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Book Reviewed: International Year of the Ocean, Redux

A review essay by Michael Bhargava* of *In a Perfect Ocean: The State of Fisheries and Ecosystems in the North Atlantic Ocean* by **Daniel Pauly** and Jay Maclean (2003); *The Empty Ocean: Plundering the World's Marine Life* by Richard Ellis (2003); and *Ocean Bankruptcy: World Fisheries on the Brink of Disaster* by Stephen Sloan (2003).

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TEXT:
[*413]

INTRODUCTION

The United Nations General Assembly declared 1998 to be the "International Year of the Ocean" in an effort to highlight the critical role of oceans in human societies and the need for ocean conservation.ⁿ¹ After a year of proclamations, white papers, and conferences, 1998 ended with slightly greater public awareness, but with little in the way of tangible improvement in the world's oceans. In the five years since 1998, the world's seas have continued to deteriorate, while the calls for global reform have escalated. This Review looks at some of the major books on marine conservation published in 2003 and the trends from which they spring.

In many ways, 2003 is a better candidate for year of the ocean than 1998. This is especially true because 2003 saw a spate of scientific studies, a commission report, a major fisheries conference, and government decisions all highlighting the urgent need to abate the continuing degeneration of worldwide marine resources. Much of this attention from ocean managers and marine biologists brought a new historical perspective on the state of the oceans. Following the lead of marine biologist Jeremy Jackson and his colleagues' groundbreaking 2001 article on how past overfishing has led to today's impoverished ecosystems,ⁿ² [*414] scientists are increasingly turning to history as a means of setting a baseline for ecological analysis.ⁿ³ In 2003, members of the ocean conservation community continued to emphasize that only by identifying the productivity the oceans have lost can we understand how it can be regained.

II. SCIENTIFIC STUDIES DEMONSTRATE THE DIRE STATE OF THE WORLD'S OCEANS

On May 15, 2003, for example, the respected journal *Nature* printed a seminal historical study demonstrating that ninety percent of the world's large fish have disappeared due to overfishing and other forms of marine exploitation.ⁿ⁴ Populations of highly migratory species such as marlin, tuna, and swordfish, along with coastal species such as cod and halibut, are in critical danger.ⁿ⁵ The study found that once fishermen discovered new fisheries, factory vessels took as little as fifteen years to deplete the new source by eighty percent or more.ⁿ⁶ "From giant blue marlin to mighty bluefin tuna, and from tropical groupers to Antarctic cod, industrial fishing has scoured the global ocean," wrote Ransom Myers, the study's lead author. "There is no blue frontier left... Since 1950, with the onset of industrialized fisheries, we

have rapidly reduced the resource base to less than 10 percent - not just in some areas, not just for some stocks, but for entire communities of these large fish species from the tropics to the poles." n7

In an interview on the findings of this new study, **Daniel Pauly**, professor of fisheries at the University of British Columbia, explained how fishermen deplete local stocks before moving to new stocks in different locales. Pauly compared the depletion of fisheries to "a ring of fire burning through a piece of paper... Since the 1970's, when the big fishing areas of the Northern Hemisphere saw catches drop, you've had this front moving out, with a massive effort off West Africa, in Southeast Asia, the southern Atlantic." n8

[*415] Another critical study, published in *Science* in August 2003, examined historical populations of whales in the North Atlantic. n9 The study argued that these stocks were far larger than scientists had previously realized. n10 Based on genetic differences in current whale populations, Joe Roman and Stephen Palumbi estimated that historical populations of humpback, fin, and minke whales in the North Atlantic were between six and twenty times larger than current populations. n11 Whaling over the course of centuries reduced these populations, and industrial whaling in the twentieth century dropped them to critical levels. n12

The *Science* study casts doubt on current whaling management practices. In recent years, whaling nations have increased the pressure on the International Whaling Commission (IWC) to end the seventeen-year-old moratorium on whaling. n13 The IWC's management procedures, however, discourage the resumption of whaling on stocks that are below fifty-four percent of the estimated carrying capacity. n14 So far, the IWC has used scientifically questionable numbers based on logbooks from seventeenth-century whalers to estimate carrying capacity. n15 Roman and Palumbi's study, however, demonstrates that pre-whaling numbers were far larger than the IWC assumed and that current populations are substantially below carrying capacity. "The possibility that vast cetacean populations existed across deep ecological time has fundamental implications not only for their management but also for our perception of the world's oceans," the authors wrote. "In light of our findings, current populations of humpback or fin whales are far from harvestable." n16

III. POLICYMAKERS RESPOND TO THE OCEAN CONSERVATION CRISIS

The year 2003 also saw two major ocean commissions, one private and one public, grapple with recommendations to overhaul United States ocean policy. These commissions have separately undertaken the first comprehensive review of U.S. ocean policy since 1969. In that year, the Stratton Commission released the report *Our Nation and the Sea*, which recommended the "efficient and harmonious development of the sea's [*416] resources" n18

The Pew Oceans Commission, chaired by former White House chief of staff Leon Panetta, released its report in June 2003 after three years of work, calling for major changes in the way the nation approaches fisheries, coastal pollution, and ocean development. n19 The report encouraged a holistic approach to ocean management and lamented the focus on marine exploitation at the expense of conservation. n20 "This nation needs to ensure healthy, productive, and resilient marine ecosystems for present and future generations," the report concluded. "In the long term, economic sustainability depends on ecological sustainability." n21 The commission urged major changes in fisheries management and American ocean policy:

Reflecting the understanding and values of this earlier era, we have continued to approach our oceans with a frontier mentality. The result is a hodgepodge of ocean laws and programs that do not provide unified, clearly stated goals and measurable objectives. Authority over marine resources is fragmented geographically and institutionally. Principles of ecosystem health and integrity, sustainability, and precaution have been lost in the fray. Furthermore, the nation has substantially underinvested in understanding and managing our oceans. The information we do have in hand is often underutilized. Plagued with systemic problems, U.S. ocean governance is in disarray. n22

Meanwhile, the U.S. Commission on Ocean Policy, appointed by President George W. Bush as mandated by the 2000 Oceans Act, continues to prepare its final report. The commission released its preliminary report on April 20,

2004, and will revise it after a period of public comment. ⁿ²³

Responding to the need to reassess the state of the nation's fisheries management, NOAA and the eight regional fisheries management councils sponsored a major conference in November 2003, in Washington, DC. ⁿ²⁴ This first-ever conference of its kind brought together [*417] more than seven hundred fisheries managers, fishermen, scientists, politicians, and environmentalists to discuss how the current fisheries management system had developed and which directions it should go in the future. ⁿ²⁵ The published proceedings of the conference provide a wealth of information on the nation's ocean areas and how they are currently being managed. ⁿ²⁶

Federal and state governments employed new approaches to fisheries and ocean management in 2003. For example, in response to the critical decline of a long-lived set of species known as rockfish, the Pacific Fisheries Management Council closed nearly the entire Pacific continental shelf to bottom trawling beginning on January 1, 2003. This was an unprecedented step made necessary by years of regulatory inaction. ⁿ²⁷ The Council calculated that such a dramatic action was necessary to avoid the extinction of species such as bocaccio, whose levels had fallen by ninety-five percent from baseline levels in the 1960s. ⁿ²⁸ Meanwhile, beginning in April 2003, a permanent ban went into effect on all fishing, trapping, and harvesting of any marine organisms in certain zones encompassing 175 square miles of the Channel Islands National Marine Sanctuary off the California coast. ⁿ²⁹ The California Fish and Game Commission approved this network of marine reserves in part to safeguard species such as rockfish, abalone, and sea otters. ⁿ³⁰ The Channel Islands marine network led to further pressure on other marine managers to create no-take marine reserves across the country. ⁿ³¹

On the East Coast, the New England Fisheries Management Council reluctantly approved its strictest restrictions on groundfish harvesting, further reducing the number of days that fishermen could pursue the groundfish species cod and haddock by twenty percent. ⁿ³² The Council had been under court order to impose further restrictions on catches of groundfish, which have not significantly recovered since a virtual disappearance of stocks in the early 1990s resulted in decades of [*418] overfishing. ⁿ³³ Conservationists nevertheless decried the Council's refusal to impose a hard quota on allowable catches, arguing that the Council continued to avoid the difficult decisions necessary to save groundfish stocks in the long term. ⁿ³⁴

IV. IN A PERFECT OCEAN: A SCIENTIFIC ANALYSIS OF THE NORTH ATLANTIC'S DECLINE

As the crises in fisheries and the calls for reform reached a fevered pitch in 2003, a series of books attempted - with varying degrees of success - to explain the problems in ocean conservation. The three books reviewed here share a historical perspective that provides a reference point for the current state of the oceans. In *A Perfect Ocean: The State of Fisheries and Ecosystems in the North Atlantic Ocean*, by eminent marine biologist **Daniel Pauly** and writer Jay Maclean, seeks to demonstrate how impoverished the North Atlantic has become. ⁿ³⁵ While fishermen whose livelihoods depend on cod and haddock stocks insist that these stocks remain robust, Pauly and Maclean place the disappearance of fish stocks on a firm scientific and historical foundation.

Pauly and Maclean's slim volume emerged from the "**Sea Around Us**" Project, a joint effort by the University of British Columbia Fisheries Centre and the Pew Charitable Trusts. ⁿ³⁶ The project, founded by Pauly in 1999, aims "to provide an integrated analysis of the impacts of fisheries on marine ecosystems, and to devise policies that can mitigate and reverse harmful trends whilst ensuring the social and economic benefits of sustainable fisheries." ⁿ³⁷ The project began with an analysis of the North Atlantic Ocean, accumulating a vast amount of data from history, biology, and fisheries management.

The book's opening demonstrates the new approach the project takes, blending insights from an array of fields. It recounts the story of the *Andrea Gale*, the swordfishing boat that tragically sank in the 1991 tempest made famous by Sebastian Junger's book, *The Perfect Storm*. ⁿ³⁸ Before it sank, the *Andrea Gail* had traveled for more than six days away from her berth and stayed out for thirty-eight days, pushing the limits of fuel and human endurance. ⁿ³⁹ Why did the crew take the vessel so far from home in search of swordfish? The areas close to shore had already been [*419]

fished out, and the ocean bottom habitats of Georges Bank had been so severely trawled that they could no longer support the rich stocks of fish that they once had.ⁿ⁴⁰ Since fishermen needed to go further from shore to find fish, the pressure increased on them to find bigger catches to cover the spiraling cost of fuel.ⁿ⁴¹ The crew of the *Andrea Gale* put themselves in grave peril because they could not find fish close to shore, forcing them to take long trips to distant waters and to remain there until they filled their hold.ⁿ⁴² The results, at least for the crew of the *Andrea Gale*, were catastrophic.

Pauly and Maclean's book proceeds with a retrospective look at what the North Atlantic ecosystems once were. The ocean "once contained an abundance of fish - not to speak of marine mammals, seabirds, and turtles - that we may find now almost unimaginable."ⁿ⁴³ The history of the North Atlantic teems with seemingly tall tales about the abundance and the size of fish: cod six-feet long, harbors writhing with striped bass, twenty-five-pound lobsters, and tuna by the millions.ⁿ⁴⁴ The authors catalog the unrelenting serial depletion of the fisheries over five centuries, involving fleets from more than a dozen countries. Starting slowly, but gaining steam during the twentieth century, these fleets used increasing levels of technology to feed a continually growing human population, leaving depauperate ecosystems that had once overflowed with life.ⁿ⁴⁵

Pauly and Maclean's historical retrospective reminds us of the baselines that we once took for granted. "We have forgotten what we used to have" marine biologist Jeremy Jackson has said. "We had oceans full of heroic fish, literally sea monsters. People used to harpoon three-metre-long swordfish in rowboats. Hemingway's *The Old Man and the Sea* was for real."ⁿ⁴⁶ Modern fishermen and fisheries scientists tend to set their sights too low, trying to bring stocks back only to minimal levels that fishermen will again exploit. But oceans, in the absence of human overexploitation, are capable of extravagant productivity. Pauly and Maclean emphasize that returning to these fabled times of six-foot cod, and not merely avoiding the commercial extinction of marine creatures, should be our goal - our "baseline of expectations."ⁿ⁴⁷ The authors take the title for their book from this concept of the idyllic aspiration. "The [*420] question we aim to answer, for the North Atlantic and subsequently the rest of the world's oceans, is: How close can we come to attaining a perfect score: A perfect ocean?"ⁿ⁴⁸

Pauly and Maclean marshal vast amounts of scientific data from the "**Sea Around Us**" project to explain how fisheries have decreased and the consequences of their decline. They overwhelm any lingering thoughts that fish are still out there waiting to be found. Using dozens of maps and charts, they describe how fishermen have consistently fished down the food web, catching large, predatory fish until they are gone, then pursuing smaller prey until they in turn disappear.ⁿ⁴⁹ Populations of cod and haddock have plummeted in the North Atlantic. Now, populations of jellyfish have exploded to fill the resulting niche, and fishermen have begun capitalizing on an emerging Japanese market for jellyfish.ⁿ⁵⁰ The lack of fish lower on the food chain has seriously affected the ability of marine mammals such as blue whales and seals to recover from historic lows.ⁿ⁵¹ The lack of fish has also grievously impacted the human communities that make their living from the sea. Pauly and Maclean describe how declining fish stocks lead to the breakdown of generations of traditions in New England and Canadian fishing communities. Fishermen can no longer make a decent living.

Pauly and Maclean understand that science is only one part of the story. Equally important is a conceptual failure to understand the limits of marine ecosystems and the lasting effects of overexploitation. Most fishing nations, including Canada and the United States, have created a distorted system of incentives that subsidizes overfishing, in the process destroying the fishing communities that the policies are designed to benefit.ⁿ⁵² Fishery scientists, rather than managing the oceans holistically, have traditionally managed single species such as cod or lobster, pretending that those species do not interact with each other or with marine mammals and human beings.ⁿ⁵³ "We have devised systems of management wholly inadequate to the task of overcoming these formidable obstacles," the authors note. "We have not used the regulatory tools and developed the right institutions for managing fisheries effectively for their long-term sustenance."ⁿ⁵⁴

Fortunately, the "**Sea Around Us**" project does not merely seek to diagnose problems but also looks to find solutions. The last quarter of In [*421] a Perfect Ocean presents a series of recommendations and alternatives to the

present state of management. Many of the recommendations are not new (the precautionary principle, for example, has been touted, if not implemented, for years),ⁿ⁵⁵ but they take on a new relevance in the wake of the overwhelming evidence of the North Atlantic decline that Pauly and Maclean present. Their solutions focus on three broad categories: (1) reducing fishing effort through quotas, marine reserves, and vessel buybacks;ⁿ⁵⁶ (2) transforming the market for fish by decreasing subsidies and imposing carbon taxes that lower the incentive to travel long distances for fish;ⁿ⁵⁷ and (3) transforming governance by tying scientific information to fisheries management.ⁿ⁵⁸

Combining history with science, and sociology with policy, *In a Perfect Ocean* is one of the most compelling and powerful works on marine affairs published in years. This is the first publication to come from the "**Sea Around Us**" Project, but the project has since expanded its sharp analysis from the North Atlantic to other areas, including the North Pacific and northwest Africa. *In a Perfect Ocean* is an impressive first effort for the project, and those interested in fisheries and marine policy eagerly anticipate subsequent books.

V. THE EMPTY OCEAN: A HISTORICAL REVIEW OF DEPLETED MARINE SPECIES

The Empty Ocean: Plundering the World's Marine Life, by Richard Ellis, is the latest work from perhaps the most prolific of all popular writers on marine issues.ⁿ⁵⁹ Ellis is already well known to readers of the literature on marine issues, with books such as *Men and Whales* and *The Search for the Giant Squid*.ⁿ⁶⁰ As are many of his projects, *The Empty Ocean* is an ambitious work, a compendium of the many ways in which humans have changed the oceans for the worse. Like Pauly and Maclean, Ellis takes a historical approach to marine policy, investigating the decline and fall of species after species subjected to unrelenting human interference. The book includes a "Who's Who" of disappearing or extinct marine species: gray whales, swordfish, cod, hawksbill turtles, the [*422] great auk, Steller sea cows, sea otters, elephant seals, Caribbean monk seals, and many more. Ellis organizes his book around these creatures, devoting a section to each and cataloguing in devastating detail how their populations have declined. Ellis does not present original research in this book. He characterizes his approach not as one of a field researcher, but as one of a "library or Internet researcher."ⁿ⁶¹ Ellis understates his effort, as the forty-three page bibliography of sources from which he draws indicates.ⁿ⁶² An accomplished painter, Ellis also illustrates his work with portraits of the various species whose histories' he describes.

The greatest strength of the book mirrors its greatest weakness. Ellis impressively compiles a rich history of marine exploitation, a valuable addition to the marine literature. The book's sheer breadth, however, tends to overwhelm the reader with a paralyzing barrage of information on the marine victims of human overexploitation. Species after species follows the now familiar path toward decimation. "Coral reefs are under assault; cod fishing is finished; overfishing has altered the oceans' ecosystem; green turtles are seriously endangered; the shortage of sea otters in the Aleutian Islands has caused a population explosion among sea urchins, which have eaten all the kelp; plankton blooms replace oysters in Chesapeake Bay; and on and on."ⁿ⁶³ Unfortunately, Ellis provides little in the way of solutions, other than to call for a stop to the bad practices in which humans engage. He dutifully trots out the idea of no-take marine reserves and calls for an end to overfishing.ⁿ⁶⁴ Both are fine ideas, but his catalogue of devastation is so overpowering that these solutions seem pale in comparison. After three hundred pages of chronicling how marine populations have vanished, Ellis finishes his book with a short chapter called "Is This The End?"ⁿ⁶⁵ Ellis does not directly answer this question, but after reading *The Empty Ocean*, the answer seems to be yes.

VI. OCEAN BANKRUPTCY: A RECREATIONAL FISHER'S ECCENTRIC PERSPECTIVE

Ocean Bankruptcy: World Fisheries on the Brink of Disaster, by Stephen Sloan, promises much but delivers little.ⁿ⁶⁶ The title creates the presumption that the book will deal with the decline of fisheries around the globe. However, Sloan, a recreational fisherman, deals almost exclusively with North Atlantic tuna and billfish. Unlike the scientific basis of Pauly and Maclean's book, or the historical basis of Ellis' book, [*423] Sloan bases his offering entirely on his personal experience fighting quota allocations set by the International Commission for the Conservation of Atlantic Tunas (ICCAT), the body that regulates fisheries for tuna, billfish, and swordfish.

This eccentric book is largely an exercise in shameless self-promotion, as Sloan encourages us to listen to his weekly radio program,ⁿ⁶⁷ read his various articles (which are conveniently appended to the book),ⁿ⁶⁸ and admire the number of corporate and non-profit boards on which he serves.ⁿ⁶⁹ His basic premise is that recreational fishermen get short shrift in international discussions about catch allocation for tuna, marlins, and other highly migratory fish. "All of us working in the recreational [fishery] sector felt uneasiness in the pit of our stomachs," he reports in a description of a meeting on future catch allocations. "We knew that one day we would be screwed out of our rightful share of any ICCAT quota, but we did not know why; nor did we know who was behind this."ⁿ⁷⁰ From this observation, Sloan launches a web of conspiracy theories, variously attacking the Kennedy clan,ⁿ⁷² the Rockefeller family,ⁿ⁷⁴ and international arms and drug dealers.ⁿ⁷⁵ He at one point compares commercial longline fishermen to the Khmer Rouge for their indiscriminate killing.ⁿ⁷⁶ Later, he remarks that when he volunteered to attend ICCAT meetings where he could fight for his own interests, "I know I felt that I was responding to President Kennedy's call, "Ask not what your country can do for you - ask what you can do for your country.""ⁿ⁷⁷

In the end, Sloan may have a point. He is certainly correct in lambasting ICCAT for its continuing failure to regulate the catch of highly migratory species in the North Atlantic adequately and its inability to deal with ships that fly flags of convenience to avoid ICCAT quotas.ⁿ⁷⁸ But his idiosyncratic writing and his black-and-white approach, in which recreational fishermen are saints and commercial fishermen and [*424] voracious Japanese consumers are sinners, tend to discredit the basic points that he tries to prove. As a result, it is hard to take this book very seriously, leaving open the niche for a good book analyzing ICCAT and the continued decline of highly migratory species.

CONCLUSION

These three books are a small part of the tidal wave of information on the world's oceans released in 2003. The various studies, reports, documentaries, and books all point to the desperate need to focus on the state of the oceans. In particular, they point to a need to bring a historical perspective to marine conservation. By historicizing the study of the oceans, we can learn exactly what we have lost and how far we need to go to reclaim marine ecosystems. The flow of information will continue this year with the final release of the U.S. Commission on Ocean Policy's report, but the year 2003 established a steady momentum for a sustained look at the world's oceans.

Legal Topics:

For related research and practice materials, see the following legal topics:
 Administrative Law Separation of Powers Executive Controls Environmental Law Natural Resources & Public Lands Endangered Species Act Takings Tax Law Federal Income Tax Computation Deductions for Amortization, Depletion & Depreciation General Overview

FOOTNOTES:

n1. United Nations General Assembly Resolution 49/131, Dec. 19, 1994, available at: <http://www.un.org/documents/ga/res/49/a49r131.htm>.

n2. Jeremy B.C. Jackson et al., Historical Overfishing and the Recent Collapse of Coastal Ecosystems, 293 Science 629 (2001).

n3. See, e.g., F.P. Chavez et al., From Anchovies to Sardines and Back: Multidecadal Change in the Pacific Ocean, 299 *Science* 217 (2003); Reg Watson & **Daniel Pauly**, Systematic Distortions in World Fisheries Catch Trends, 414 *Nature* 534 (2001); Jeremy B. C. Jackson, What was natural in the coastal oceans? 98 *Proc. Nat'l Acad. Sci.* 5411 (2001).

n4. Ransom A. Myers & Boris Worm, Rapid Worldwide Depletion of Predatory Fish Communities, 423 *Nature* 280 (2003).

n5. *Id.*

n6. *Id.*

n7. Cover Study of Nature Provides Startling New Evidence That 90 percent of Large Fish, Including Tuna, Marlin, Swordfish, Sharks, Cod, Halibut, Are Gone; Leading Scientists Say Need to Attempt Restoration on Global Scale Is Urgent, *Ascribe Newswire*, May 13, 2003.

n8. William J. Broad & Andrew C. Revkin, Has the Sea Given Up Its Bounty?, *N.Y. Times*, July 29, 2003, at 1.

n9. Joe Roman & Stephen R. Palumbi, Whales Before Whaling in the North Atlantic, 301 *Science* 508 (2003).

n10. *Id.*

n11. *Id.* at 509.

n12. *Id.*

n13. Kevin McElderry, Moratorium at Stake as Whaling Nations Battle with Critics, Agence France Presse, June 16, 2003.

n14. Roman supra note 9, at 510.

n15. Kenneth R. Weiss, Early Whale Population Undercounted, Study Says: Their Numbers Before Commercial Hunting May Have Been Much Higher Than Thought, L.A. Times, July 25, 2003, at 32.

n16. Roman supra note 9 at 510.

n17. Commission on Marine Science, Engineering and Resources, Our Nation and the Sea: A Plan for National Action 2-3 (2003).

n18. In response to the commission report, President Nixon created the National Oceanic and Atmospheric Administration.

n19. Pew Ocean Commission, America's Living Oceans: Charting a Course for Sea Change (2003).

n20. Id.

n21. Pew Ocean Commission, America's Living Oceans: Charting a Course for Sea Change ix-x (2003).

n22. Id. at viii.

n23. See United States Commission on Ocean Policy, Preliminary Report, (April 20, 2004) available at www.oceancommission.gov.

n24. *Managing our Nation's Fisheries: Past, Present and Future*. (David Witherell ed.) (2004)

n25. Id. at 7.

n26. Id.

n27. Keith Easthouse, *Deep Trouble*, N. Coast J. Wkly, July 18, 2002, available at <http://www.northcoastjournal.com/071802/cover0718.html>; *Caught: Fishing Ban is Blunt and Will Bring Hard Times, but it is the Only Way to Save the Industry*, San Jose Mercury News, June 23, 2002, at 6P.

n28. Populations of widow rockfish, darkblotched rockfish, and other rockfish have fallen dramatically. Canary rockfish have crashed to only eight percent of their pre-fished level, and bocaccio have fallen to only 3.6 percent of their 1969 population. See Magnuson-Stevens Act Provisions; Fisheries off West Coast States and in the Western Pacific; Pacific Coast Groundfish Fishery; Annual Specifications and Management Measures, 68 Fed. Reg. 936 (January 7, 2003).

n29. Kenneth R. Weiss, *Fishing Permanently Banned Around the Channel Islands*, L.A. Times, Oct. 24, 2002, at 1.

n30. Id.; Lydia K. Bergen & Mark H. Carr, , *Env't.*, March 1, 2003, at 8.

n31. Gerard Wright, *In the Zone*, Nat'l Parks, Nov. 1, 2003, at 26.

n32. Beth Daley, *New Rules Seek to End Overfishing*, *Boston Globe*, Nov. 8, 2003, at B3.

n33. Beth Daley & Gareth Cook, *Sea Change: The New England Fisheries Crisis*, *Boston Globe*, Oct. 26, 2003, at A1.

n34. *Id.*

n35. **Daniel Pauly** & Jay Maclean, *In a Perfect Ocean: The State of Fisheries and Ecosystems in the North Atlantic Ocean* (2003).

n36. *Id.* at xvii.

n37. **Sea Around Us Project**, at <http://www.seaaroundus.org/project.htm> (last visited Apr. 17, 2004).

n38. Sebastian Junger, *The Perfect Storm* (1997).

n39. Pauly, *supra* note 35, at xxi.

n40. *Id.*

n41. *Id.* at xxi-xxiv

n42. Id. at xxiv.

n43. Id. at 5.

n44. Id at 8-10; see also Mark Kurlansky, *Cod: A Biography of the Fish That Changed the World* (1997).

n45. Id. at 17-19.

n46. Mark Henderson, *Giants of the Ocean "Facing Extinction," Times London*, May 15, 2003, at 14.

n47. Pauly, *supra* note 35, at 21.

n48. Id. at xxx.

n49. Pauly has pioneered the concept of "fishing down food webs." See **Daniel Pauly** et al., *Fishing Down Marine Food Webs*, 279 *Science* 860 (1998).

n50. Id. at 52-53.

n51. Id. at 56-61.

n52. Id. at 66-71.

n53. Id. at 66.

n54. Id. at 75.

n55. The precautionary principle advocates that caution should be used when an activity raises a threat of harm, despite scientific uncertainty. The precautionary principle places the burden on justifying the activity despite the potential threat, rather than allowing the activity to continue until a threat can be proven. The principle has been incorporated into international agreements such as Agenda 21 from the 1992 U.N. Conference on Environment and Development. The elusive nature of the principle makes it extraordinarily difficult to implement.

n56. Id. at 94-104.

n57. Id. at 104-10.

n58. Id. at 110-16.

n59. Richard Ellis, *The Empty Ocean: Plundering the World's Marine Life* (2003).

n60. Richard Ellis, *Men and Whales* (1991); Richard Ellis, *The Search for the Giant Squid* (1998).

n61. Ellis, *supra* note 59, at xiii.

n62. *Id.* at 307-350.

n63. *Id.* at 299.

n64. *Id.* at 297-99.

n65. *Id.* at 293-305.

n66. Stephen Sloan, *Ocean Bankruptcy: World Fisheries on the Brink of Disaster* (2003).

n67. *Id.* at 84-5.

n68. *Id.* at 186-196.

n69. *Id.* at 119, 122.

n70. *Id.* at 72.

n71. Id. at 26.

n72. Id. at 33.

n73. Id. at 50.

n74. Id. at 92.

n75. Id. at 98.

n76. Id. at 47.

n77. Id. at 99.

n78. One easy way for ICCAT member countries to circumvent treaty quotas is to pay non-ICCAT countries such as Honduras or Cambodia for the use of their flag on fishing vessels. Any fish caught on these vessels will not be counted under the member countries' quota. This major weakness in the ICCAT treaty system leads to thousands of tons of poached fish caught every year.