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NOTES

Rent a Reef? How the Privatization of Florida Coral Reefs May Advance Local Conservation Efforts

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I. INTRODUCTION: CORAL REEFS ARE SUFFERING FROM OVERUSE

Coral reefs, the "rainforests of the sea," have been estimated to contribute more than $375 billion annually to the global economy in

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providing ecosystem services.[1] Despite covering only 0.1% of the earth's surface, coral reefs are the most diverse marine ecosystem per unit area on earth.[2] Over the last decade, scientists have sounded the alarm that coral reefs are in trouble.[3] By one estimate, certain reefs in the Caribbean Sea have degraded nearly eighty percent from an ecologically pristine state.[4] Even the Great Barrier Reef in Australia is losing coral,[5] despite extensive and long-standing legal protections.[6]

There is no single cause of this coral loss. At a local scale, overfishing destabilizes the coral reef ecosystem through the removal of both large predators and smaller herbivorous fish.[7] Corals are particularly sensitive to overfishing of certain groups of fish that graze on algae, which would otherwise outcompete corals.[8] Other direct sources of harm to coral reefs include pollution and fishing methods such as dynamite fishing or trawling that physically damage coral.[9] From a global perspective, rising sea levels, climate change, and ocean acidification also threaten future coral survival.[10]

With reefs facing a multitude of local and global threats, it has

1. John M. Pandolfi et al., *Are U.S. Coral Reefs on the Slippery Slope to Slime?*, 307 SCI. 1725, 1725 (2005) (citations omitted). Involving both ecology and economics, ecosystem services are the benefits from "complex interactions among species and their abiotic environment," especially benefits that humans enjoy. *See, e.g.*, Brendan Fisher et al., *Defining and Classifying Ecosystem Services for Decision Making*, 68 ECOLOGICAL ECON. 643, 651 (2009). Losses in ecosystem services result in fishery collapses, beach closures, harmful algal blooms, fish kills, coastal flooding, and species invasions. *See* Boris Worm et al., *Impacts of Biodiversity Loss on Ocean Ecosystem Services*, 314 SCI. 787, 788–89 (2006).

2. Nancy Knowlton et al., *Coral Reef Biodiversity*, *in* LIFE IN THE WORLD'S OCEANS: DIVERSITY, DISTRIBUTION, AND ABUNDANCE 65, 65 (Alasdair McIntyre ed., 2010) (citations omitted).

3. *See, e.g.*, David R. Bellwood et al., *Confronting the Coral Reef Crisis*, 429 NATURE 827, 827 (2004).

4. John M. Pandolfi et al., *Global Trajectories of the Long-Term Decline of Coral Reef Ecosystems*, 301 SCI. 955, 957 (2003).

5. Glenn De'ath et al., *The 27-Year Decline of Coral Cover on the Great Barrier Reef and Its Causes*, 109 PROC. NAT'L ACAD. SCI. 17,995, 17,996 (2012).

6. Australia first protected the Great Barrier Reef by law in 1975. *Great Barrier Reef Marine Park Act 1975* (Austl.). The Great Barrier Reef Marine Park Authority now manages 344,400 square kilometers through a comprehensive multi-use zoning scheme. Austl. Gov't, *Facts About the Great Barrier Reef*, GREAT BARRIER REEF MARINE PARK AUTHORITY, http://www.gbrmpa.gov.au/about-the-reef/facts-about-the-great-barrier-reef (last visited Dec. 23, 2012).

7. *See* Bellwood, *supra* note 3, at 830 (citations omitted).

8. *Id.*

9. Clive R. Wilkinson, *Global and Local Threats to Coral Reef Functioning and Existence: Review and Predictions*, 50 MARINE & FRESHWATER RES. 867, 871–73 (1999) (citations omitted).

10. Because coral reefs rely on symbiotic algae living inside coral tissue for food production, corals are highly light dependent. Future projections of sea level rise over the next century include rates that exceed anticipated coral reef growth rates, which may result in local reef drowning. *See* Nancy Knowlton, *The Future of Coral Reefs*, 98 PROC. NAT'L ACAD. SCI. 5419, 5422 (2001). See generally Ove Hoegh-Guldberg et al., *Coral Reefs Under Rapid Climate Change and Ocean Acidification*, 318 SCI. 1737 (2007), for an explanation of how corals, which require specific

become increasingly clear that creative solutions are necessary to address these threats. The global consumption of fossil fuels and other anthropogenic activities cause climate change, rising sea levels, and ocean acidification,[11] and will consequently require a more global solution than is proposed here. Instead, this Note will focus entirely on addressing local threats to coral reefs. One of the most important local problems is overuse, particularly overfishing.[12] Destructive fishing methods, dredging, and physical damage from boats and swimmers also directly damage coral reefs.[13]

Such overuse is an example of what Garret Hardin famously called the "tragedy of the commons."[14] In the tragedy of the commons, resources that are freely open to all users suffer from overuse and abuse. In a system free of any rules, individual actors have no incentive to protect the resources, but only seek to maximize individual gain.[15] In a world where resources are limited, "[f]reedom in a commons brings ruin to all."[16] The only way to prevent this tragedy is to restrict access through the development of private property rights or governmental regulation.[17]

Commentators frequently consider the oceans and marine resources a classic example of the commons feared by Hardin.[18] Corals are unique in the marine environment, and thus a commons that is uniquely difficult to protect. As organisms whose skeletal structure serves as the basis for the ecosystem they support,[19] corals cannot simply be protected as individual organisms. Effective protection of corals requires a more holistic approach to avert the tragedy of the commons. Existing laws in the United States are therefore ill-equipped to address coral management.

In this Note, I argue that coral reefs, which are traditionally pro-

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environmental conditions in order to grow, are expected to suffer from altered oceanic chemistry and increased temperatures.

11. *See, e.g.*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IPCC FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007 30, 36–37, 52 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf; *see also* Hoegh-Guldberg, *supra* note 10, at 1737.

12. *See* Jeremy B.C. Jackson et al., *Historical Overfishing and the Recent Collapse of Coastal Ecosystems*, 293 SCI. 629, 631–34 (2001); *see also* Pandolfi et al., *supra* note 4, at 957.

13. *See, e.g.*, John M. McManus et al., *Effects of Some Destructive Fishing Methods on Coral Cover and Potential Rates of Recovery*, 21 ENVTL. MGMT. 69, 75–76 (1997); *see also* Walter C. Jaap, *Coral Reef Restoration*, 15 ECOLOGICAL ENG'G 345, 347 (2000).

14. Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1234, 1244 (1968).

15. *Id.*

16. *Id.*

17. *Id.* at 1247.

18. *See, e.g.*, RÖGNVALDUR HANNESON, THE PRIVATIZATION OF THE OCEANS 1 (2004) ("The oceans are, or were, the last commons."); *see also* Jonathan H. Adler, *Legal Obstacles to Private Ordering in Marine Fisheries*, 8 ROGER WILLIAMS U. L. REV. 9, 11–12 (2002).

19. *See, e.g.*, CHARLES R.C. SHEPPARD ET AL., THE BIOLOGY OF CORAL REEFS, 1–2 (2009).

tected by the public trust doctrine, can be privately managed as an additional conservation tool. Although the public trust doctrine generally governs marine resource management, Florida law allows leases of submerged lands, particularly for the aquaculture of shellfish and live rock. A similar lease could be granted over an existing coral reef, giving the lessee the right to exclude other users and providing a solution to Hardin's tragedy. Nor would such leases be a unique privatization of resources in the public trust, as evidenced by oil and gas leases on the outer continental shelf and fishing management schemes that restrict access by other users.

Part II discusses the existing legal framework regarding coral protection at the federal and state level.[20] Part III reviews the public trust doctrine, an important principle underlying the use of all marine resources in the United States. In Part IV, I propose a new model for coral reef conservation in Florida by leasing coral reefs to conservation groups in Florida. Part V surveys existing examples of privatized marine resources in the United States, including offshore energy extraction and the novel fishing management tool of individualized transfer quotas ("ITQs"). These examples will serve to compare and contrast different elements of the effects of marine resource privatization, an alternative to governance, which has thus far done little to avert the tragedy of the commons as far as corals are concerned.

II. EXISTING U.S. AND FLORIDA LAWS FAIL TO FULLY PROTECT CORAL REEFS

Despite the number of statutes that nominally protect corals, these laws are generally patchy in their coverage and effectiveness. Like many issues in ocean and coastal policy, coral reef conservation has suffered from the "endemic fragmentation of governance."[21] Of the 140 federal laws that address ocean and coastal policy in effect as of 2004,[22] only a handful of laws are potentially related to coral conservation.[23] Of inter-

20. For the sake of simplicity, this Note will focus on Florida reefs, and consequently, Florida laws. However, United States coral reefs are found in the waters of Florida, Hawaii, Texas, Louisiana, and several Caribbean and Pacific territories. NOAA/NCCOS CTR. FOR THE COASTAL MONITORING & ASSESSMENT'S BIOGEOGRAPHY TEAM, THE STATE OF CORAL REEF ECOSYSTEMS OF THE UNITED STATES AND PACIFIC FREELY ASSOCIATED STATES: 2008, at 2 (2008), *available at* http://ccma.nos.noaa.gov/ecosystems/coralreef/coral2008/pdf/CoralReport2008.pdf [hereinafter STATE OF CORAL REEF ECOSYSTEMS OF THE UNITED STATES].

21. Mary Turnipseed et al., *The Silver Anniversary of the United States' Exclusive Economic Zone: Twenty-Five Years of Ocean Use and Abuse, and the Possibility of a Blue Water Public Trust Doctrine*, 36 ECOLOGY L.Q. 1, 4–5 (2009).

22. *Id.* at 4 n.6.

23. *See* Abandoned Shipwreck Act of 1987, 43 U.S.C. §§ 2101–2106 (2006); Clean Water Act, 33 U.S.C. §§ 1251–1387 (2006); Coastal Barrier Resources Act of 1982, 16 U.S.C

est to this Note are the Coral Reef Conservation Act of 2000,[24] the Endangered Species Act,[25] and the National Marine Sanctuaries Act.[26] In addition to the federal laws, there are several Florida laws that govern coral reefs as well.[27]

A. *The Coral Reef Conservation Act of 2000*

Responding to stalled congressional attempts to pass comprehensive coral protection legislation, President Bill Clinton signed Executive Order No. 13,089 in 1998.[28] The order contained lofty goals—preventing federal agencies from harming coral reefs and requiring agencies to improve reef ecosystems.[29] It also created the Coral Reef Task Force, which recommended protecting twenty percent of United States' coral reefs from all fishing through the implementation of no-take marine reserves.[30]

Congress passed the Coral Reef Conservation Act of 2000 ("CRCA")[31] to give the executive order and the Coral Reef Task Force more legal teeth.[32] However, the CRCA has largely failed to live up to these hopes,[33] perhaps because of the political process present in the passage of the CRCA that was otherwise lacking in Executive Order Number 13,089. The Act gave the National Oceanic and Atmospheric

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§§ 3501–3510 (2006); Coastal Zone Management Act of 1972, *id.* §§ 1451–1456; Coral Reef Conservation Act of 2000, *id.* §§ 6401–6509; Endangered Species Act, *id.* §§ 1531–1544; Magnuson-Stevens Fishery Conservation and Management Act of 1976, *id.* §§ 1801–1891; Marine Protection, Research and Sanctuaries Act of 1972 (National Marine Sanctuaries Act), *id.* §§ 1431–1445(a); Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 and National Invasive Species Act, *id.* §§ 4701–4751.

Additionally, President George W. Bush recently used the Antiquities Act (16 U.S.C. § 431) to create the Papahanaumokuakea Marine National Monument in 2006, and the Rose Atoll Marine National Monument, the Marianas Trench National Monument, and the Pacific Remote Islands National Monument in 2009. *See, e.g.*, Alison Rieser & Jon M. Van Dyke, *New Marine National Monuments Settle Issues*, 24 NAT. RESOURCES & ENV'T 50, 50 (2009).

24. 16 U.S.C. §§ 6401–6409.

25. *Id.* §§ 1531–1544.

26. *Id.* §§ 1431–1445(a).

27. *See infra* Part II.D.

28. Robin Kundis Craig, *The Coral Reef Task Force: Protecting the Environment Through Executive Order*, 30 ENVTL. L. REP. 10,343, 10,345–47 (2000).

29. Exec. Order No. 13,089, 63 Fed. Reg. 32,701 (June 11, 1998); *see also* Robin Kundis Craig, *Taking Steps Toward Marine Wilderness Protection? Fishing and Coral Reef Marine Reserves in Florida and Hawaii*, 34 MCGEORGE L. REV. 155, 214–15 (2003) [hereinafter Craig, *Marine Wilderness Protection*].

30. Craig, *Marine Wilderness Protection*, *supra* note 29 at 215. A no-take marine reserve prohibits all extractive use of marine resources within the reserve. *See, e.g.*, NOAA'S MARINE PROTECTED AREAS CENTER, MARINE RESERVES IN THE UNITED STATES (2011), *available at* http://www.mpa.gov/pdf/helpful-resources/factsheets/us_marinereserves.pdf.

31. 16 U.S.C. §§ 6401–6409 (2006).

32. Craig, *Marine Wilderness Protection*, *supra* note 29, at 217.

33. *Id.* at 219.

Administration ("NOAA"), an agency more responsive to congressional pressure than the presidentially-created Coral Reef Task Force, primary authority over coral conservation.[34] More fundamentally, the Act reflects struggles between two often-conflicting interests: conservation and fishing.[35] Finally, a bill to reauthorize CRCA is lingering in Congress, despite bipartisan support.[36]

Thirteen years after the passage of the CRCA, has the United States met the Coral Reef Task Force's goal of protecting twenty percent of United States corals with no-take marine reserves? Although one report indicates that twenty-four percent of United States coral reefs are protected by no-take reserves, this figure is misleading.[37] It comes from a survey of Marine Protected Areas ("MPAs"), a broadly defined term that "refers to a range of types of MPAs, from multiple-use areas that allow fishing or other uses, to 'no-take reserves' where extractive uses are prohibited."[38] Although twenty-four percent of these MPAs that specifically protect corals are no-take reserves, there is no indication as to how much actual area this figure includes and thus what percentage of United States' coral reefs are protected by no-take reserves. It only indicates that twenty-four percent of U.S. MPAs that protect corals are no-take reserves.

Elsewhere, NOAA is more transparent about the relative rarity of no-take reserves in the United States: three percent of all U.S. waters are protected by no-take marine reserves, ninety-five percent of which are in the Papahanaumokuakea Marine National Monument in Hawaii.[39] And U.S. coral health is in decline overall.[40] So while the Coral Reef Task Force's quantitative goal may have been dubiously satisfied, corals have not benefitted significantly from the CRCA.

B. *The Endangered Species Act*

Congress passed the Endangered Species Act ("ESA") in 1973 "to

34. *Id.* at 217. To be fair, granting NOAA authority to oversee the Coral Reef Management Act may also have been an easy way to realize the recommendations of the Coral Reef Task Force.

35. Robin Kundis Craig, *Coral Reefs, Fishing, and Tourism: Tensions in U.S. Ocean Law and Policy Reform*, 27 STANFORD ENVTL. L.J. 3, 26–27 (2008) [hereinafter Craig, *Tensions in U.S. Ocean Policy*].

36. NOAA, *Reauthorization Archives: 112th Congress*, CORAL REEF CONSERVATION PROGRAM (Jan. 11, 2013), http://coralreef.noaa.gov/aboutcrcp/strategy/reauthorization/archive/.

37. NOAA CORAL REEF CONSERVATION PROGRAM, REPORT ON THE STATUS OF MARINE PROTECTED AREAS IN CORAL REEF ECOSYSTEMS OF THE UNITED STATES 5 (2007), *available at* http://data.nodc.noaa.gov/coris/library/NOAA/CRCP/project/1188/us_reefs_mpa_status_report_vol_1_2004.pdf.

38. *Id.*

39. *See* Rieser & Van Dyke, *supra* note 23, at 50.

40. STATE OF CORAL REEF ECOSYSTEMS OF THE UNITED STATES, *supra* note 20, at 5.

provide a means whereby the ecosystems upon which endangered . . . and threatened species depend may be conserved, to provide a program for the conservation of such endangered . . . and threatened species, and to take such steps as may be appropriate to" prevent the extinction of such species.[41] Considered one of the most protective environmental laws in the world,[42] the ESA places the interests of protected species above those of most federal agencies and federally-funded projects. Once a species is designated as endangered or threatened under the Act, federal agencies are generally barred from taking action that may "jeopardize the continued existence" or cause the "destruction or adverse modification" of the protected species and its critical habitat.[43] Furthermore, the U.S. Fish and Wildlife Service ("FWS") and NOAA's National Marine Fisheries Service ("NFMS"), the agencies charged with overseeing the ESA, are required to designate critical habitat for protected species.[44]

Historically, FWS and NFMS have listed far more terrestrial and freshwater species than marine species.[45] But in 2006, NFMS listed two Caribbean coral species, elkhorn coral (*Acropora palmata*) and staghorn coral (*Acropora cervicornis*) as threatened.[46] Historically, these two species were the most important reef building species in the Caribbean; during the 1980s, some local populations declined by eighty to ninety-seven percent.[47] NFMS further designated critical habitat for these corals in 2008.[48] Currently, the critical habitat for these species includes most of the Florida Keys Reef Tract in which acroporid species have been found, as well as areas off the coasts of Puerto Rico and the U.S. Virgin Islands.[49] Furthermore, in late 2012, NFMS proposed elevating the status of the two acroporid species to endangered[50] and listing an additional sixty-four coral species, including seven Caribbean species, as either

41. 16 U.S.C. § 1531(b) (2006).

42. REED F. NOSS ET AL., THE SCIENCE OF CONSERVATION PLANNING 1 (1997).

43. 16 U.S.C. § 1536(a)(2).

44. *Id.* § 1533(a)(3)(A). Federal agencies must designate critical habitat according to "the best scientific data available." *Id.* § 1533(b)(2).

45. Craig, *Tensions in U.S. Ocean Policy*, *supra* note 35, at 18.

46. Final Listing Determinations for Elkhorn Coral and Staghorn Coral, 71 Fed. Reg. 89, 26,852, 26,852 (May 9, 2006) (to be codified at 50 C.F.R. pt. 223).

47. Proposed Threatened Status For Elkhorn Coral and Staghorn Coral, 70 Fed. Reg. 88, 24,359, 24,360 (May 9, 2005) (to be codified at 50 C.F.R. pt. 223). Scientists attribute this drastic die-off to a combination of factors, including hurricanes, the outbreak of new coral diseases, and the collapse of the keystone species, the long-spined sea urchin (*Diadema antillarum*). *See* Toby A. Gardner et al., *Long-Term Region-Wide Declines in Caribbean Corals*, 301 SCI. 958, 959–60 (2003).

48. Critical Habitat for Threatened Elkhorn and Staghorn Corals, 73 Fed. Reg. 229, 72,237 (Nov. 26, 2008) (to be codified at 50 C.F.R. pts. 223 and 226).

49. *Id.* at 72,237–40.

50. Proposed Listing Determination for 82 Coral Species and Reclassification of *Acropora*

endangered or threatened.[51]

Despite designation under the ESA, the ESA does not provide ideal protection for Caribbean corals for several reasons. For one, the ESA treats vertebrates and invertebrates, the class to which corals belong, separately. The ESA protects species of fish, wildlife, and plants, as well as "any distinct population segment of *vertebrate* fish or wildlife."[52] This usage arose from a legislative compromise to provide more fine-tuned protection for vertebrate species whose populations were diminished in only parts of their range.[53] This distinction means that an invertebrate species must be endangered or threatened across all or a significant portion of its range in order to merit protection under the ESA, but distinct subpopulations of vertebrates may be protected under the ESA.[54] NFMS recognized this challenge in its 2012 decision to list sixty-six—of eighty-three proposed species in a petition filed by the Center for Biological Diversity—coral species under the ESA.[55] Ultimately, the distinction between vertebrates and invertebrates means that certain invertebrates that may be in need of protection, but not necessarily threatened or endangered throughout their entire range, may not be listed under the ESA.[56]

Another concern is that the only currently listed Caribbean coral species are designated as threatened, instead of the more protective classification of endangered. Under Section Nine of the ESA, only endangered species, and not threatened species, are protected against takings.[57] If passed, NFMS's 2012 proposal may list seven Caribbean

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palmata and *Acropora cervicornis*, 77 Fed. Reg. 236, 73,220, 73,253 (Dec. 7 2012) (to be codified at 50 C.F.R. pts. 223 and 224) [hereinafter Proposed Listing Determination for 82 Coral Species].

51. *Id.* at 73,248. The proposed endangered Caribbean corals are: boulder star coral (*Montastraea annularis*); mountainous star coral (*Montastraea faveolata*); pillar coral (*Dendrogyra cylindrus*); rough cactus coral (*Mycetophyllia ferox)*; and star coral (*Montastraea franksi*). The two proposed threatened Caribbean species are Lamarck's sheet coral (*Agaricia lamarki*) and elliptical star coral (*Dichoenia stokesii*). NOAA Fisheries Service, *NOAA Proposes Listing 66 Reef-Building Coral Species Under the Endangered Species Act*, OFFICE OF PROTECTED RESOURCES (Dec. 31, 2012), http://www.nmfs.noaa.gov/pr/species/invertebrates/corals.htm.

52. 16 U.S.C. § 1532(16) (2006) (emphasis added).

53. *See, e.g.*, David S. Pennock & Walter W. Dimmick, *Critique of the Evolutionary Significant Unit as a Definition for "Distinct Population Segments" Under the U.S. Endangered Species Act*, 11 CONSERVATION BIOLOGY 611, 612 (1997). Although the House of Representatives did not intend to lessen protections for invertebrate species, the provision of the 1978 Amendments to the ESA allows more discretion in designating critical habitat for invertebrates. H.R. REP. No. 95-1625, 16–17 (1978).

54. 16 U.S.C. § 1532(6), (20).

55. *See* Proposed Listing Determination for 82 Coral Species, *supra* note 50, at 73,246.

56. Pennock & Dimmick, *supra* note 53, at 616. Furthermore, current regulations under the ESA barely contemplate protection of the larval stage of coral life cycles. *See generally* Ryan Kelly, *Spineless Wonders: How Listing Marine Invertebrates and Their Larvae Challenges the US Endangered Species Act*, 19 PENN. ST. ENVTL. L. REV. 1 (2011).

57. § 1538(a)(1). "Take" is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap,

corals as endangered, protecting these species from takings.[58] However, under current law, only federal agencies are barred from harming corals; individuals and state or local governments that harm threatened species do not violate the ESA.[59]

Moreover, the initial critical habitat designation for the two acroporid species was controversial. NFMS failed to initially establish critical habitat, stating that "[t]he designation of critical habitat is not determinable at this time due to the extremely complex and physical requirements of these two acroporid species."[60] When NFMS finally did designate critical habitat, it did not set standards for water quality or water temperature, two important factors for environmentally-sensitive corals.[61] Despite NOAA's recognition that water pollution from the Gulf of Mexico, Florida Bay, and southern Florida potentially damages reefs throughout the Florida Keys, NOAA has failed to regulate water temperature or quality for corals' benefit.[62] Additionally, ongoing efforts to restore the Florida Everglades could potentially degrade water quality in the critical habitat.[63] Thus, current critical habitat designation for the two threatened acroporid species does not fully consider environmental factors necessary for these species' continued existence.

Finally, despite a stated holistic intent to protect ecosystems, the ESA does not actually provide ecosystem protection.[64] After a brief appearance in the stated purpose,[65] the word "ecosystem" is absent from the rest of the statute's text.[66] The ESA's focus on individual species protection comes up particularly short in the context of protecting corals, which are not only individual animals, but also serve as the basis for the coral reef ecosystem.[67] Because corals depend on healthy populations of

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capture, or collect [an endangered species], or attempt to engage in any such conduct." *Id.* § 1532(19).

58. *See supra* text accompanying notes 51–52.

59. 16 U.S.C. § 1538(a)(1); *see also* Craig, *Tensions in U.S. Ocean Policy*, *supra* note 35, at 19.

60. Final Listing Determinations for Elkhorn Coral and Staghorn Coral, 71 Fed. Reg. 89, 26,852, 26,860 (May 9, 2006) (to be codified at 50 C.F.R. pt. 223).

61. Blake Armstrong, Note, *Maintaining the World's Marine Biodiversity: Using the Endangered Species Act to Stop the Climate Change Induced Loss of Coral Reefs*, 18 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 429, 441 (2012). The Center for Biological Diversity filed a lawsuit in 2008 against NFMS, arguing that NFMS's failure to consider these variables was not based on the "best available science," and was therefore arbitrary and capricious. *Id.* at 442.

62. Final Listing Determinations for Elkhorn Coral and Staghorn Coral, 71 Fed. Reg. at 26,855.

63. Robin Kundis Craig, Acropora *spp.: Water Flow, Water Quality, and Threatened Florida Corals*, 8 NAT. RES. & ENV'T. 8, 11 (2007).

64. Craig, *Tensions in U.S. Ocean Policy*, *supra* note 35, at 19.

65. 16 U.S.C. § 1531(b) (2006).

66. NOSS ET AL., *supra* note 42, at 1.

67. *See, e.g.*, SHEPPARD ET AL., *supra* note 19, at 1–2.

other species living on reefs,[68] protecting corals alone from takings does not necessarily significantly protect corals.[69]

Under the current status of the ESA as applied to corals, two species receive minimal protection; NFMS's proposed listing, if passed, may expand the ESA's reach over corals significantly. However, even the proposed listing of sixty-four additional species and status elevation of certain species may not be enough to reverse the decline of U.S. coral reefs. The ESA's focus on species, rather than ecosystems, is inadequate to address the complex biological and environmental needs of coral reefs. To provide more useful protection, NFMS must consider these needs more seriously in the future.

C. *The National Marine Sanctuaries Act*

Congress passed the National Marine Sanctuaries Act ("NMSA")[70] in response to public outrage against the heavily publicized dumping of nerve gas, oil waste, and other pollutants in Florida waters and the 1968 Santa Barbara oil spill.[71] Although the immediate goals of the early bills were to completely ban oil drilling in such environmentally sensitive and recreationally popular areas, what emerged as the final NMSA was more complex: marine sanctuaries are "protected for multiple uses and subject to a great deal of public and legislative input. In short, Congress appears to have intended the NMSA to serve as a kind of Organic Act for an entirely new system of underwater national parks."[72]

Under the Act, NOAA may designate marine areas based on "conservation, recreational, ecological, historical, scientific, cultural, archaeological, educational, or aesthetic qualities . . . ."[73] National Marine Sanctuary designation protects the resources therein from unlawful destruction or removal.[74] There are currently thirteen National Marine Sanctuaries, including the Florida Keys National Marine Sanctuary stretching across the Florida Keys Reef Tract.[75]

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68. *See, e.g.*, Bellwood, *supra* note 3, at 830; Gardner et al., *supra* note 47, at 959–60.

69. Recall that only corals that are listed as endangered are protected from takes (§ 1538(a)(1)), and that no coral species are yet listed as endangered. *See, e.g.*, Proposed Listing Determination for 82 Coral Species, *supra* note 50, at 73,220, 73,253.

70. 16 U.S.C. §§ 1431–1445b (2006).

71. Michael C. Blumm & Joel G. Blumstein, *The Marine Sanctuaries Program: A Framework for Critical Areas Management in the Sea*, 8 ENVTL. L. REP. 50,016, 50,018 (1978).

72. Jeff Brax, *Zoning the Oceans: Using the National Marine Sanctuaries Act and the Antiquities Act to Establish Marine Protection Areas and Marine Reserves in America*, 29 ECOLOGY L.Q. 71, 82 (2002) (citations omitted).

73. 16 U.S.C. § 1433(a).

74. *Id.* § 1436(a).

75. NOAA, *National Marine Sanctuaries: Frequently Asked Questions*, NAT'L MARINE SANCTUARIES, http://sanctuaries.noaa.gov/about/faqs/welcome.html (last updated Jan. 22, 2013).

As a means of protecting coral reefs, NMSA may be one of the stronger acts, but it rarely has been exercised to its full potential. Because it "emphatically encourages multiple uses" of protected areas, no-take marine reserves are the exception, rather than the rule under NMSA.[76] Consequently, fishing and other extractive activities continue throughout much of waters otherwise protected by NMSA. Additionally, designation of sanctuaries is a difficult and lengthy process,[77] and may result in something other than a National Marine Sanctuary, such as a Marine National Monument.[78] One early commentator suggested that the Antiquities Act,[79] a previously dormant statute allowing the President to unilaterally designate national monuments, be used to create more marine reserves in place of NMSA.[80] Indeed, President Bush used the Antiquities Act in 2006 and in 2009 to create the largest marine reserves in U.S. waters, sidestepping NMSA entirely.[81]

Because NMSA encourages multi-use zoning in spaces protected under the Act, few no-take marine reserves are created under NMSA; recent no-take marine reserves have been designated through other channels.[82] These no-take marine reserves, the gold standard of coral conser-

76. Craig, *Tensions in U.S. Ocean Policy*, *supra* note 35, at 15. Professor Craig notes that the Dry Tortugas Ecological Reserve is one of the few, if only, fully protected no-take marine reserves under NMSA. *Id.* at 14–15. Established in 2001, the Dry Tortugas Ecological Reserve was not originally part of the Florida Keys National Marine Sanctuary (established in 1990) due to objections of fishing interests. Craig, *Marine Wilderness Protection*, *supra* note 29, at 235. One of the most important reasons that the Reserve was eventually able to close the area to all fishing and most diving and snorkeling was its relative isolation from land compared to the rest of the Florida Keys National Marine Sanctuary. Joanne Delaney, *Community Capacity Building in the Designation of the Tortugas Ecological Reserve*, 14 GULF & CARIBBEAN RES. 163, 168 (2003). Increased isolation means fewer users interested in fishing, diving, and other extractive uses of the Reserve. *Id.*

However, the Reserve has since become enmeshed with the Dry Tortugas National Park Research Natural Area, complicating the management of this area. The Florida Keys National Marine Sanctuary surrounds the Dry Tortugas Ecological Reserve, but the Dry Tortugas National Park Research Natural Area is jointly managed by the Florida Fish and Wildlife Conservation Commission and the National Park Service, which are separate entities from the National Marine Sanctuary Program. *See, e.g.*, THE NATIONAL PARK SERVICE & THE FLORIDA FISH & WILDLIFE CONSERVATION COMMISSION, IMPLEMENTING THE DRY TORTUGAS NATIONAL PARK RESEARCH NATURAL AREA SCIENCE PLAN: THE FIVE-YEAR REPORT, inside cover, iii (2012), *available at* http://www.nps.gov/ever/naturescience/upload/DRTORNA5YrFINALComplete04092012LoRes.pdf.

77. *See, e.g.*, Brax, *supra* note 72, at 85–90.

78. Craig, *Tensions in U.S. Ocean Policy*, *supra* note 35, at 16 (noting that the Florida Keys National Marine Sanctuary Act was created through special legislation and that the proposed Northwestern Hawaiian Islands National Marine Sanctuary ultimately became a Marine National Monument under the Antiquities Act).

79. 16 U.S.C. § 431 (2006).

80. Brax, *supra* note 72, at 123–27.

81. *See* Rieser & Van Dyke, *supra* note 23, at 50.

82. *See supra* note 78.

vation,[83] are a valuable solution to the tragedy of the commons: by excluding all users, the commons are not subject to use by anyone.

D. *Florida Laws*

Florida has several laws and regulations specifically governing coral reefs, but these are generally ineffective, inefficient, or both. For example, the Florida Department of Environmental Protection manages habitats,[84] while the Florida Fish and Wildlife Conservation Commission ("FWC") governs living resources, including both fish and coral.[85] Because corals are living resources that create habitat for other living resources, they fall squarely between the jurisdiction of both agencies. Additionally, Florida's public trust doctrine strongly protects the right to fish, with certain statutory exceptions.[86] As a result, Florida's government vis-à-vis coral conservation is fragmented and prioritizes fishing interests above conservation.

Florida does have an Endangered Species Program that is distinct from the federal ESA.[87] Despite recognition that Florida has the greatest number of endangered and threatened species in the continental United States,[88] Florida law provides little protection beyond the federal ESA. In the ESA and the equivalent regulations under Florida law, the language that defines "take" is essentially the same, although Florida's regulation provides a clearer definition.[89] Perhaps in recognition of the lack of meaningful protection afforded to imperiled species, FWC recently announced that it would begin drafting management plans for the sixty species protected by the Florida law.[90]

There are two substantive differences between the federal ESA and Florida's equivalent law and regulations that are relevant to this discussion. Unlike the federal ESA as managed by NFMS, Florida regulations prevent the taking of state-listed threatened species.[91] Additionally, there

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83. *See, e.g.*, Bellwood et al., *supra* note 3, at 831.

84. *See, e.g.*, *Coral Reef Conservation Program*, FLA. DEP'T ENVTL. PROTECTION, http://www.dep.state.fl.us/coastal/programs/coral/ (last updated Feb. 4, 2013).

85. *See, e.g.*, *Saltwater Conservation Programs*, FLA. FISH & WILDLIFE CONSERVATION COMM'N, http://myfwc.com/conservation/saltwater/ (last visited Feb. 7, 2013).

86. FLA. STAT. § 379.244(1) (2010).

87. *Id.* § 379.2291 (2011).

88. *Id.* § 379.2291(2).

89. *Compare* 16 U.S.C. § 1532(19) (2006) ("The term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.") *with* FLA. ADMIN. CODE r.68A-27.001 (2012) (defining "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct. The term 'harm' in the definition of take means an act which actually kills or injures fish or wildlife . . . .").

90. *A New Conservation Model for Florida Species*, FLA. FISH & WILDLIFE CONSERVATION COMM'N, http://myfwc.com/wildlifehabitats/imperiled/ (last visited Feb. 7, 2013).

91. FLA. ADMIN CODE r.68A-27.003(2)(a). This regulation provides more protection to

is one species of coral, pillar coral (*Dendrogyra cylindrus*), that is currently listed as threatened under Florida's Endangered and Threatened Species Act.[92] However, NFMS recently proposed listing this species as endangered under the federal ESA, potentially removing this disparity between federal and state law.[93]

Finally, Florida has an additional statute, the Coral Reef Protection Act, specifically targeted at protecting coral reefs.[94] This statute is limited in scope, banning only vessel groundings on reefs and requiring compensation for any such damage caused by vessel groundings.[95] The statute expresses no concern for ecosystem-level management of coral reefs.

Overall, the existing legal structure protecting Florida corals has done little to prevent the decline of Caribbean coral reefs. Current federal and state statutes have a nominal, if any, interest in ecosystem management in the way that corals need. "Nearly three decades of federal regulation have failed to provide for the sustainable utilization of America's marine resources."[96] Governance, one solution to the tragedy of the commons, has not protected coral reefs. Privatization may be in order.[97] Such privatization can co-exist with the public trust doctrine, which protects resources for the general public.

III. PRIVATE LEASES AND FLORIDA'S PUBLIC TRUST DOCTRINE

The public trust doctrine is an ancient concept in American common law. It protects certain natural resources by requiring the state to maintain the resources for use by the public.[98] As part of the rise of the environmental movement in the United States, the public trust doctrine enjoyed a revival sparked by the publication of Professor Sax's article in 1970.[99] While generally important to modern environmental law, the public trust doctrine is especially prominent in the marine environment because the public trust has historically protected the rights of naviga-

species listed as threatened under Florida's Endangered and Threatened Species Act than to species listed as threatened under the federal ESA.

92. *Id.* at r.68A-27.003(2)(g).

93. Proposed Listing Determination for 82 Coral Species, *supra* note 50, at 73,248.

94. FLA. STAT. § 403.93345 (2010). Florida has also prohibited the removal or damage of corals in John Pennekamp Coral Reef State Park in Key Largo. *Id.* § 258.083 (2012).

95. *Id.* § 403.93345.

96. Adler, *supra* note 18, at 10.

97. *Id.* at 12–14 (citations omitted); *see also infra* Part IV.

98. *See, e.g.*, Illinois Cent. R.R. Co. v. Illinois, 146 U.S. 387, 452 (1892).

99. *See generally* Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471 (1970); *see also* JACK H. ARCHER ET AL., THE PUBLIC TRUST DOCTRINE AND THE MANAGEMENT OF AMERICA'S COASTS 1–4 (1994) (reviewing the rise of the environmental movement in the United States and the public trust doctrine's role in that rise).

tion, commerce, and fishing.[100] Florida has expanded the role of private entities in managing public trust resources by creating leases of submerged lands for aquaculture.[101] Thus, Florida's public trust doctrine expressly incorporates private use for the public's benefit.

A. *History of the Public Trust Doctrine in the United States*

Stemming from Roman and English law, property rights over rivers, seashores, and seas fall under the public trust.[102] Under the public trust doctrine, the state serves as trustee of natural resources for the public.[103] As the Supreme Court explained in 1892, "it is a title different in character from that which the state holds in lands intended for sale."[104] This doctrine traditionally protects the rights of navigation, commerce, and fishing for the people of the state, "freed from the obstruction or interference of private parties."[105]

Scholars have debated the extent of a federal public trust doctrine—or whether it even exists separately from that of the states' public trust doctrines. In *Illinois Central Railroad Co. v. Illinois*, the Supreme Court stated that the public trust doctrine prevented the sale of submerged lands in Lake Michigan to a private corporation.[106] Not only was Illinois the proper titleholder of this property, but the Court also recognized that the United States' navigational interests derived from the Commerce Clause.[107] For Professor Craig and other scholars, this case stands as a clear pronouncement of a federal public trust doctrine.[108] However, Dr. Turnipseed and her colleagues argue that there is no explicit federal public trust doctrine,[109] suggesting that the navigational servitude of *Illinois Central Railroad* complicates the express acknowledgment of a federal public trust doctrine.[110]

What is clear is that the federal public trust doctrine, however explicit or implicit it may be, is largely defined by state ownership of submerged lands.[111] The original thirteen colonies adopted the public

100. *Illinois Cent. R.R. Co.*, 146 U.S. at 452.

101. *See* Broward v. Mabry, 50 So. 826, 829 (Fla. 1909).

102. *See* Sax, *supra* note 99, at 475.

103. *See, e.g.*, Turnipseed et al., *supra* note 21, at 8.

104. *Illinois Cent. R.R. Co.*, 146 U.S. at 452.

105. *Id.*

106. *Id.* at 463.

107. *Id.* at 463–64.

108. *See* Robin Kundis Craig, *A Comparative Guide to the Eastern Public Trust Doctrines: Classifications of States, Property Rights, and State Summaries*, 16 PENN. ST. ENVTL. L. REV. 1, 4 Fall 2007 [hereinafter Craig, *Eastern Public Trust*]. *See also* Turnipseed et al., *supra* note 21, at 41 n.235.

109. Turnipseed et al., *supra* note 21, at 40.

110. *Id.* at 40–46.

111. *See, e.g.*, Craig, *Eastern Public Trust*, *supra* note 108, at 5. *See also* Robin Kundis Craig,

trust doctrine as part of a larger reliance on English common law.[112] States that subsequently entered the Union obtained title to tidal and navigable waters under the Equal Footing Doctrine.[113] Although every state has some form of the public trust doctrine, the doctrine differs between the eastern and western states in certain aspects. Broadly speaking, the western states have been far more protective of public rights in fresh waters because of the relative scarcity of fresh water east of the Hundredth Meridian, the "water divide" of the United States.[114] By comparison, the eastern states have generally recognized more coastal rights,[115] expanding beyond navigation, commerce, and fishing to include swimming, bathing, recreation, pleasure boating, and other activities.[116]

Although the public trust doctrine evolved as a branch of common law, the Supreme Court recognized early on that Congress has the right to impose statutory constraints on the public trust doctrine:

> It is the settled law of this country that ownership of and dominion and sovereignty over lands covered by tide waters, within the limits of the several states, belong to the respective states within which they are found, with the consequent right to use or dispose of any portion thereof, when that can be done without substantial impairment of the interest of the public in the waters, and subject always to the paramount right of congress to control their navigation so far as may be necessary for the regulation of commerce with foreign nations and among the states.[117]

In 1953, the United States first exercised that right when Congress formally granted title to the States of submerged lands within three nautical miles of the shoreline and "the natural resources within such lands and waters" under the Submerged Lands Act of 1953.[118]

B. *The Public Trust Doctrine in Florida*

Originally a Spanish territory, Florida inherited some Spanish legal traditions upon joining the United States. *Res communes*, a civil law

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A Comparative Guide to the Western States' Public Trust Doctrines: Public Values, Private Rights, and the Evolution Toward an Ecological Public Trust, 37 ECOLOGY L.Q. 53 (2010) [hereinafter Craig, *Western States' Public Trust*].

112. *See, e.g.*, Craig, *Eastern Public Trust*, *supra* note 108, at 4 (citations omitted).

113. Pollard's Lessee v. Hagan, 44 U.S. (3 How.) 212, 229 (1845).

114. Craig, *Western States' Public Trust*, *supra* note 111, at 56.

115. *Id.*

116. Craig, *Eastern Public Trust*, *supra* note 108, at 13 (citations omitted).

117. Illinois Cent. R.R. Co. v. Illinois, 146 U.S. 387, 435 (1892).

118. 43 U.S.C. §§ 1301; 1311–12 (2006). However, the federal government explicitly retained a navigational servitude and a right to regulate under the Commerce Clause even over state waters. *Id.* § 1314.

equivalent to the public trust doctrine,[119] protected natural resources, including navigable waters, for the crown. Unless the crown passed a law to the contrary, "the public navigable waters and submerged lands and tide lands in the provinces [e.g., Florida] were held in dominion by the crown as *res communes* and used as *res omnium*, and sales and grants of such lands to individuals were contrary to the general laws and customs of the realm."[120] When Florida entered the United States in 1845, Florida traded the Spanish civil law *res communes* doctrine for the common law public trust doctrine of the original thirteen colonies under the Equal Footing Doctrine.[121]

Since joining the Union, Florida has relied increasingly on common law, its constitution, and its statutes to expand the public trust doctrine beyond its original conception of fishing, navigation, and commerce. The Florida Supreme Court has recognized the public trust and its role of the public's interests in navigation, commerce, fishing, bathing, and other rights in cases dating to the early twentieth century.[122]

The Florida Constitution affirms that the State maintains title to "lands under navigable waters, within the boundaries of the state [and] which have not been alienated . . . in trust for all the people."[123] The Florida Constitution also allows for the sale of submerged lands "when in the public interest."[124]

Although the state constitution allows the sale of submerged lands, Florida has since passed a statute banning future sales and conveyances of submerged lands that remain in the public trust.[125] Submerged lands that were previously bequeathed to private owners may remain private,

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119. BLACK'S LAW DICTIONARY 1421 (9th ed. 2009). Although both civil law and common law doctrines protect marine waters and their resources, the regimes have a fundamentally different approach. Under the civil law *res communes*, such property rights were considered *res nullius*, owned by none. *Ex parte* Powell, 70 So. 392, 396 (Fla. 1915). In a common law regime, the same property would be owned by all. *Id.*

120. Apalachicola Land & Dev. Co. v. McRae, 98 So. 505, 518 (Fla. 1923).

121. *See Ex parte Powell*, 70 So. at 396.

122. *E.g.*, Perky Props. v. Felton, 151 So. 892, 895 (Fla. 1934) ("The tidal and submerged lands of the state and the uses thereof are held in trust for all the people of the state . . . ."); *Apalachicola Land & Dev. Co.*, 98 So. at 518–19 (stating that the Spanish law of *res communes* was the basis of the public trust doctrine in Florida); *Ex parte Powell*, 70 So. at 396 ("Under the laws of this state, the public waters and the fish therein are held by the state for the benefit of the people of the state, subject to such regulation of the use thereof as the lawmaking power may provide."); Broward v. Mabry, 50 So. 826, 829 (Fla. 1909) (recognizing that the public trust doctrine, while protecting rights of navigation, fishing, commerce, bathing and "other easements allowed by law," grant the state the right to convey limited rights over submerged lands, provided that such conveyances are "for the public welfare").

123. FLA. CONST., art. X § 11. The Florida Legislature passed this provision in 1970. *See* Craig, *Eastern Public Trust*, *supra* note 108, at 25.

124. FLA. CONST., art. X § 11.

125. FLA. STAT. § 379.232(1) (2008).

but all other lands are publicly owned. The public's right to fishing in Florida has also been protected by statute: "No water bottoms owned by the state shall ever be sold, transferred, dedicated, or otherwise conveyed without reserving in the people the absolute right to fish thereon, excepted as otherwise provided in these statutes."[126]

C. *Lease of Submerged Lands Under the Public Trust Doctrine in Florida*

Florida has also had a long history of leasing its submerged lands under the public trust doctrine, particularly for the harvest of shellfish. A 1925 case from the Florida Supreme Court explains that Florida had leased water bottoms to private individuals to harvest oysters dating back to at least 1913,[127] a date contemporaneous with that court's original pronouncements on the public trust doctrine.[128] The court made clear that Florida inherited this tradition from Spanish law and English common law, stating that leases for harvesting shellfish "involve[ ] a right in submerged lands and the waters over them . . . and this right was common to the public under Spanish rule, as well as under English and American government."[129]

With these leases came constitutional protections, particularly from the Takings Clause of the Fifth Amendment. In 1938, lessees of oyster beds sued the City of Tampa for discharging two-and-a-half million to four million gallons of untreated sewage onto their leased oyster beds daily, damaging the oysters, and preventing the plaintiffs from selling their oysters.[130] The Florida Supreme Court found in favor of the plaintiffs, stating that the statutory grant of leases for shellfish aquaculture "materially altered the common law right of the defendant to empty its raw sewage into the ocean."[131] Consequently, the court held that the city, by dumping sewage onto leased oyster beds, had violated the plaintiffs' due process rights by taking their property without just compensation.[132]

Florida has continued to lease submerged lands for aquaculture through the Florida Department of Agriculture.[133] Laws governing sub-

126. *Id.* § 379.244(1) (2010).

127. *Apalachicola Land & Dev. Co.*, 98 So. at 516.

128. *E.g.*, Perky Props. v. Felton, 151 So. 892, 895 (Fla. 1934) *Apalachicola Land & Dev. Co.*, 98 So. at 518–19; *Ex parte* Powell, 70 So. 392, 396 (Fla. 1915); Broward v. Mabry, 50 So. 826, 829 (Fla. 1909).

129. *Apalachicola Land & Dev. Co.*, 98 So. at 519 (citations omitted).

130. Gibson v. City of Tampa, 185 So. 319, 320 (Fla. 1938).

131. *Id.* at 321.

132. *Id.*

133. FLA. ADMIN. CODE r.18-21 (2012). The Florida Department of Environmental Protection oversees submerged land leases for docks and related coastal development. *Id.*

merged lands for aquaculture primarily focus on shellfish,[134] but the Department of Agriculture has approved leases for live rock, which includes corals and related organisms destined for the aquarium trade.[135] Moreover, Florida's expansive definition of aquaculture is neither limited to species valued for food use, nor focused entirely on the commercial value of aquaculture.

> The Legislature declares that it is in the state's economic, *resource enhancement*, and food production interests to promote aquaculture production of food and *nonfood aquatic species* . . . . The Legislature declares that aquaculture shall be recognized as a practicable resource management alternative . . . *to protect and conserve natural resources, to reduce competition for natural stocks, and to augment and restore natural populations.* Therefore . . . the Legislature declares that aquaculture is in the public interest.[136]

Thus, not only has Florida specifically included aquaculture into its public trust doctrine, the state legislature has also explicitly incorporated notions of conservation into its aquaculture scheme.

IV. A Proposed Solution: Leasing Coral Reefs in Florida for Conservation

It is not a great leap to suggest that similar leases could be created for the nominal aquaculture of coral reefs under Florida law. Florida has historically leased submerged lands held in the public trust to private individuals to harvest shellfish;[137] more recently, the Florida Division of Aquaculture, under the Department of Agriculture, has granted submerged land leases for the harvest of live rock, a collection of rock and dead coral skeleton[138] upon which live coral, algae, sponges, and other marine invertebrates grow.[139] Aquarists use live rock in aquaria as a proxy for wild coral reefs, because the live rock supports the organisms in an aquarium in a similar way that wild coral serves as the basis of the coral reef ecosystem.[140]

If aquaculture leases have been granted for shellfish and live rock,

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134. Fla. Stat. § 253.68 (2006).

135. *Marine Ornamental Species and Live Rock*, Fla. Dep't of Agric. & Consumer Servs., http://www.floridaaquaculture.com/bad/aquaproducts_ornamentals.htm, (last visited Jan. 14, 2013).

136. § 253.68 (emphases added).

137. *See supra* Part III.C.

138. Coral reefs grow through a constant process of building new skeleton over old tissue. *See, e.g.*, Sheppard et al., *supra* note 19, at 94.

139. William W. Falls et al., Live Rock Aquaculture: Final Report Prepared for the National Science Foundation 2 (2003), *available at* http://tbsaltwater.com/liverock/LiveRock Study.pdf.

140. *Id.*

what prevents the establishment of a similar lease over an existing wild coral reef? Instead of granting private users the exclusive right to lease a discrete area in the ocean for shellfish or live rock aquaculture, the same lease could be granted to private individuals for coral reef conservation. Lessees interested in conservation would not be required to harvest the coral, fish, or other marine resources in the leased area, and instead prevent such extraction through the exclusion of other users.[141] Finally, such a lease does not require the invention of a new legal framework, because Florida law—both the public trust doctrine and aquaculture statutes—has adequate room for this proposal.[142] Granting exclusive use rights prevents the tragedy of the commons by limiting use of and access to reefs.

A. *How Would a Coral Reef Lease Work?*

A lease of a coral reef would resemble existing aquaculture leases of submerged lands. Aquaculture leases grant lessees the use of submerged lands in the lease,[143] as well as the water above, also known as the water column, "to the extent required by" ongoing aquaculture activities.[144] In granting the lessee use of both submerged lands and the adjacent water column, the statutes avoid a potentially murky problem: whether coral reefs, which form a hard substrate on the ocean floor, are submerged lands themselves or marine resources in the water column. Additionally, the lessee is the exclusive owner of all marine resources that he would culture.[145] Together, these statutes make clear that the lessee would have exclusive use of any corals in a leased area.

A coral reef lease would differ from current aquaculture leases in one significant way: lessees would not need to harvest the coral or other resources within the lease. Although the term aquaculture typically implies harvesting of the cultured resources,[146] Florida law does not mandate such harvest, but instead declares that aquaculture can "protect and conserve natural resources . . . and . . . augment and restore natural populations."[147] Instead of harvesting either coral or the fish that inhabit the reef, granting a lease to private individuals not to harvest the resources, but to protect them from use, could satisfy Florida law. This is because conservation of natural resources is one goal of Florida's

141. FLA. STAT. § 253.72(2) (2000).

142. *See infra* Part IV.B.

143. FLA. STAT. § 597.010(4) (2009).

144. *Id.* §§ 253.68–70 (2005).

145. *Id.* § 597.010(4) ("[A]ll oysters and clams, shell, and cultch grown or placed thereon shall be the exclusive property of such lessee . . . .").

146. WEBSTER'S THIRD NEW INT'L DICTIONARY, UNABRIDGED 108 (1993).

147. § 253.68.

aquaculture laws,[148] and thus part of Florida's public trust doctrine. A coral reef lease therefore would resemble existing leases for shellfish and live rock; the only major difference would be the ultimate goal. In a proposed lease of a coral reef, the lessee would not harvest the coral in her lease, but conserve the reef and its living resources.

B. *How Would a Lessee Protect His Interests in the Lease?*

Property and proprietary interests are meaningless without effective enforcement.[149] A successful lease would not only grant lessees exclusive use of the leased submerged lands and water column, but would also provide legal protections from any infringement of that exclusive use by both private actors and government actors.

Excluding other users, including would-be fishermen, is possible under existing law. Although Florida has protected the public's right to fishing,[150] this right has been limited by other statutes, including the statute that allows lessees exclusive use of the water column.[151] If exclusion is "necessary to permit the effective development of the species of animal or plant life being cultivated by the lessee," the lessee may prevent the public from boating, swimming, or fishing in the lease.[152] Because overfishing and physical contact from swimmers, boats, and anchors can damage coral reefs,[153] a lessee seeking to exclude these users has a strong argument that exclusion is "necessary to . . . the effective development" of the protected coral.[154] Moreover, not only is the lessee the exclusive user of the resources within the lease, but an additional statute creates a setback by preventing shellfish harvest within twenty-five feet of a lease.[155] Therefore, Florida law would permit a lessee to exclude other users from the lease and surrounding area. Granting such leases would be one way to prevent a given coral reef from being a commons by restricting access.

Moreover, there are existing mechanisms for enforcing a lessee's exclusive use rights. One statute requires lessees to post visible markers that indicate the boundaries of a lease and restrictions on public use within the lease, effectively serving as a "Keep Out" notice.[156] This law

148. FLA. STAT. § 253.68 (2006).

149. *See, e.g.*, Harold Demsetz, *The Exchange and Enforcement of Property Rights*, 7 J.L. & ECON. 11, 17 (1964).

150. FLA. STAT. § 379.244(1) (2010).

151. *Id.* § 597.010(4) (2009); *see also id.* § 379.232(1) (2008).

152. *Id.* § 253.72(2) (2000).

153. *See supra* text accompanying note 9.

154. FLA. STAT. § 253.72(2) (2000).

155. *Id.* § 253.72(3) (2000).

156. *Id.* § 253.72(1) (2000).

also makes violations of any posted requirements a second-degree misdemeanor.[157] Florida's aquaculture statutes clearly protect the lessee's interests from interference by private actors.

Finally, Florida common law also prevents governmental invasions of the lease. Lessees should be protected from takings without compensation under the Fifth Amendment.[158] The Florida Supreme Court long ago found that municipal dumping of sewage onto leased oyster beds violated the Takings Clause of the Fifth Amendment.[159] The statutory grant of such a lease, not the lease's purpose, endows the lease with this constitutional protection.[160] The fact that a coral reef lessee would be using her property differently than would a shellfish lessee does not strip the coral lessee of the Fifth Amendment safeguards. Therefore, according to Florida statutory and common law, the lessee's exclusive use of the lease area and any resources therein should prevent private or state actors from violating that use.

C. *What Other Considerations Could Emerge from Such a Lease?*

To be sure, this proposal is not a foolproof way to protect coral reefs. In order to satisfy the public trust doctrine, a lessee would need to demonstrate that she is actively conserving reefs for the benefit of the public. Attempts to adversely possess or acquire title to establish traditional private ownership should not succeed.[161] Accordingly, leases should be granted to recognized non-governmental organizations, with

157. *Id.*

158. Gibson v. City of Tampa, 185 So. 319, 321 (Fla. 1938).

159. *Id.*

160. *Id.* ("[T]he enactment of . . . [laws] to provide for the propagation and culture of oysters materially altered the common law right of defendant to empty its raw sewage into the ocean.").

161. Previous attempts by private individuals attempting to acquire title to coral reefs have failed. In 1969, Mr. Ray Louis, seeking to create the Grand Capri Republic, attempted to adversely possess and construct several buildings on four coral reefs four-and-a-half miles off of Elliot Key in South Florida. United States v. Ray, 294 F. Supp. 532, 534 (S.D. Fla. 1969), *aff'd in part, rev'd in part*, 423 F.2d 16 (5th Cir. 1970) (reversing only one form of relief granted to the United States). Because this occurred in federal waters, the United States sued Mr. Ray under the Outer Continental Shelf Lands Act (43 U.S.C. §§ 1331–1356a (2006)), claiming that the United States had jurisdiction over construction in the outer continental shelf. *Ray*, 294 F. Supp. at 536. Although the court found that the United States did not have actual possession of the reefs, the court ruled for the United States by recognizing sovereign interests in preventing such an attempt. *Id.* at 542.

More recently, the Ninth Circuit Court of Appeals rejected a private company's attempt to acquire title to Kingman Reef, an isolated coral atoll nearly one thousand miles south of Honolulu, finding that the United States had not abandoned its interests in the atoll. Kingman Reef Atoll Invs. v. United States, 541 F.3d 1189, 1192 (9th Cir. 2008). This case became moot when President Bush protected Kingman Reef under the Pacific Remote Islands Marine National Monument. *See* U.S. FISH & WILDLIFE SERV., PACIFIC REMOTE ISLANDS MARINE NATIONAL MONUMENT, *available at* http://www.fws.gov/pacificremoteislandsmarinemonument/PRIMNM%20brief.pdf.

the consent of the state, which serves as the trustee for the public under the public trust doctrine.

There are additional limitations on the location of such leases. Florida regulations prevent submerged land leases in state parks; therefore no lease will be granted in John Pennekamp Coral Reef State Park or Bahia Honda State Park.[162] Most of the coral reefs in Florida are found within the Florida Keys National Marine Sanctuary, making these reefs and submerged lands subject to any sanctuary-specific regulations. For example, "[m]oving, removing, taking, harvesting, damaging, disturbing, touching, breaking, cutting, or otherwise injuring, or possessing (regardless of where taken from) any living or dead coral, or coral formation, or attempting any of these activities," is prohibited in the Florida Keys National Marine Sanctuary without a permit.[163]

Additionally, conservation of individual coral reefs will not address the global crises that reefs are currently facing, like rising sea levels, warming seas, and increasing ocean acidity.[164] However, creating such a lease, resembling a privately-managed no-take marine reserve, around a few coral reefs could provide an alternative way to protect reefs where traditional governance has failed. Nor would such a lease be the first example of privatizing marine resources in the public trust in American waters.

V. EXISTING EXAMPLES OF PRIVATIZATION OF MARINE RESOURCES

Historically, the size and fluidity of the marine environment have made it inherently difficult to enforce any private property rights therein because of the inability to exclude others. "The oceans are the classic case of an open access (i.e., no property rights) resource because of their fluid interconnectedness, their vast size, and the resulting difficulty of enforcing property rights to any particular area or resource."[165] While generally true, certain developments over the last half-century have defied this argument that limiting access to marine resources is impossible. The United States has created two schemes of discrete private property rights: leases of submerged lands for oil and gas production through the Outer Continental Shelf Lands Act[166] and the development of Individual Transfer Quotas in certain fisheries as a way to accommodate fishery and conservation interests.[167] Although these schemes have dif-

162. FLA. ADMIN. CODE r.18-21.020(1) (2009).

163. 15 C.F.R. § 922.163(a)(2) (2012).

164. *See supra* text accompanying notes 10–11.

165. Robert Costanza, *The Ecological, Economic, and Social Importance of the Oceans*, 31 ECOLOGICAL ECON. 199, 204 (1999).

166. 43 U.S.C § 1301 (2006).

167. *See infra* Part V.B.

ferent goals and means to achieve those goals, they share one important factor: they encourage the development of specific private property rights in order to conserve and use resources protected by the public trust.

A. *Offshore Energy Extraction: Leases of Discrete Areas in the Ocean*

Granting individuals exclusive access to the marine environment is not a new concept in federal ocean policy. The United States has administered leases of federal submerged lands, primarily for oil and gas exploration and extraction, under the Outer Continental Lands Shelf Act of 1953 ("OCSLA").[168] Through this program, the United States has allowed leasing of resources that are in the public trust. Although this federal program has different goals than are proposed in this Note, it is a useful example of one way in which public trust assets have been successfully privatized.

i. How Leases Under OCSLA Work

Before the enactment of OCSLA, there was a long-running debate about whether the federal government could lease minerals in submerged lands. Several individuals applied for such leases under the Mineral Leasing Act of 1920,[169] but were rejected by the Department of Interior, which claimed that the law did not apply to offshore oil and gas deposits.[170] Even after the United States Supreme Court provided some (albeit brief) clarification on sovereignty in the oceans,[171] the Department of Interior continued denying lease applications under the Mineral Leasing Act of 1920.[172]

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168. 43 U.S.C §§ 1331–1356(a) (2006). OCSLA's role in managing alternative energy sources, like wind or tidal power, remained unclear until the passage of the Energy Policy Act of 2005. 43 U.S.C. § 1337 (2006); *see also* Sarah Y. Dicharry, Comment, *Wind Energy Production Compensation Scheme: Oil-Like Royalties or Oyster-Like Rent?*, 58 Loy. L. Rev. 179, 191 (2012). Because the Energy Policy Act is relatively new and much of the related law remains unsettled, this discussion will focus only on the older OCSLA scheme.

169. 30 U.S.C §§ 181–195 (2006).

170. Robin Kundis Craig, *Treating Offshore Submerged Lands as Public Lands: An Historical Perspective*, Pub. Land & Resources L. Rev. (forthcoming 2013) (manuscript at 12–13) (on file with author) [hereinafter Craig, *Offshore Submerged Lands*].

171. For a short time, the United States, and not coastal states, controlled even the first three miles from shore. United States v. California, 332 U.S. 19 (1947). However, the Court provided little clarification as to who actually held title over these submerged lands, stating that the federal government "has paramount rights in and power over" submerged lands within three miles of shore. *Id.* at 40; *see also* Craig, *Offshore Submerged Lands*, *supra* note 170, at 11. However, "Congress decided to 'correct' the Court's holding by 'returning' the first three miles of ocean submerged lands to the coastal states" with the passage of the Submerged Lands Act of 1953. *Id.* at 18–19.

172. *Id.* at 13–14.

In 1945, concerned about securing access to oil in the wake of World War II,[173] President Truman claimed all resources on and under the continental shelf of the United States for the country.[174] Thus, President Truman set the stage for Congress to clarify ownership of submerged lands with the passage of the Submerged Lands Act and OCSLA in 1953. In the Submerged Lands Act, Congress formally granted title of submerged lands three nautical miles or less from shore to adjacent states.[175] Under OCSLA, the United States asserted jurisdiction over the outer continental shelf beyond three nautical miles.[176]

OCSLA authorized the Minerals Management Service ("MMS"), now known as the Bureau of Ocean Energy Management ("BOEM"),[177] to lease plots of submerged lands on the outer continental shelf for oil and gas production.[178] In the Gulf of Mexico, companies seeking such leases must first "buy" the right to access leased parcels at auction.[179] Successful lessees have the right to explore, extract, and produce minerals from the plot for five to ten years, possibly longer "if oil and gas continue to be produced in 'paying quantities.'"[180] Lessees must also pay royalties to the BOEM on each barrel of oil produced.[181] Despite the lengthy application process, the United States has seen considerable profits from such leases. BOEM currently levies royalties of at least 12.5% of the value of oil and gas produced in the Gulf of Mexico.[182] In 2001 alone, MMS, BOEM's predecessor, reported over $6.5 billion in federal revenues from oil and gas royalties, bonuses, and other rents from these leases.[183]

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173. *See, e.g.*, HANNESON, *supra* note 18, at 31.

174. Proclamation No. 2667, 10 Fed. Reg. 12,305 (Sept. 28, 1945).

175. 43 U.S.C. §§ 1301–1315 (2006); *see also supra* notes 109–10 and accompanying text. Off of Texas and Florida's Gulf Coast, state sovereignty extends nine miles from their respective coasts. *See* United States v. Louisiana, 363 U.S. 121 (1960).

176. 42 U.S.C. § 1332 (2006).

177. In the wake of the *Deepwater Horizon* oil spill in 2010, then Secretary of the Interior Ken Salazar ordered the reorganization of the MMS into the Bureau of Ocean Energy Management and the Bureau of Safety and Environmental Enforcement after criticism that the MMS failed to properly oversee faulty safety procedures that led to the spill. *See* Jason DeParle, *Minerals Service Had a Mandate to Produce Results*, N.Y. TIMES, Aug. 7, 2010, http://www.nytimes.com/2010/08/08/us/08mms.html?pagewanted=1&ref=mineralsmanagementservice.

178. 42 U.S.C. §§ 1334–1356 (2006).

179. John A. Duff, *Offshore Management Considerations: Law and Policy Questions Related to Fish, Oil, and Wind*, 31 B.C. ENVTL. AFF. L. REV. 385, 395 (2004) (citations omitted).

180. *Id.*

181. *Id.*

182. BUREAU OF OCEAN ENERGY MGMT., GULF OF MEXICO LEASE TERMS AND ROYALTY RELIEF, (Nov. 5, 2012), *available at* http://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Energy_Economics/Fair_Market_Value/GOMLeaseTermsRRSummary.pdf.

183. U.S. COMM'N ON OCEAN POL'Y, AN OCEAN BLUEPRINT FOR THE 21ST CENTURY: FINAL REPORT 359 (2004) (citations omitted).

Despite the financial benefits of OCSLA leases, there are currently no such leases off Florida's coasts, either in federal or state waters. After the *Deepwater Horizon* spill, President Obama and Interior Secretary Ken Salazar shelved proposals to open leases off Florida's coasts under OCSLA.[184] The moratorium will last at least until 2017.[185] Florida has banned drilling for oil in state waters since 1990.[186] But both the federal moratorium and the state statutory ban remain controversial, as lawmakers at the national and state levels have sought to reverse them.[187]

ii. Leases Under OCSLA and Leases of Coral Reefs

Leases under OCSLA are a useful analogue for the kind of lease proposed in Part IV. In the Submerged Lands Act, Congress explicitly recognized that it was "in the public interest" to grant states sovereignty over "the lands beneath navigable waters" three nautical miles from the shore, "and the natural resources within such lands and waters."[188] Although the Submerged Lands Act is not technically part of OCSLA, the statutes are related and organized together in the United States Code.[189]

The public trust doctrine is also evident in OCSLA. The statute itself recognizes "the value of the resources [in the outer continental shelf] and the public interest served by promoting development of the resources."[190] Given that the public trust doctrine has protected navigable bodies of water, there is no reason that the doctrine should not extend to federal waters in the Exclusive Economic Zone under OCSLA or the United Nations Law of the Sea treaty.[191] Professor Craig has also argued that OCSLA has reshaped the common law understanding of public lands, a term that traditionally meant that the government was

184. John M. Broder & Clifford Krauss, *U.S. Halts Plan to Drill in Eastern Gulf*, N.Y. Times, Dec. 1, 2010, http://www.nytimes.com/2010/12/02/us/02drill.html?hp=&pagewanted=print.

185. *Id.*

186. Fla. Stat. § 377.242(1)(a) (1996); *see also* Leigh Derenne Braslow, Comment, *Coastal Petroleum's Fight to Drill off Florida's Gulf Coast*, 12 J. Land Use & Envtl. L. 343, 352 (1997).

187. *See, e.g.*, Clifford Krauss & Ashley Parker, *Romney Energy Plan Would Expand Oil Drilling on U.S. Land and Offshore*, N.Y. Times, Aug. 22, 2012, http://www.nytimes.com/2012/08/23/us/politics/romney-tries-to-refocus-campaign-on-economy-and-obama-turns-to-education.html; Trimmel Gomes, *Florida Legislature Says* No *to Offshore Drilling*, WFSU (Oct. 4, 2011, 8:16 PM), http://news.wfsu.org/post/florida-legislature-says-no-offshore-drilling.

188. 43 U.S.C. § 1311(a) (2006).

189. The Submerged Lands Act is codified at 43 U.S.C. §§ 1301–1315. OCSLA follows immediately after the Submerged Lands Act. *Id.* §§ 1331–1356a.

190. *Id.* § 1337(k)(2)(B).

191. *See* Turnipseed et al., *supra* note 21, at 38–40 (explaining that the complicated proprietary rights in the Exclusive Economic Zone do not necessarily bar the application of the public trust doctrine, which can arise directly from the United States' sovereignty).

free to sell and dispose of such lands as it deemed fit.[192] This new view of public lands, coupled with the statutory context of OCSLA, aligns OCSLA more closely with the traditional public trust doctrine, in which the government has a far more limited ability to alienate property.[193] The seeds of the public trust doctrine are present, whether the United States has ever explicitly recognized it in these waters.[194] And under that doctrine, the United States has created a scheme in which private individuals are able to make use of public resources "in the public interest."[195]

However, there are important differences between leases under OCSLA and those proposed in this Note. The federal government manages the leases under OCSLA with a limited, but growing, role of adjacent states.[196] By comparison, Florida oversees its own leases of submerged lands for aquaculture, subject to any relevant federal laws.[197] Additionally, if Florida were to lift its statutory ban on oil exploration in state waters, it presumably would need to incorporate some of the public trust language already present in its aquaculture laws.[198]

More importantly, OCSLA is almost entirely concerned with oil and gas development, which is a very different goal than the lease proposed here. Rather than focusing on resource extraction and use, a lease for coral conservation is staunchly anti-use, and is proposed partly because overuse and abuse of coral reefs have led to their decline. Despite these differences, OCSLA is nevertheless a useful comparison because it is a clear example of how a government in the United States (here, the federal government) has managed its public trust resources in a way that limits access to a particular area in space for the use of private organizations.

B. *Individual Transfer Quotas: Limiting Access to Living Marine Resources*

Another example of privatizing marine resources is evident in the relatively new fishing management tool, individual transfer quotas ("ITQs"). The concept of "freedom of the seas," the idea that no sovereign could limit the access of another to the oceans, reigned throughout

192. *See* Craig, *Offshore Submerged Lands*, *supra* note 170, at 6.

193. *Id.* at 39.

194. Turnipseed et al., *supra* note 21, at 40.

195. § 1337(k)(2)(B).

196. *See* Rachael E. Salcido, *Offshore Federalism and Ocean Industrialization*, 82 TUL. L. REV. 1355, 1370–72 (2008).

197. FLA. STAT. §§ 253.68–75 (2012).

198. *Id.* § 253.68 (2006). *See also* Braslow, *supra* note 186, at 368–69 (arguing that leases to drill for oil in Florida waters may violate the state's public trust doctrine).

much of the last millennium.[199] Typically considered one of the last commons,[200] the world's fisheries have undergone a series of regulatory enclosures over the last half-century.[201] In the United States, this process has shifted from the international and national level, by claiming a two hundred mile exclusive economic zone, to the regional level with the development of ITQs in various fisheries around the country.[202]

i. Development of Individual Transfer Quotas

Throughout much of western history, coastal nations have sought some form of control over their waters, including access to fishing.[203] The most brazen attempt was the 1494 division of the Eastern and Western Hemispheres between Spain and Portugal in the Treaty of Tordesillas.[204] Other nations, particularly the Dutch, protested and argued that access to the oceans, and attendant fishing rights, should be generally free to all nations.[205] One exception to this freedom of the seas doctrine was the territorial sea, in which coastal states sought greater control over the sea and its resources, particularly fish stocks, in the waters closest to shore.[206] From the 1800s, most countries had accepted three nautical miles as the limit of the territorial sea, the area in which any sovereign could regulate fisheries.[207]

After World War II, the three-mile limit increased up to two hundred nautical miles, spurred by the Truman Proclamations.[208] President Truman claimed all of the resources on the United States' continental shelf for the country, as well as the right to control fishing in these waters.[209] Other countries responded to the Truman Proclamations by claiming similar rights to control fisheries in their waters up to two hundred nautical miles from shore.[210] The Third United Nations Conference on the Law of the Sea finally codified this de facto limit when it was ratified in 1994.[211] Although the United States has yet to sign the treaty, the limit became law in the United States in 1976 with the passage of the

199. *See, e.g.*, Hanneson, *supra* note 18, at 29–31 (noting that the Dutch, who first coined the term "freedom of the seas," did so in response to attempts by other countries to control international trade).

200. *See, e.g., id.* at 1.

201. *Id.* at 3.

202. *Id.* at 135.

203. *Id.* at 29.

204. Donald R. Rothwell & Tim Stephens, The International Law of the Sea 2 (2010).

205. Hanneson, *supra* note 18, at 30.

206. *See* Rothwell & Stephens, *supra* note 204, at 59–61.

207. *See, e.g.*, Hanneson, *supra* note 18, at 31.

208. *Id.*

209. *See supra* notes 173–76 and accompanying text.

210. *See* Hanneson, *supra* note 18, at 31–34.

211. *Id.* at 38.

Magnuson-Stevens Fishery Conservation and Management Act ("Magnuson-Stevens Act"), claiming for the United States an exclusive economic zone in waters two hundred miles from shore.[212]

Since the exclusive economic zone provided a legal basis for controlling access to fisheries, many countries have used ITQs as a fishery management tool.[213] An ITQ grants a user the right to catch a certain amount of fish, either a fixed number of fish or a percentage of the total catch, over a given time period.[214] Rather than establishing a pure property right over the fish stock, which would be difficult to do and harder to enforce, ITQs are a kind of exclusive use right, limiting *only* access and use.[215] In doing so, ITQs are able to limit the number of users and make the most efficient use of a scarce resource. Limiting the number of users and the amount of fish removed prevents overfishing and ends the tragedy of the commons. And by making the quotas easily transferable, ITQs ensure that the users who can use them most effectively are those who can pay the most.[216]

In the United States, ITQs have developed under the Magnuson-Stevens Act, which created eight regional Fisheries Management Councils.[217] According to the Magnuson-Stevens Act, the councils must develop management plans for fisheries "to provide optimum yields on a continuing basis."[218] Of the eight regions, six councils have developed at least fifteen management plans under the umbrella term "catch shares."[219] According to NOAA, catch shares "include[ ] specific program[s] . . . such as 'limited access privilege' (LAP) and 'individual fishing quota' (IFQ)[220] programs, and other exclusive allocative measures . . . that grant an exclusive privilege to fish in a geographically designated fishing ground."[221]

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212. 16 U.S.C. § 1802(6) (2006).

213. HANNESON, *supra* note 18, at 52.

214. *Id.* at 56.

215. *See, e.g., id.* at 53–56.

216. *Id.* at 57.

217. 16 U.S.C. § 1852 (2006).

218. *Id.* § 1801. *But see* Marian MacPherson, *Integrating Ecosystem Management Approaches into Federal Fishery Management Through the Magnuson-Stevens Fishery Conservation and Management Act*, 6 OCEAN & COASTAL L.J. 1, 6–7 (2001) (explaining the complicated relationship between "optimum yield" and "maximum sustainable yield" in the Magnuson-Stevens Act).

219. NOAA, *Catch Shares*, OFFICE OF SUSTAINABLE FISHERIES, http://www.nmfs.noaa.gov/sfa/domes_fish/catchshare/index.htm (last visited Jan. 16, 2013).

220. Individual Fish Quota is another term for ITQs. *See, e.g.*, HANNESON, *supra* note 18, at 144.

221. NOAA, NOAA CATCH SHARE POLICY: EXECUTIVE SUMMARY 1 (2010).

ii. Individual Transfer Quotas and Leases of Coral Reefs

Like the lease proposed in Part IV, ITQs are a clear example of access restriction to a right otherwise in the public trust. Both tools are legal ways to limit full public access to a resource owned by the public; the only way this paradox works is that the restriction serves to protect and conserve that resource *for* the benefit of the public.

However, ITQs are not a perfect comparison to coral reef leases. ITQs seek to manage a far more mobile resource, fish, than coral reefs, which generally remain stationary after settling out of their larval phase. This basic biological difference may actually complicate ITQ enforcement relative to a reef lease: at least with a coral reef, a discrete geographic area could exist, complete with signs warning boaters and swimmers not to enter.

Two important additional questions about ITQs remain: are they effective? And what rights do they actually convey? The first remains unanswered, and the second unclear. Under political pressure, Congress imposed a moratorium on the four existing ITQs between 1998 and 2002.[222] Consequently, most catch share programs in the United States were enacted over the last decade.[223] The jury is still out as to ITQs' ability to restore protected stocks around the world.[224]

In addition to complicating the scientific understanding of ITQs' effectiveness, the moratorium stalled the development of ITQs' legal understanding as well. ITQs in the United States are explicit about the fact that they do not grant users rights, but privileges that are revocable without compensation.[225] Despite this limitation, ITQs do confer some rights. For example, the Ninth Circuit Court of Appeals has recognized "protectable property interest[s]" in the ITQ itself, which are protected by procedural due process.[226] However, citing the United States Supreme Court, the court stated that it is "pure fantasy" to think that

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222. *See* Hanneson, *supra* note 18, at 150–51.

223. NOAA, *Catch Shares – Programs by Region*, Office of Sustainable Fisheries, http://www.nmfs.noaa.gov/sfa/domes_fish/catchshare/catchshare_region.htm (last visited Jan. 16, 2013).

224. *See, e.g.*, Olivier Thébaud et al., *From Anecdotes to Scientific Evidence? A Review of Recent Literature on Catch Share Systems in Marine Fisheries*, 10 Frontiers in Ecology & the Env't 433, 435 (2012) (finding a substantial lack of scientific research on the effectiveness of ITQs); *see also* Cindy Chu, *Thirty Years Later: The Global Growth of ITQs and Their Influence on Stock Status in Marine Fisheries*, 10 Fish & Fisheries 217, 225 (2009) (noting that twelve of twenty studied stocks improved after the implementation of ITQs in various countries, but also explaining how ITQs alone are not always directly responsible for the recovery of fish populations).

225. Hanneson, *supra* note 18, at 77.

226. Foss v. Nat'l Marine Fisheries Servs., 161 F.3d 584, 588 (9th Cir. 1998).

there is a property right in the fish themselves.[227]

Arguably, there is a stronger proprietary interest in aquaculture leases of submerged lands in Florida. Unlike the federal Magnuson-Stevens Act, which the Ninth Circuit said "does not confer any . . . property rights,"[228] Florida's aquaculture laws have more explicitly created these rights. For example, Florida law states that the shellfish in aquaculture leases are the "exclusive property" of the lessee.[229] Moreover, a separate law makes violation of posted lease restrictions a second-degree misdemeanor.[230] Finally, the Florida Supreme Court has long recognized that these rights are protected by substantive due process from taking without just compensation.[231]

Finally, the most important difference between ITQs and the proposed reef lease lies in their purposes. The primary goal of ITQs is to manage depleted fish stocks.[232] "It goes without saying that a quota management system [such as ITQs] is ill suited to deal with questions of preservation for purposes other than material benefits."[233] The purpose of the proposal in Part IV, however, is to provide a more holistic approach to coral conservation by protecting the coral and the fish that inhabit it.

CONCLUSION

According to the basic principle of the public trust doctrine, the state serves as trustee over resources in the public trust on behalf of the public. Given the failing health of U.S. coral reefs, both the federal government and Florida have done a poor job protecting these invaluable resources. Governance alone has not prevented coral reefs from suffering the tragedy of the commons. It is time to consider the alternative: allowing private management schemes to take a more active role in coral conservation.

The state—here, both the United States and the state of Florida—cannot and should not surrender this duty completely to private entities; the public trust doctrine forbids such an action. However, both the federal and state public trust doctrines have expanded already to include a growing role for private partnerships. In creating submerged lands leases under OCSLA and ITQs, the federal government has recognized implicitly that the exclusion of the general public in favor of particular individ-

227. *Id.* (citing Douglas v. Seacoast Prods., Inc., 431 U.S. 265, 284 (1977)).
228. *Id.*
229. FLA. STAT. § 597.010(4) (2009).
230. *Id.* § 253.72(1) (2000).
231. Gibson v. City of Tampa, 185 So. 319, 321 (Fla. 1938).
232. *See supra* notes 214–16 and accompanying text.
233. HANNESON, *supra* note 18, at 91.

uals can be in the public's best interest. Florida has gone further, welcoming private individuals to participate in its public trust doctrine by expressly granting the right to lease submerged lands for aquaculture.

Florida should take this privatization one step further to advance its coral reef conservation strategies. Such a step would require little legal invention, but merely a refashioning of existing aquaculture laws, which have been a part of Florida law for over a century. Given the dire status of Florida's reefs, failure to take any action would be a violation of public trust principles.