretariat: Commission with the Permanent Commission for the South Pacific undertaking Secretariat functions.

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

73 Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention)

1982 Jeddah

Secretariat Website: http://www.persga.org/

Treaty Text: http://www.unep.ch/regionalseas/main/persga/redconv.html

Treaty Focus: Pollution

Treaty Region: Red Sea and Gulf of Aden: Entire sea area, taking into account integrated ecosystems of the Red Sea, Gulf of Aqaba, Gulf of Suez, Suez Canal to its end on the Mediterranean, and the Gulf of Aden as bounded by the following rhumb lines: 1. From Ras Dharbat Ali (lat. 16°39' N, long. 53°3.5' E), thence to a point (lat. 16° 00' N, long. 53°25' E), thence to a point (lat. 12°40' N, long. 55°00' E) lying ENE of Socotra Island, thence to Ras Hafun (lat. 10°26' N, long. 51°25' E).

Member States: Djibouti; Egypt; Jordan; Palestinian Authority; Saudi Arabia; Somalia; Sudan; Yemen

Secretariat: Council; General Secretariat

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

74 Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, with Annex

1986 Noumea

Secretariat Website: http://www.sprep.org/

Treaty Text: http://www2.unitar.org/cwm/publications/cbl/synergy/pdf/cat3/UNEP_regional_seas/convention_noumea/convention_noumea.pdf

Treaty Focus: Pollution

Treaty Region: South Pacific

Member States: American Samoa; Australia; Cook Islands; Micronesia; Fiji; France; French Polynesia; Guam; Kiribati; Marshall Islands; Nauru; New Caledonia; New Zealand; Niue; Northern Mariana Islands; Palau; Papua New Guinea; Samoa; Solomon Islands; Tokelau; Tonga; Tuvalu; US; Vanuatu; Wallis and Futuna

Secretariat: South Pacific Commission (later South Pacific Regional Environment Programme (SPREP))

Scientific Advisory Board: No. There are provisions in the Convention for Parties to share and collaborate on scientific data/findings.

Enforcement: Self-enforcement

75 Rio Declaration on the Environment and Development: Agenda 21 (includes Section 17: Protection of the Oceans, All Kinds of Seas, Including Enclosed and Semi-enclosed Seas and Coastal Areas and the Protection of Rational Use and Development of their Living Resources)

1992 Rio de Janeiro

Secretariat Website: http://www.unep.org/

Treaty Text: http://www.unep.org/Documents.Multilingual/Default.asp?documentid=52

Treaty Focus: Principles re: sustainable development and the environment

Treaty Region: Global Principles

Member States: 178 Countries

Secretariat: N/A (Though the Rio Convention and Principles are under UNEP)

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

76 Marine Strategy Framework Directive

2008 Brussels

Secretariat Website: http://ec.europa.eu/environment/water/marine/index_en.htm

Treaty Text: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0056:EN:HTML

Treaty Focus: All marine resources

Treaty Region: Marine environments and ecosystems within European Union's member nations' jurisdiction/sovereignty.

Member States: All members of the European Union

Secretariat: European Commission

Scientific Advisory Board: Not specified

Enforcement: No specific enforcement mechanism.

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