Ocean Ecosystem Stewardship

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Sometimes the more important a thing is, the more it is taken for granted, as if its very grandeur cancels out better judgment . . . like the ocean.

The Cousteau Society¹

Various principles for stewardship of the ocean's ecosystems are embodied in a prodigious number of international, regional, and nation-state regimes. These regimes have proved to be ineffective in slowing the clear-cutting of the world's oceans and restoring the rich fabric of the global and coastal marine environment. This article explores the reasons for this ineffectiveness and suggests that the primary problem is that no regime focuses on the ocean's ecosystem as an interconnected biotic circle. Instead, the regimes typically represent a disjointed, piecemeal, and/or single-species approach concentrating on players as if they were autonomous and isolated.

Proposed as a first step in marine ecosystem stewardship is implementation of a flexible, information-based, adaptive management system appropriate for individual businesses and organizations. The second step is a global framework that embraces a holistic approach to stewardship.

Part I begins by highlighting the importance of the oceans followed by examples of complex, multiple stressors that disturb the ecosystem. The section then canvasses the plethora of legal regimes aimed at stewarding living marine species.

Part II explores general management theories and codes and proposes adaptive management based on an eco-market strategy as a basis

for effectuating commitment to ecosystem stewardship—a pragmatic strategy for individual organizations and businesses. It postulates that once this basis is formed, the possibility of creating an effective global initiative is greatly enhanced. Global models are offered with requirements for implementing the worldwide initiative.

Several observations are posited. First, current stewardship of the marine ecosystem is based on a series of regimes directed at the various parts rather than the whole and, as such, is ineffective. Second, the application of an environmental strategy such as ISO 14001, with a focus on environmental efficiency, can be an effective first step in a global effort to steward living marine species. Third, that stewardship must be supported through an interdisciplinary approach encompassing the view of representative stakeholders. Finally, marine stewardship requires a global integrated strategy that embraces scientific, economical, social, and ethical dimensions based on an analysis of representative and continual video footage of the marine ecosystem.

I. THE STATE OF THE OCEAN

If the ancients had known what the earth was really like, they undoubtedly would have named it Oceanus.

The Matchless Phenomenon of the Sea

A. The Importance of the Oceans

The ocean is "the largest ecosystem on Earth," covering more than seventy percent of the earth's surface or 140 million square miles. The total volume of the ocean is approximately 300 million cubic miles containing ninety-seven percent of the planet's free water and weighing

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3 See Cousteau Society, supra note 1, at 18.
5 See Kieran Mulvaney, A Sea of Troubles: In the International Year of the Ocean, Are We Reaching the Limits?, E: ENVTL. MAG., Jan. 11, 1998, at 28, 28.
approximately 1.3 million tons. The average depth of the world's oceans is about 2.4 miles with maximum depths exceeding six miles.

Land's tallest peak, 29,028-foot-high Mount Everest, could be sunk without a trace in the ocean's greatest abyss, the 35,800-foot-deep Mariana Trench in the Western Pacific. If all the irregularities on the earth's surface were to be smoothed out, both above and below the water, so that there were no dents or holes anywhere, no land would show at all. The ocean would cover the entire globe to a depth of 12,000 feet.

At more than four billion years old, the ocean is also the oldest ecosystem. Over ninety-eight percent of the biosphere—earth's habitable space—is composed of oceans and seas. Ninety percent of the world's vegetation is in the sea. Marine life, unrivaled in diversity, draws sustenance from the oceans. Thousands of species ranging from microscopic organisms to leviathans are supported by the oceans. Such diversity far outweighs that found on land. The ocean mirrors tropical forests in diversity of its species. For example, sixty-one percent of the

7 See Mulvaney, supra note 5, at 28.
8 See Briggs et al., supra note 6. The Atlantic Ocean reaches a maximum depth of 8,380 meters; the Pacific Ocean reaches depths of 11,034 meters; the Indian Ocean's maximum depth is 7,450 meters; and the Polar Oceans' maximum depth is 5,502 meters. See Sci. Am. Presents: The Oceans, Fall 1998, at 8, 8-14.
9 See Engel, supra note 2, at 11.
10 See, e.g., Engel, supra note 2, at 37; Briggs et al., supra note 6.
11 See James Johnston, Celebrating the Sea—with Warning Waves Week Ahead, The Scotsman, Jan. 12, 1998, at 20, available in LEXIS, News Library, Curnws File (citing World Wildlife Fund data). For purposes of this article, the terms "oceans" and "seas" are used interchangeably even though a sea may be considered as a tract of water within an ocean. In other instances, the "sea" may encompass four distinct oceans: the Pacific, the Indian, the Atlantic, and the Arctic, each of which may have smaller seas. See, e.g., Engel, supra note 2, at 11.
13 See Nybakken & Webster, supra note 4.
14 See Johnston, supra note 11, at 20.
earth's phyla, the second most general taxonomic grouping, contain marine organisms. “Of the thirty-three animal phyla, thirty describe residents of the ocean, fifteen exclusively so.”17 “A cubic foot of ocean surface water may have as many as 20,000 microscopic plants, together with hundreds of planktonic species.”18 Six percent of the world's coastal environment (estuaries, coastal wetlands, seagrasses, mangroves, coral reefs, and continental shelves) provides forty-three percent of the world's ecosystem services.19 The number and diversity of known species in the oceans continues to increase.20

Weather is determined by a partnership between the atmosphere and the ocean. The air is a product of the ocean ecosystem.21 “Tiny marine plants, known as phytoplankton, release up to half of the oxygen we breathe as a by-product of photosynthesis . . . . During the food-making process [of photosynthesis], phytoplankton also absorb carbon dioxide, regulating the amount of this greenhouse gas in the atmosphere.”22 The ocean “fixes” approximately eighteen billion tons of
carbon each year in the photosynthesis process. Flora of the seas absorbs carbon dioxide and helps regulate the earth's climate.

The oceans provide a significant supply of food and other resources for human animals. Seafood is the main source of protein for nearly half of the world's six billion people. Marine species such as sponges and corals provide substances used for the treatment of leukemia and in bone-grafting and replacement. The rosy periwinkle, a snail from Madagascar, produces alkaloids that can be used to treat Hodgkin's disease and acute lymphocytic leukemia. Medical research on sea life has helped to understand the human body. For example, much of what is currently known about the human nervous system has come from studies of squid; it also appears that "the simple nervous system of New England's lobsters is helping to explain ... excessive aggression in humans." Cures for diseases such as Parkinson's, Alzheimer's, and muscular dystrophy are being explored through study of the abalone's programmed cell death. Molecular biologists use clams to research human ovarian cancer. The sea squirt, whose "clusters are routinely scraped from boat hulls . . . is the only other animal besides humans and other primates, that regularly accumulates uric acid and crystals of calcium oxalate in its 'kidney.' These crystals become kidney stones.

The oceans are the source for other commercial products such as the thickening extract from kelp that gives ice cream and toothpaste their firmness. Kelp derivatives are also used in insecticides.

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24 See Johnston, supra note 11, at 20.
26 See Johnston, supra note 11, at 20.
27 See Endo, supra note 21, at 14.
29 See Beth Livermore, Fishing for Cures; Marine Life Studies, POPULAR SCI., May 1995, at 62.
30 See id. Serotonin, a chemical compound implicated in violent human behavior, is also present in lobsters. See id.
31 See id.
32 See id.
33 See id.
34 See id.
35 See Johnston, supra note 11, at 20.
The potential of further benefits traced to the ocean's bounties is restrained only by the imagination. New marine species continue to appear.\textsuperscript{36} In 1991, a new species of beaked whale was discovered off the coast of Peru.\textsuperscript{37} The oarfish, which can grow to fifty feet, was photographed alive for the first time in 1997.\textsuperscript{38}

Yet, the ocean's secrets remain largely undiscovered. The surface of the moon has been explored more than the oceans.\textsuperscript{39} Researchers have studied less than ten percent of the ocean.\textsuperscript{40} “Even today the deep trenches of the oceans remain the most remote and unexplored parts of the planet.”\textsuperscript{41} Benthic species yet to be described are estimated to be between one million and ten million.\textsuperscript{42} The oceans provide fertile ground for exploration.\textsuperscript{43} But exploitation can only result in ecological tragedy.\textsuperscript{44} “If we don't have the oceans, we don't have anything. If we destroy them . . . we're destroying ourselves.”\textsuperscript{45}

B. \textit{Multiple Stressors on the Marine Ecosystem}

\textit{Everybody takes the sea for granted. The problem is when you look at it you only see a wibbly wobbly bit of water, and people don't realise there is a third dimension—such as all the critters that live in the sea—we don't even know}

\textsuperscript{36} See A Wilder Kingdom: Finding New Mammals: In 10 Years 450 Species have been Discovered; Many are Endangered, \textit{NEWSDAY}, June 17, 1997, at B3.
\textsuperscript{37} The Pygmy beaked whale, or \textit{Mesoplodon peruvianus}, is the smallest member of a group called beaked whales for their distinctive dolphin-like snout. They are so rarely seen that it took scientists 15 years to find enough specimens to feel confident that they were members of a previously unknown species. See \textit{New Species of Whale Is Discovered in Pacific}, \textit{N.Y. TIMES}, May 14, 1991, at C4.
\textsuperscript{38} See Johnston, \textit{supra} note 11.
\textsuperscript{39} See \textit{ENGEL}, \textit{supra} note 2, at 55. Engel states that humans know less about the submerged seventy percent of the earth's surface than the near side of the moon. As recently as 1920, ships were still measuring the depths of the sea by heaving to and dropping a weighted line, a method that the Greek historian Herodotus watched sailors use 2,400 years ago. One single measurement in deep water could take all day.
\textsuperscript{40} See Nybakken & Webster, \textit{supra} note 4, at 74, 75.
\textsuperscript{41} Vincent, \textit{supra} note 4.
\textsuperscript{42} See Nybakken & Webster, \textit{supra} note 4, at 75.
\textsuperscript{43} See \textit{id}.
\textsuperscript{44} See \textit{id}. at 87.
\textsuperscript{45} See \textit{Endo}, \textit{supra} note 21, at 14 (quoting William Fenical, Scripps Institution).
what some of them are. So we don’t know much about this thing but we are already treating it as if it is an unchangeable fact of life that will always be there—but if we keep removing or destroying the biodiversity, it is going to have consequences that we cannot even think about.

Iain Watt, Marine Ecologist, the Royal Geographical Society

Descriptions of the vastness of the ocean should be tempered with facts that illustrate its fragility and precarious carrying capacity. “Although the weight of the oceans is 250 times that of the atmosphere, it is only one part in 4,000 the weight of the Earth.”

Relatively recently humans have begun to perceive the marine environment as a complex system supporting a significant complement of the world’s biological diversity. One of the difficulties with seeing what is happening to the oceans is that for most humans, it is difficult to “look.” Unlike trees, birds, and other land-based flora and fauna, ocean riches are not easily discernable. By their very nature, living marine species are “in” the element rather than “on” it. An imaginative challenge is posed for a typical person in an industrialized nation to visualize the extent of the problem when the seafood shelf of the grocery store is lined with choices of fish and other marine delicacies. “Where’s the problem?” asks the consumer.

Only when whales surface, dolphins leap, schools of fish blacken blue water, or shrimpers pull in their nets—or when dolphins wash up on the beach, illegal whale meat is confiscated, or the nightly news depicts trawlers being boarded in international waters by officers of an outraged coastal nation—is one reminded of what lies in the depths of this vast area.

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46 See Vincent, supra note 4.
47 See Mulvaney, supra note 5, at 28 (quoting James Lovelock, originator of the Gaia hypothesis). The Gaia (in Greek mythology, Gaia, or Gaea, was the goddess of the earth) hypothesis, propounded by British physicist James E. Lovelock, regards the earth system, including air, water, soil, and the lives they support, as a single, complex, self-regulating organism. See J.E. LOVELOCK, GAIA: A NEW LOOK AT LIFE ON EARTH (1979). See also, SEN. AL GORE, EARTH IN THE BALANCE 264 (1992). This principle is pivotal to the United Nations Conference on Environment and Development (UNCED). See PHILIP SHABECOFF, A NEW NAME FOR PEACE: INTERNATIONAL ENVIRONMENTALISM, SUSTAINABLE DEVELOPMENT, AND DEMOCRACY 126, 177 (1996).
Similar to what has happened on land, the oceans have been systematically clear-cut. Instead of taking generations to be laid to waste, the ocean is feeling the trauma after only a few decades. For many living marine species, populations have been significantly reduced. Although there are myriad reasons, three primary human activities contributed to this decline: systematic over-harvesting of the oceans; disruption of the ecosystem through pollution; and the blight of uncontrolled development. Legal regimes have not kept pace with the expansive exploitation of the ocean's inhabitants and degradation of their ecosystem. Degrading of the oceans first captured global attention through the explorations of Thor Heyerdahl. In 1947, he and five crew members sailed a raft across what was then a comparatively pristine ocean, from Peru to Tahiti. In 1970, he crossed the Atlantic and “reported seeing far more oil lumps than fish, and alerted the world about the enormous quantities of trash, oily wastes and plastic debris he observed in the sea.” Almost thirty years later, the degradation is even more apparent.

Coastal invasion and destruction of marine habitat are equally pervasive contributors to the deterioration of the ocean ecosystem. A brief look at the sobering statistics and issues depicting but a few of the multiple stressors provides a clear indication that Heyerdahl’s second travel portended gloom.

1. Pollution

The oceans have been called “our global garbage can.” Pollution

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50 See GLOBAL MARINE BIOLOGICAL DIVERSITY, supra note 15, at 3-8 (describing the complete extinction of the Stellar’s sea cow within 27 years of its discovery).
51 See id. at 68.
52 See id. at xxvii.
54 See Mulvaney, supra note 5, at 28.
55 See id.
56 See id. (citing a letter from Dr. Claude Martin, Director General of the World Wide Fund for Nature, and Dr. Thor Heyerdahl, which appeals to the United Nations to effectuate a plan to preserve the oceans).
57 See id.
58 See id.
59 See id. at 31.
sources are varied: "The National Research Council estimates that as many as 8.8 million tons of oil enter the ocean each year as a result of human activity, and that at any given time, the ocean contains 280,000 tons of tar."

In 1996, a California beach clean-up effort resulted in retrieving over half a million pounds of garbage and over 95,000 pounds of recyclables. In another effort, between March 1994 and February 1995, 40,580 debris items were collected in a daily sweep of a sixteen-mile study area along the coast of Padre Island (Texas). Shrimping industry items, including wood disks used on shrimp nets, accounted for sixty-five percent of the objects. About ninety percent of the trash washing in from the waters off Padre Island is plastic—bags, sheeting, containers. All kinds of garbage, ranging from fishing nets to trash from cargo ships to litter on the beach, finds its way into coastal waters and the ocean, where it traps, ensnares and entangles marine wildlife such as marine mammals, sea turtles and seabirds.

Fleets leave approximately five to six hundred miles of driftnets, sometimes referred to as "ghost nets," floating in the North Pacific annually; at present rates of fishing, in the year 2000, there will be enough driftnets to stretch one-third the way around the world. "In the 1980s, it was [estimated] that 30,000 northern fur seals died each year after becoming entangled in marine debris, principally lost or abandoned fishing gear [including driftnets]." An estimated 155,000 sea turtles drown in shrimp nets worldwide each year. Ingestion of plastics such as

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60 Id. (citing National Research Council statistic). See also Nancy Lord, Our Only Ocean; Care for the Oceans, SIERRA, July 17, 1998, at 34 (citing National Research Council statistic) available in LEXIS News Library, Mags File. It should be noted that tar balls also can be a naturally occurring phenomenon.

61 See BRITA, Coastal Cleanup Day (visited Nov. 30, 1998) <http://ceres.ca.gov/coastalconmi/web/ccd/rell1.html>. Over 706,005 pounds of trash and recyclables were removed in a similar 1997 effort. See id.

62 See Mulvaney, supra note 5, at 62.


64 Mulvaney, supra note 5, at 62.

balloons and bags by marine life often results in fatalities. Sea turtles ingest plastic bags, mistaking them for jellyfish, a favorite food. When eaten, plastics can damage the stomach lining and block intestinal passages.

Vessel source operational pollution accounts for twelve percent of marine pollution while land-based and atmospheric sources account for seventy-seven percent. Ocean dumping accounts for ten percent of marine pollution, and offshore production accounts for one percent. Atmospheric deposition, pollution entering the water from the atmosphere either as a precipitation or in dry form, is another source of pollution. Heavy metals and chemical compounds such as polychlorinated biphenyl (PCBs), dichlorodiphenyltrichloroethylene (DDT), and dioxin have been associated with a wide range of impacts on marine wildlife. Striped dolphins in the western North Pacific, for example, have concentrations of PCBs and DDT more than ten million times higher than the water in which they live; Beluga whales in the St. Lawrence Seaway have levels of cadmium and mercury exceeding the World Health Organization’s safety levels. Pathogens contaminate living marine species.

MICHAEL WEBER, ET AL., DELAY AND DENIAL: A POLITICAL HISTORY OF SEA TURTLES AND SHRIMP FISHING (1995) (estimating that number at 125,000).

See NATIONAL SAFETY COUNCIL, supra note 18, at 59.

See id.

See id.


See id.

PCBs are any of a group of organic compounds that were once widely used as liquid coolants and insulators in industrial equipment. They are toxic to animals. See Peter J. Bryant, BIODIVERSITY AND CONSERVATION, A HYPERTEX BOOK (1997), Ch. 14: HABITAT POLLUTION, at 1 (visited Nov. 30, 1998) <http://darwin.bio.uci.edu/~sustain/bio65/lec14/b65lec14.htm#chlorinatedhydrocarbons>.

DDT is an insecticide toxic to animals when swallowed or absorbed through the skin. It has been banned for most uses in the United States. See id.

For a general overview of DDT, PCBs and dioxins, see id.


Pathogens are agents that cause disease, especially a living microorganism such as a bacterium or fungus. See NATIONAL SAFETY COUNCIL, supra note 18, at 45.

See id.
In the United States, some 4500 cases of shellfish-associated gastroenteritis, believed to be caused by viruses, were documented between 1980 and 1989; and as of late 1992, nearly one-third of the shellfish beds were closed or restricted because of pollution.\textsuperscript{77}

Large quantities of hazardous substances other than oil are regularly washed up on European coasts due, in part, to a relatively high proportion of shipping accidents in the North Sea involving ships carrying dangerous chemical substances.\textsuperscript{78}

Seventy percent of sewage waste dumped in the Pacific Ocean is untreated.\textsuperscript{79} An estimated forty-four percent of ocean pollution arises from runoff from land sources.\textsuperscript{80} Agricultural runoff contains nitrogen and phosphorous, two primary nutrients that nourish algae in water.\textsuperscript{81} This "nutrient pollution causes eutrophication—excessive growth of plankton (algal blooms) in surface water (sometimes known as 'green tides' or 'brown tides')."\textsuperscript{82} This can lead to biological "dead zones."\textsuperscript{83} A 7000-square mile "dead zone" nearly the size of New Jersey\textsuperscript{84} has been documented off the Louisiana and Texas coasts.\textsuperscript{85}

\textsuperscript{77} See id.
\textsuperscript{78} See Peter Wetterstein, Carriage of Hazardous Cargoes By Sea – The HNS Convention, 26 GA. J. INT'L & COMP. L. 595, 595 n.2 (1997) (citing EUROPEAN PARLIAMENT: REPORT ON THE ENVIRONMENTAL DAMAGE CAUSED BY OIL SPILLS FROM SHIPS: EUROPE ENVIRONMENT, DOCUMENT SUPPLEMENT TO EUROPE ENVIRONMENT 5 (No. 396-20 October 1992)).
\textsuperscript{79} See Brian McAndrew, Fishing for Solutions to a Growing World Crisis, TORONTO STAR, June 14, 1998, at 1.
\textsuperscript{81} See NATIONAL SAFETY COUNCIL, supra note 18, at 47.
\textsuperscript{82} Id.
\textsuperscript{83} See id. Dead zones are areas of hypoxic water, "patches of water depleted of oxygen where little can live." Id.
\textsuperscript{85} See Scott W. Nixon, Enriching the Sea to Death, SCI. AM. PRESENTS: THE OCEANS, Fall 1998, at 48, 51.
2. Living Marine Species

a. Fish

The chronology of the demise of many fish species follows a typical path.\textsuperscript{86} Harvesting the ocean for nature's "bounty" traditionally involved low-tech, labor-intensive pursuit.\textsuperscript{87} With little technical advances, even in the early 1900s, fish trawlers deployed dories to catch targeted fish with traditional fishing gear.\textsuperscript{88} After World War II, however, industrialization of fishing began in earnest.\textsuperscript{89} By the 1960s, "the first longliners arrived on the East Coast [of the United States] bringing a new level of efficiency to an artisanal form of work."\textsuperscript{90} The rapid development of technology acumen never slowed.\textsuperscript{91} Radar, sonar, spotter planes, and eventually satellite navigation, monitoring, and imaging complemented drift gillnetting\textsuperscript{92} and longlines in the quest for rapidly declining populations,\textsuperscript{93} all in an attempt to meet the escalating demand of humans for seafood. Thus, the concept of sustainability must compete with the perceived need for fishery products.

As a result, seventy percent globally of the world's targeted ocean species are either depleted or fully exploited.\textsuperscript{94} Fish production has

\textsuperscript{86} See C.J. Chivers, \textit{Empty Waves, Consider the Sea}, WILDLIFE CONSERVATION, July-Aug. 1998 (discussing how uncontrolled technology has signaled commercial extinction of fish populations).
\textsuperscript{87} See id. at 42.
\textsuperscript{88} See id. at 38 (describing the methods of swordfish fishers).
\textsuperscript{89} See Safina, \textit{supra} note 49, at 60.
\textsuperscript{90} Chivers, \textit{supra} note 86, at 43.
\textsuperscript{91} See Safina, \textit{supra} note 49, at 60 (describing the use of satellites and LORAN (Long-Range Navigation)).
\textsuperscript{92} In drift gillnetting, plastic mesh is hung beneath buoys and placed in ocean currents. When retrieved, the mesh is laden with catch. See Chivers, \textit{supra} note 86, at 43.
\textsuperscript{93} During the 1950s and 1960s, fishers adapted various military technologies to hunting on the high seas. Radar allowed boats to navigate in total fog, and sonar made it possible to detect schools of fish deep under the oceans' opaque blanket. Electronic navigation aids such as LORAN (Long-Range Navigation) and satellite positioning systems turned the trackless sea into a grid so that vessel could return to within 15 meters of a chosen location.
\textsuperscript{94} See Chivers, \textit{supra} note 86, at 43.
overtaken the production of beef and poultry combined.95 A 1998 Worldwatch Report details how fishing grounds throughout the world are suffering huge losses in fish species and their environment.96 In the United States, the number increases to eighty percent.97 The National Marine Fisheries Service (NMFS) notes that at least eighty-six major fish stocks are severely depleted with some species reaching the crisis stage: Chinook and coho salmon in the Pacific Northwest; king mackerel and red snapper in the Gulf of Mexico; and red drum, black drum, and spotted seatrout in the Atlantic; they are tiny fractions of their former abundance.98

In 1497, the experiences of Italian explorer John Cabot in Canadian waters off Newfoundland were thus described: "[Fish could] be taken not only with the net but in baskets let down with a stone so that it sinks in the water."99 However, by 1992, the fish were so few that the Canadian government declared a two-year moratorium.100 The spawning population of codfish further plummeted to an estimated 15,000 tons in 1994.101

Other dwindling catches include: Atlantic halibut, down to 3700 tons from a peak of 21,000 tons, red grouper at 2100 tons from 22,700, and yellowtail flounder at 3600 tons from 79,000 tons.102 Pelagic

97 See Chivers, supra note 86, at 42.
98 See George Reiger, Troubled Waters: Most Anglers are Content to Leave Management to the "Experts"—and so the Pelagic Fisheries Continue to Dwindle and Vanish, FIELD & STREAM, May 1998, at 28.
101 See David Usborne, Empty Seas Lash Newfoundland, Cod "Pirates' and Factory Ships Have Robbed a Canadian Community of its Centuries-old Way of Life, INDEPENDENT, May 1, 1994, at 15.
102 See McAndrew, supra note 79, at 1 (quoting the Food and Agriculture Organization).
fisheries\textsuperscript{103} fare no better: bluefin tuna stocks are ten percent of what they were thirty years ago, and blue and white marlin populations are less than twenty-five percent.\textsuperscript{104} The marlin's situation is worse than the tuna's because, although bluefin numbers seem to have stabilized at currently remnant levels, marlin stocks continue to slide due to an allowable bycatch in the commercial longline\textsuperscript{105} and drift-gillnet fisheries.\textsuperscript{106}

Collapse of stocks occurs off the coasts of both developed and lesser-developed nations.\textsuperscript{107} Since 1989, world population climbed at about ten percent; in contrast, the total landings of fish from the ocean declined by almost as much.\textsuperscript{108} Despite a record 1997 fish harvest of 121 million tons worldwide, “eleven of the world's fifteen most important fishing areas are in decline and sixteen percent of the major fish species are either fully or overexploited,” according to a report released by Worldwatch Institute in Washington in 1998.\textsuperscript{109} Thus, almost three-

\textsuperscript{103}Pelagic species live in open oceans or seas rather than in waters adjacent to land or inland waters. See WEBSTER’S NINTH NEW COLLEGIATE DICTIONARY 868 (1990).

\textsuperscript{104}See Reiger, supra, note 98, at 21. Pound for pound, the bluefin tuna may be the most valuable animal on earth. See Chivers, supra note 86, at 40. Japan imports 90% of the world's bluefin tuna at prices up to $40,000 each or $50 a pound. One report noted a 600-pound tuna auctioned off for $80,000. See Tuna Commission Imposes Sanctions Against 3 Nations, PATRIOT LEDGER (Quincy, MA), 3 Dec. 1996 at 7; Don Stanley, Down on the Fish Farm, SACRAMENTO BEE, Apr. 27, 1994, at FD1.

\textsuperscript{105}The longline is little more than a strand of heavy fishing cable suspended beneath buoys and outfitted with as many as 3,000 baited hooks. Any creature—including sea turtles, marine mammals, and diving birds—that tries to eat the bait risks being hooked . . . . According to a 1995 study, 282 longline vessels deployed 8.9 million hooks in the Atlantic, the Caribbean, and the Gulf of Mexico in a single year. In 1996, while targeting the shrinking swordfish and tuna populations, longliners also killed and discarded 500,000 pounds of marlin and 150,000 pounds of sailfish.

Chivers, supra note 86, at 40. See also Safina, supra note 49, at 60 (“Many industrial fishing vessels are floating factories deploying gear of enormous proportions: 129 kilometers of submerged longlines with thousands of baited hooks, bag-shaped trawl nets large enough to engulf 12 jumbo jetliners and 64-kilometer-long drift nets.”).

\textsuperscript{106}See Reiger, supra note 98, at 21.

\textsuperscript{107}A “collapse” is said to occur when the catch undergoes an abrupt and continued drop, often drastic, from which stocks may or may not recover. See Brian J. Rothschild, How Bountiful are Ocean Fisheries?, 2 CONSEQUENCES 15, 16.

\textsuperscript{108}See id. at 14.

\textsuperscript{109}See Decimated Fish Stocks, supra note 96.
quarters of the world's fishing grounds are in decline.\textsuperscript{110} So many fish species have become extinct that fishers are bringing up younger, lower quality fish from "the bottom of the barrel," the report said.\textsuperscript{111}

The industrialized world consumes forty percent of world fish harvests.\textsuperscript{112} Use of fish in industrial countries for non-human animal feed and oils is greater than the amount of fish eaten by people in Latin America, Africa and India combined.\textsuperscript{113} In 1994, the United Nations Food and Agriculture Organization (FAO) estimated that the amount of human consumption is about twenty-nine pounds of fish per person per year.\textsuperscript{114} The gap between supply and demand of seafood for human consumption continues to grow. An FAO study concludes the gap could reach forty million tons by 2010.\textsuperscript{115} To maintain these consumption levels in the face of rapid population growth, world fisheries would have to boost food fish supplies by twenty-five percent by the year 2010.\textsuperscript{116}

Even with fisheries' decline, the commercial fishing industry worldwide has doubled in size since 1970. An estimated one million large vessels, and registered tonnage surpassing twenty-six million, currently prowl the world's ocean.\textsuperscript{117} The largest ships catch the most fish. "The 40,000 largest fishing vessels [that fish the world's oceans] catch as much as the 3.4 million smaller ships restricted to coastal waters. Factory ships that catch, process, and freeze up to five hundred tons of fish daily have [plied the waters] for more than forty years."\textsuperscript{118} Today's Malthusian commercial fishers use factory trawlers the size of football fields equipped with advanced electronic equipment and satellite communications such as remote sensing to track fish; some use airplanes or helicopters.\textsuperscript{119} Added

\textsuperscript{110} See Maddox, \textit{supra} note 95, at 21.

\textsuperscript{111} See id.

\textsuperscript{112} See \textit{Decimated Fish Stocks}, \textit{supra} note 96, at 24.


\textsuperscript{116} See id.


\textsuperscript{118} McAndrew, \textit{supra} note 79, at 22.

to that detection technology are the fishing techniques of monofilament driftnets, purse seining, and long lines. Driftnet fishing in the northern Pacific alone encompasses an area the size of the United States. These nets drift in the open ocean capturing not only the target species but also non-selected species of marine wildlife. The result is two-fold: by-catch of not only economically undesirable fish species but oftentimes rare and endangered marine mammals, birds, and other marine wildlife; and marine pollution from plastics such as nylon multifilament mesh.

By-catch represents the millions of tons of non-target fish that are caught in nets set for other species of fish. These are discarded overboard either dead or dying. One of every four fish ends its life as by-catch. Global by-catch estimates conservatively range from nineteen to thirty-three tons annually not including marine mammals, sea birds, and


See William T. Burke, Driftnets and Nodules: Where Goes the United States?, 21 OCEAN DEV. & INT'L L. 237, 239 (1990). Driftnets are made by linking sections of gill net to form longer nets that stretch up to twenty-five miles in length. Under United States law, large scale driftnet fishing is described as

a method of fishing in which a gillnet composed of a panel or panels of webbing, or a series of such gillnets, with a total length of two and one-half kilometers or more is placed in the water and allowed to drift with the currents and winds for the purpose of entangling fish in the webbing.


See Maddox, supra note 95, at 1.

some invertebrates, or approximately one fourth of the annual marine catch. In other words, only ninety-one million of the estimated one hundred and twenty-one million tons of fish harvested each year are consumed, with the rest simply discarded. Shrimpers net about five pounds of by-catch for every one pound of shrimp. In some cases, the ratio increases to as high as fifteen to one. This by-catch is estimated to be equivalent to ten pounds of food for every human.

"Worldwide, fishing fleets are emptying the seas of sharks." Commercial fishing discards about six million sharks a year, half the total catch. When a species is slow growing and has a low reproductive rate, the problem is exacerbated. The National Marine Fisheries Service reports that sharks in United States Atlantic waters are being caught forty percent faster than they can reproduce. Depending on the species, shark numbers have fallen by fifty to eighty percent . . . . The average weight of a landed Atlantic swordfish has dropped from two hundred and sixty six pounds to ninety pounds . . . . 'We’re down to killing the babies.'

Driftnets are not the lone culprit:

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126 See id. Note also, that for aquatic fauna, extinction and endangerment rates exceed those for terrestrial fauna. For example, it is estimated that for North American species, 20% of fishes, 36% of crayfishes, and 55% of mussels were extinct or imperiled, compared with seven percent of mammals and birds. See L. Master, The Imperiled Status of North American Aquatic Animals, BIODIVERSITY NETWORK NEWS (1990) 3(3): 1-2, 7-8. Only four percent of the federally protected aquatic species in the United States with recovery plans have recovered significantly, compared with 20% of protected terrestrial species. See Jack E. Williams & Richard J. Neves, Introducing the Elements of Biological Diversity in the Aquatic Environment, 57 N. AM. WILDLIFE & NAT. RESOURCES CONF. TRANSACTIONS 345 (1992).

127 See Maddox, supra note 95.


129 See Maddox, supra note 95.

130 See id.

131 See MacKay & Stricker, supra note 99, at 17.

132 Chivers, supra note 86, at 40.

133 See MacKay & Sticker, supra note 99, at 18.

134 See id.

135 See id.

136 Chivers, supra note 86, at 38 (quoting Carl Safina, founding director of the Living Oceans Program at the National Audubon Society).
Scientists evaluating the effect of wasteful fishing practices no longer consider the methods that replaced the vilified giant driftnets to be less harmful. Bottom trawling, used to harvest shrimp, scallops, and flounder, is perhaps more devastating to marine ecosystems than long-lining . . . or drift netting. Bottom-trawling rakes the bottom, kills plants and animals, and interrupts ecological processes.\(^\text{137}\)

One billion low-income people who rely on fish as their primary source of animal protein are feeling the impacts of declining fisheries; and about 200 million people who depend on fishing for their livelihoods are being “squeezed” out of their way of life.\(^\text{138}\)

Devastation of fish populations in some areas notwithstanding, the industry continues to grow: the FAO “estimates [thirty] million commercial fishermen and fish farmers produced one hundred and seventeen million ton[s] of fish last year, up from thirteen million fishermen and sixty-six million ton[s] in 1970.”\(^\text{139}\) Spending on fishing fleets has increased significantly, but there is so much over-capacity that profits per fishing vessel have dropped by more than half over the last twenty-five years.\(^\text{140}\) The FAO estimates that the fishing industry spends $124 billion annually to harvest $70 billion worth of fish.\(^\text{141}\) At the same time, the fishing industry worldwide receives more than $20 billion a year in subsidies, between twenty-two and thirty-eight percent of revenues.\(^\text{142}\) Removing subsidies, significantly lessening inefficiency, and stopping exploitation are critical to regaining healthy fish populations.

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\(^{137}\) Tundi Agardy, *It's Not Just What We Fish. But How We Fish That Matters*, CHRISTIAN SCI. MONITOR, Mar. 6, 1998, Opinion/Essay at 14. *See also Differing View on the Effects of Seafloor Bottom Trawling*, Sea Technology, Mar. 1999 at 103 (offering two views: that bottom trawling devastates marine life; but that in some areas such as the sea floor off the coast of New England which is mostly sand, bottom trawling has the effect of resuspending that sand which, in turn, helps those ecosystems which depend on disturbance for their health.)

\(^{138}\) *See Fisheries*, supra note 113, at 1 (citing Anne Platt McGinn, WORLDWATCH INSTITUTE REPORT).

\(^{139}\) McAndrew, supra note 79, at 1 (quoting the UN Food and Agriculture Organization).

\(^{140}\) *See McGinn, supra* note 84, at 59, 72.


\(^{142}\) *See McGinn, supra* note 84, at 72; Chivers, supra note 86, at 43.
b. Whales

Marine mammals have the sad misfortune of being swimming aggregates of commodities that some humans desire. Nowhere is the fate of marine mammals more hotly debated than with the whale. This contentiousness is cogently exemplified in the deliberations of the International Whaling Commission (IWC) whose purpose, among other goals, is to evaluate and allocate the economic burden on various species in particular geographic regions. This mandate posed many problems, not the least of which was the constant shortage of reliable scientific data to calculate adequately the maximum allowable hunting load on both particular species and individual populations. Exact numbers for certain species are difficult to attain because of technical and logical challenges. In an area as vast as an ocean, how can population numbers be arrived at with certainty? What technology is needed to ascertain accurate population counts? Further, incorrect data has been generated by the whaling nations themselves. In files kept secret for many years, it was revealed that the Soviet Union systematically slaughtered significant numbers of the world's protected whale population, selling some of the lucrative flesh to Japan:

[In the 1961-62 season the Soviet Union told the IWC that 270 rare humpback whales had been killed by four Antarctic fleets, whereas scientists on board reported that 1,568 were killed by one fleet alone. As a result of the plunder, the humpback whale herd around New Zealand and Australia was wiped out by 1966. Six years later, the sei herd in the Indian Ocean was destroyed, and by 1975 the sperm whales north of Hawaii had all but ceased to exist.]

143 See infra notes 253-270 and accompanying text.
Between 1948 and 1973, the Soviet Union killed 48,477 humpback whales while reporting only 2710 kills to the IWC. The population of North Atlantic right whales is estimated to be no more than 300 individuals. The number of finback whales in the Southern Hemisphere is estimated to be 4,000, down from a peak population of 500,000.

Taking into account the position of animals in food chains, the killing of one whale amounts to harvesting from three hundred to five hundred square kilometers of ocean area. The extermination of whales affects the entire ecosystem of the world oceans even more than over-fishing. "Being at the top of the ocean's trophic chains, whales and other sea mammals play an immense role in stabilizing this ecosystem, maintaining its stable equilibrium."

c. Other Living Marine Species such as Turtles, Sea Birds, Dolphins, and Porpoises

The crisis of declining fish populations has a direct impact on the decline of other marine species. How fish are harvested and how many triggers the fate of other species. Fishing methods commonly used to catch swordfish, as well as other over-fished species, selectively destroy

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Alexei V. Yablokov, a whale biologist and ecology adviser to President Boris Yeltsin, used declassified Soviet Ministry of Fisheries records to find that in the 1960s, one Soviet factory ship told the IWC it had killed 152 humpback and 156 blue whales. In fact it had taken 7,207 humpbacks and 1,433 blue whales and illegally killed 717 right whales, a species protected by the whaling commission since the 1930s.


150 See Yablokov & Ostroumov, supra note 145, at 137.

151 Id.

152 See generally, Agardy, supra note 137.

153 See id.
species such as sea turtles, sea birds, dolphins, and porpoises.\textsuperscript{154} For example, the population of sea turtles worldwide is threatened by destructive fishing practices.\textsuperscript{155} It is estimated that over 125,000 turtles die every year as a result of unwanted by-catch.\textsuperscript{156} Several species of sea turtles are now facing possible extinction including loggerheads, greens,\textsuperscript{157} leatherbacks, hawksbills, and Kemp's ridleys.\textsuperscript{158}

d. Introduced Species

Non-indigenous or exotic species have been dubbed the "corporate raiders of nature"\textsuperscript{159} and the "darkest cloud yet in the invasion biology of North America."\textsuperscript{160} Many of these exotic species arrived in the United States in ballast water.\textsuperscript{161} Ballast water may contain aquatic organisms including pathogens, as well as dormant stages of microscopic toxic aquatic plants that can cause harmful algal blooms after their release.\textsuperscript{162} Approximately ten billion tons of ballast water is transferred each year.\textsuperscript{163} As ballast is emptied at the port of call, these organisms are emptied out as

\textsuperscript{154} See id. at 14.
\textsuperscript{155} See Katherine Bishop, Lawsuit Seeks Ban on Shrimp Imports: Group Asks to Curb Nations Not Protecting Sea Turtles, N.Y. TIMES, Feb. 25, 1992, at A13; WEBER, supra note 65.
\textsuperscript{156} See WEBER, supra note 155. See also Baker, supra note 65.
\textsuperscript{157} Green sea turtles were once so abundant "that early explorers described them as traveling in fleets." Archie Carr, The Big Green Seafood Machine, WILDLIFE CONSERVATION, July-Aug. 1998, at 18. Some estimate that the Caribbean green turtle populations may have been reduced by as much as 99% since the arrival of Europeans. See id.
\textsuperscript{158} See WEBER, supra note 155, at 37; Bishop, supra note 155; State Department Guidelines Implement Sea Turtle Decision, Int'l Trade Rep. (BNA) No. 17, at 687 (Apr. 24, 1996).
\textsuperscript{159} Jim Hiney, Hostile Takeover, TEXAS SHORES, Summer 1998, at 3. No universal term for these invaders has been agreed upon by regulators, conservationists, and researchers. Monikers to describe the species as a generic group include: aquatic exotics, nonindigenous, transplants, and aliens. See id. at 5.
\textsuperscript{160} Dan Terlizzi, Foreword to MARYLAND SEA GRANT: ZEBRA MUSSELS AND THE MID- ATLANTIC 3 (1993).
\textsuperscript{161} See id. Ballast water is "taken on" to give stability to a vessel.
\textsuperscript{162} See The International Environmental Agenda: Toxic Paints, Emissions, and Ballast Water, INT'L SHIP REGISTRY REV., Aug. 1998 at 1, 2 [hereinafter INT'L SHIP REGISTRY REV.].
\textsuperscript{163} See id.
As vessels travel faster, the survival rates of species carried in ballast tanks have increased.

The Atlantic comb jelly, a United States east coast native, was introduced by ballast water into the Black and Azov Seas in the early 1980s. By 1988, it had become the dominant species in the Black Sea, leading to the collapse in fish stocks and an estimated $250 million of lost fisheries revenue. Biologists report that exotics are thought to have played a role in seventy percent of the native aquatic species extinction in the United States this century. The problem gained public attention in the mid-1980s when the prolific zebra mussel, thought to originate in Eastern Europe, arrived in the Great Lakes in ballast water. Damage results when the creature cements itself to submerged hard surfaces, including water pipes of electrical utilities. The damage caused by the mussel is expected to reach $5 billion by the year 2002, a figure which does not represent the ecosystem disaster for other species. Introduced species have dramatically transformed other marine ecosystems. They make up eighty percent of the species found in many areas of San Francisco Bay, the most invaded site in the country. There are thought to be more than two hundred established exotic species in San Francisco

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165 See Mulvaney, supra note 5, at 28.

166 See Hiney, supra note 159, at 6.


170 See id.

171 See id.
Bay, including the Asian clam, which is now found at densities of 3000 per square foot. A new species establishes itself there every two or three months.

Non-indigenous species can be introduced in ways other than through ballast-water discharge. For example, Florida is plagued by exotic tropical fish that are raised for the aquarium industry and then are either intentionally let go or escape. Recreational boaters who move their boats from one state or one country to another may unknowingly have various organisms attached to the bottom of the vessel. Intracoastal waterways and drainage basins such as the Mississippi River, which drains into the Gulf of Mexico, also provide a means for these species to migrate.

3. Tidal and Coastal Zone

The coastal regions represent the interface between the marine and land environments. These regions provide many species with habitats for breeding, feeding, and shelter. The vast majority of all marine life inhabit the intertidal zone and shallow seas bordering the continents. One-third of the world's marine fish species are found on coral reefs, referred to as the rain forests of the oceans, as they are the most productive coastal ecosystems of all. Ninety percent of the world's fish catch is made within two hundred nautical miles of the coast, and the majority of that catch is within the first five miles.

More than two-thirds of the world's largest cities are located on coasts, and populations of coastal areas are growing faster than inland populations. Two-thirds of the developed world's current population

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172 See Hiney, supra note 159.
173 See Mulvaney, supra note 5.
174 See Hiney, supra note 159.
175 See id. at 4-5.
176 See id.
177 See ENGEL, supra note 2, at 14.
178 See Mulvaney, supra note 5. "Indonesia's waters alone are home to more than 400 hard coral species . . . . [Its reefs] support 2,500 species of fish, nearly 35 percent of the world's fish species." Rita Ariyoshi, Halting a Coral Catastrophe, NATURE CONSERVANCY, Jan.-Feb. 1997, at 20, 22.
179 See Mulvaney, supra note 5.
live within thirty-seven miles of a shoreline.\textsuperscript{182} Estimates are that two-thirds of the population of lesser-developed nations will be living along coasts by the end of the century.\textsuperscript{183}

In the United States, a staggering one-half of the population lives within forty miles of the coast, which encompasses less than ten percent of the contiguous states, and it is estimated that by the year 2010 that number will increase to sixty percent.\textsuperscript{184} The average population density is almost five times greater in coastal counties than in non-coastal counties.\textsuperscript{185} One-third of the nation's Gross Domestic Product (GDP) is produced in the coastal zone through fishing, transportation, recreation, and other industries,\textsuperscript{186} reflecting support of 28.3 million jobs.\textsuperscript{187} "In 1995, the United States fishing industry added more than $20 billion to the economy, and coastal tourism generated more than $54 billion."\textsuperscript{188}

"Oceans are also superhighways for moving commerce. . . . Over ninety-eight percent of all foreign trade in and out of the United States is

\textsuperscript{183} See CICIN-SAIN & KNECHT, supra note 181, at 15-16 (citing WORLD COAST CONFERENCE, PREPARING TO MEET THE COASTAL CHALLENGES OF THE 21ST CENTURY: REPORT OF THE WORLD CONFERENCE 1993).
\textsuperscript{185} See NATIONAL SAFETY COUNC'L, supra note 18, at 59.
moved by ocean transport. Today, this trade accounts for more than twenty percent of the nation's Gross Domestic Product.\textsuperscript{189}

These multiple stressors have a profound and deleterious impact on the ecological integrity of coastal and tidal areas, as reflected in but a few, representative facts. The Environmental Protection Agency (EPA) notes that "fully forty percent \textcolor{black}{[of United States' waters are]} too polluted for fishing, swimming and other recreation, with pollution causing over 2,500 beach closings" in 1997 alone.\textsuperscript{190} In 1996, there were 2,200 fishery advisories and dozens of documented "dead zones."\textsuperscript{191} More than three hundred distinct salmon populations are at risk of extinction primarily due to the loss of upstream habitat areas to dam building, and urbanization.\textsuperscript{192} "Changes in coastlines through coastal development have altered fish habitats and disturbed spawning grounds,"\textsuperscript{193} including activities aimed at producing more fish. One out of every five fish consumed comes from aquafarms.\textsuperscript{194} However, aquaculture results in significant pollution from wastes.\textsuperscript{195} These farms also destroy coastal habitats that support living marine species.\textsuperscript{196} For example, seventy-five percent of mangrove forests in the Philippines, and forty percent in Ecuador, have been cut down to make way for aquaculture ponds.\textsuperscript{197}

These harms continue to compound. In the United States, ten percent of the nation's coral reefs have been degraded beyond recovery, with another thirty percent likely to decline within the next twenty years.\textsuperscript{198} According to the Interior Department's Fish and Wildlife Service, the contiguous forty-eight states lost fifty-three percent of their original

\textsuperscript{189} See Baker Statement, supra note 186.
\textsuperscript{190} Gina Robicheaux, Clinton Called on for Ocean Protection: Over 120 Groups Urge Clinton to Protect America's Oceans at National Ocean's Conference, CAPITAL REP., June 4, 1998 available in LEXIS, News Library, Curnws File.
\textsuperscript{191} See Menduno, supra note 182, at 107.
\textsuperscript{192} See James William Gibson, Oceans Full of Tears, WASH. POST, Feb. 23, 1998, at B3.
\textsuperscript{193} See McAndrew, supra note 79, at 1.
\textsuperscript{194} See McGinn, supra note 84, at 60.
\textsuperscript{195} See Mulvaney, supra note 5, at 30.
\textsuperscript{196} See McAndrew, supra note 79.
\textsuperscript{197} See Mulvaney, supra note 5, at 32.
\textsuperscript{198} Coral reefs represent another excellent example of the interconnectiveness of the ocean's ecosystem. Destruction of one reef has an effect on other reefs downstream. See, e.g., Luba Vangelova, It's Showtime on the Reef, WILDLIFE CONSERVATION, July-Aug. 1998, at 27.
wetlands between the 1780s and 1980s. The United States is losing about 120,000 acres of wetlands annually, with Louisiana alone losing sixty miles each year.

4. Climate Change

Multiple stressors must be seen in the context of overall global change. For example, unstable conditions are further affected by climate change and global warming resulting from ozone depletion. "The composition, geographic distribution, and productivity of many ecosystems will shift as individual species respond to changes in climate. These will likely lead to reduction in biological diversity and in the goods and services ecosystems provide for society, such as clean water and recreation." The changes could cause rising sea levels and sea surface temperature increases, among other problems. Greenhouse warming could result in thermal expansion of the ocean sufficient to raise sea level by thirty centimeters [11.7 inches] or more in the next 100 years. The United States discharges into the atmosphere twenty million tons of sulfur dioxide and twenty million tons of nitrogen oxides annually. The resulting acid rain that contributes to the deterioration of marine life through the addition of nitrogen also stimulates algae growth which promotes eutrophication.

Sharp increases or decreases in numbers of species are characteristic indicators of destabilized ecosystems. Thus, subjecting

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199 See NATIONAL SAFETY COUNCIL, supra note 18, at 49. In the 1700s there were an estimated 221 million acres of wetlands in the lower forty-eight states. In the mid-1970s the estimate dropped to 106 million acres, plus 170 million in Alaska and about 52,000 in Hawaii. See id. Wetlands, by definition, may be found outside the coastal area. See, e.g., NATIONAL SAFETY COUNCIL, supra note 18, at 9-10, 73-80.

200 See Robicheaux, supra note 190.

201 See Mulvaney, supra note 5, at 32-33.


203 See id.

204 See David Schneider, The Rising Seas, SCI. AM. PRESENTS: THE OCEANS, Fall 1998, at 28, 28.

205 See Bryant, supra note 71, at 1.

206 See id. at 3.

207 See generally, EUGENE P. ODUM, FUNDAMENTALS OF ECOLOGY 242 (3rd ed. 1971).
populations of living marine species to these phenomena results in an unstable marine ecosystem that, in turn, has a significant impact on all life forms. With these facts in mind, it is distressing to note that less than one percent of the world's oceans and seas has been designated as protected.\textsuperscript{208} This grim overview illustrates the repercussions caused by failed attempts at stewarding living marine species. Those in power and other stakeholders have not kept pace in addressing the onslaught of increased human activity surrounding these species. Nor have they tackled these complex issues from an ecosystem perspective.

C. Major Stewardship Regimes

Stewardship of living marine species involves four distinct spatial issues. The first issue is the stewardship of those living marine resources on the high seas, such as pelagic fish and mammals that spend their lives in transit on those waters. The second issue is stewarding those migrating species that spend only part of their life in habitats under the jurisdiction of one nation-state; for example, the anadromous,\textsuperscript{209} state-of-origin species such as salmon that may inhabit fresh water streams, brackish waters, and the high seas. The stewardship of these species must encompass the aspects of both their hibernation and reproduction. The third issue is stewardship of those marine species that reside within a nation-state's jurisdiction, these resident organisms that live in the water column near the coast and/or continental shelf. The fourth and final issue involves the maintenance of the biosphere's ecosystem to ensure the survival of all these marine species. Effectively accomplishing this goal requires a re-tooling of traditional thinking, one that centers on an eco-system view in which interplay and interdependency forms the basis of decision-making; one in which the ocean is no longer viewed as a subservient and pliant backdrop to human activity, but rather one in which the ocean's ecosystems intertwine into a web of unity.

\textsuperscript{208} See Johnston, supra note 11, at 20.

\textsuperscript{209} Anadromous species live out some phases of their lives in marine habitats and reproduce and undergo early development in fresh waters. See Peter B. Moyle \& Joseph J. Cech, Jr., Fishes: An Introduction to Ichthyology 158 (3rd ed 1996). Diadromy is the general phenomenon of migrating between two environments as a regular part of the life cycle. The other cycles are catadromy, moving from fresh to salt water to spawn; and amphidromy, moving between the two environments for purposes other than spawning. See id.
Historically, there have been three types of international rules and proposed rules for stewarding living marine species with each one defining a level of control or ownership: free access to these species; joint control of these species; and international ownership of these species. All three view living marine species in terms of their consumptive resource value. The first of these is exemplified by fishing on the high seas. Exercising this freedom has resulted in significant diminution or extinction of marine species populations, and must therefore, be considered an inappropriate and ineffective rule. The second rule involves joint control by interested nation-states. Living marine species such as large cetaceans fall under this rule, as when whales are hunted by certain nations.

The inadequacy of the first two rules led to the third, that of declaring living marine resources international property of humankind. Even here, however, the focus remains on consumptive value. Determining a more effective regime for stewarding living marine species may be ascertained by asking several questions. First, in order to sustain a population, how many members of a species, and up to what size, may be harvested, or none at all? The answer demands an analysis of complex factors such as the carrying capacity of the oceans, climatic alternations, environmental inputs and stressors affecting the ocean’s ecosystem, and ethical concerns. The second question, regarding the proper allocation among various stakeholders, depends on how the first is answered. The final two questions reflect how the word “stakeholder” is defined. Does

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211 See id. at 451-486.
212 This article uses the terms “high seas” and “open ocean” interchangeably. The area of the high seas is defined by the United Nations Convention on the Law of the Sea, *opened for signature* Dec. 10, 1982, U.N. Doc. A/CONF.62/122, 21 I.L.M. 1261 (1982), *reprinted in* UNITED NATIONS, OFFICIAL TEXT OF THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA WITH ANNEXES AND INDEX, U.N. Sales No. E.83.V.5 (1983) [hereinafter 1982 Law of the Sea Convention]. Under the 1982 Law of the Sea Convention, a coastal state has jurisdiction over marine resources not only in its internal waters and territorial sea but also within its Exclusive Economic Zone (EEZ) which extends up to a maximum of two hundred nautical miles from a state’s shore. See *id.* arts. 3, 8, 57, 21 I.L.M. at 1272, 1280. The “high seas” are defined as “all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic state.” *Id.* art. 86, 21 I.L.M. at 1286.
213 See YABLOKOV, & OSTROUMOV, *supra* note 145, at 137.
214 See *id.* at 136.
215 See *id.* at 137.
the term "stakeholder" include living marine species themselves? If the answer to this question is yes, then should their inherent interests, their entitlements, be taken into account when developing a stewardship policy? Assessing the attitude of those humans involved in deciding the level of human impact on living marine species reveals what ultimately will be the guiding principles of stewardship.

Legal regimes currently in place to effectuate stewardship of living marine species are, for the most part, species specific and lack coherence and effective enforcement mechanisms. A recent drama underscores this ineffectiveness and illustrates the necessity for developing an effective strategy for stewarding living marine species. It depicts the explosive clash of economic and environmental pressures, international tension, and threatened violence among various stakeholders in deciding the fate of marine species. The players are Canada and the United States. Canada has the world's longest coastline with some 151,484 miles and the second largest continental shelf encompassing some four million square miles. The United States' coastline is 12,300 miles and its territorial sea includes more than 3.4 million square miles. The stage was set for a crisis when, in the spring of 1997, Canadian and United States representatives of the Pacific Salmon Commission walked away from the table without deciding the issue of the annual permitted catch. Canadian commercial fishers claimed that in the absence of limits, Alaskan fishers harvested more than five hundred thousand sockeye

216 See id. There are over eighty international agreements pertaining to the rational utilization of the natural resources of the oceans. See id.

217 See id. at 137-38.

218 See CICIN-SAIN & KNECHT, supra note 181, at 309.


220 See CICIN-SAIN & KNECHT, supra note 181, at 316.


222 The Pacific Salmon Treaty of 1985 established the Pacific Salmon Commission to manage activities in the salmon fisheries within two hundred miles of the western coasts of Canada and the United States. See Pacific Salmon Treaty, Jan. 28, 1985, U.S.-Can., T.I.A.S. No. 11091. The purpose of the Commission is to "advise the Parties on any matters relating to the Treaty." Id. art. II, para. 8. It includes one Canadian Section and one U.S. Section, each of which has one vote. See id. art. IV, para. 1, art. II para. 6. The Commission oversees the efforts of three geographically-based fishery management panels, reviews their reports, and makes recommendations. See id. art. II, para. 18, art. IV para. 5.

salmon, as they swam through Alaskan waters on their way south to Canada to spawn. This was more than three times the amount ever allowed under the Pacific Salmon Treaty. In an attempt to protect their own share of the salmon, Canadian fishers responded first with public protests and threats of violence. Then, on July 19, 1997, the fishers took action. A flotilla of Canadian fishing boats blockaded an Alaska-bound United States ferry with three hundred aboard as it left its port in Prince Rupert, British Columbia. Only after three days of intense negotiations was the ferry finally permitted to depart. The incident provides an acute example of each nation's attempt to ensure sustainability of marine species. At the same time, such drama illustrates the exigency for significant change in the stewardship of and attitude towards living marine species. The incident also exemplifies the frustrations of coastal nations over their apparent inability to check over-fishing.

A look at the major legal schemes reveals a pastiche of overlapping and even contradictory regimes. Most are species-specific. Of these, a few address both target and non-target species protection or conservation. All do little more than tinker with issues and none encompasses a global vision for the marine ecosystem.

1. Regimes for Stewarding Living Marine Species

a. Major International Regimes

Two international bodies are the primary progenitors of marine environmental law: the United Nations (UN) and its agency, the International Maritime Organization (IMO). The UN does not have a long history of environmental emphasis. With the exception of the

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225 See McGinn, supra note 84, at 59. For a discussion of the Pacific Salmon Treaty, see infra notes 516-524 and accompanying text. See also, DePalma, supra note 223.
226 See Egan, supra note 224.
227 See id.; DePalma, supra note 223.
228 See Egan, supra note 224.
229 See DePalma, supra note 223.
International Convention for the Regulation of Whaling (ICRW) signed in 1946, the United Nations prior to 1972 passed few international environmental agreements. It may be plausibly argued that the International Convention for the Regulation of Whaling should never be construed as an environmental law but rather an economic regime supporting the whaling industry.

In 1972, the United Nations declared itself committed to environmental issues. Members of the United Nations have subsequently enacted several significant environmental conventions addressing the marine environment. Only a small number require substantive commitment by signatories or have monitoring or enforcement mechanisms.

The IMO, formerly called the Intergovernmental Maritime Consultative Organization (IMCO), was established by a convention adopted at a 1948 conference in Geneva and it began functioning in 1958, when the convention entered into force. It is the organization on which the maritime world traditionally depended for promulgating accident avoidance schemes through vessel construction, equipment, and safety.

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233 See, e.g., D'Amato & Chopra, supra note 144, at 21.


237 See the IMO website (visited March 11, 1999), <http://www.imo.org/imo/introd.htm>.
standards. More recently, the IMO has begun to address pollution problems vigorously.

Protection regimes for living marine species can be subsumed into several categories. The first category includes those international and United States federal regimes designed to protect marine species directly. The second category includes those regimes that indirectly protect them through specific pollution prevention and response initiatives. The final category consists of voluntary codes and management strategies that either directly address living marine species or can be applied to stewardship strategies. These categories are by no means entirely separate. However, each is addressed independently with major protection provisions highlighted. Where applicable, the first date after each regime indicates the year the regime was opened for signature while the second represents the year of entry into force.


In response to increasing jurisdictional squabbles over decreasing marine bounty came a clarion call for a regime to clearly delineate the rights and duties of coastal and flag states toward living marine species. The call was answered in the form of the 1982 Convention on the Law of the Sea. Provisions for protection of living marine species on the high

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238 See id.
240 For purposes of this section only, the term “protection” is used to describe generically those regimes that may emphasize conservation and, in some instances, sustainability.
241 For example, certain global issues such as climate change defy neat categorization.
242 See 1982 Law of the Sea Convention, supra note 212.
243 The fundamental basis for the rights of freedom of the seas and navigation under international law is the concept that a vessel has a nationality which has been conferred upon it by a state. See THOMAS J. SCHOENBAUM, ADMIRALTY AND MARITIME LAW 46-47 (1987). See also, S.S. Lotus (Fr. v. Turk.), 1927 P.C.I.J. (Ser. A) No. 10, at 25 (Sept. 7) (holding that a state enjoys exclusive jurisdiction over its flag vessels in the absence of an exception sanctioned under customary international law; and a ship navigating the seas may sail only under the flag of the nation in which it is registered).
seas in general are found in Articles 117 and 118. An agenda for stewardship of fish populations is found in Articles 55-75 for species in an EEZ and Articles 86-120 for species in the high seas. For example, coastal states and states fishing for straddling stocks are directed to agree on the proper allocation of straddling stocks both within the EEZ and beyond and distant to it in Article 63. States fishing for highly migratory species must cooperate in order to conserve these fisheries and optimize utilization according to Article 64. Article 116 ensures the right to fish on the high seas subject to treaty obligations while Article 119 addresses maximum sustainable yields for fish stocks and the requirement of considering the special needs of developing nations. Marine mammal conservation is the focus of Articles 65 and 120. The conservation of sedentary species is addressed in Articles 76 and 77.

The 1982 Law of the Sea Convention represents a solid first step in articulating rights and duties of states and providing a general framework for conservation. Unfortunately, these provisions are too vague and have little strength. There is no enforcement mechanism as the duties are not binding on a party. Conservation is described in general terms but the interconnectedness and interdependency of the ecosystem are never addressed. Thus, it falls woefully short of providing the muscle, direction, and vision needed for stewardship of marine species and their ecosystems.

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244 See 1982 Law of the Sea Convention, supra note 212, arts. 117-18.
245 See id. arts. 55-75. For the official designation of the EEZ as an area defined by the United Nations Convention on the Law of the Sea, see supra note 212.
246 See id. arts. 86-120.
247 See id. art. 62(2).
248 See id. art. 116.
249 See id. art. 119 (1), (2).
250 See Davis, supra note 80, at 164.
251 See id.
252 See id.

The ICRW represents the attempt of fifteen nations to achieve "the optimum level of whale stocks . . . to make possible the orderly development of the whaling industry." Conservation was equated with optimal commercialization. The United States was a founding member in this organization. The International Whaling Commission (IWC) is the agency authorized to carry out the goals of the ICRW including providing guidance on catch quotas and to identifying methods and levels of exploitation of specific species. The IWC is composed of one commissioner from each contracting government and various experts and advisors. An international inspectorate established by member countries enforces the provisions.

There are several major weaknesses of the IWC. First, the IWC lacks power to sanction nations for the violation of harvest quotas. Secondly, any member nation can "opt-out," or escape the effects of IWC regulation by simply filing an objection. For example, a nation may be

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254 See ICRW, supra note 253, pmbl., 62 Stat. at 1716-17. These members were Argentina, Australia, Brazil, Canada, Chile, Denmark, France, the Netherlands, New Zealand, Norway, Peru, the Union of South Africa, the Union of Soviet Socialist Republics, the United Kingdom, and the United States. See id. at 1716.
256 Currently, over 40 nations have ratified the ICRW and become members of the IWC. See 1985 TREATIES IN FORCE 311.
260 See ICRW, supra note 253, art. IX, 62 Stat. at 1720.
261 See id. art. V, para. 3(c), 62 Stat. at 1719 ("[Any] amendment [to the ICRW] shall become effective with respect to all Contracting Governments which have not presented
excused from complying with an amendment to a harvest quota if the nation files a timely objection to the amendment. Another avenue is for a nation to leave the IWC. Any contracting party may withdraw. The worldwide ban by the IWC on for-profit hunting in 1986 is illustrative. This moratorium represented what a minority of members felt was a fundamental change brought about by the majority and they questioned the legitimacy of the IWC. However, the effect of the moratorium could be avoided simply by opting out or by leaving the IWC. Such alternatives reduce the effectiveness of the regime.

The opt-out system is an unrealistic mechanism because it undermines a regime's goal of developing regulatory uniformity. It forces the contracting parties effectively to become members of separate agreements because over time, as parties exercise their right to opt out of various amendments, different parties will end up having different legal obligations to the regime.

Indeed, this severe reversal from the IWC's original priorities led to just such action: Iceland withdrew from the IWC; Norway resumed whaling. Japan based resumption of its whaling on the grounds that whale meat is a traditional Japanese food and therefore a part of Japanese culture.

See ICRW, supra note 253, art. XI, 62 Stat. at 1721.
See, e.g., Caron, supra note 147, at 155 (1995).

The fervor of nations' commitments to their respective positions continues. On June 28, 1996, Norway left an IWC international conference in protest at a motion condemning its hunt of minke whales. The resolution called on Norway to reveal the size of its stockpiles of whale-meat and blubber, and to describe its actions for curbing illegal trade. Norway protested that inquiries into internal trade practices were outside the authority of the IWC. See Jenny Booth, Norwegian Blow-out in Protest at Minke Motion, SCOTSMAN, June 29, 1996, at 8. On Norway's side were statistics accepted by the IWC scientific committee giving a much higher estimate of the stocks of minke in the northeast Atlantic. See Charles Clover, Norwegian Protest at Call to Stop Whaling, THE DAILY TELEGRAPH, June 29, 1996, at 6.

See, e.g., Caron, supra note 147, at 161 n.45; Kazuo Sumi, The "Whale War" Between Japan and the United States: Problems and Prospects, 17 DEN. J. INT'L L. &
Several pro-whaling nations formed the North Atlantic Marine Mammal Commission (NAMMCO), an alternative to IWC, and advocated sustainable commercial whale hunting.\textsuperscript{267} Iceland, described as “an IWC renegade,” spearheaded this “breakaway regional group.”\textsuperscript{268} Its members also include Norway\textsuperscript{269} and Greenland.\textsuperscript{270}

iii. Fish Populations


\textsuperscript{268} Booth, \textit{supra} note 265. The Faeroe Islands were particularly dismayed with the IWC’s role in discussion of pilot whales. Pilot whales are too small to be protected by the rules of the IWC. It is estimated that the Faeroe islanders killed nearly 500 pilot whales in their first traditional hunt of 1996. \textit{See id.} They hold a non-commercial hunt, called a grindarap, of small pilot whales each year. Meat and blubber from the hunts are distributed free of charge to islanders. \textit{See} Richard Holledge, \textit{The Wilder Shores: The whale-hunters of the Faeroes have their own style of living, well adapted to these rugged, bird-haunted northern islands}, \textit{The INDEPENDENT (LONDON)}, Apr. 9, 1997, at 23. The method of killing—schools of pilot whales are driven into bays and killed by hand, with men wielding whaling knives—has been opposed by various welfare groups. \textit{See, e.g.}, Richard O’Mara, \textit{World Ban on Whaling to Continue Environment: But an International Whaling Commission Compromise May Lead to a Lifting of the Moratorium Next April}, \textit{L.A. TIMES}, July 4, 1992 at 1.

\textsuperscript{269} Norway’s whalers ended the 1998 hunting season with a kill of 624. This was short of the quota of 671 allowed by the government. \textit{See Whalers Fail to Meet Quota}, \textit{FIN. TIMES}, Aug. 19, 1998, at 1, available in LEXIS, News Library, Cumws File. This quota was the highest since Norway resumed whaling in 1993.

\textsuperscript{270} NAMMCO’s seat is in Tromsø, Norway. \textit{See} Hoel, \textit{supra} note 267, at 120. Greenland and the Faeroe Islands are semi-autonomous Danish territories.

Because this methodical document is refreshingly new in its stewardship perspective, it requires additional scrutiny. Participants to the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro (referred to as the Earth Summit) agreed to address the specific issue of straddling and highly migratory fish stocks. Fish stocks may "straddle" the boundary between domestic and international waters. Highly migratory species migrate through both the coastal state's EEZ and the high seas during their life span. Who has control over these fish is problematic because fish do not observe international ocean boundaries.

Under the Straddling Stocks Agreement, the requirement of cooperation frequently forms the basis of the obligations delineated and examples of what constitutes cooperation is provided. Regional and sub-regional organizations are charged with developing the substantive strategy for halting the diminution of fish populations. The Straddling

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273 Migration has been described as a "cyclical, and therefore predictable, phenomenon whereby certain animals perform periodic movements between two separate geographic areas, one area usually being where they breed." See Cyril De Klemm, Migratory Species in International Law, 29 NAT. RESOURCES J. 935, 935 (1989). Highly migratory species include most tuna species, swordfish, marlin and other billfish, and some sharks. Some fish stocks appear to swim between the definitions: "The Chilean horse mackerel, which straddles 1,500 miles off the EEZ of Chile and Peru, is a particular case of a straddling stock that might, from the biological standpoint, be as highly migratory in nature as some of the smaller tuna listed in the 1982 [Law of the Sea] Convention." Some High Seas Fisheries Aspects Relating to Straddling Fish Stocks and Highly Migratory Fish Stocks, U.N. Food & Agricultural Organization, U.N. Doc. A/CONF.164/INF/4 at 2 (1993).

274 Migratory and straddling species account for roughly 20% of the total marine catch and include some of the most ecologically valuable fish populations. See Peace on the High Seas?, NEW SCIENTIST, Aug. 5, 1995, available in LEXIS, News Library, Arcnws File.

275 See Straddling Stocks Agreement, supra note 271, art. 5.

276 See id. arts. 19-23.
Stocks Agreement calls on both coastal and inland states to "apply the precautionary approach widely to conservation, management and exploitation of straddling fish stocks and highly migratory fish stocks in order to protect the living marine resources and preserve the marine environment."²⁷⁷

Not only does the Straddling Stocks Agreement echo the principles of conservation and cooperation found in the 1982 Law of the Sea Convention, but it also adds three vital components to successful stewardship of marine species: enforcement and sanctions; compulsory dispute settlement; and protection of non-targeted, non-commercial valued species. Enforcement and sanctions are specific. Non-flag states who are parties to the Agreement have the authority to board vessels of other parties fishing on the high seas to ensure compliance with sub-regional or regional initiatives.²⁷⁸ When a state detects a violation by its flagged vessel, sanctions must be applied that are "adequate in severity to be effective in securing compliance . . . and shall deprive offenders of the benefits accruing from their illegal activities."²⁷⁹ Serious violations may result in ordering a fishing vessel to port.²⁸⁰ Under the compulsory dispute settlement provision, unresolved disputes may result in the submission of information to a third-party dispute settlement tribunal, either established by the parties as they see fit or provided in the mechanisms of the 1982 Law of the Sea Convention, which is incorporated by reference.²⁸¹ The Straddling Stocks Agreement requires states to minimize the catch of non-

²⁷⁷ Id. art. 6. The precautionary approach (also referred to as the precautionary principle) is one response when there is scientific uncertainty about future harm. The approach lowers the burden of proof required for taking action against proposed or existing activities that may have serious long-term harmful consequences. Definitions and parameters vary with specific treaty context. Incorporation of the precautionary principle is found in the Preamble to Biodiversity Convention: "Where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat." United Nations Convention on Biological Diversity, opened for signature June 5, 1992, pmbl., 31 I.L.M. 818 (entered into force Dec. 29, 1993) [hereinafter Biodiversity Convention].

²⁷⁸ See Straddling Stocks Agreement, supra note 271, art. 14 (port States are authorized to board and inspect vessels voluntarily entering their ports), art. 17 (port States may maintain control over a suspected vessel while the port State's authorities inform the ship's respective flag State).

²⁷⁹ Id. art. 19(2).

²⁸⁰ See id.

²⁸¹ See id. art. 30.
targeted species harvested with commercially valued fish and must protect endangered species to “the extent practicable.” States must also assess activities other than fishing on these non-targeted species.

As novel and forceful as the Straddling Stocks Agreement provisions are, there remain serious flaws. The Straddling Stocks Agreement stops short of addressing two significant areas. First, the majority of fish are harvested within a country's EEZ. Even though coastal states must apply general principles of conservation and precautionary approach techniques within their respective EEZ, the Straddling Stocks Agreement is restricted in its application within national jurisdiction. Second, it does not address a major cause of fish stock depletion: over-capitalization of the world's fishing fleets.

(b) The Kyoto Declaration and Plan of Action on the Sustainable Contribution of Fisheries to Food Security (Kyoto Declaration), 1995

Under the Kyoto Declaration, ninety-five nations committed themselves to enact national laws and regulations to promote sustainable fisheries. The Declaration encourages states to adhere to the FAO's 1995 Code of Conduct for Responsible Fishers and to consider becoming parties to the 1982 Law of the Sea Convention, the 1993 FAO Compliance Agreement, and the 1995 Fish Stocks Agreement. It also encourages a precautionary approach.

See id. art. 5(f).
Id. art. 5(d).
See De Klemm, supra note 273, at 946.
See Straddling Stocks Agreement, supra note 271, art. 6.
This agreement prohibits fishing for anadromous fish,\textsuperscript{295} those fish that ascend rivers during certain seasons for purposes of breeding (e.g., salmon and steelhead trout) but spend most of their lives in the high seas of the North Pacific Ocean.\textsuperscript{296} The goal is to conserve these stocks for coastal countries to fish within their 200-mile EEZ, preserving the benefits for states-of-origin.\textsuperscript{297} The Convention established the North Pacific Anadromous Fish Commission (NPAFC) to promote the conservation of salmon in the North Pacific\textsuperscript{298} and to oversee oceanic research and international cooperation on fishing issues.\textsuperscript{299} Signatories who find vessels fishing illegally may bring those vessels into the enforcing country's ports and turn the violators over to the appropriate authorities in their home country for prosecution.\textsuperscript{300} The Convention prohibits trafficking in illegally caught salmon\textsuperscript{301} and the re-flagging of vessels under a non-signatory country's flag to avoid the ban on high seas fishing.\textsuperscript{302} It replaced the International Convention for the High Seas Fisheries of the North Pacific Ocean,\textsuperscript{303} which terminated in 1993.\textsuperscript{304}

\textsuperscript{293} See id. para. 10.
\textsuperscript{295} See id. art. III.
\textsuperscript{296} See id. art. I. "Anadromous Fish" are defined as "the fish of anadromous species . . . which migrate into the Convention Area." Id. art. II.
\textsuperscript{297} See id. pmbl.
\textsuperscript{298} See id. art. VIII.
\textsuperscript{299} See id. arts. VIII-IX.
\textsuperscript{300} See id. art. V.
\textsuperscript{301} See id. art. III(3).
\textsuperscript{302} See id. art. IV(3).
\textsuperscript{303} Convention for the High Seas Fisheries of the North Pacific Ocean, May 9, 1952, 4 U.S.T. 380, 205 U.N.T.S. 65 [hereinafter INPFC].
\textsuperscript{304} The purpose of this Convention was to promote and coordinate scientific studies relating to the fishery resources of the North Pacific Ocean and to conserve those resources. See id. pmbl., 205 U.N.T.S. at 80. It established the International North Pacific Fisheries Commission (INPFC). See id. art. II, 205 U.N.T.S. at 82.
(d) The Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (FAO Compliance Agreement), 1994

This is considered an integral part of the non-binding 1995 UN FAO's International Code of Conduct for Responsible Fisheries. It also builds upon the legal framework established by the 1982 United Nations Convention on the Law of the Sea. The compliance agreement is designed to clarify and expand the rights and duties of states whose vessels fish on the high seas. Imposed on all states whose vessels fish on the high seas is the obligation to ensure that those vessels fish in a manner that is consistent with conservation and management efforts. States must implement a licensing program or another form of authorization for their vessels to fish on the high seas. The authorization can only be granted if the state can effectively exercise its responsibilities under the agreement with respect to each of its vessels. Parties must maintain detailed records on the vessels they authorize to fish on the high seas. This information must be submitted to the FAO for inclusion in a global registry of high seas fishing vessels. If a party has reason to believe that the vessels of another state are fishing in a manner that undermines the effectiveness of international conservation and management measures, it must report such information to the flag state. The information may also be reported to the FAO.

308 See FAO Compliance Agreement, supra note 305, pmbl., 33 I.L.M. at 969-70.
309 See id. art. III (1)(a), 33 I.L.M. at 971.
310 See id. art. III (2), 33 I.L.M. at 972.
311 See id. art. III (3), 33 I.L.M. at 972.
312 See id. art. IV, 33 I.L.M. at 973.
313 See id. art. VI, 33 I.L.M. at 974-76.
314 See FAO Compliance Agreement, supra note 305, art. VI (8)(b), 33 I.L.M. at 975-76.
315 See id.

The Convention requires member nations to make decisions based on the best available information provided by the International Council for the Exploration of the Sea (ICES).\(^\text{317}\) The ICES is pivotal in ensuring a cooperative approach to protecting and enhancing Atlantic salmon.


Under the 1978 Convention, seal species are protected from overexploitation.\(^\text{319}\) However, with few exceptions, the 1978 Convention does not ban hunting.\(^\text{320}\) Protective reserves are established where seals are not to be captured.\(^\text{321}\)

v. The Agreement on the Conservation of Polar Bears, 1973, 1976\(^\text{322}\)

Five nation-states\(^\text{323}\) whose territories are in the range of Beaufort Sea polar bears, signed an agreement in 1973 with the goal of conserving polar bears.\(^\text{324}\) The agreement restricts human taking or harvesting of polar bears and commits the parties to take steps to protect the habitat of these bears.\(^\text{325}\) Cooperation and sharing of scientific research is also required.\(^\text{326}\)


\(^{317}\) See id. art. 9, 35 U.S.T. at 2290, 1338 U.N.T.S. at 37-38.


\(^{319}\) See 1978 Convention, supra note 318, art. 2, 29 U.S.T. at 444.

\(^{320}\) See id. arts. 2, 4, 29 U.S.T. at 444-45.

\(^{321}\) See id. art. 3(1)(d) & (e), 29 U.S.T. at 444.


\(^{323}\) These are Canada, Denmark/Greenland, Norway, Russia (then the Soviet Union), and the United States. See id. pmbl., 27 U.S.T. at 3921.

\(^{324}\) See id.

\(^{325}\) See id. arts. I, II, 27 U.S.T. at 3921. Exceptions are listed in Article III.

\(^{326}\) See id. art. VII, 27 U.S.T. at 3922.
vi. *Migratory Birds*

Several Conventions address migratory bird populations.

(a) *The Convention Between the United States and Great Britain (For Dominion of Canada) For the Protection of Migratory Birds in the United States and Canada, 1916, 1916*327

This bilateral Convention lists broad categories of species.328 It encourages the establishment of refuges to enhance conservation efforts.329 Enforcement mechanisms are not provided.330 The Protocol of 1979,331 which provides an exception for taking by indigenous populations, is not in force.332

(b) *The Convention Between the United States of America and the United Mexican States for the Protection of Migratory Birds and Game Mammals, 1936, 1937*333

This bilateral Convention lists individual species334 and encourages the establishment of refuges to enhance conservation efforts.335 Enforcement mechanisms are not provided.336 A supplemental agreement

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328 See 1916 Convention, supra note 327, art. I, 39 Stat. at 1702-03.

329 See id. art. IV, 39 Stat. at 1704.

330 See generally, id.


332 See id.


334 See id. art. IV, 50 Stat. at 1313.

335 See id. art. II(B), 50 Stat. at 1312.

336 See generally, id.
in 1972 added to the list of birds referenced in Article IV of the Convention.\textsuperscript{337}

(c) The Convention Between the Government of the United States of America and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment, 1972, 1972\textsuperscript{338}

The 1972 Convention lists individual species.\textsuperscript{339} It does not provide enforcement mechanisms.\textsuperscript{340} An amendment in 1974 provides a list of endangered bird species in Japan and the United States.\textsuperscript{341}

vii. Driftnets

The United Nations passed two resolutions calling for the reduction of driftnet fishing.

(a) The United Nations General Assembly Resolution on Large-Scale Pelagic Driftnet Fishing and its Impact on the Living Marine Resources of the World's Oceans and Seas (Pelagic Driftnet Fishing I), 1989\textsuperscript{342}

In 1989, the U.N. adopted Resolution 44/225, Pelagic Driftnet Fishing I, with the goal of reducing driftnet fisheries.\textsuperscript{343} The resolution described large-scale pelagic driftnet fishing as "a method of fishing with

\textsuperscript{339} See id. annex, 25 U.S.T. at 3337.
\textsuperscript{340} See generally, id.
\textsuperscript{343} See generally, id.
a net or combination of nets intended to be held in a more or less vertical position by floats and weights, the purpose of which is to enmesh fish by drifting on the surface of or in the water.\footnote{\textit{id.} at 147, 29 I.L.M. at 1556.} The resolution called for regulatory measures that would take account of the best scientific data available.\footnote{See \textit{id.} at 148, 29 I.L.M. at 1558.} A moratorium was called for on all large-scale pelagic driftnet fishing by June 30, 1992, with exceptions as necessary.\footnote{See \textit{id.}.} Both reduction of driftnet fishing in the Pacific and halting expansion of driftnet fishing in other areas were the goals.\footnote{See \textit{id.}.}


The 1982 Law of the Sea Convention provisions place an obligation on nations to protect and preserve the marine environment.\footnote{See 1982 Law of the Sea Convention, \textit{supra} note 212.} After scientific review found that driftnet fishing had an adverse impact on the conservation and sustainable management of living marine resources,\footnote{See Pelagic Driftnet Fishing II, \textit{supra} note 348, 31 I.L.M. at 242.} in 1991, the U.N. adopted Resolution 46/215, Pelagic Driftnet Fishing II, which called for a more general moratorium on driftnet fishing even if the moratorium would cause adverse socio-economic consequences.\footnote{See \textit{id.}.} Beginning January 1, 1992, members were required to reduce large-scale pelagic high seas driftnet fisheries by reducing the number of vessels involved, reducing the length of the nets used, and reducing the areas open for fishing.\footnote{See \textit{id.}} The number of driftnet fisheries
was supposed to have been reduced by fifty percent by June 30, 1992, with the global moratorium fully implemented by December 31, 1992. Even though the Resolution is not legally binding, patrols by the United States Coast Guard in the north Pacific Ocean have shown the effectiveness of the moratorium.


CITES was ratified in 1975 and addresses the export, import, and transit of certain species of wild animals and plants. Trade in species listed under CITES is restricted. All cetacean species (whale and dolphin) are currently listed in either Appendix I (endangered) or Appendix II (threatened) of CITES. Appendix I lists the gray, blue, humpback, bowhead, and right whales. All other cetacean species are listed in Appendix II. Other marine mammals such as sea lions, walrus, marine otters, manatees, sea turtle and dugong and certain terrestrial fauna and flora are also protected.


The CCAMLR's goal is to sustain marine diversity. "evidences the developing views on conservation,” and a “more ecological

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353 See id.
354 See id.
356 See generally, id.
357 See generally, id.
358 See id.
359 Convention on the Conservation of Antarctic Marine Living Resources, Apr. 7, 1982, U.S.-Austl. 33 U.S.T. 3476 [hereinafter CCAMLR]. The area is bounded in the north by the latitude 60 degrees south and by the Antarctic Convergence which partially extends beyond 60 degrees south. See id. art. IV, 33 U.S.T. at 3479. The Antarctic Convergence is the circumpolar zone, a natural boundary between cold Antarctic waters moving north and warm subtropical waters moving south, and is a line joining the following points along parallels of latitude and meridians of longitude: 50 S, 0; 50 S, 30 E; 45 S, 30 E; 45 S, 80 E; 55 S, 80 E; 55 S, 150 E; 60 S, 150 E; 60 S, 50 W; 50 S, 50 W; 50 S, 0. See id. art. I(4), 33 U.S.T. at 3479.
360 See id. art. I, 33 U.S.T. at 3478-79.
approach to management." Measures to prevent a decrease of target species populations below their level of maximum sustainable yield as well as to impose limits on by-catch of non-target species are required. The impact of harvesting on non-target species and the ecosystem as a whole is considered.

x. Antarctic Treaty, 1959, 1961

The treaty was designed to ensure that this region, which represents about ten percent of the Earth's surface and plays a central role in regulating the Earth's environmental processes, would be used exclusively for peaceful purposes and to promote cooperation in scientific research. Article IX(1)(f) of the Treaty refers to the "preservation and conservation of living resources in Antarctica." In 1972, the Convention for the Conservation of Antarctic Seals grew out of this treaty on the recommendation of the Antarctic Treaty Consultative Party group (ATCPs). Protection of the Antarctic by the parties to the Treaty include both direct and indirect measures.

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362 See CCAMLR, supra note 359, art. II(3), 33 U.S.T. at 3479. This protects the over-harvesting of krill, a vital link in the Antarctic food chain.  
363 See id.  
366 See Major Victory for the Antarctic, Field Notes, FOCUS, Mar.-Apr. 1998, at 3.  
370 Examples of direct measures protecting the Antarctic can be found in Article I (restricting military use of Antarctica) and Article V (prohibiting nuclear explosions and disposal of hazardous waste). See Antarctic Treaty, supra note 364, arts. I, V, 12 U.S.T. at 795, 796, 402 U.N.T.S. at 72, 76. Indirect measures include Articles II and III, regarding the sharing of scientific information. See id. arts. II, III, 12 U.S.T. at 795-96, 402 U.N.T.S. at 74.
In 1998, the Environmental Protection Protocol to the Antarctic Treaty took effect, proclaiming the continent to be a natural reserve devoted to peace and science. First approved in 1991 by the twenty-six leading nations with scientific interests in the region, including the United States, Russia, China, India, Japan, Argentina, Brazil and most major European nations, the treaty bans mining and mineral exploration for at least fifty years. Nations with scientific operations on the continent are required to remove garbage and reclaim old dumps; the treaty prohibits pets, including dogs. Tourist ships and scientific stations can no longer discharge raw sewage into Antarctica's waters. Pesticides, polystyrene packaging and non-sterile soil can no longer be brought to Antarctica and all significant experiments and building projects on the continent will require environmental impact statements.


Established in 1902 as a result of conferences held in 1899 and 1901, this is the oldest intergovernmental marine science organization. Formal recognition as a Convention occurred in 1964. Fostering international cooperative scientific studies is the goal of the ICES. The Council's principal functions include the promotion and encouragement of research and investigations for the study of the sea particularly related to its living resources. The work of ICES covers the broad areas of fisheries, oceanography, and environmental sciences. An example of

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372 See Rogers, supra note 365.
373 See id.
374 See Kearns, supra note 371.
375 See Rogers, supra note 365.
376 See id.
378 See id. pmbl.
379 See NOAA, supra note 235, at J4.
380 See ICES, supra note 377, at 238.
381 See id. art. I.
382 See id.
383 See NOAA, supra note 235.
these studies is the promulgation of suggested guidelines for exotic fish introduction.384

Contracting parties include: Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, the Netherlands, Norway, Poland, Portugal, Russia, Spain, Sweden, the United Kingdom and the United States.385 Scientific Observer status was granted to Australia, South Africa, and Greece.386 Lithuania applied for membership in 1997.387 A Protocol in 1970 provided additional procedural articles.388

xii. Wetlands: Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention), 1971, 1975389

The Convention is one of the first international treaties designed to protect habitat and is the only international accord dedicated to the conservation and protection of wetlands.390 Each signatory is obligated to “designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance”391 and to “promote the conservation of wetlands and waterfowl by establishing nature reserves on wetlands.”392 Under the convention, wetlands include a wide variety of habitats such as coastal lagoons, mangroves, and coral reefs.393 Also included are “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt,

385 See NOAA, supra note 235, at J4-J5.
386 See id. at J5.
387 See id.
390 See NOAA, supra note 235, at J10-J11.
391 Ramsar Convention, supra note 389, art. 2(1), T.I.A.S. No. 11,084, 996 U.N.T.S. at 246.
392 Id. art. 4(1), T.I.A.S. No. 11,084, 996 U.N.T.S. at 247.
393 See NOAA, supra note 235, at J11.
including areas of marine water the depth of which at low tide does not exceed six metres.\textsuperscript{394}

xiii. General Biodiversity: Convention on Biological Diversity (Biodiversity Convention), 1992, 1993\textsuperscript{395}

The Biodiversity Convention was first signed at the 1992 Earth Summit in Rio de Janeiro.\textsuperscript{396} Since then, nearly 200 nations have either signed or ratified the agreement.\textsuperscript{397} The goal of the Biodiversity Convention is to stop the extinction of commercially useful wildlife and promote the "sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies."\textsuperscript{398} Nations are also encouraged to adopt the "precautionary principle" or approach.\textsuperscript{399}

\textsuperscript{394} Ramsar Convention, \textit{supra} note 389, art. 1(1), T.I.A.S. No. 11,084, 996 U.N.T.S. at 246-7.


\textsuperscript{396} Although more than 150 countries signed the treaty at the Earth Summit, it did not enter into force until 90 days after 30 countries ratified or agreed to abide by the treaty. \textit{See} The International Treaty to Protect the Diversity, Int'l Trade Rep. (BNA), Oct. 6, 1993, \textit{available in WL}, BNA-ITR database. On September 30, 1993, Mongolia became the thirtieth country to ratify the Convention; the Biodiversity Convention then went into effect 90 days later on December 29, 1993. \textit{See Chronological Summary: Events of 1993}, 5 COLO. J. INT'L ENVT'L. L. & POL'Y 181, 187 (1994).


\textsuperscript{398} Biodiversity Convention, \textit{supra} note 395, art. 1. Sustainable development has been defined as industrial development that meets the needs of the present while sustaining the quality of the environment so that future generations may meet their own needs. \textit{See}, \textit{e.g.}, \textit{DESIGN FOR ENVIRONMENT} 4 (Joseph R. Fiksel ed., 1996) (citing \textit{WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT, OUR COMMON FUTURE} (1987)).

\textsuperscript{399} For a definition of the precautionary principle, see \textit{supra} note 277.
b. "Major Regionally-Focused Regimes


Adopted in 1989 by a number of nations concerned about driftnet fishing in the South Pacific, the blueprint for this convention was the South Pacific Nuclear Weapon Free Zone Treaty. The Driftnet Convention 1989 and its protocol established a zone free of driftnet fishing. It provided the impetus for the United Nations recommendation establishing a global moratorium on all high seas driftnet fishing. Parties to the Convention agree to prohibit their nationals from fishing with driftnets in the specified area. The Convention also has two supplemental Protocols. The first prohibits a country's nationals from using driftnets, requires cooperation with other parties on managing albacore tuna within the Convention area, and requires appropriate enforcement measures. The second protocol is open only to Pacific rim countries and it requires parties to prohibit the use of driftnets in areas under their jurisdiction and to deny drifnet-fishing vessels access to their ports and facilities. The convention has been signed by small island nations of the South Pacific—the Cook Islands, Federated States of...
Micronesia, Kiribati, Marshall Islands, Nauru, Niue, Palau, and Solomon Islands, Tokelau, Tuvalu, and Vanuatu—as well as larger nations such as Australia, France, New Zealand, and the United States.\(^{410}\)

ii. Fisheries

A number of organizations and agreements created international fishery regulatory bodies.\(^{411}\) They reflect geographical and/or species-specific emphasis.\(^{412}\) They were created for the purpose of managing single species through setting and allocating catch quotas among the parties.\(^{413}\) In some instances, they have expanded management measures to include reduction of by-catch through improved technology and operations.\(^{414}\) In varying degrees, the regional cooperatives have met with some success.\(^{415}\)

iii. Preservation of the Halibut Fishing of the Northern Pacific Ocean and Bering Sea Convention, 1953\(^{416}\)

The Convention established the International Pacific Halibut Commission.\(^{417}\) Its success is due in part to the fact that only two States,

\(^{410}\) See id., 29 I.L.M. at 1450.


\(^{413}\) See David S. Ardia, Does the Emperor Have No Clothes? Enforcement of International Laws Protecting the Marine Environment, 19 MICH. J. INT'L L. 497, 520 (1998); Suzann Iudicello & Margaret Lytle, Marine Biodiversity and International Law: Instruments and Institutions that can be Used to Conserve Marine Biological Diversity Internationally, 8 TUL. ENVTL. L. J. 123, 134 (1994).

\(^{414}\) See Iudicello & Lytle, supra note 413, at 134.

\(^{415}\) See GLOBAL MARINE BIOLOGICAL DIVERSITY, supra note 15, at 230-34.


\(^{417}\) See id. art. III, 5 U.S.T. at 8.
Canada and the United States, are parties.\textsuperscript{418} Thus, consensus may be reached more easily. The Protocol of 1979\textsuperscript{419} amended the Convention to address the fact that Canada and the United States had established exclusive jurisdiction over fisheries within 200 nautical miles of their coasts.\textsuperscript{420} The Protocol also established specific limits on the number of halibut each country can catch.\textsuperscript{421}


The IATTC applies to fishing in the eastern tropical Pacific Ocean for yellowfin and skipjack tuna and tuna baitfishes.\textsuperscript{423} It established the first multilateral tuna organization, the IATTC Commission, to study the biology of the tunas and related species with a view to determining the effects that fishing and natural factors have on their population and to recommend appropriate conservation measures.\textsuperscript{424} The Commission developed the International Dolphin Conservation Program (IDCP) in 1976 with the goal of reducing by-catch of dolphins through monitoring dolphin mortality associated with the setting of purse seine nets deliberately around dolphins.\textsuperscript{425} In 1992, nations with tuna vessels operating in the eastern Pacific Ocean entered into the La Jolla Agreement which committed them to reduce dolphin mortality to insignificant levels with a goal of eliminating it entirely.\textsuperscript{426}

\textsuperscript{418} See id., 5 U.S.T. at 7.
\textsuperscript{419} Protocol Amending the Convention Between the United States of America and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea, Mar. 29, 1979, 32 U.S.T. 2483.
\textsuperscript{420} See id. at 2485.
\textsuperscript{421} See id. at 2493-94.
\textsuperscript{422} Convention for the Establishment of an Inter-American Tropical Tuna Commission, May 31, 1949, U.S.-Costa Rica, 1 U.S.T. 230 [hereinafter IATTC]. Although the IATTC Convention was originally concluded by the governments of Costa Rica and the United States, it is open to adherence by other nations. See id. at 239. Nations that have since chosen to adhere to the IATTC include: Ecuador, France, Japan, Nicaragua, Panama, Vanuatu, and Venezuela. See NOAA, supra note 235, at J9.
\textsuperscript{423} See IATTC, supra note 422, at 231.
\textsuperscript{424} See id. at 236-37.
\textsuperscript{425} See NOAA, supra note 235, at J9.
\textsuperscript{426} See Agreement for the Reduction of Dolphin Mortality in the Eastern Pacific Ocean, June 1992, 33 I.L.M. 936. This Agreement established an annually decreasing limit on

The Donut Hole Agreement establishes long-term measures for the conservation, management, and optimum utilization of the Aleutian Basin Pollock stock in the Central Bering Sea in the so-called donut hole, a small area of high seas encircled by the EEZs of Russia and the United States. Among other requirements, parties must specifically authorize their fishing vessels to fish for pollock in the Convention area. Vessels fishing for pollock in the “donut hole” are also required to use real-time satellite position-fixing transmitters and carry observers on board. This multinational fishing agreement has been joined by all states whose vessels fish the Convention’s geographical area for the protected species. An “opt-out” procedure is not provided for in the Donut Hole Agreement.

the total allowable dolphin mortality in the fishery to a level of less than 5,000 in 1999. The IDCP has already reached that goal. See id. See Marine Mammal Protection Act discussion, infra notes 445-472 and accompanying text.


428 See Dunlap, supra note 427, at 114.


431 The parties to the agreement are Japan, China, Republic of Korea, Poland, Russia and the United States. See 34 I.L.M. at 67; Dunlap, supra note 427, at 114. There are scant examples of similar, unified signatories to other treaties. See, e.g., Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries, Oct. 24, 1978, art. 12, S: EXEC DOC. T, 96th Cong., 1st Sess. (1979); International Convention for the Conservation of Atlantic Tunas, May 14, 1966, art. 8, 673 U.N.T.S. 63.

432 See generally, Donut Hole Agreement, supra note 427.

This multinational fishing agreement was organized in order to realize the 1982 Law of the Sea Convention principles for high seas fishing.434 All states whose vessels fish the targeted geographical area for the protected species have joined.435 The Northwest Atlantic Fisheries Organization (NAFO)436 was created pursuant to the Convention. NAFO manages ten important fish stocks, seven of which straddle the Canadian EEZ.437 Its Fisheries Commission is empowered to allocate fishing quotas within its region of operation.438

435 See NOAA, supra note 235, at J12.
436 It was formed in 1979 after the Northwest Atlantic coastal nations extended their fisheries jurisdictions. See Tobin Welcomes U.S. Entry into NAFO, CANADA NEWswire, Nov. 30, 1995, available in WL, Canwireplus Database. It was to provide for the conservation and management of fish stocks in the Northwest Atlantic located beyond Canada's 200-mile limit. See id. On November 3, 1995, President Clinton signed legislation authorizing the United States to join NAFO. See id. United States officials subsequently deposited the necessary documents to join NAFO on November 29, 1995. See id. Membership in NAFO requires the United States to stop its vessels from fishing in the NAFO area unless it has quotas. See id. The legislation provides the necessary legal authority for the United States to control its vessels in the NAFO area. See id. Admission of the United States raises to 16 the number of NAFO Contracting Parties. See id. The others are Canada, the EU (including Spain and Portugal), Bulgaria, Cuba, Denmark (for the Faeroe Islands and Greenland), Iceland, Japan, Korea, Norway, Poland, Romania, Russia, Estonia, Latvia and Lithuania. See id.
437 The straddling stocks include Grand Banks cod, three Grand Banks flounder and Grand Banks redfish, capelin, and squid. The NAFO high seas stocks are in an area known as the Flemish Cap and consist of cod, redfish, and American plaice. See NAFO Scientists Agree on Threat to Northern Cod, CANADA NEWswire, June 5, 1992, available in WL, CanWireplus Database.
438 See NAFO Convention, supra note 433, art. XI(4). Although the United States participated in early negotiations regarding the formation of NAFO, it became a contracting party only after the passage of the Straddling Stocks Agreement (discussed supra note 271). See Tobin Welcomes U.S. Entry Into NAFO, supra note 436. Implementation of the High Seas Fishing Compliance Act and all NAFO rules governing fishing in the NAFO-Regulatory Area are applicable to United States fishing vessels. See
The goal of the Convention is the conservation of tuna and tuna-like fish throughout the Atlantic Ocean and adjacent seas. However, it provides that: "[n]othing in this Convention shall be considered as affecting the rights, claims or views of any Contracting Party in regard to the limits of territorial waters or the extent of jurisdiction over fisheries under international law." This multinational fishing agreement has been joined by all states whose vessels fish the convention area for the protected species. The Convention establishes the International Commission for the Conservation of Atlantic Tunas (ICCAT) to promote tuna conservation and management. Conservation measures may be recommended to which contracting parties may object.

c) Major United States Federal Regimes

i. The Marine Mammal Protection Act (MMPA), 1972

The MMPA's goal is to ensure national and international protection of marine mammal species. The MMPA protects an entire class of...
living marine species and, with limited exceptions, imposes a general moratorium on the taking of marine mammals in order to protect and conserve marine mammals and to prevent the diminishment of the population stocks beyond a point where specific species may not recover.

The moratorium on and permit program for the taking of marine mammals are the heart of the MMPA. Any person is prohibited from taking any marine mammal in waters under the jurisdiction of the United States. The exceptions to this broad rule include instances where: a permit is obtained under the statute; the taking is provided for in an international treaty to which the United States is a party; or the taking is by an Alaskan native for subsistence purposes. The term “take” is defined broadly to include: “harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill.” The MMPA also establishes various prohibitions on the transfer, sale, possession and importation of marine mammals and marine mammal products. The MMPA makes it unlawful, except pursuant to a permit for scientific research, to import a marine mammal that is pregnant, nursing or less than eight months old, taken from a species or population stock designated by the Secretary as depleted, or taken in a manner deemed inhumane by the Secretary. Despite the MMPA's goal of reducing incidental takings to levels approaching zero mortality, the permit process allows for takings from non-depleted stock.

The MMPA created the Marine Mammal Commission to monitor marine mammal populations and to work with states, federal agencies, and foreign nations. Authority to enforce the MMPA is split between the

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447 A marine mammal is defined as any mammal that is morphologically adapted to the marine environment including sea otters, dolphins, seals, walruses and whales; or a mammal which primarily inhabits the marine environment, such as the polar bear. See id. § 1362(5).
448 See id. § 1361 (Supp. 1997).
449 See id. § 1371.
450 See id. § 1372(1).
451 See id. § 1372.
452 Id. § 1362(12).
453 See id. §§ 1371-1372.
454 See id. § 1372(b).
455 See id. §§ 1374, 1371(a)(5).
456 See id. §§ 1401-1404.
National Oceanic and Atmospheric Administration (NOAA)\textsuperscript{457} and the Secretary of the Interior.\textsuperscript{458} The Secretary is permitted to transfer management authority for a species of marine mammal to a state if the state satisfies certain requirements.\textsuperscript{459}

A number of international initiatives may be triggered by the MMPA. For example, the MMPA directs the Secretaries of Interior and Commerce through the Secretary of State to “initiate the amendment of any existing international treaty for the protection and conservation of any species of marine mammal to which the United States is a party in order to make such treaty consistent with the purposes and policies”\textsuperscript{460} of the MMPA. This provision also allows U.S. representatives to the International Whaling Commission to appeal for stronger whale protection measures.\textsuperscript{461} In addition, the MMPA authorizes the Secretary of State to enter into international agreements establishing a global moratorium on certain tuna harvesting practices that endanger dolphins.\textsuperscript{462}

Persons violating the MMPA are subject to civil and, if the violation is knowing, criminal penalties.\textsuperscript{463} A vessel involved in an unlawful taking is subject to seizure and forfeiture of its entire cargo as well as civil penalties.\textsuperscript{464} The language of the MMPA authorizes the Secretary of Commerce to consider habitat destruction and preservation in administering the Act.\textsuperscript{465} Shrimp trawls, hazardous materials release, point and non-point source discharges, and coastal zone development may be considered in the overall evaluation of marine mammal protection.\textsuperscript{466}

\textsuperscript{457} NOAA has authority over all members of the order Cetacea and, except for walruses, of the order Pinnipedia. See id. § 1362(11)(A).

\textsuperscript{458} The Secretary has authority over all other marine mammals unless otherwise identified. See id. § 1362(11)(B).

\textsuperscript{459} See id. § 1379(b).

\textsuperscript{460} Id. § 1378(a)(4).


\textsuperscript{463} See id. § 1375 (1972).

\textsuperscript{464} See id. §§ 1376-77.

\textsuperscript{465} See, e.g., id. § 1373(b); 140 CONG. REC. H2714 (daily ed. Apr. 26, 1994) (statement of Rep. Studds).

\textsuperscript{466} In enacting the MMPA, Congress noted that “the most pervasive and threatening [hazard facing marine mammals was] . . . degradation of the environment upon which they depend.” H.R. REP. No. 707-92 at 88 (1972), reprinted in 1972 U.S.C.C.A.N. 4144, 4147. See also, INTERAGENCY TASK FORCE ON PERSISTENT MARINE DEBRIS, REPORT OF THE INTERAGENCY TASK FORCE ON PERSISTENT MARINE DEBRIS 43, 51 (1988); Charles
In 1997, the MMPA was amended to implement an international agreement governing tuna fishing in the eastern tropical Pacific Ocean (ETP). The International Dolphin Conservation Program Act (IDCPA) revises current law by changing the definition of "dolphin safe" fishing methods for purposes of tuna labeling. In certain circumstances, the embargo on imported tuna caught with purse seine nets is retracted. The conservation program requires limits on dolphin mortality. The law requires the Secretary of the Interior to conduct a study to determine the population of stocks in the ETP and the effect of tuna fishing on these stocks.

ii. Fishing/Fisheries

(a) The Sustainable Fisheries Act (SFA), 1996

The SFA amended the Magnuson Fishery Conservation and Management Act by instituting a more aggressive federal management of the nation's fish populations. The SFA removes the discretion over the definition of overfishing, adds requirements to reduce by-catch and waste, and includes provisions protecting essential habitat for fisheries systems. If the Secretary of Commerce (the Secretary) determines that a fishery is "over-fished," she or he is required to immediately notify the appropriate regional fishery management council and give the council one


Id.

See id. § 5, 111 Stat. at 1126.

See id. § 5, 111 Stat. at 1125-26.

See id. § 4, 111 Stat. at 1124.

For a concise overview of the amendment, see Kristen M. Fletcher, U.S. Amends Tuna Dolphin Law, Water Log 4, 14.


year to develop a fishery management plan that ends overfishing and rebuilds the stock of fish. If the regional council fails to develop a plan within one year, the Secretary is required to prepare a plan within nine months. The plan must be within a time frame that is "as short as possible, taking into account the status and biology of any over-fished stock of fish . . . and the interaction of the over-fished stock of fish within the marine ecosystem," but must generally be accomplished in less than ten years. The regional council developing the fishery management plan is still responsible for specifying "objective and measurable criteria for identifying when the fishery . . . is over-fished."

The SFA includes a new national standard to minimize by-catch or mortality from by-catch. The SFA requires the identification of "essential fish habitat" within a timetable to be developed by the Secretary. Fishery management plans must "minimize to the extent practicable adverse effects upon such habitat . . . and identify other actions to encourage the conservation and enhancement of such habitat." The SFA requires that federal agencies review the consequences of their actions in or affecting a new regime of protected areas known as "essential fish habitat."

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477 "Over-fished" is defined as a rate of "fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis." See SFA, § 102(8), 110 Stat. at 3562. "Maximum Sustainable Yield" is defined as the largest average annual catch or yield that can be taken over a significant period of time from each stock under prevailing ecological and environmental conditions. See National Oceanic and Atmospheric Administration, 61 Fed. Reg. 32,538, 32,549 (to be codified at 50 C.F.R. pt. 602). A fishery shall be classified as approaching a condition of being over-fished if, based on trends in fishing effort, fishery resource size, and other appropriate factors, the Secretary estimates that the fishery will become over-fished within two years. See SFA, § 109(e)(1), 110 Stat. at 3584 (amending 16 U.S.C. § 1854(e)).

478 See id. § 109(e)(5), 110 Stat. at 3585 (amending 18 U.S.C. 1854(e)).
479 See id. § 109(e)(4), 110 Stat. at 3584-85 (amending 18 U.S.C. § 1854(e)).
480 Id. § 108(a), 110 Stat. at 3584-85 (amending 18 U.S.C. § 1853(a)).
481 See id. § 106(b), 110 Stat. at 3570 (amending 16 U.S.C. § 1851(a)).
482 Id. § 102(3), 110 Stat. at 3561 (amending 16 U.S.C. § 1802(10)) ("Essential fish habitats" are waters in which fish spawn, breed or develop to maturity.).
484 Id. § 108(a)(3), 110 Stat. at 3574 (amending 16 U.S.C. § 1853(a)(7)).
(b) The National Fishing Enhancement Act, 1984 (Artificial Reefs Act)\textsuperscript{486}

The goal of the Artificial Reefs Act is to promote and facilitate responsible and effective efforts to establish artificial reefs.\textsuperscript{487} States may apply to the Secretary of Transportation for obsolete ships that would be designated for scrap if the state intends to sink such ships for use as an offshore artificial reef for the conservation of marine life.\textsuperscript{488} Applications must include, among other things, a statement and estimate with respect to the conservation goals which are sought to be achieved by use of the ships and a certificate from the EPA stating that the vessel will be compatible with water quality standards and other appropriate environmental protection requirements.\textsuperscript{489}

(c) Fish and Wildlife Act, 1956, and associated provisions\textsuperscript{490}

This Act was promulgated with the recognition that resources are a living, renewable form of national wealth that is capable of being maintained and greatly increased with proper management, but equally capable of destruction if unwisely managed.\textsuperscript{491} In response, this Act authorizes the Secretary of Interior or the Secretary of Commerce to conduct investigations and prepare reports regarding fish and fish habitats in order to provide for the proposed development of fish resources.\textsuperscript{492}

(d) Fish and Wildlife Coordination Act, 1994\textsuperscript{493}

This Act gives the Secretary of the Interior broad authority to take action necessary for the conservation of fish and wildlife, including the acquisition of land or water through purchase or exchange.\textsuperscript{494} Wildlife conservation must receive equal consideration with other features of


\textsuperscript{489} See id. § 1220(b).

\textsuperscript{490} Fish and Wildlife Act, Pub. L. No. 84-1024, 70 Stat. 1119 (codified as amended at 16 U.S.C. §§ 742a-742k; 744-748; 750-73; 753a-753b; 754; 758-758d; and 760a-760g).


\textsuperscript{492} See id. § 744.

\textsuperscript{493} See id. §§ 661-666c (1994 & 1997 Supp.).

\textsuperscript{494} See id. § 663.
water-resource development. \(^{495}\) Federal permitting and licensing agencies must consult with the National Marine Fisheries Service (NMFS) and the Fish and Wildlife Service (FWS) before issuing a permit for activities that modify any body of water. \(^{496}\) The NMFS provides comments and recommendations to prevent loss of, and damage to, fish populations and their habitats. \(^{497}\)

(e) *Atlantic Coastal Fisheries Cooperative Management Act, 1993* \(^{498}\)

This Act was promulgated to address issues concerning “coastal fishery resources that migrate, or are widely distributed, across the jurisdictional boundaries of two or more of the Atlantic states [ranging from Maine to Florida] and of the Federal Government.” \(^{499}\) This interstate and state-federal compact supports and encourages the development, implementation, and enforcement of effective interstate conservation and management of Atlantic coastal fishery resources. \(^{500}\) The Secretary of Commerce, in cooperation with the Secretary of the Interior, is responsible for supporting the interstate fishery management efforts of the Atlantic States Marine Fisheries Commission (ASMFC). \(^{501}\) This Commission, one of three such Commissions in the United States, \(^{502}\) is charged with preparing and adopting an interstate “coastal fishery management plan[] to provide for the conservation of coastal fishery resources.” \(^{503}\) States are required to implement and enforce the plan. \(^{504}\) If the ASMFC determines that a state has failed to carry out its responsibilities or is out of compliance with its plans, the ASMFC may recommend action to the Secretary of Commerce, who must then declare a moratorium on fishing in the area in question within the waters of the non-complying state. \(^{505}\)

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\(^{495}\) See id. § 661.

\(^{496}\) See id. § 662(a).

\(^{497}\) See NOAA, supra note 235, at C41-42.


\(^{500}\) See id. § 5101(b).

\(^{501}\) See id. § 5103(a).


\(^{504}\) See id. § 5104(b).

\(^{505}\) See NOAA, supra note 235, at C38-39.
(f) **Central, Western, and South Pacific Fisheries Development Act, 1972**

This Act authorizes the Secretary of Commerce to carry out a program for the development of tuna and other latent fisheries resources of the Central, Western, and South Pacific Ocean with the Pacific Fisheries Development Foundation or other organization. The program includes exploration for and stock assessment of tuna and other fish; improvement of harvesting techniques; gear development; biological resource monitoring; and an economic evaluation of the potential for tuna and other fisheries in such areas.

(g) **Atlantic Salmon Convention Act, 1982**

This Act implements the Convention for the Conservation of Salmon in the North Atlantic Ocean. The Convention establishes a council. The United States is represented by three U.S. Commissioners. The Secretary of State may receive and act upon communications from the North Atlantic Salmon Conservation Organization. The Secretary of Commerce, in cooperation with the Secretary of the Interior and the Secretary of the department in which the Coast Guard is operating, promulgates regulations necessary to carry out the purposes and objectives of the Convention. The Act provides provisions for enforcement of its implementing regulations including criminal penalties.

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507 See 16 U.S.C. § 758e.
508 See id.
511 See id. art. III.
513 See id.
514 See NOAA, supra note 235, at C39.
515 See 16 U.S.C. § 3606(b)(2). Violation of regulations promulgated under the Act is punishable by criminal penalties of a fine of not more than $50,000 or imprisonment of up to six months.
(h) **Pacific Salmon Treaty Act, 1985**

This Act implements the Treaty Concerning Pacific Salmon between the United States and Canada. The Treaty addresses both conservation and international harvest allocation (also referred to as "equity"). Both Canada and the United States must conduct their fisheries programs to prevent overfishing and ensure that each receives benefits equal to the production of salmon originating in their respective waters. The Act authorizes the appointment of four U.S. Commissioners to the Pacific Salmon Commission: members of the Northern Panel, Southern Panel and Fraser River Panel, and members of an advisory committee. The Secretary of Commerce promulgates regulations necessary to carry out the United States' international obligations under the treaty and may preempt state or tribal law if necessary to fulfill the United States' obligations under the treaty.

(i) **Atlantic Tunas Convention Act, 1975**

This Act implements the International Convention for the Conservation of Atlantic Tunas, signed at Rio de Janeiro on May 14, 1966, which established the International Commission for the Conservation of Atlantic Tunas (ICCAT). The International Convention is one of the few fishing agreements joined by all states whose vessels fish the convention area for the protected species. Three Commissioners are authorized to serve as U.S. delegates to ICCAT. The Secretary of State may act on behalf of the United States with respect to ICCAT activities, with the concurrence of the Secretary of Commerce and the Secretary of the department in which the Coast Guard is operating, when appropriate.

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518 131 CONG. REC. S2690-02 (1985).
519 See Pacific Salmon Treaty, supra note 517.
520 See id. art. III, para. 1.
522 See id. § 3636.
524 See id. § 971.
525 See id. § 971a.
526 See id. § 971c.
The Secretary of Commerce is authorized to administer and enforce the Convention and to promulgate necessary and appropriate regulations.\textsuperscript{527} The Secretary of the department in which the Coast Guard is operating is primarily responsible for enforcement activities at sea.\textsuperscript{528} The Act also provides for enforcement of the Act and its implementing regulations.\textsuperscript{529}

(j) \textit{Eastern Pacific Tuna Licensing Act, 1984}\textsuperscript{530}

This Act implements the Eastern Pacific Ocean Tuna Fishing Agreement, signed in San Jose, Costa Rica, on March 25, 1983.\textsuperscript{531} The Secretary of State may act on behalf of the United States and appoint a U.S. delegate to the representative body.\textsuperscript{532} The Secretary of Commerce, in cooperation with the Secretary of State and the Secretary of the department in which the Coast Guard is operating, promulgates necessary regulations.\textsuperscript{533}

(k) \textit{Tuna Conventions Act, 1950}\textsuperscript{534}

The Act authorizes the appointment of not more than four Commissioners to the International Commission for the Scientific Investigation of Tuna and the Inter-American Tropical Tuna Commission (IATTC) bodies.\textsuperscript{535} The Secretary of State may act on behalf of the United States with respect to Commission activities, and the Secretary of Commerce is authorized to promulgate necessary regulations.\textsuperscript{536} The Secretary may prohibit tuna imports from countries whose vessels engage in "repeated and flagrant fishing operations" that threaten the achievement of IATTC's recommendations.\textsuperscript{537} Provisions for enforcement of the Act and its implementing regulations are included.\textsuperscript{538}

\textsuperscript{527} \textit{See id.} § 971d(a).

\textsuperscript{528} \textit{See id.} § 971d(b).

\textsuperscript{529} \textit{See NOAA, supra} note 235, at C39.


\textsuperscript{531} \textit{See id.} § 972.

\textsuperscript{532} \textit{See id.} § 972a.

\textsuperscript{533} \textit{See id.} § 972e.

\textsuperscript{534} \textit{Tuna Conventions Act, 16 U.S.C. §§ 951-991}.

\textsuperscript{535} \textit{See id.} § 952.

\textsuperscript{536} \textit{See id.} § 955(a) & (b).

\textsuperscript{537} \textit{See id.} § 951.

\textsuperscript{538} \textit{See id.} § 956.
(l) **South Pacific Tuna Act, 1988**

This act implements the Treaty on Fisheries Between the Government of Certain Pacific Island States and the Government of the United States, signed in Port Moresby, Papua New Guinea, on April 2, 1987. The Secretary of State is authorized to act on behalf of the United States in Treaty matters. The Secretary of Commerce, with the concurrence of the Secretary of the department in which the Coast Guard is operating, issues regulations necessary to carry out the objectives of the Treaty and the Act. Operators of vessels may be required to have licenses to fish in the Licensing Area. The Secretary may order fishing vessels to leave the Licensing Area upon making certain findings. Vessels must stow gear while in closed areas and must allow and assist observers. The Act provides for enforcement of the Act and its implementing regulations.

(m) **Northern Pacific Halibut Act, 1982**

This Act implements the Convention between the United States and Canada for the preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea. It authorizes the appointment of Commissioners to the International Pacific Halibut Commission, outlines the responsibilities of the Secretary of Commerce and North Pacific Fishery Management Council in regulating the Pacific halibut fishery, and provides for enforcement of the Act.

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540 See id. § 973(17). The signatories to the Treaty include: Australia, the Cook Islands, Fiji, the Federated States of Micronesia, the Republic of Kiribati, the Republic of the Marshall Islands, the Republic of Nauru, New Zealand, Papua New Guinea, the Solomon Islands, Tuvalu, the United States, the Republic of Vanuatu, and Western Samoa.
541 See id. § 973h(b).
542 See id. § 973b.
543 See id. § 973c(b)(1).
544 See id. § 973i.
545 See id. §§ 973k, 973l.
546 See id. §§ 973b, 973h.
548 See id. § 773.
549 See id. §§ 773a, 773c(a), 773c(c), 773i.
(n) *Atlantic Striped Bass Conservation Act, 1984*\(^{550}\)

The goal of this Act is to "support and encourage the development, implementation, and enforcement of effective interstate action regarding the conservation and management of the Atlantic striped bass."\(^{551}\) The Atlantic States Marine Fisheries Commission determines each year whether coastal states are in compliance with the Interstate Fisheries Management Plan for Striped Bass.\(^{552}\) If a coastal state is not in compliance with the Plan, the Secretary of Commerce and the Secretary of the Interior must declare a moratorium on fishing for that species within the coastal waters of that coastal state.\(^{553}\)

(o) *Anadromous Fish Conservation Act, 1965*\(^{554}\)

This Act provides authority to enter into cooperative agreements to conserve, develop, and enhance anadromous fish resources including conducting research and investigations.\(^{555}\) The Secretary of the Interior is authorized to enter into cooperative agreements with one or more States for the purpose of conserving, developing and enhancing anadromous fish resources and the fish in the Great Lakes and Lake Champlain that ascend streams to spawn.\(^{556}\)

iii. *Whaling*

(a) *Whaling Convention Act, 1949*\(^{557}\)

This Act implements the International Convention for the Regulation of Whaling.\(^{558}\) The President appoints the United States Commissioner to the International Whaling Commission (IWC).\(^{559}\) The

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\(^{552}\) *See id.*

\(^{553}\) *See id.*


\(^{555}\) *See id.* § 757a(a).

\(^{556}\) *See id.* § 757a(b).


\(^{558}\) *See id.* § 916(a).

\(^{559}\) *See id.* § 916a(a).
Secretary of Commerce is authorized to administer and enforce the Act.\textsuperscript{560} The Act forbids persons subject to the jurisdiction of the United States to engage in whaling or shipping, transporting, purchasing, selling, offering for sale, importing, exporting, or possessing whales in violation of the Convention or implementing regulations.\textsuperscript{561} Through enactment of the Pelly Amendment to the Fishermen's Protective Act of 1967\textsuperscript{562} and later, the Packwood-Magnuson Amendment,\textsuperscript{563} economic sanctions may be instituted against any nation whose operations detract from the measures advocated by the IWC.\textsuperscript{564}

The Pelly Amendment has been defined to apply to actions by foreign nationals in their fishing operations, which inhibit the effectiveness of an international fishery conservation program.\textsuperscript{565} It also applies where "nationals of a foreign country, directly or indirectly, are engaging in trade or taking which diminishes the effectiveness of any international program for endangered or threatened species . . . ."\textsuperscript{566} The Packwood-Magnuson Amendment sanctions a country upon certification by the Secretary of State that the country is diminishing the effectiveness of the work of the IWC.\textsuperscript{567} The sanction triggers reduction of the country's fishing allocation in United States waters by at least fifty percent.\textsuperscript{568} Certification under the Packwood-Magnuson Amendment also serves as certification under the Pelly Amendment.\textsuperscript{569}

\begin{footnotes}
\item See id. § 916g(a).
\item See id. § 916c(a).
\item Id. § 1978(a)(2).
\item See 16 U.S.C. § 1821(e)(2).
\item See id. § 1821(e)(2)(B).
\item See id. § 1821(e)(2)(A).
\end{footnotes}
(b) Indian Treaty Rights to Hunt and Fish

Certain Indian tribes in the Puget Sound and Columbia River basins of the Pacific Northwest and on the Great Lakes have federally recognized and protected treaty guaranteed rights to take fish including shellfish and, in the case of the Treaty with the Makah,^570^ to take whales and seals.\(^571\) These rights are protected and enforced under the Supremacy Clause of the United States Constitution.\(^572\) The federal government also protects these rights pursuant to its trust responsibility towards the affected tribes.\(^573\)

iv. Seals: Fur Seal Act Amendments, 1983\(^574\)

These amendments prohibit the taking of fur seals in the North Pacific Ocean with several exceptions: Indians, Aleuts, and Eskimos who


\(^{571}\) See id. art. IV, 12 Stat. at 940.

\(^{572}\) See U.S. CONST. art. VI.

\(^{573}\) These rights, which were reserved in treaties entered into by the United States with various Indian tribes in the mid-1800's, have been the subject of numerous court decisions including seven decisions by the United States Supreme Court. The treaties in the Pacific Northwest (commonly known as the Stevens Treaties after Territorial Governor Isaac Stevens, the principal federal negotiator at the time) generally contain a provision similar to the following Article 3 of the Medicine Creek Treaty, Mar. 3, 1855, 10 Stat. 1132 (treaty conference concluded Dec. 26, 1854):

> The right of taking fish, at all usual and accustomed grounds and stations, is further secured to said Indians in common with all citizens of the territory . . . . Provided however, That they shall not take shell fish from any beds staked or cultivated by citizens . . . ."

\(^{id}\)

The courts have interpreted these treaties rather broadly, recognizing that they reserved unto the tribes several important legal rights including: 1) a right of access to all usual and accustomed fishing places; 2) a right to a fair share of the fishery, which has been interpreted to mean 50 percent of the harvestable resource within each tribe's usual and accustomed area; and 3) a right to discriminatory laws necessary for conservation.—Moreover, although the focal point of litigation to date has been on anadromous fish such as salmon, the courts and federal regulatory agencies have recently applied these principles to shellfish and other fish species.

NOAA, *supra* note 235, at C42.

dwell in that area may take fur seals for subsistence purposes. The Secretary of Commerce is responsible for regulating the taking of fur seals. The Amendments authorize a North Pacific Fur Seal Commission.

v. Turtles

Laws and regulations aimed at reducing the destructive impact of commercial fishing practices on sea turtles include: the Magnuson Fishery Conservation and Management Act; Marine Mammal Protection Act; High Seas Driftnet Fisheries Enforcement Act; and the Sea Turtle Conservation-Shrimp Trawling Requirements Regulations.

vi. Other Species-Specific Acts

(a) Sponge Act, 1947

This Act regulates the landing, curing, and sale of sponges taken from the Gulf of Mexico and the Straits of Florida.

(b) Jellyfish, Sea Nettles, and other Such Pests and Seaweed in Coastal Waters: Control or Elimination, 1966

In order to protect fish and shellfish in coastal waters, this law authorizes the Secretary of Commerce to cooperate with and provide assistance to the States in controlling and eliminating jellyfish (commonly referred to as "sea nettles") and other such pests and in conducting research for the purposes of controlling floating seaweed in such waters.

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575 See id. §§ 1152, 1153.
576 See id. § 1155(a).
577 See id. § 1157.
578 For a description of the problem, see supra notes 59-85 and accompanying text.
584 Sponges are considered part of the animal phyla of the sea. See, e.g., ENGEL, supra note 2, at 17.
586 See id. § 1201.
(c) Control of "Crown of Thorns" Starfish, 1970

The Crown of Thorns starfish is a natural predator that can destroy coral reefs by eating the delicate coral. The purpose of this law is to conserve and protect coral reef resources of the tropical islands of interest and concern to the United States in the Pacific; to safeguard the critical island areas from possible erosion; and to safeguard future recreational and aesthetic uses of Pacific coral reefs. To accomplish this, the law authorizes the Secretaries of Commerce, the Interior, and the Smithsonian Institute to cooperate with and provide assistance to the governments of the State of Hawaii, the territories and possessions of the United States, (including Guam and American Samoa, the Trust Territory of the Pacific Islands, and other island possessions of the United States) in the study and control of the "Crown of Thorns" starfish.

(d) Nonindigenous Aquatic Nuisance Prevention and Control Act, as amended, 1990

The purpose of this Act is to minimize unintentional introduction and dispersal of nonindigenous species into waters of the United States through ballast water management and other requirements; to coordinate federally conducted, funded or authorized research, prevention control, information dissemination and other activities regarding the zebra mussel and other aquatic nuisance species; to develop and carry out environmentally sound control methods to prevent, monitor and control unintentional introductions of nonindigenous species from pathways other than ballast water exchange; to understand and minimize economic and ecological impacts of nonindigenous aquatic nuisance species that become established, including the zebra mussel; and to establish a program of research and technology development and assistance to States in the

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588 See id. § 1212.
589 See id. § 1211.
590 See id. § 1212.
management and removal of zebra mussels.\textsuperscript{592} Other non-indigenous species that infest coastal waters of the United States and have the potential for causing adverse economic and ecological effects include: the mitten crab on the Pacific Coast; the green crab in the coastal waters of the Atlantic Ocean; and the brown mussel along the Gulf of Mexico.\textsuperscript{593}

The Act directs the department that houses the United States Coast Guard, after consultation with the Aquatic Nuisance Task Force, to issue regulations to prevent the introduction and spread of aquatic nuisance species into the Great Lakes through ballast waters.\textsuperscript{594} The Act also requires the Task Force to implement a prevention, monitoring, and control program for aquatic nuisance species in United States waters.\textsuperscript{595}

vii. Driftnets

(a) The Driftnet Impact Monitoring, Assessment, and Control Act, 1987 (DIMACA)\textsuperscript{596}

The DIMACA requires that the Secretary of State initiate negotiations with foreign governments conducting driftnet fishing in the South Pacific.\textsuperscript{597} The coverage was expanded in 1990 to specifically enforce the moratorium on driftnet fishing called for by the UN Resolution 44/225 and the Wellington Convention.\textsuperscript{598} The amended Act states that "the Secretary [of Commerce], through the Secretary of State and the Secretary of the department in which the Coast Guard is operating, shall seek to secure international agreements to implement immediately the findings, policy, and provisions of this section, and in particular an

\textsuperscript{592} See 16 U.S.C. § 4701(b) (1994).


\textsuperscript{594} See 16 U.S.C. § 4722(a).

\textsuperscript{595} See id. § 4722(c).


\textsuperscript{597} See 16 U.S.C. § 1826(c).

\textsuperscript{598} See id. § 1826(c). For more information on UN Resolution 44/225 see supra notes 342-347 and accompanying text. For more information on the Wellington Convention see supra notes 400-401 and accompanying text.
international ban on large-scale drift net fishing.” The DIMACA created substantial reporting requirements: the Commerce Secretary must submit an annual report to the Senate Committee on Commerce, Science, and Transportation and the House Committee on Merchant Marine and Fisheries.

(b) *High Seas Driftnet Fisheries Enforcement Act, 1992 (HSDFEA)*

The DIMACA was followed by the High Seas Driftnet Fisheries Enforcement Act of 1992 (HSDFEA). The HSDFEA allows for sanctions against other nations that continue to use drift nets and requires the Secretary of Commerce to identify other nations whose nationals or vessels continue to fish with large-scale drift nets on the high seas. When an offending country is identified, the President must ask it to stop using the nets. If the identified country refuses, the Secretary then must prohibit the import of fish and fish products from that country.

viii. *General Species Protection*

(a) *Antarctic Marine Living Resources Convention Act, 1984*

The Act provides the domestic legislative authority to implement the Convention on the Conservation of Antarctic Marine Living Resources. It prohibits activities that harass, molest, harm, wound, or kill any species of living organism found within the Antarctic Convergence. Also illegal is the transport, sale, import, export, or
possession any of these species by a person who knew or reasonably should have known that the species were taken in violation of the Convention. The Secretary of Commerce is responsible for promulgating regulations to implement this Act and enforcing its statutory prohibitions.

(b) *Antarctic Conservation Act, 1978*  

This Act is intended to provide for the conservation and protection of the fauna and flora of Antarctic and of the ecosystem upon which these depend. The Act is to be consistent with the Antarctic Treaty, signed in Washington on December 1, 1959 and the Protocol on Environmental Protection to the Antarctic Treaty, signed October 4, 1991, in Madrid.

(c) *Endangered Species: Endangered Species Act, 1973 (ESA)*  

The ESA protects species of plants and animals listed as threatened or endangered. The Secretary of the Interior and the Secretary of Commerce determine whether any species is endangered or threatened. They must also designate critical habitat and develop and implement recovery plans for threatened and endangered species. The ESA prohibits the taking of any member of an endangered species. “Taking” is broadly defined and includes harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any of this type of conduct.

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610 See id. § 2435(3).
611 See id. § 2436.
613 See id. § 2401(b).
614 See id.
616 See id. § 1531(b).
617 See id. § 1533(a)(A) & (B).
618 See id. § 1533(b)(2).
619 See id. § 1538(a).
620 See id. § 1532(19).
(d) *Illegal Traffic: Lacey Act Amendments, 1981*\(^{621}\)

This Act prohibits domestic and international trafficking in protected fish, wildlife, and plants.\(^ {622}\) It does so by requiring that most shipments of fish and wildlife moving in interstate or foreign commerce be accurately marked and labeled as to their contents.\(^ {623}\) The import, export, transport, sale, receipt, acquisition, or purchase of fish, wildlife, and certain indigenous plants taken, possessed, transported, or sold in violation of state, federal, Indian tribal, or foreign laws or regulations that relate to fish or wildlife or plants is unlawful.\(^ {624}\) Violators are subject to both criminal and civil sanctions.\(^ {625}\) The prohibitions apply broadly to all wild animals whether dead or alive and to any part, product, egg, or offspring, including captive-bred animals.\(^ {626}\)

ix. *Coastal Areas: Coastal Barrier Resources Act, 1982, as amended*\(^ {627}\)

The goal of this Act is to promote appropriate use and conservation of coastal barriers along the Atlantic, Gulf, and Great Lakes coastlines, including bay barriers, barrier islands, and other geological features composed of sediment that protect landward aquatic habitats from direct wind and waves.\(^ {628}\) The barriers provide essential habitats for wildlife and marine life.\(^ {629}\) Among other items, the Act seeks to minimize damage to marine life by establishing a coastal barrier resources system and considering the means of achieving long-term conservation of barrier resources.\(^ {630}\)

In addition to those laws that deal directly with a living marine species or a specific geographic oceanic area, there are laws which indirectly protect living marine species through pollution prevention, including: pollution by oil from vessels; pollution by harmful substances other than oil; pollution from vessel operations; disposal of shoreside

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\(^{622}\) See id. § 3372.

\(^{623}\) See id. § 3372(b).

\(^{624}\) See id. § 3372(a).

\(^{625}\) See id. § 3373(a) & (d).

\(^{626}\) See id. § 3371(a).


\(^{628}\) See id. § 3501(b).

\(^{629}\) See id. § 3501(a)(2).

\(^{630}\) See NOAA, supra note 235, at E34.
waste at sea; pollution from offshore pipelines, cable, platforms, and seabed mining; and shore-based and atmospheric marine pollution and coastal and adjacent waters. Other federal laws indirectly protect and conserve living marine species through the areas of coastal tourism and recreation, global climate change, and research and education.

For a general discussion of these laws, see W.M. von Zharen, Environmental Governance of the Seas, the Coastal Zone, and Their Resources, 9 Nat. Resources & Env't 3, 10 (Spring 1995); and W.M. von Zharen, Marine Transportation: Major Oil Pollution Prevention and Compensation Regimes: Jurisdictional Issues in Oil Pollution, in NATURAL RESOURCES LAW (Richard Fink ed., 1994).


See, e.g., the National Sea Grant College Program Act, 33 U.S.C. §§ 1121-1131 (1994). This Act authorizes the award of grants and contracts to initiate and support programs at Sea Grant colleges and other institutions for research, education, and advisory services in any field related to the conservation and development of marine resources. The current authorizing legislation, 33 U.S.C. § 1124a, provides for implementation of an international program to encourage and promote international research, educational activities, and technology transfers related to ocean and coastal issues; to promote exchange of information with respect to these resources; and to
d. Other International Environmental Regimes

In response to global attention focusing on the need for environmental protection, several voluntary regimes have emerged recently: The Code of Conduct for Responsible Fisheries (1995),635 the Ocean Charter (1998);636 and ISO 14001 (1996).637 The first two regimes reflect a fundamentally different approach to stewardship of the living marine species, one in which the species are seen as part of a complex ecosystem.638 The third one, a generic standard, is designed to be applied to a wide variety of organizations and businesses with diverse economic, social, and cultural drivers.639


courage international collaboration with respect to marine scientific research. However, no funds have been appropriated for this purpose.

638 The FAO Code's mission includes “effective conservation, management, and development of living aquatic resources, with due respect for the ecosystem and biodiversity.” See Introduction to FAO CODE, supra note 636. The management objectives should provide that “biodiversity of aquatic habitats and ecosystems is conserved and endangered species are protected.” Id. art. 7.2.2d. The FAO Code also includes sections on Protection of the Aquatic Environment, id. art. 8.7, Protection of the Atmosphere, id. art. 8.8, and Integration of Fisheries into Coastal Area Management, id. art. 10. The Ocean Charter focuses on “maintaining the health of the oceans and the abundance of its fisheries, together with the wise and safe use of all its resources” which must include “understanding the marine environment and its living community . . . .” See My Ocean Charter, supra note 636.
In 1995, the member countries of the FAO agreed to commit themselves to a Code of Conduct for Responsible Fisheries, the first international code to address multiple facets involved in the sustainable development of the seas' fisheries. The Code "sets out principles and international standards of behavior for responsible practices." Unlike many stewardship regimes, this one specifically echoes a theme of ecosystem management: measures should ensure conservation of species "belonging to the same ecosystem or associated with or dependent upon the target species." Fisheries management should "promote the maintenance of the quality, diversity and availability of fishery resources in sufficient quantities for present and future generations." The objective is to ensure the long-term sustainability of fish stocks so that these can be harvested by generations to come, thus making a substantial contribution to world food security and employment opportunities. The Code includes a number of articles, each developing a specific aspect of fishing practices, including Fishing Operations, Fisheries Management, Integration of Fisheries into Coastal Area Management, Aquaculture Development, Post-Harvest Practices, and Trade.

640 The Code developed out of the obligation established under the 1982 Law of the Sea Convention to provide a new framework for the better management of marine resources. This, coupled with the staggering statistics reflecting over-exploitation of fish stocks, degradation of marine ecosystems, and international conflicts regarding fisheries management, contributed to the focus on new approaches. As a result, in 1991, the FAO was asked to develop the concept of responsible fisheries and a Code of Conduct to foster its application. In May 1992, an International Conference on Responsible Fishing endorsed the Cancun Declaration which stressed the need for commercial fishing to occur within a framework of "responsible fishing." The Declaration laid the groundwork and it called on the FAO to develop a Code of Conduct for Responsible Fishing. The Declaration was brought to the attention of the Earth Summit in Rio de Janeiro, Brazil, in June 1992. The Code of Conduct was adopted on October 31, 1995, in Resolution 4/95.

641 See FAO CODE, supra note 635, at 144.


643 FAO CODE, supra note 635, introduction.

644 Id. art. 6.2.

645 Id.

646 See id. art. 7.2.

647 See generally id. Several FAO Technical Guidelines for Responsible Fisheries have already been published including: Responsible Fishing Operations (No. 1); Precautionary...
The Code is carefully crafted to include those phrases and terms that clearly articulate the values and principles of the Code. This includes the concept of sustainable utilization of fishery resources in harmony with the environment; the use of capture and aquaculture practices which are not harmful to ecosystems, resources and their quality; the incorporation of added value to such products through transformation processes meeting the required sanitary standards; and the conduct of commercial practices so as to provide consumers access to good quality products. The choice of terms is worthy of note: the emphasis on the complex marine environment as a whole is reflected in sections dealing with aquatic ecosystems, endangered species, biodiversity, critical fisheries habitats, the impact of fisheries, and the impact on environment. The Code also addresses by-catch and other waste, noting that living marine species have sustainability limits and that modern technologies can result in poor utilization of the catch. Selectivity—the ability to harvest target species with non-target fish, juveniles, and other by-catch escaping unharmed—is an integral part of responsible fishing. To achieve this, the traditional emphasis on quantity must be shifted to sustainable fishing. The pressures on fish populations must be

Approach to Capture Fisheries and Species Introductions (No. 2); Integration of Fisheries into Coastal Area Management (No. 3); Fisheries Management (No. 4); and Aquaculture Development (No. 5). They are directed to states, international organizations, fisheries management bodies, owners, managers and charterers of fishing vessels as well as fishers and their organizations, and may be applied by States on a voluntary basis to all fishing operations, to all fishing vessels (including vessels engaged in transshipment of fish), to fishers, owners, managers, masters of harbors for fishing vessels, and competent authorities.

648 See FAO CODE, supra note 635, art. 6.3.
649 See id. art. 6.6.
650 See id.
651 See generally id. art. 6.16.
652 See id. arts. 6.1, 6.4.
653 See id. art. 7.6.9.
654 See id. art. 6.6.
655 See id. art. 6.8.
656 See id. arts. 6.7, 7.4, 7.6.4, 7.6.9.
657 See id. art. 6.7. See also id. arts. 7.4.2, 10.2.4.
658 See id. art. 7.6.9.
659 See id. arts. 7.6.9, 8.
660 See id. art. 7.6.9.
661 See generally id. art. 7.2.
Using the precautionary approach, prudent foresight takes into account existing uncertainties to determine a course of action. The Code emphasizes the use of environmentally safe fishing gear and practices, ones that do not create an unacceptable environmental impact. The deleterious effect of discarded or lost gear is noted.

The Code considers human factors such as the necessity of food, the nutritional value and safety of products, and the consideration of economical and social factors in addition to natural resource conservation. The issues of poverty, employment, and fishers' rights are considered. Responsibilities for sustainable fisheries are shared between fishing industries and States including special responsibilities given to Flag States and Port States.

Also included is attention to provisions for safety and safe working conditions, the use of internationally agreed standards for statistics, measurements, and assessment, the importance of monitoring, control and surveillance of all fishing activities, and conflicts resulting from intensive fishing with each operator or community using its own methods. In an effort to include all stakeholders, the Code includes subsistence fisheries, with fisheries carried out by local communities with traditional, customary fishing practices given priority.

The decision-making processes should include the concepts of transparency, timeliness, consultation, and participation of stakeholders. There are specific provisions for operation and equipment (respect for

662 See generally id.
663 See id. art. 6.5.
664 See id. arts. 6.6, 7.6.9.
665 See id. art. 7.6.9. This gear can entangle or trap aquatic species.
666 See id. art. 6.2, 6.18.
667 See id. art. 6.7.
668 See id. arts. 6.4, 7.4.2, 7.4.5.
669 See id. art. 6.2.
670 See id. art. 6.18.
671 See id. arts. 6.18, 10.1.3.
672 See id. arts. 8.1, 8.2, 8.3.
673 See id. art. 6.17.
674 See id. arts. 6.17, 7.4.4, 7.4.6.
675 See id. arts. 6.10, 7.1.7.
676 See id. art. 6.15.
677 See id. art. 6.18.
678 See id. arts. 7.6.6, 10.1.3.
679 See id. arts. 6.13, 10.1.2.
680 See id. arts. 7.1.2, 7.1.6.
existing regulation; ship traffic separation schemes; marking of vessels and fishing gear; and documents to be carried on board). Agreement on measures to ensure compliance with resources management schemes in the high seas is stressed. Various stakeholders in the industry including the shrimp industry are considering adoption of the Code.

ii. Ocean Charter

The principles of the Cousteau Society's 1998 Ocean Charter are part of a joint effort of the Society working in association with the United Nation Educational, Scientific, and Cultural Organization's (UNESCO) Intergovernmental Oceanographic Commission to pursue ocean-related projects. Signatories, as individuals rather than nations, demonstrate a commitment to joining the international appeal to protect the seas and oceans and to demonstrate ever-increasing concern for the environment. The commitment recognizes that:

The oceans and the creatures therein are a necessary part of life on this planet;

Maintaining the health of the oceans and the abundance of its fisheries, together with the wise and safe use of all its resources, must be accepted and honoured by governments so that future generations can enjoy the continuing benefit for all peoples;

Understanding the marine environment and its living community is necessary for the stewardship of the oceans and the seas, and for the making of decisions to protect and husband its resources;

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681 See id. arts. 7.6.4, 7.6.5.
682 See Fisheries, supra note 642.
685 See id.
We must work together to succeed—within countries people can influence ocean policies if they act together—internationally, countries should help their neighbours and accept regional policies and actions—countries having the knowledge and resources should assist less fortunate nations—data and information on the oceans should be readily exchanged—international and intergovernmental organizations should be used to generate global programs and agreements.  

The agreement cautions that the signatory acknowledges his promise to remember the Charter in the treatment of the oceans and the waters that flow into the ocean, in work and play, and in decision-making. Thus, the Charter emphasizes the importance of the role of protecting not only the ocean but also the ecosystem.

iii. The ISO 14001

The International Organization for Standardization, commonly referred to as ISO, is an international, non-governmental federation of “standards bodies” from one hundred and thirty nations. The

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686 Id.
687 See id.
688 See Introduction to ISO (last modified June 16, 1998) <http://www.iso.ch/infoe/intro.htm>. At first glance, logic would dictate that the acronym for the International Organization for Standardization would be IOS rather than ISO. See id. However, ISO is not an acronym. ISO is a word derived from the Greek *isos* which means “equal,” a prefix meaning equal or uniform, and used in numerous words such as isobar, isomeric and isopropyl. The idea of “equal standard,” then, was the intention. ISO as meaning “equal” rather than as an acronym is also valid for the organization’s three official languages: English, Russian, and French.
689 See id. See generally, About CEN and European Standardization (last modified Oct. 9, 1998) <http://www.cenorm.be/AboutCEN/AboutCEN.html>. Working within the same genre is the Comité Européen de Normalization (CEN), a committee which drafts standards on behalf of the fifteen European Union (EU) countries as well as six nations belonging to the European Free Trade Association (EFTA). The CEN’s procedures, for the most part, mirror those of the ISO with standards adopted on the basis of majority vote. Once it is decided that a standard is needed, the choice is made whether to develop it via the CEN or through the ISO. An agreement between the CEN and the ISO was signed in 1991, the so-called Vienna Agreement, in which an attempt was made to route standards development through ISO. However, the choice is still made on a case-by-case basis depending on the standard.
organization addresses environmental management on a broader and more global scale through its environmental management standard, ISO 14001, and the ISO 14000 series in general. The standards represent unprecedented market-place initiatives. The ISO 14000 series provides specific requirements and principles for environmental management with the goal of internalizing environmental standards into private sector actions globally. ISO 14001 is the specification document, the only "standard." Thus, it is prescriptive. It is a "management" standard, not a legal standard. Other types of documents in the series include tools and guidelines. The ISO 14000 series defines management processes to be followed to control the impact an organization will have on the environment. It is up to the organization to identify what environmental impacts are acceptable within the legal framework. The ISO 14000 series was developed to be generic in order to find broad application throughout industries, businesses, and organizations in diverse geographical, cultural, and social conditions. ISO 14001 may be used to replace the traditional pièce-mêlée regulatory approach to stewarding ocean species.

The focus of ISO 14001 is on a management ecosystem. ISO 14001 requires a multifaceted, interdisciplinary look at all aspects of a business or organization's activities, products, or services at all levels in all areas and an analysis of how these interact with the environment. In other words, ISO 14001 focuses on both the parts and the whole. Ocean ecosystem stewardship must be just as demanding. In Part II, appropriate applications of ISO 14001 are included.

690 See INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, ISO 14001: ENVIRONMENTAL MANAGEMENT SYSTEMS—SPECIFICATION WITH GUIDANCE FOR USE (1996) [hereinafter ISO 14001].
691 See VON ZHAREN, ISO 14000, supra note 639.
692 See id. at 13.
693 See id. at 15.
694 See id. at 16.
695 See id. at 14.
696 See id. at 15.
697 See id.
698 See id. at 39.
699 See id. at 40.
II. EXPANDED CRITERIA FOR OCEAN ECOSYSTEM STEWARDSHIP

As Part I revealed, the legal regimes aimed at conservation, protection, and management of living marine species are varied and form a patchwork quilt of fragmented law. Each attempts to meet goals that oftentimes overlap and even contradict other laws. Specificity and enforcement mechanisms are sorely lacking. Only a particular species or group, geographical region, practice, or media is taken into account. There are separate regimes for fisheries management, protection of marine mammals, driftnet use, management of the Antarctic living species, and wetlands conservation, among others. None is ecologically visionary. Not one addresses ocean stewardship of living marine species with the emphasis on the integrity of the oceanic ecosystem.

What is called for, then, is a supranational, integrated, adaptive marine ecosystem stewardship regime that centers on the whole as well as the parts. That the responsibilities of stewardship rest almost exclusively in the hands of nation-states disregards the very fabric of interconnectedness and interdependency that can only be addressed on a global level. Still, nation-states must be involved as they are critical to effective monitoring of the seas.

Why have humans been able to clear-cut the oceans while the equivalent activity on land is excoriated? The reason is simple in its clarity, complex in its conceptualization: the immensity of the oceans. A hundred-ton whale can be harvested with impunity. Shortly after the factory ship leaves to another destination, little evidence is left. Unlike a denuded forest visible for decades, the ocean leaves no trace of the transgression. A cooperative partnership must center on a global initiative with the force and resources, human and financial, of nation-states.

A. An Integrated, Informative, Adaptive Strategy for Stewardship of the Ocean's Ecosystem

World collective consciousness has reached a point where it accepts that something must be done to effectively steward living marine species and their ecosystem. This demands, at a minimum, attention to a number of pragmatic requirements. The underpinnings for specific directives have been established in such regimes as the Straddling Stocks

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700 See generally, FREEDOM FOR THE SEAS IN THE 21ST CENTURY (Jon M. Van Dyke et al. eds., 1993).
- Agreement,\textsuperscript{701} the Code of Conduct for Responsible Fisheries,\textsuperscript{702} and the ISO 14001 standard.\textsuperscript{703} These offer a baseline. For example, ISO 14001 is designed to promote an organization's environmental responsibility.\textsuperscript{704} The assumption is that effective environmental management of individual organizations will ultimately be good for the environment as a whole.\textsuperscript{705}

The ISO 14001 offers effective near-term solutions. However, an additional global strategy of stewardship is needed to provide the required breadth and depth of a global framework reflecting a multi-disciplinary understanding of the complex ecosystem of living marine species. The framework must be buttressed by global dissemination of relevant information, global education of stakeholders, and global application of appropriate financial resources. Finally, ethical dimensions of stewardship must be considered.

1. \textit{Environmental Management System (EMS)}

This requirement involves integrating stewardship of the ocean's ecosystem into a workable environmental management system (EMS). Although an EMS may take many forms, there are essential ingredients that must be included in every effective EMS. A viable EMS must consider the viewpoints of stakeholders and interested parties to maximize the potential for achieving objectives.\textsuperscript{706} A blueprint can be found in Canada's National Round Table on the Environment and the Economy's (NRTEE) plan for sustainable oceans.\textsuperscript{707} Co-management is featured as the basis on which to build sustainability strategies in which all stakeholders participate.\textsuperscript{708} Co-management, synonymous with cooperative management, joint management, and collaborative management,\textsuperscript{709} is defined as a system that enables a sharing of decision-

\textsuperscript{701} See Straddling Stocks Agreement, \textit{supra} note 271.
\textsuperscript{702} See FAO Conference Resolution 15/93, \textit{supra} note 291.
\textsuperscript{703} See \textit{VON ZHAREN}, ISO 14000, \textit{supra} note 639. \textit{See generally supra} notes 692-699 and accompanying text.
\textsuperscript{705} See \textit{id.} at 492.
\textsuperscript{706} See \textit{VON ZHAREN}, ISO 14000, \textit{supra} note 639, at 53.
\textsuperscript{707} See NRTEE, \textit{supra} note 25.
\textsuperscript{708} See \textit{id.} at xiii-xv.
\textsuperscript{709} See \textit{id.} at 12.
making power, responsibility, and risk between governments and stakeholders including, but not limited to, resource users, environmental interests, experts, and wealth generators. It is a form of power sharing. Some fisheries stewardship programs integrated these concepts years ago. For example,

in Norway, co-management of the Lofoten Islands cod fishery has been in place for over a century. To stop fighting among fishers, the Lofoten Act, passed in the 1890s, gave responsibility for the regulation of fisheries to the fishers. District committees elect their own representatives and make the rules for fishing: who fishes, when they can fish, and what kind of gear they can use.

The NRTEE stewardship regime requires that the government be a partner in order “to give the project validity under the definition of co-management.” The co-management regime offers several potential benefits. Bringing together varying interests results in a “more comprehensive understanding of resource and environmental use constraints and opportunities.”

The relationship between government and stakeholders is redefined so that the burden and responsibility of day-to-day decision-making is shared. The regime fosters joint accountability, thus decreasing the likelihood of a stakeholder acting solely in her or his own vested interests and basing decisions exclusively on short-term goals. Co-management also supports the goal of transparency in the decision-making process.

The structure lends itself to being responsive to regional needs in order to

\[\text{\textsuperscript{710}} \text{See id. at 14.} \]
\[\text{\textsuperscript{711}} \text{See id. at 12.} \]
\[\text{\textsuperscript{712}} \text{Id. at 13 (citing 2 ROYAL COMMISSION ON ABORIGINAL PEOPLES, RESTRUCTURING THE RELATIONSHIP 666 (Ottawa Minister of Supply and Services, 1997)).} \]
\[\text{\textsuperscript{713}} \text{See id.} \]
\[\text{\textsuperscript{714}} \text{Id. at 42.} \]
\[\text{\textsuperscript{715}} \text{See id. at xiv.} \]
\[\text{\textsuperscript{716}} \text{Id. at 19.} \]
\[\text{\textsuperscript{717}} \text{See id.} \]
\[\text{\textsuperscript{718}} \text{See id. at 19-20.} \]
\[\text{\textsuperscript{719}} \text{See id. at 20.} \] Open decision-making processes should allow user groups the opportunity to assume more authority over decisions relating to the use and enjoyment of ocean resources. See id.
tap local knowledge and build upon specific, unique strengths of particular regions.\textsuperscript{720}

The NRTEE co-management regime must be created from a mandate, such as a memorandum of understanding among parties, in order to establish its legitimacy.\textsuperscript{721} "Co-management initiatives begin with the identification of a problem and a recognized need to make changes to an existing management regime."\textsuperscript{722} This involves defining the unit—"the issue, the resource, the geographic area—that is to be co-managed."\textsuperscript{723} The interested stakeholders must then agree on a list of specific objectives.\textsuperscript{724} As the objectives are developed, the membership of interested stakeholders may change, thus triggering an analysis of the respective roles of various members including the role of the government member.\textsuperscript{725} Those stakeholders formally recognized as parties to the co-management regime could be signatories to an agreement or those identified in legislation.\textsuperscript{726} Participants—stakeholders and partners—must be motivated by a willingness to achieve co-management goals.\textsuperscript{727} Because a co-management regime is not intended to replace existing management systems with volunteer initiatives, public and private sector funding is necessary "to create the organization, then to support administration, research and information distribution."\textsuperscript{728} Vital to the success of the co-management regime is the ability to agree on process issues.\textsuperscript{729} If obstacles to agreement manifest themselves, then the co-management regime would implement dispute resolution mechanisms and consensus-based decision-making process techniques.\textsuperscript{730}

Other core elements are essential to the success of a co-management EMS. The first is a strong supporting institution—the council, board, or agency charged with implementation.\textsuperscript{731} Co-management fosters a shared sense of both ownership and responsibility

\textsuperscript{720} See id. at 21.
\textsuperscript{721} See id. at 42.
\textsuperscript{722} Id. at 41.
\textsuperscript{723} Id.
\textsuperscript{724} See id.
\textsuperscript{725} See id. at 42.
\textsuperscript{726} See id.
\textsuperscript{727} See id. at 43.
\textsuperscript{728} Id.
\textsuperscript{729} See id.
\textsuperscript{730} See id.
\textsuperscript{731} See id. at 25.
"with the intended result that all players consider the impact of their actions on the entire system." The challenge is to create a "competent and trusted institution" to nurture "a successful long-term stewardship process." The role of the institution also includes:

determining the appropriate relationship between players; . . . fostering trust by engaging the broader public in awareness and education; collaborating with other institutions at various levels of government and in the academic, research, and business community; collaborating with other stakeholders . . . proactively seeking their participation in long-term stewardship initiatives; designing implementation systems for the co-management agreement; preserving local knowledge and incorporating it into program design and implementation; and capacity-building to engage a broader range of stakeholder in implementation and design.

Another element is effective engagement of stakeholders in order to "probe the intricacies of key issues, to define the values and principles for action, to explore new concepts, to forge alliances, and to create a legitimacy for the implementation and delivery phases." A co-management EMS promotes capacity building, defined as "the sum of efforts needed to nurture, enhance and utilize the skills and capabilities of people and institutions at all levels." This may be accomplished by: improving the knowledge base to facilitate better decision-making; developing better policies and strategies; enhancing management practices and techniques; and reforming institutions.

The NRTEE identified concerns that need to be addressed when applying co-management arrangements, both practical and theoretical. Is the system merely a way of shifting costs from government to users? How much does co-management cost and who pays for it? Is there

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732 Id.
733 Id.
734 Id. at 25-26.
735 Id. at 27.
736 Id. at 29 (citing the United Nations Development Programme (UNDP) description of capacity building).
737 See id. at 30.
738 See id. at 31-35.
sufficient political will for co-management to succeed? Will pursuit of co-management take a lot of time? Will it be difficult to accommodate the interests of co-managers, stakeholders, and the public in a co-management agreement? How will co-managers be chosen?

Several examples illustrate how co-management principles have been applied.

a. Cree Subsistence Fishers: A Community-based Resource Management System, Canada

The Chisasibi Creek fishery is one of the most extensively documented subsistence fisheries in northern Canada. The environmental logic of its indigenous people depends on "extensive traditional ecological knowledge and a set of adaptive practices carried out under the guidance of elders and stewards/leaders." "The fishery is characterized by three practices: the concentration of effort on seasonal aggregations of fish; the rotation of fishing areas (pulse-fishing); and the use of a mix of gill-net mesh sizes to optimize the catch per unit of effort and to maintain multiple age-classes of fish, important for maintaining ecological resilience and resource sustainability." The stakeholders include knowledgeable stewards "who manage information, provide leadership for collective decision making, and enforce the rules and ethical norms of the community," thus building consensus through knowledge, skills and values from one generation to the next.

Cree subsistence fisheries do not fall under the rules that govern commercial fisheries. Until 1971, the Cree had their own subsistence

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740 NRTEE, supra note 25, at 71. For example, in certain indigenous fishing cultures, the counting of fish was thought to show disrespect for the fish. See Berkes, supra note 739, at 66, 74, 84-86.
741 NRTEE, supra note 25, at 71.
742 Id.
743 See, e.g., Carol M. Rose, Given-ness and Gift: Property and the Quest for Environmental Ethics, 24 ENVTL. L. 1 (discussing three possible sources for environmental ethics: indigenous people's practices, biologic rights, and older forms of common property).
744 See NRTEE, supra note 25, at 70.
fisheries on the Quebec side of James Bay. With the announcement of the James Bay hydroelectric development project, the Cree, among others, went to court to obtain an injunction in order to protect the fishery habitat used by the Cree. A mandate was issued in 1975 in which the federal government formally recognized the role of traditional Cree leaders in the management of fish and wildlife resources.

b. Chesapeake Bay Program, United States

The Chesapeake Bay is the largest estuary in the United States: it supports fisheries in excess of $1 billion annually. The shoreline of the Chesapeake and its tributaries—among them, the Potomac, the Susquehanna, the Patuxent, and the Choptank rivers—meanders over 4,000 miles. Fifteen million people live in its 64,000-square-mile watershed. Reclamation and protection of this system is the goal of the Chesapeake Bay Foundation, established in 1966. This 83,000-member, nonprofit group marshals environmental advocates and prods relevant government agencies. Along with the Chesapeake Bay Program, it forms a partnership that serves as a national and international estuarine model. Other stakeholders include the Susquehanna and Potomac River Commissions who oversee water consumption, coordinate environmental restoration vital to the Chesapeake Bay, and assist the Program with its

745 See id.
746 High mercury levels from the hydro project effectively closed the fishery by the mid-1980s. See id. at 71.
747 See id. at 70.
748 See id.
749 See id. at 62.
750 For example, the Susquehanna River, with an average flow of 19 million gallons of water per minute, supplies 50% of the freshwater entering the bay. See Don Hopey, Chesapeake Bay Clean-up Behind Schedule, PITTSBURGH POST-GAZETTE, Apr. 22, 1996, at A7, available in LEXIS, News Library, Pstgaz File.
751 See Bill Lambrecht & Sandra Martin, Chesapeake Countdown, PLANNING, Nov. 1995, at 11.
752 See id. at 10-11.
753 See NRTEE, supra note 25, at 62.
754 See Lambrecht & Martin, supra note 751, at 11.
efforts to reduce river pollutants by forty percent by the year 2000 and to reduce the bay's nutrient load by forty percent from 1985 levels.

Three states, the federal government, and local groups signed the first Chesapeake Bay Agreement in 1983. The 1987 Chesapeake Agreement organized twenty-nine "commitments to action" in six areas: living resources, water quality, population growth and development, public education, public access, and governance. The first step was to create broad consensus about the need to save the Bay; the second step was to achieve broad consensus on the causes of problems and how they should be addressed; the final step required implementation of remedial action, a step still in progress. Volunteers were trained to take samples and compile measurements of various areas throughout the watershed. Coupled with this is data collected by state and federal scientists.

Progress is evident: controls on toxic emissions and storm-water drainage have cut heavy metal discharges in half and nearly two-hundred miles of streams have been reclaimed since 1988. In 1995 the tiny stripeback darter showed up in the Patuxent River—the first time it has been spotted in Maryland waters since 1944. Bay grasses, an important nursery habitat for other bay life, are slowly gaining ground: from an estimated 200,000 acres in the 1960s, grasses diminished to 41,000 acres in 1978, when surveys began. A 1993 report showed 73,000 acres of grasses. The target is 114,000 acres by 2005. Success is attributed to several key inputs: the broad consensus gained at the beginning because all stakeholders were directly affected by "observable, serious deterioration in water quality"; "scientists were forthright and in agreement;"

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757 See Hopey, supra note 750. Such a reduction will allow sunlight to reach many of the underwater grass beds and increase the levels of dissolved oxygen in the deepest parts of the bay. See id.
758 See id.
759 See NRTEE, supra note 25, at 62.
760 See id.
761 See id.
762 See id.
763 See Lambrecht & Martin, supra note 751, at 11.
764 See id.
765 See id.
766 See id.
767 NRTEE, supra note 25, at 62.
"helped ensure that the right issues were being addressed." In addition, "management agencies took action swiftly once the issues were identified."

c. South Beaufort Sea Polar Bears

Another co-management EMS example is an agreement spearheaded by user groups in the United States and Canada. In 1988, various stakeholders established a cooperative management plan for polar bears of the southern Beaufort Sea. The plan was negotiated primarily by the Canadian Inuvialuit (western Inuit) Game Council and the United States North Slope Borough Fish and Game Management Committee. It is noteworthy that indigenous peoples and national authorities such as the Canadian Wildlife Service and the United States Fish and Wildlife Service were able to work cooperatively and effectively in establishing the management plan.

d. Marine Stewardship Council

A more specific EMS template may be modeled after the Marine

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768 Id. For a discussion of the importance of science-policy interaction, see, e.g., NATIONAL RESEARCH COUNCIL, COMMITTEE ON SCIENCE AND POLICY FOR THE COASTAL OCEAN, SCIENCE, POLICY AND THE COAST: IMPROVING DECISION-MAKING (1995). Scientific information is needed to guide the wise use of coastal resources, to protect the environment, and to improve the quality of life of coastal zone residents. This need is becoming more evident as the complexity of the relationships among the environment, resources, and the economic and social well-being of human populations is fully recognized and as changes and long-term threats are discovered.

Id. at 7.

769 NRTEE, supra note 25, at 62.

770 Id. See also Robert Costanza & Jack Greer, The Chesapeake Bay and its Watershed: A Model for Sustainable Ecosystem Management, in BARRIERS AND BRIDGES TO THE RENEWAL OF ECOSYSTEMS AND INSTITUTIONS 169 (Lance H. Gunderson et al. eds., 1995).


772 See id.
Stewardship Council (MSC),\textsuperscript{773} an alliance initially formed between the World Wildlife Fund (WWF) and Unilever.\textsuperscript{774} In this market-based solution to protecting the world's declining fish population, the MSC promotes voluntary, independent certification of performance standards for fisheries management based on specific standards for individual fisheries to ensure the long-term viability of global fish populations and the health of the marine ecosystems on which they depend.\textsuperscript{775} The MSC accredits independent certification firms that will apply the standards to individual fisheries.\textsuperscript{776} Products must come from fisheries that are not exhibiting signs of over-fishing, and only fisheries meeting these standards will be eligible for certification and the "on-pack" logo.\textsuperscript{777} Using the dolphin-friendly tuna product to demonstrate that higher prices are not necessary, fish processors and retailers are not expected to charge a premium for sustainably-sourced fish.\textsuperscript{778} The first U.S.-based company to adopt the MSC program illustrates the diversity of participants: Special Expeditions is a tour company who pledged to serve sustainably-caught fish on its cruises.\textsuperscript{779}

\textsuperscript{773} See Carl Safina, \textit{Seafood Marketers and Conservation: New Hope for World Fisheries}, LIVING OCEANS NEWS, Spring 1996, at 2. The MSC model was derived from the 1993 WWF's Forest Stewardship Council (FSC). See MICHAEL SUTTON & CAROLINE WHITFIELD, MARINE STEWARDSHIP COUNCIL, INFORMATION PAMPHLET: NEW HOPE FOR WORLD FISHERIES (on file with author) [hereinafter SUTTON & WHITFIELD, MARINE STEWARDSHIP COUNCIL]. The FSC sets international standards for certifying that timber and wood products come from sustainably managed forests. Since its inception, nearly fifteen million acres of forests worldwide have been certified under the council's standards as being ecologically well managed. See FSC Homepage (visited Mar. 8, 1999) \texttt{<http://www.fscus.org/index.html>}. The MSC initiative began with a feasibility study in which the MSC explored how the forest sustainability model could be adapted to meet specific sustainability needs of global marine fisheries. The WWF formed a partnership with the World Bank, the largest source of public sector financing for forest conservation and management and, as such, is an important voice in forest policy. See, \textit{e.g.}, Kathryn S. Fuller, \textit{State of the World's Forests Sparks Unprecedented Partnerships}, FOCUS, Mar.-Apr. 1998, at 2.

\textsuperscript{774} Unilever is one of the world's largest buyers of fish with over $5 billion profit in the first half of 1997. See Unilever Records $ 5.08 Billion Net Profit for Half Year, Aug. 1, 1997, BUS. WIRE, available in LEXIS, News Library, Bwire File.

\textsuperscript{775} See SUTTON & WHITFIELD, MARINE STEWARDSHIP COUNCIL, \textit{supra} note 773.

\textsuperscript{776} See id.

\textsuperscript{777} See id.


\textsuperscript{779} For other examples, see \textit{WWF Calls on Corporate America to Protect the Planet}, PR NEWSWIRE, Aug. 17, 1998, \textit{available in LEXIS}, News Library, Prnews File.
These examples illustrate different approaches to maintaining an EMS. Each shares the same ingredients: motivated stakeholder involvement; evaluation of an activity's impact on the environment; establishing objectives and targets; developing and implementing an action plan; and continually evaluating, monitoring, and adapting. Another model that requires these elements is ISO 14001. However, it goes one step further. To be certified to ISO 14001, an organization must meet strict criteria. Among these is the requirement that an organization demonstrates its commitment to environmental management. An environmental policy must be developed and communicated to all levels of the organization and to the public. A system must be in place to identify all applicable legislative and regulatory requirements. Environmental aspects associated with the organization's activities, products, and services that may have an impact—positive or negative—on the environment must be analyzed and prioritized. An effective management process must be in place to develop and meet objectives and targets aimed at reducing the negative impact on the environment. Employees must be trained to recognize environmental impacts of their activities. Management reviews and audits must identify areas for continued improvement of environmental performance through effective environmental management. Communication with internal and external interested parties must be maintained. To ensure the success of the strategy, appropriate financial and human resources must support the system. This pro-active strategy provides a generic blueprint for all segments of the marine sectors, from a single fishing trawler to a seafood processor.

780 See ISO 14001, supra note 690, art. 1.
781 See id. art. 4.1.
782 See id. art. 4.4.3.    
783 See id. art. 4.3.2.    
784 See id. art. 4.5.1.    
785 See id. arts. 4.3.3, 4.3.4.    
786 See id. art. 4.4.2.    
787 See id. arts. 4.5.4, 4.6.    
788 See id. art. 4.4.3. Interested parties or stakeholders are oftentimes diverse, including fishers, financial institutions, shareholders, food processors, neighbors, unions, and the printed media, for example.
789 See id. art. 4.4.1.    
790 Two major shipping companies achieved ISO 14001 certification in 1998. This is noteworthy because the shipping industry is grappling with a compulsory international safety and environmental management regime, the International Safety Management
2. Eco-market Strategy

The requirements for creating an adaptive, integrated approach to stewardship of the ocean's ecosystem include development of an EMS centered on an eco-market, value-driven strategy. It is encouraged by businesses who incorporate environmental objectives into successful business strategies as well as consumers who are making more intelligent decisions about purchases that affect the environment and who are keeping a closer eye on corporate claims. Eco-market solutions result in increased efficiency, improved employee morale, added value to the bottom line, and in most cases cut millions of dollars in costs. Sustainably managed oceans can result in "green" market premiums: "Environmental performance is one of the many important measures of business success." In examining the relationship between (ISM) Code. The ISM Code, developed by International Maritime Organization in 1993, was adopted into the International Convention for the Safety of Life at Sea (SOLAS 74), see SOLAS, supra note 239, Chapter IX: Management for the Safe Operation of Ships, and became mandatory for certain vessels beginning 1 July 1998. Priority was given to passenger ships, tankers, gas carriers, and bulk carriers. It is intended as a means to encourage continuous improvement of safety management skills in the maritime industry and can be applied to all ships. It addresses the importance of designated persons with various responsibilities within the company and requires that management procedures be documented, coordinated, and monitored in accordance with government and company requirements. The result is the company's Safety Management System. See W.M. von Zharen & William Duncan, Environmental Risk Assessment and Management in the Maritime Industry: The Interaction Among ISO 9000, ISM and ISM Management Systems. 1994, vol. 102, 137-164. See also, Beside ISM Code, IMO is Looking Into Environmental Guidelines, BUS. TIMES (Singapore), Apr. 15, 1998, at 1, available in LEXIS, News Library, News Library, Curnws File.

791 See, e.g., Johns Manville Insulation Fits the Green Profile Market Size and Purchasing Decision, Nov. 19, 1998, PR NEWSWIRE, available in LEXIS, News Library, Curnws File (citing recent environmental studies revealing that quality, value-priced products and environmental attributes are the driving force in purchasing decisions today); Thought for Food—Food Shoppers Say They'd Like to be Green, PATRIOT LEDGER (Quincy, MA), May 21, 1997 at 26 (quoting a recent Food Marketing Institute's report, the Greening of Consumers: "52 percent of consumers now express concern about environmental issues and want to make some of their purchasing decisions based on those ideas.")

792 See EPA, AN INTRODUCTION TO ENVIRONMENTAL ACCOUNTING AS A BUSINESS MANAGEMENT TOOL: KEY CONCEPTS AND TERMS, EPA 742-FL-95-001, June, 1995, at 1-2 [hereinafter EPA, INTRODUCTION TO ENVIRONMENTAL ACCOUNTING].

793 Id. at 1.
environmental and financial performance of the Domini 400 Social Index (DSI), a social acceptability screen analogue to the Standard and Poor's 500 Index (S&P), the DSI has outperformed the S&P since its inception in 1990. Environmental performance screening is used by the investment world as well. By 1997, an estimated $165 billion funds were managed under social screens in the United States and the environment was one of those screens. Environmental screens are used in virtually all the socially screened mutual funds in the United States.

Environmental spending is approaching two percent of the nation's gross national product. "United States companies spend an estimated $140 billion annually to improve environmental performance while only a quarter of these costs are traced directly to environmental compliance." "Better management of these costs is important for reducing public and private expenditures and avoiding contingencies in the form of liabilities." Environmental performance initiatives such as waste management, energy efficiency, and recycling can be both profitable and environmentally preferable. Increasing shareholder value and environmental value can occur simultaneously. For example, DuPont estimates that "during the period of time when its overall environmental impacts were being reduced by over 50%, its shareholder value increased by over 200%.

795 See id.
796 See id.
797 See id.
799 Id. (quoting J. Owen, ed., Environmental Compliance: Management the Mandate, Manufacturing Engineering 114(3) at 59-66
800 Id.
An eco-market strategy requires appropriate allocation of environmental costs, savings, and benefits. These accounting methods have been referred to as: activity-based cost management; total quality environmental management; environmental cost accounting; full-cost environmental accounting; green accounting; and accounting for sustainable development.803

An eco-market strategy focuses on the triple bottom line: financial (those costs that directly affect a company’s bottom line), environmental (those costs associated with nature and the environment), and social (those costs to society).804 At this point, the first type is the only one to which a company may be accountable.805 Measuring environmental factors, however, can result in environmental costs being “significantly reduced or eliminated as a result of business decisions, ranging from operational and housekeeping changes, to investment in ‘greener’ process technology, to redesign of processes/products.”806

“Understanding the environmental costs and performance of processes and products can promote more accurate costing and pricing of products and can aid companies in the design of more environmentally preferable processes, products, and services for the future.”807 Environmental costs can include conventional costs such as the cost of using raw materials, utilities, capital goods, and supplies when such costs are reduced or eliminated: for example, decreased use of natural resources; implementation of energy saving devices; decreased consumption of non-renewable resources.808 Environmental costs can also include costs incurred prior to the operation of a process, system, or facility, such as costs related to siting, design of environmentally preferable products or processes, qualifications of suppliers, and evaluation of alternative pollution control equipment.809 There may be

804 See id. at 484.
805 Recently, the Council of Economic Priorities, a United States-based non-governmental organization, developed SA 8000, a voluntary international labor standard. It includes the issues of child labor, forced labor, health and safety, discrimination, working hours, pay, and discipline. See Roger Cowe, Code Breaks the Ethics Ploys, GUARDIAN, June 13, 1998, at 30, available in LEXIS, World Library, Guardn File.
806 EPA, INTRODUCTION TO ENVIRONMENTAL ACCOUNTING, supra note 792, at 1.
807 Id. at 2.
808 See id. at 8.
809 See id. at 10.
regulatory and voluntary environmental costs incurred in operating a business.810 Another potential cost is prospective costs, those expenditures that will occur at “more or less well defined points in the future.”811 There may be costs associated with going beyond compliance to prevent or reduce pollution from future operations.812 Other environmental costs may include contingent costs, those that may or may not be triggered at some future time.813 These contingent costs are best described in “probabilistic terms: their expected value.”814 Examples include the costs of compensating for future natural resource damage; future accidental releases of contaminants into the ocean; future fines and penalties for future regulatory infractions; and future costs due to unexpected consequences of permitted or intentional releases.815 Finally, environmental costs that are less tangible or intangible should be considered:816

Humans, corporations, and disparate segments of the environment are not dissociated individual islands floating in a vacuum; they live in a web of direct and indirect interconnections. Externalized costs don't disappear, even if they are ignored. The ‘free’ absorption of negatives by the commons, or the destruction of resources that do not in the commons have to be paid for, are not in reality ‘free goods’ in terms of a societal accounting. These externalities have serious accumulated consequences that can end up dwarfing the short term logic that spawned them.817

810 See id.
811 See id. Examples include replacing a fuel tank, minimizing deleterious ecological impacts of aquaculture, closing a site, and complying with regulations that have been promulgated but are not yet in effect.
812 See EPA, INTRODUCTION TO ENVIRONMENTAL ACCOUNTING, supra note 792, at 10.
813 See id. at 11.
814 Id.
815 See id.
816 See id.
Consider the cost of navigating a fishing trawler from point A to point B. That cost would include the traditional cost factors: gasoline, oil, and wear and tear on the vessel. Factored into the price of gas and oil is the cost associated with traditional costs exploration and production, marketing and taxes (those factors typically included in a price per gallon/liter cost). The price could also include those direct costs associated with health care required by a pollution-based disease or some measure of degradation to the atmosphere and, in turn, the ocean as well as direct degradation of the ocean. That is, the price per gallon/liter could reflect the costs attributable to air pollution from the vessel engine, or the cost of degradation of the marine environment caused by any lubricant and/or gas discharged while filling the tanks or in running the engine. The price could reflect those costs associated with the degradation of the environment used in exploration and production (hazardous wastes, erosion, and chemical manufacturing, for example) and environmental costs of marketing the gas and lubricant (prints, dyes, raw materials for paper). The price could include costs factored in for potential liability for a spill during exploration, production, or marketing. If the refinery that produced the gasoline purchased clean technology, and thus reduced significantly its air emissions, or it produced a fuel that resulted in no harm to the air, how would that be reflected on the refinery’s bottom line or the cost of the gasoline at the pump? A similar analysis could be used to assess the costs associated with the environmental impact of a fishing vessel’s operations including those costs triggered through general activities, such as vessel maintenance and repair, and those triggered through specific fishing operations, such as types and use of gear.

An eco-market strategy reconciles environmental goals with sound business decisions, e.g., for vessel hulls, replacing toxic antifouling paints containing organotins with a less expensive alternative such as a silicon-based paint.818

Continuous improvement through auditing provides potential cost-savings because auditing enhances efficiency.819

818 Antifouling paints are used to coat the bottoms of ships to prevent sealife from attaching themselves to the hull, thereby slowing down the vessel and increasing fuel consumption. See INT’L SHIP REGISTRY REV., supra note 162, at 1. Organotin tributyl tin (TBT) is one of the most effective antifouling paints but has been proven to cause deformations in oysters and sex changes in whelks, a marine snail. See id.

performance auditing is proactive; it reduces risk. Through environmental audits, problems can be identified internally and corrected quickly. Environmental audits provide assurance that environmental controls are functioning and provide a focus on environmental issues. As a market-based economic instrument, third-party certification has a distinct advantage in attaining environmental goals because it is market-neutral compared to direct regulatory mechanisms. The auditing and certification process encourages the industry to improve stewardship of living marine species while at the same time providing easier market access or a greater market share where consumers are environmentally motivated.

3. Adaptive Stewardship

Adaptive stewardship is essential because of the complexity of the ocean and the continual development of knowledge about its inhabitants. The strategy should be one to test theories and adapt to the results of these tests. It should include mechanisms for exploring and reconciling different and dynamic perceptions of ecosystem protection and ecological sustainability. Effective stewardship depends on the ability to address change in information, direction, and objectives. This can only be achieved with a dynamic infrastructure. To do this requires a rethinking of perceptions of the ocean ecosystem. Adaptive stewardship requires learning from successes and failures; it requires flexibility; it requires continual review, continual assessment of knowledge, and continual improvement to respond to new information.

Adaptive stewardship includes collaboration for information dissemination based on best scientific evidence available concerning the

ocean ecosystem as well as environmental systems in general. Reliable dissemination and retrieval of honest information requires pervasive use of computers and information technology to rapidly and continually equip stakeholders and decision-makers with relevant decision-making tools. Expertise, programs, and resources must be linked with identified needs and stated requests. A model for adaptive management is found in ISO 14001. The structure of ISO 14001 is premised on vision-based leadership that clearly defines an organization's goals as well as the direction for achieving them. Effective communication at all levels and functions, response to relevant communications from external interested parties, and consideration of processes for external communications are required. Processes for external communication on significant environmental aspects must be considered and decisions must be recorded. Adaptive stewardship acknowledges that a strategy responding to change must include continuous monitoring and corrective feedback. Under ISO 14001, a procedure must be maintained in which all key elements of operations and activities that can have a significant impact on the environment are monitored and measured. Adaptive stewardship requires continual improvement and review. Under ISO 14001, the EMS must be periodically reviewed to ensure suitability, adequacy and effectiveness at appropriate intervals to ensure continual improvement.

4. Education and Resources

Stewardship must focus on education and be buttressed by the required financial and personnel resources. Consumers, businesses, and other stakeholders must be made aware of the way in which their actions have an impact on ocean and coastal ecosystems sometimes thousands of miles away. Equally important is the dissemination of relevant information in a continual loop, from grass roots with hands-on information to scientific data for an administrative level and back again.

823 ISO 14001, supra note 690.
824 See id. art. 1.
825 See id. art. 4.4.3.
826 See id.
827 See id. art. 4.5.1.
828 See id.
829 See generally id. arts. 4.5, 4.6.
830 See id. arts. 4.5.4, 4.6.
Resources must be available to address ocean ecosystem issues through
global field programs with an emphasis on lesser-developed countries.
The support must come from major funding institutions such as the World
Bank. Environment policy guidance for these institutions is vital. These
institutions must be part of the process of demonstrating how
environmental costs, often hidden costs, may be reduced or eliminated as a
result of business decisions ranging from operational and housekeeping
changes to investing in green processes. These financial centers must
also insist on funding only those efforts that take into account how an
activity impacts the ecosystem.

5. Global Framework

The problems of the ocean are global and, as such, require global
solutions. Therefore, a supranational framework for stewarding living
marine species and the ocean ecosystem must be established. This
framework must include a strategy of anticipatory planning and a
proactive approach to stewardship. Models have been offered. An
oceanic visionary, Elisabeth Mann Borgese, described several of the more
ambitious ones, each with certain characteristics appropriate for
establishing a global framework. One model, originally articulated by
Claiborne Pell, describes a comprehensive ocean development plan
coordinated by the National Ocean Agency Headquarters with an
International Sea Patrol for surveillance, enforcement, and monitoring.
Pell’s 1968 Treaty on Principles Governing the Activities of States in the
Exploration and Exploitation of Ocean Space “establishes a licensing
agency with powers that considerably exceed those of the International
Sea-Bed Authority under the United Nations Convention on the Law of
the Sea (1982 Convention).” His plan gave non-governmental
organizations similar authority and treatment as nation-states. Pell
stressed “the need for new, international ‘machinery’ to ensure ‘the most
efficient exploitation of the resources consistent with the conservation and

831 See, e.g., EPA, INTRODUCTION TO ENVIRONMENTAL ACCOUNTING, supra note 792.
832 See Elisabeth Mann Borgese, The Process of Creating an International Ocean Regime
to Protect the Ocean's Resources, in FREEDOM FOR THE SEAS IN THE 21ST CENTURY (Jon
M. Van Dyke et al. eds., 1993).
833 See id. at 24-25 (citing CLAIBORNE PELL, THE CHALLENGE OF THE SEVEN SEAS
(1966)).
834 Id. at 25.
835 See id. (quoting PELL, supra note 833).
prevention of waste of the natural resources of the sea-bed and subsoil of ocean space.\textsuperscript{836} Unfortunately, he does not provide the mechanism—legislative or executive—for logistically controlling such a global initiative.\textsuperscript{837}

Borgese described a second model, the Ocean Regime (also known as the Santa Barbara Draft) published in 1968.\textsuperscript{838} Its language emphasizes “horizontal interdependence.”\textsuperscript{839} “The creation of the regime [would] be a political and constitutional task rather than an economic or technological one” with the goal of “creat[ing] a new form of cooperation in the international community.”\textsuperscript{840} The emphasis would be on an adaptive strategy in order to meet rapid changes and discoveries.\textsuperscript{841} Rather than establishing a rigid code, issues would be addressed as they emerged.\textsuperscript{842} Borgese notes that interdependencies and interconnectedness of ocean issues had created a “porousness” of the boundaries between what used to be separate levels of governance—national, regional, and international—and the continuity of jurisdictions.\textsuperscript{843} Rather than invade national sovereignty, this porousness enlarges the concept of legislation.\textsuperscript{844} Because she adds planning as a forth dimension to government, the concept of law is enlarged.\textsuperscript{845} Whether planning has the character of “law,” (that is, enforceability) should not be the focus.\textsuperscript{846} What is relevant is whether the plans “benefit those who comply with them and exclude from such benefits those who do not comply.”\textsuperscript{847} Two additional salient components characterize this model: the implementation of linkages that create a continual pattern of connection among regional organizations, national governments, and the global ocean regime; and a decision-making

\textsuperscript{836} Id. at 26 (quoting PELL, supra note 833).
\textsuperscript{837} See id.
\textsuperscript{838} See Borghese, supra note 832, at 26.
\textsuperscript{839} Id. at 27.
\textsuperscript{840} Id. at 26.
\textsuperscript{841} See id. at 27.
\textsuperscript{842} See id. at 26-28.
\textsuperscript{843} See id. at 27.
\textsuperscript{844} See id. at 27-28.
\textsuperscript{845} See id. at 28. Borgese concedes that there may be many more dimensions to government; that indeed, we “must shed our Western prejudices as our interests curve around the globe, into outer space, into ocean space.” Id.
\textsuperscript{846} See id.
\textsuperscript{847} Id. at 28.
process based on interdisciplinary input that creates a new synthesis among politics, sciences, and economics.\textsuperscript{848}

Another model discussed by Borgese was introduced in 1971 by Arvid Pardo.\textsuperscript{849} Pardo is considered by many as the progenitor of the phrase “common cultural heritage” in the context of the law of the sea.\textsuperscript{850} He designed a preliminary draft of an ocean space treaty to replace the Geneva Convention on the Law of the Sea 1958\textsuperscript{851} and advocated a completely new blueprint for the law governing mankind's use of the resources of the high seas beyond the limits of the resource jurisdiction of any state.\textsuperscript{852} Pardo maintained that property considered the common heritage of mankind “should be . . . administered by an international authority for the benefit of all peoples.”\textsuperscript{853} Pardo's draft defined coastal state jurisdiction in ocean space, which later was reflected in the 1982 Law of the Sea Convention: national ocean space of two hundred miles and then international ocean space onward.\textsuperscript{854} His draft defined the International Ocean Space Institutions, consisting of an Assembly, a Council, an International Maritime Court, and a Secretariat.\textsuperscript{855} Major subsidiary sectors included an Ocean Management and Development Commission, a Scientific and Technological Commission, and a Legal Commission.\textsuperscript{856} Representation in all sectors was weighted on the basis of population, length of coastline, gross tons of merchant shipping, possession of research and rescue vessels, the amount spent annually on marine scientific research, the amount of fish harvested annually, the amount of offshore hydrocarbons produced annually, the possession

\textsuperscript{848} See id. at 26-28.
\textsuperscript{849} See id. at 30.
\textsuperscript{851} See Borgese, supra note 832, at 30.
\textsuperscript{853} Id. at 516 (quoting Arvid Pardo, Whose Is the Bed of the Sea?, 62 AM. SOC’Y INT’L L. PROC. 216, 225-26 (1968)).
\textsuperscript{854} See Borgese, supra note 832, at 30. This is in contrast to the more complex delimitation enacted by the 1982 Law of the Sea Convention.
\textsuperscript{855} See id.
\textsuperscript{856} See id.
of submarine pipelines or cables in international ocean space, and finally, the amount paid to the Institutions (which is based on revenue obtained from the exploitation of natural resources in national ocean space—a kind of ocean development tax).  

He set up a rather elaborate class categorization through which decisions were made:

States meeting the standards set up by these weighting factors belong to category A; coastal states not meeting these standards belong to category B; and landlocked states make up category C. Decisions on most issues require a majority of votes of states belonging to category A plus a majority of votes of states belonging to one of the other two categories. Some crucial decisions require a majority of votes of all three categories.

Unfortunately, this categorization results in greater power for wealthier coastal nations.

In addition to these models described by Borgese, another global framework could be similar to the Ocean Guardians envisioned by Christopher Stone in which “some public or non-governmental organization is designated to act as a guardian for each hazarded portion of the [global] commons.” The system centers on a type of attorney-client relationship in which the client is the ocean. The guardian/attorney monitors its client's condition. On behalf of the client, the guardian/attorney appears before the legislatures and administrative agencies of nation-states considering actions which may have an impact on the client. The guardian/attorney appears as a special intervenor-counsel

857 Id.
858 Id.
859 See id. at 30-31.
860 See Christopher Stone, Mending the Seas through a Global Commons Trust Fund, in FREEDOM FOR THE HIGH SEAS IN THE 21ST CENTURY: OCEAN GOVERNANCE AND ENVIRONMENTAL HARMONY 171 (Jon M. Van Dyke et al. eds., 1993).
861 Id. at 172.
862 See id. at 173.
863 See id.
in a variety of bilateral and multilateral disputes. The guardian/attorney may also initiate legal and diplomatic actions.

Each of these models demands, at a minimum, that ocean ecosystem issues be viewed as global and interdependent. They replace the traditional “species by species, resource by resource, project by project, threat by threat” approach. These global models require an integrated, adaptive, multidisciplinary approach to solve the complex, multifaceted problems facing effective stewardship of living marine species and the ocean ecosystem.

6. Ethical Foundations

Finally, stewardship of living marine species must be based on an ethical foundation, a dimension in which living marine species are perceived as vulnerable to the impacts of human activities. This requires stewardship of living marine species not because they are subservient to humans, not because it may turn out that if some species becomes extinct, humans will be negatively affected. To the contrary, the stewardship must rest on something deeper, something that pulls humans beyond the

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864 See id.
865 See id.
867 We have moral obligations to protect things of aesthetic value, and to ensure . . . their continued existence; thus we have a duty to protect individual [non-human] animals . . . and to ensure that there will continue to be [non-human] animals of this sort . . . . We value and protect [non-human] animals because of their aesthetic value, not because they are members of a given species.

Lilly-Marlene Russow, *Why Do Species Matter?*, ENVTL. ETHICS 3 (1981). See also Louis P. Pojman, *Animal Rights: Sentience as Significant*, GLOBAL ENVIRONMENTAL ETHICS (2000) (discussing the five theories of obligations to (non-human) animals: the No-Status Theory (non-human animals have no rights or moral status because they have no souls), the Indirect-Obligation Theory (although non-human animals have no inherent rights, they should be treated kindly), the Equal-Status View (equating human animals with non-human animals because there is no rational basis for separating out the human animal, and that it is fundamentally wrong to view non-human animals as resources), the Equal Consideration Theory (holding that non-human animals are just like human animals in basic morally relevant ways and so merit our moral regard), and the Split-Level Theory, which aims at correcting the preceding positions and recognizes that both sentience and rational self-consciousness are important in working out a global interspecies morality).
narrow focus of human utilization of these species. The process involves each person, each business, and each organization, looking carefully at their actions, the products they produce or use, the services they give or receive and determining what effect it may have on the ocean and its inhabitants. This ethical dimension questions whether it makes any difference if one more high rise condominium is built on the coast; one more automobile is produced; one more plastic bag drifts on the waves; one more offshore platform is erected; or one more plate of sautéed scallops is served.

III. CONCLUSION

Life in the sea is extravagant in its abundance and its variety. The size of the ocean, the complexity and variety of issues surrounding it, and the constant change and evolution of multiple stressors on the ocean's ecosystem, requires that living marine stewardship be multifaceted, integrated, and adaptive. Too-often international regimes have placed problems in a box: now we will address fish depletion; now we will address ocean dumping; now we will address whale hunting. With few exceptions, the legal regimes do not focus on the ocean or its living marine species in the context of an ecosystem. Certainly, the task is daunting; the issues are far ranging and diverse. Because of this, efforts expended to have particular activities regulated or banned by international treaties have been piecemeal solutions doomed to failure. Technology, greed, and the lack of accountability combined to create change with unprecedented rapidity. When change occurs in one part of the ecosystem, the impact is shared in varying degrees by all the parts.

To return this fragile ecosystem to stability and health, much more remains to be done not only in pragmatic areas such as information access, compliance, and enforcement but also in policy development, more precisely, global policy re-tooling. Present-day policy and law will have a significant impact on the livelihood of many. The impact for human animals and living marine species will be affected by whether living marine species are stewarded as part of an ecosystem as well as whether the seas will be acknowledged as an integral part of a larger ecological phenomenon.

Effective stewardship must be predicated on several principles. First, that the marine ecosystem is interconnected and interdependent and, as such, requires switching from a single-species stewardship approach to a holistic one-in which the skein of life that enmeshes every living thing in
the sea is considered. Second, that effective stewardship begins with the systematic application of a universal environmental management strategy that addresses the impacts of an organization's activities, services, or products and one in which continual improvement is mandatory. Third, that a global framework for effectuating stewardship of living marine species must be implemented, one that is adaptive and one that centers on stakeholders' interests, expansion of education, and global dissemination of relevant and honest information. Finally, effective stewardship demands a thoughtful analysis of how living marine species and the ocean's ecosystem should be perceived.