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**Why International Catch Shares
Won't Save Ocean Biodiversity**

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Why International Catch Shares Won't Save Ocean Biodiversity

Holly Doremus*

Skepticism about the efficacy and efficiency of regulatory approaches has produced a wave of enthusiasm for market-based strategies for dealing with environmental conflicts. In the fisheries context, the most prominent of these strategies is the use of “catch shares,” which assign specific proportions of the total allowable catch to individuals who are then free to trade them with others. Catch shares are now in wide use domestically within many nations, and there are increasing calls for implementation of internationally tradable catch shares. Based on a review of theory, empirical evidence, and two contexts in which catch shares have been proposed, this Article explains why international catch shares are not likely to arrest the decline of ocean biodiversity. Catch shares were developed to promote greater economic efficiency and profitability in the fishing industry. They have proven capable of doing so at the domestic level, although their effects on wealth distribution have frequently been controversial. Theoretical and empirical support for the proposition that catch shares promote conservation, especially of non-target resources, is thinner. Furthermore, in the international context catch shares face special challenges. Catch shares cannot resolve the value differences that underlie the most intractable disagreements about international fisheries management. They are less likely to reduce conflicts over total allowable catch in the international than in the domestic context, because distrust of managers and competitors runs deeper. Finally, catch share strategies require effective enforcement, which is both institutionally and practically difficult to provide for many international fisheries. In general, catch shares are not a promising route to improving international fisheries management, and pursuing them could distract the international

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community from more important steps toward improving conservation of global ocean resources.

INTRODUCTION.....	3
I. FROM COMMONS TO CATCH SHARES	4
II. FOR BETTER OR WORSE?	11
A. <i>Goals Matter</i>	13
1. Economic Efficiency	13
2. Wealth Distribution	15
3. Resource Stewardship: Target and Non-Target Species .	17
4. Conflict Reduction	20
5. Fisheries Goals in the International Context	23
B. <i>Information and Trust</i>	27
C. <i>Administration and Enforcement</i>	29
III. NOT EVERY PROBLEM IS A NAIL.....	32
A. <i>Tradable Whale Permits</i>	32
B. <i>Multilateral Tuna Management</i>	40
IV. CONCLUSION	44

1. Introduction

There is currently a great deal of enthusiasm, in both the domestic and the international contexts, for property rights-based approaches to fishery management. Such approaches, most commonly in the form of “catch shares,” or individually allocated portions of the total allowable catch (TAC), have been adopted in a number of nations for fisheries covering a number of stocks. Although there are not yet any international catch share fisheries, recent proposals suggest a move in that direction may be inevitable.

In this Article, I evaluate international catch share strategies as conservation tools and find them wanting. Catch shares have had positive economic effects in a range of domestic fisheries, but are not necessarily useful for addressing ecological problems. They may reduce conflict over total allowable catch levels, but only if the participants have a long time horizon and believe catch restrictions are necessary. At the same time, catch share programs enhance

conflicts over the allocation of rights, which are commonly a major barrier to international fishery agreements. Finally, property rights-based fisheries management requires committed and effective enforcement institutions, which are notably lacking in many global fisheries.

A closer look at two contexts in which tradable property rights have been proposed—to govern the harvest of whales and bluefin tuna—shows that such proposals would face high political and practical hurdles, without offering much added conservation value. While many international fisheries clearly need better management and frustration with current regulatory approaches is understandable, introducing catch shares should not be the first priority. The effort to make a catch share strategy work could unproductively distract from addressing more important needs.

I. From Commons to Catch Shares

Fisheries present a classic tragedy of the commons.¹ Traditionally, national and international law protected rights of open access; the freedom of anyone who wanted to do so to participate in fisheries was fiercely guarded. That was not a problem when pressure on ocean resources was limited. At that point, the seas were effectively inexhaustible relative to the ability and desire of human beings to exploit them. But as demand for fish and the sophistication of fishing technologies increased, the tradition of open access became problematic both for fishermen and for their targets.

Put most simply, the problem was (and is) that too many boats were chasing too few fish. From the fisherman's perspective, that meant that the economic rents of resource exploitation were lost, or to put it in less abstract terms, that profits were elusive. With essentially no barriers to entry, fishery participants dissipated a greater and greater share of revenues in an unwinnable arms race, adding vessels and equipment so that they might capture fish before their competitors could do so. The costs of fishing rose until the industry was barely profitable.² Not only were incomes kept low, risks to life and limb were

1. Garrett Hardin is famous for coining this phrase. Garrett Hardin, The Tragedy of the Commons, 162 *Science* 1243 (1968). But the idea had been articulated in the fisheries context years earlier. H. Scott Gordon, The Economic Theory of a Common-Property Resource: The Fishery, 62 *J. Pol. Econ.* 124, 134-35 (1954).

2. Indeed, the industry may operate at a deficit. One report several years ago pegged annual costs at \$124 billion, compared to harvest value of only \$70 billion. Carrie Tipton, Note, Protecting Tomorrow's Harvest: Developing a National System of Individual Transferable Quotas to Conserve Ocean Resources, 14 *Va. Env'tl. L.J.* 381, 390 (1995).

kept high. Commercial fishing, always a dangerous occupation, became even more so as fishermen sought to maximize their share of the catch.

From a conservation perspective, traditional open access fishing was equally problematic. Fishermen had no incentive to leave fish in the ocean, where they would be available to the first comer. Sustainable harvest might be to the benefit of the entire industry, but participants who were unable to restrain the behavior of their competitors would be foolish to restrain themselves. The economically rational behavior was a mad scramble in which everyone sought to grab as much fish as they could in the short run, without regard to long-term effects on the resource. The predictable outcome was “fishing down food webs.”³ The easiest and most lucrative targets were fished out to the point where chasing them no longer made economic sense. Then the industry moved on to the next target, and the next.

This uncontrolled fish chase threatened entire marine ecosystems, not just target species. If harvests could be increased or speeded up by the use of bottom trawls⁴ or enormous drift nets,⁵ it was entirely rational for fishermen locked in

3. Daniel Pauly et al., Fishing Down Marine Food Webs, 279 *Science* 860 (1998).

4. The Natural Resources Defense Council has compared bottom trawling to land-based strip mining: “Bottom trawlers drag giant weighted nets along the ocean floor, ripping up or scooping out whatever they encounter, including ancient coral forests, gardens of anemones and entire fields of sea sponges Trawling nets, huge weighted bags, can be 200 feet wide and 40 feet high, weigh as much as 1,000 pounds, and can be sunk to depths of 5,000 feet or more beneath the water’s surface. Heavier, stronger gear allows trawl nets to plow over rocky bottoms, destroying the underwater corals, sponges and rock structures that provide important habitat for fish.” Protecting Ocean Habitat from Bottom Trawling, *Nat. Resources Def. Council* (Feb. 1, 2007), <http://www.nrdc.org/water/oceans/ftrawling.asp>. Although most of it occurs in very deep waters, the sediment plumes stirred up by bottom trawling reach the surface, where they can be seen from space. Bottom Trawling Impacts on Ocean, Clearly Visible from Space, *Sci. Daily* (Feb. 20, 2008), <http://www.sciencedaily.com/releases/2008/02/080215121207.htm>. In addition to destroying seafloor habitat, bottom trawls “catch everything in their path, including endangered sea turtles, juvenile fish and other unwanted species.” **Monterey Bay Aquarium, Fishing Methods Fact Card**, available at http://www.montereybayaquarium.org/cr/cr_seafoodwatch/content/media/MBA_SeafoodWatch_TrawlingFactCards.pdf (last visited Nov. 6, 2012).

5. Drift nets are enormous fine mesh panels hung vertically in the ocean. They are non-selective, designed to catch or entangle whatever swims into them. They have been used for centuries, but have long been a source of conflict both because they are capable of so efficiently killing their target species and because they also kill large numbers of non-target fish, birds, and marine mammals. See Stuart Sugarman, The Failure to Achieve a High Seas Driftnet Ban, 3 *Int’l Legal Persp.* 5 (1992); Simon P. Northridge, Driftnet Fisheries and Their Impacts on Non-Target Species: A Worldwide Review (FAO Fisheries Technical Paper No. 320, 1991), available at <http://www.fao.org/docrep/003/T0502E/T0502E00.htm#TOC>. High-seas driftnetting began in the 1970s, prompted by the expulsion of foreign fisheries from newly expanded Exclusive Economic Zones and facilitated by the development of strong thin nylon filament. See Sugarman, supra. The U.N. General Assembly in 1991 called for a worldwide moratorium on large-scale high

competition with one another to adopt those methods. By-catch and incidental effects on non-target species were unintended but apparently unavoidable consequences of the race to capture the resource. As in other contexts, the combination of two legal rules—(1) that the resources of the ocean were unowned until reduced to possession; and (2) that anyone could pursue those resources—inevitably encouraged waste and overexploitation.

By the 1950s, economists had noted the consequences of the inefficient and destructive race for fish, and suggested that private property rights might hold solutions.⁶ In the short run, however, those insights had little practical consequence for ocean fisheries. Prevailing circumstances made privatization seem both unnecessary and impractical. The resources of the seas were still widely viewed as inexhaustible; although landings in some fisheries had already declined, many believed those declines were cyclical rather than the result of systematic over-exploitation.⁷ There was a great deal of skepticism that restraint on the part of fishermen would make a difference to population levels. Furthermore, the legal regime allowed vessels from every nation to fish most of the world's oceans, with the exception of narrow territorial seas. That created a kind of prisoner's dilemma. It made little sense for any individual nation to restrict fishing when others might not do so. That nations could only supervise vessels flying their flag made the situation worse. Imposing stringent domestic regulations might simply trigger a flight of vessels to flags of convenience, and nations with little direct stake in fisheries could capture vessel registration revenues by offering lax regulatory regimes.

A few fisheries were both sufficiently valuable and so obviously in decline as to justify early negotiation of multilateral treaties allowing stronger management. Whaling provides the most prominent example. Several species of whales were hunted to near extinction by the early twentieth century.⁸ Eventually

seas driftnet fishing effective in 1993. G.A. Res. 46/215, U.N. Doc. A/RES/46/215 (Dec. 20, 1991).

6. E.g., H. Scott Gordon, *The Economic Theory of a Common-Property Resource: The Fishery*, 62 *J. Pol. Econ.* 124 (1954). Although Gordon's landmark paper is conventionally recognized as originating the argument for privatizing fisheries, careful historical work by Harry Scheiber and Christopher Carr notes the influence on Gordon's views of a debate 12 years earlier between two federal fisheries scientists over the desirability of limiting entry to fisheries. Harry N. Scheiber and Christopher J. Carr, *From Extended Jurisdiction to Privatization: International Law, Biology, and Economics in the Marine Fisheries Debates, 1937-1976*, 16 *Berkeley J. Int'l L.* 10, 21-23 (1998).

7. See, e.g., Harry N. Scheiber, *Ocean Governance and the Marine Fisheries Crisis: Two Decades of Innovation—and Frustration*, 20 *Va. Env'tl. L.J.* 119, 119-20 (2001).

8. For a brief history of whaling and its impacts on whale populations, see Lisa Kobayashi, *Lifting the International Whaling Commission's Moratorium on Commercial Whaling as the Most Effective Global Regulation of Whaling*, 29 *Environ* 177, 180-84 (2006).

the whaling nations realized that some form of international regulation was necessary. In 1946, after a protracted gestation period,⁹ they agreed to the International Convention for the Regulation of Whaling (hereinafter the “Whaling Convention”),¹⁰ creating an ostensibly science-driven process to set enforceable harvest limits at sustainable levels. While the Whaling Convention for decades functioned more as a “whaling club” than an effective conservation institution,¹¹ its adoption signaled a new willingness of fishing nations to cede authority to international institutions.¹²

In the 1970s, pressure from nations anxious to limit the incursion of foreign fishing fleets produced a dramatic shift in the other direction, toward stronger national control of ocean resources. Sovereign interests were expanded to an exclusive economic zone (EEZ) extending as much as 200 miles from the coast.¹³ That expansion brought a much larger proportion of the world’s fisheries under national control, encouraging the development of domestic regulatory regimes for ocean fisheries.¹⁴

The earliest domestic ocean fishery management regimes relied primarily on catch limits, coupled with seasonal and geographic closures and gear restrictions. Fairly quickly, however, some important fishing nations began to incorporate property rights approaches.¹⁵

9. For discussion of the history of the Whaling Convention, see Cinnamon Pinon Carlarne, Saving the Whales in the New Millennium: International Institutions, Recent Developments and the Future of International Whaling Policies, 24 *Va. Env'tl. L.J.* 1, 5 (2005).

10. International Convention for the Regulation of Whaling, Dec. 2, 1946, 62 Stat. 1716, 161 U.N.T.S. 72, [hereinafter ICRW] available at <http://www.icrcw.int/cache/downloads/1r2jdhu5xtuswws0ocw04wgcw/convention.pdf>.

11. Id. at 6–7.

12. Id. at 5.

13. This expansion of sovereign territory began with unilateral declarations by coastal states such as the U.S., but was then endorsed by the United Nations Convention on the Law of the Sea, Art. 57, Dec. 10, 1982, 1883 U.N.T.S. 397 (entered into force Nov. 16, 1994), available at http://www.un.org/Depts/los/convention_agreements/texts/unclos/unclos_e.pdf. See also Scheiber, supra note 7, at 126.

14. Scheiber, supra note 7, at 126 (noting that “an estimated 85% or more of commercially exploitable fish stocks and all then-known exploitable seabed mineral resources were located in the EEZ ocean areas”). Although the high seas contain only a small proportion of commercially important ocean resources, transboundary, straddling and highly migratory stocks are all beyond the regulatory control of any single nation. Katrina M. Wyman, The Property Rights Challenge in Marine Fisheries, 50 *Ariz. L. Rev.* 511, 518 (2008).

15. Indeed, fisheries economists had been among those arguing for expanded national exclusive economic zones precisely because they saw division of the oceans into sovereign territories as laying the essential groundwork for the establishment of property rights in ocean resources. Id. at 512.

In the 1980s, for example, individual transferable quotas (ITQs) were assigned to participants in several fisheries in New Zealand and Australia.¹⁶ Initially, these quotas were quantitatively specific, meaning that quota holders were given the right to harvest a specified mass of fish in perpetuity.¹⁷ That approach turned out not to work very well, however, because the available harvest in many fisheries varies widely from year to year. Within a few years, fishery managers decided that a better strategy was to combine property rights with catch limits. Fishery participants were assigned rights to a proportion of the TAC, assuring them of a continued role in the fishery without guaranteeing a specific level of harvest.¹⁸

“Catch shares,” as these proportional rights are often called, need not be transferable. Nations seeking to maximize the economic productivity of their fisheries, however, often make them transferable, sometimes subject to restrictions. As implemented, therefore, the catch share strategy is typically an example of the more general “cap-and-trade” approach. Regulators set a cap on the allowable harvest, assign industry participants rights to a portion of that cap, and allow rights holders to sell or lease those rights to others. Catch shares are currently the dominant property rights tools in fisheries management worldwide.¹⁹

The expansion of catch share programs has coincided with a more general shift from exclusively regulatory regimes toward market-based approaches to environmental protection and resource management. In the 1970s, just about the time that EEZs grew dramatically, economists (particularly in the United States) began emphasizing the inefficiencies of uniform pollution regulations and promoting the use of market-based tools such as tradable permits as a more cost-

16. Iceland may have been the first nation to try individual fishing quotas, starting in 1979. Ragnar Arnason, Ocean Fisheries Management: Recent International Developments, 17 **Marine Pol’y** 334, 338 (1993). New Zealand seems to have jumped in most enthusiastically. Since 1990, New Zealand’s fisheries have all been subject to catch share management. Alison Rieser, Property Rights and Ecosystem Management in U.S. Fisheries: Contracting for the Commons?, 24 **Ecology L.Q.** 813, 823–24 (1997).

17. John H. Annala, New Zealand’s ITQ System: Have the First Eight Years Been a Success or a Failure?, 6 **Revs. Fish Biology & Fisheries** 43, 45 (1996); Richard G. Newell et al., Fishing Quota Markets, 49 **J. Envtl. Econ. & Mgmt.** 437, 442 (2005).

18. Id.

19. It bears noting that catch shares and similar individuated strategies are not the only form property rights-based fisheries might take. See Alison Rieser, Property Rights and Ecosystem Management in U.S. Fisheries: Contracting for the Commons?, 24 **Ecology L.Q.** 813, 818–29 (1997) (offering a taxonomy of potential property rights arrangements in fisheries); Katrina M. Wyman, The Property Rights Challenge in Marine Fisheries, 50 **Ariz. L. Rev.** 511 (2008) (arguing that the optimal property rights structure for fisheries is a context-sensitive mix of public and private property rights). Because catch shares so dominate contemporary policy discussions, however, they are the focus of the discussion in this paper.

effective approach.²⁰ There is a prominent economic literature arguing that the “evolution of property rights”—that is, the gradual development of stronger individual property rights over time—is an inevitable and desirable process for resources under exploitation pressure.²¹

Although many environmentalists were initially skeptical of property rights approaches to pollution and resource management, many (though certainly not all) have been won over, at least in a general sense. Property rights approaches seem to offer pragmatic political benefits, reducing resistance to environmental protection. One prominent example from the United States is the acid rain program. Environmental advocates had been agitating for twenty years for stronger control of the sulfur dioxide and nitrogen oxide emissions responsible for acidification of lakes and streams in eastern North America. Calls for stronger regulation were unsuccessful.²² But switching to a cap-and-trade strategy reduced industry resistance sufficiently that an acid rain control program eventually made it through the legislature in 1990.²³ Today, that program is widely credited with reducing emissions more rapidly and at far lower cost than industry had predicted would be possible.²⁴

20. See, e.g., John H. Dales, *Pollution, Property and Prices* (1968); William J. Baumol & Wallace E. Oates, *The Theory of Environmental Policy* (1975); Bruce Ackerman & William Hassler, *Clean Coal/Dirty Air* (1981); Robert W. Crandall, *Controlling Industrial Pollution: The Economics and Politics of Clean Air* (1983); Thomas Tietenberg, *Emissions Trading: An Exercise in Reforming Pollution Policy* (1985); Richard B. Stewart, *Economics, Environment, and the Limits of Legal Control*, 9 *Harv. Envtl. L. Rev.* 1 (1985); Albert M. McGartland & Wallace E. Oates, *Marketable Permits for the Prevention of Environmental Deterioration*, 12 *J. Envtl. Econ. & Mgmt.* 207 (1985).

21. See, e.g., Terry L. Anderson & P.J. Hill, *The Evolution of Property Rights: A Study of the American West*, 18 *J.L. & Econ.* 163, 167 (1975); Saul Levmore, *Two Stories about the Evolution of Property Rights*, 31 *J. Legal Stud.* S421, S421 (2002); Gary D. Libecap & James L. Smith, *The Economic Evolution of Petroleum Property Rights in the United States*, 31 *J. Legal Stud.* S589, S589 (2002). Although he did not use evolutionary language, Harold Demsetz is the original source of these ideas. See Harold Demsetz, *Toward a Theory of Property Rights*, 57 *Am. Econ. Rev.* 347 (1967).

22. E. Donald Elliott, *Lessons from Implementing the 1990 CAA Amendments*, 40 *Envtl. L. Rep.* 10592, 10595 (2010).

23. Clean Air Act Amendments, Pub. L. No. 101-549, Title IV (1990) (codified as amended at 42 U.S.C. §§ 7651–7651o).

24. See, e.g., Richard B. Stewart, James L. Connaughton & Lesley C. Foxhall, *Designing an International Greenhouse Gas Emissions Trading System*, 15 *Natural Res. & Env't* 160, 161–62 (2001); A. Denny Ellerman, Paul L. Joskow & David Harrison, Jr., *Pew Ctr. on Global Climate Change, Emissions Trading in the U.S.: Experience, Lessons, and Considerations for Greenhouse Gases* 15 (May 2003), available at <http://www.c2es.org/publications/emissions-trading-us-experience-lessons-and-considerations-greenhouse-gases>.

Not surprisingly, given this bipartisan appeal, cap-and-trade approaches have spread rapidly, including in the fisheries management world. By the mid-2000s, management of at least 120 fisheries worldwide employed a catch share strategy in some form,²⁵ and property rights more generally had become the dominant focus of fishery policy discussions.²⁶ There are also existing and developing markets for greenhouse gas emissions,²⁷ for emissions of conventional air pollutants,²⁸ for discharges of pollutants to water,²⁹ and for endangered species habitat.³⁰

Few of these markets are truly international yet, but there are increasingly calls for international environmental trading systems. Carbon markets are the most high-profile example,³¹ but fishery quota proposals are also prominent.

25. Christopher Costello et al., Can Catch Shares Prevent Fisheries Collapse?, 321 **Science** 1678, 1679 (2008) [hereinafter Costello, Fisheries Collapse]; see also Richard G. Newell et al., Fishing Quota Markets, 49 **J. Envtl. Econ. & Mgmt.** 437, 437–38 (2005) (asserting that fishing quotas have been instituted in more than 15 countries for the management of more than 80 species).

26. E.g., Seth Macinko & Daniel W. Bromley, Property and Fisheries for the Twenty-First Century: Seeking Coherence from Legal and Economic Doctrine, 28 **Vt. L. Rev.** 623, 625 (2004) (“[C]ontemporary beliefs about the role and nature of property rights in fisheries seem to be so strongly entrenched as to dominate nearly all discussions of fisheries policy”).

27. David Harrison, Jr. et al., Using Emissions Trading to Combat Global Climate Change: Programs and Key Issues, 38 **Envtl. L. Rep.** 10367 (2008).

28. Daniel A. Farber, Pollution Markets and Social Equity: Analyzing the Fairness of Cap and Trade, 39 **Ecology L.Q.** 1, 10–16 (2012).

29. Emissions Trading Moves to Water, But It’s Not as Simple, **Envtl. F.**, March-April 2003, at 62–69; **Conservation Tech. Info. Ctr.**, Getting Paid for Stewardship: An Agricultural Community Water Quality Trading Guide (July 2006), available at http://ctic.org/media/users/lvollmer/pdf/GPFS_final%281%29.pdf; Rena Steinzor et al., Water Quality Trading in the Chesapeake Bay (Ctr. for Progressive Reform, Briefing Paper No. 1205, May 2012), available at http://www.progressivereform.org/articles/WQT_1205.pdf.

30. See, e.g., J.B. Ruhl et al., A Practical Guide to Conservation Banking Law and Policy, 20 **Nat. Resources & Env’t.**, Summer 2005, at 26; Jonathan Remy Nash, Trading Species: A New Direction for Habitat Trading Programs, 32 **Colum. J. Envtl. L.** 1 (2007); **speciesbanking.com**, www.speciesbanking.com (describing itself as “a global information clearinghouse for a segment of biodiversity markets focusing on biodiversity offsetting, compensation and offset banking”); Endangered Species Program, For Landowners, Conservation Banking, U.S. Fish and Wildlife Serv., <http://www.fws.gov/endangered/landowners/conservation-banking.html> (last visited Nov. 8, 2012).

31. The Kyoto Protocol included three mechanisms for trading carbon emissions across international lines. Ann E. Carlson, Designing Effective Climate Policy: Cap-and-Trade and Complementary Policies, 49 **Harv. J. on Legis.** 207, 222–23 (2012). Although a successor agreement to Kyoto has not yet been negotiated, it seems very likely that any such agreement will include international emissions trading. For one form such trading could take, see Erin Sedloff, Creating a Category Under the Kyoto Protocol Based on Non Emissions, 18 **Hastings W.-Nw. J. Envtl. L & Pol’y** 379 (2012).

Some observers have long regarded the spread of individual quota systems as inevitable.³² Recently, specific proposals for international tradable quota systems for the harvest of ocean resources have begun to appear. A few months ago, for example, a paper appeared in the high-profile journal *Nature* urging that the Whaling Commission create freely tradable whale harvest permits.³³ Commentators have also proposed the use of catch shares in the Atlantic bluefin tuna fishery,³⁴ and the Indian Ocean Tuna Commission is considering allocation of tradable quota shares to its member states.³⁵

Like enthusiasm for property rights approaches to environmental protection in general, enthusiasm for such approaches to fisheries management, while expanding, is by no means universal. Opponents object to privatization of a resource they view as peculiarly public,³⁶ are skeptical of the practical ability to implement property rights approaches,³⁷ and fear the potential distributional impacts.³⁸

II. For Better or Worse?

This is an opportune moment to examine the possibilities and limits of property rights approaches as tools for international fisheries management. Such approaches have yet to make substantial inroads on the international scene, but are increasingly proposed as solutions to management of international ocean

32. Arnason, *supra* note 16, at 339.

33. Christopher Costello et al., *A Market Approach to Saving the Whales*, 481 *Nature* 139 (2012) [hereinafter Costello, *Market Approach*].

34. See Seth Korman, *International Management of a High Seas Fishery: Political and Property-Rights Solutions and the Atlantic Bluefin*, 51 *Va. J. Int'l L.* 697 (2010–11).

35. Jeremy Noye & Kwame Mfodwo, *First Steps Toward a Quota Allocation System in the Indian Ocean*, 36 *Marine Pol'y* 882 (2012).

36. See, e.g., Alison Rieser, *Prescriptions for the Commons: Environmental Scholarship and the Fishing Quotas Debate*, 23 *Harv. Envtl. L. Rev.* 393, 414 (1999).

37. See, e.g., Eric M. Singer, *Towards a Sustainable Fishery: The Price-Cap Approach*, 24 *Tulane Envtl. L.J.* 253, 285 (2011) (“That legal battles and a legislative moratorium have resulted from the thorny issue of ITQ allocation suggests that, for political reasons, an efficient ITQ system may be very difficult to implement in many fisheries.”); Parzival Copes, *A Critical Review of the Individual Quota as a Device in Fisheries Management*, 62 *Land Econ.* 278, 281–88 (1986) (detailing some of the many things that can go wrong in implementation of individual transferable quota systems).

38. See, e.g., Shi-Ling Hsu and James E. Wilen, *Ecosystem Management and the 1996 Sustainable Fisheries Act*, 24 *Ecology L.Q.* 799, 809 (1997) (noting that Greenpeace opposition to IFQs rests in part on the desire to “keep[] fisheries in the hands of small entrepreneurs”); Seth Macinko & Daniel W. Bromley, *Who Owns America’s Fisheries?* (2002).

resources.³⁹ Moreover, the oldest domestic catch share programs have been in effect for thirty years now, and should provide some data about the performance of property rights programs.

Although both proponents and opponents of property rights approaches often seem to argue from faith-based absolutist stances, the reality is more nuanced.⁴⁰ Catch shares are not a silver bullet for the multiple problems of ailing global fisheries any more than any other strategy is. I draw three lessons relevant to international marine resources from the theory and history of property rights approaches to fisheries management. First, the usefulness of property rights strategies depends critically on the goals of management. Property rights strategies were developed to promote the economic efficiency of the fishing industry, but management goals are typically more diverse than that.⁴¹ They may include limiting distributional impacts, conserving target and non-target resources, and reducing political conflict. Although catch shares can sometimes serve these other goals, they do so less directly and not always effectively. Second, to the extent that long-term stewardship of the targeted resource is an important goal, the ability of a property-rights approach to advance that goal will depend on both the economic context and the strength of fishery participants' beliefs that the fishery is both exhaustible and actually declining. The strength of that perception will be affected by the type and extent of available data, but also by the level of trust in that data. Third, the success of catch share programs depends on effective and credible enforcement institutions, which have long been a limiting factor for conventional fisheries management.

Most catch share programs to date have been implemented in developed nations, and have allocated fisheries under single-nation control. Even in this context, catch shares are not always the right tool for the job. They are much more likely to fail, however, in the international context, which complicates disagreements about goals, can undermine trust, and is often characterized by weak enforcement.

39. See, e.g., **Anthony Cox, Quota Allocation in International Fisheries** 7–8 (OECD Food, Agriculture, and Fisheries Papers, No. 22, 2009), available at <http://dx.doi.org/10.1787/218520326143> (highlighting “the increased use of market mechanisms” such as “cap-and-trade systems . . . in combination with more traditional regulatory and planning approaches”).

40. The importance of context is beginning to be recognized. See, e.g., Mark Fina, Evolution of Catch Share Management: Lessons from Catch Share Management in the North Pacific, 36 **Fisheries** 164 (2011) (concluding on the basis of the experience of one U.S. fishery management council that “catch share management should be undertaken only as specific fishery and management needs dictate”).

41. U. Rashid Sumaila, A Cautionary Note on Individual Transferable Quotas, 15(3) **Ecology & Soc'y** 36 (2010) (“[I]t is clear that for fisheries managers, scientists, and the public, fisheries management is not about economic efficiency alone.”).

A. Goals Matter

Like many other environmental conflicts, fisheries disputes are “wicked problems,”⁴² meaning they are not objectively definable. People with different values and priorities see wicked problems differently and therefore identify different solutions. Imagine, for example, a commercial fisherman and a marine ecologist looking at a declining fishery. Each may believe that the nature of the problem is obvious, but their views of it are likely to be dramatically different. The commercial fisherman may focus on limited industry profitability. The ecologist, by contrast, will likely assign greater importance to long-term effects on ecosystem processes or changes in ecosystem structure. The two observers, given their very different perspectives, may have difficulty even communicating with one another about what steps to take, or what changes might count as solutions.⁴³

Identifying and prioritizing goals is perhaps the most fundamental step in addressing environmental problems, but one that is often skipped or overlooked. It is a crucial step in deciding what role property rights approaches should play in fisheries management. Management might, and indeed typically does, have several goals, some of which are better served by property rights strategies than others. The next sections discuss several typical goals, and their relationship to rights-based management.

1. Economic Efficiency

Property rights were first identified as the solution to the “fishing problem” by economists who defined that problem narrowly as economic inefficiency in the fishing industry. In his seminal paper on the economics of fisheries, for example, H. Scott Gordon sought to address “the plight of fishermen and the inefficiency of fisheries production,”⁴⁴ and quoted with approval an earlier economist’s definition of the fisheries problem as the failure of the harvest “to

42. Horst W. Rittel & Melvin M. Webber, *Dilemmas in a General Theory of Planning*, 4 *Pol’y Scis.* 155, 160–67 (1973).

43. Fisheries scientist Ray Hilborn noted precisely this divergence of views in a 2007 paper. Ray Hilborn, *Managing Fisheries is Managing People: What Has Been Learned?*, 8 *Fish & Fisheries* 285, 286 (2007) (“[E]cologists and economists can have very different views of a successful fishery . . . their solutions may differ because of their objectives.”).

44. Gordon, *supra* note 6, at 134.

yield a satisfactory living to the fisherman.”⁴⁵ A year later, following up on Gordon’s work, Anthony Scott similarly described the problem as inefficient management of natural resources.⁴⁶ Fisheries economists continue to endorse this description of the fisheries problem.⁴⁷

Both Gordon and Scott argued that a key goal of fisheries management should be for fishers and their nations to capture, rather than dissipate, the rents of resource extraction. They viewed a lack of firm property rights as the key source of inefficiency. Economists today agree that lack of property rights facilitates the overcapitalization that continues to plague global fisheries. Furthermore, they agree with Gordon and Scott that the race to capture fish, made necessary by the lack of ownership rights to the unharvested fish, encourages wasteful fishing behavior.⁴⁸ In their haste to catch all the fish they can as quickly as they can, fishers may overwhelm processing facilities, depress the market, and catch fish they cannot profitably sell. At the extreme, fishermen are driven to a “derby-style” race that captures the entire allowable catch in a few days.⁴⁹ Derby fishing creates a number of problems. It is unsafe.⁵⁰ It often results in overshooting the TAC, so that harvested fish may need to be discarded.⁵¹ It also necessarily pushes

45. *Id.* at 125 (quoting A.G. Huntsman, Fishery Depletion, 99 *Science* 534 (1944)).

46. Anthony Scott, The Fishery: The Objectives of Sole Ownership, 63 *J. Pol. Econ.* 116 (1955).

47. *See, e.g.*, Ragnar Arnason, Property Rights as a Means of Economic Organization, in *U.N. Food & Agric. Org., Use of Property Rights in Fisheries Management: Proceedings of the FishRights99 Conference* 14 (Ross Shotton ed., 2000).

48. *See, e.g.*, Costello et al., *supra* note 25; *Nat’l Oceanic & Atmospheric Admin., NOAA Technical Memorandum NMFS-F/SPO-86, The Design and Use of Limited Access Privilege Programs* 9 (Lee G. Anderson & Mark C. Holliday, eds., 2007); R. Quentin Grafton et al., Incentive-Based Approaches to Sustainable Fisheries, 63 *Can. J. Fisheries & Aquatic Sci.* 699 (2006). For a sharply contrasting view, see Daniel W. Bromley, Abdicating Responsibility: The Deceits of Fisheries Policy, 34 *Fisheries* 280 (2009).

49. The best known example in the U.S. comes from the Alaska halibut fishery, where the season averaged two to three days per year before a catch share program was introduced. *Comm. to Review Individual Fishing Quotas et al., Sharing the Fish: Toward a National Policy on Individual Fishing Quotas* 72 (1999) [hereinafter *Sharing the Fish*]. In 1994, just prior to adoption of the individual quota system, the season was down to less than one day. Francis T. Christy, The Death Rattle of Open Access and the Advent of Property Rights Regimes in Fisheries, 11 *Marine Res. Econ.* 287, 293 (1996). In the Alaska halibut fishery at its worst, more than six thousand vessels landed 23 million pounds of halibut in just a few days. Tipton, *supra* note 2, at 392.

50. In the Alaska halibut fishery, for example, the Coast Guard answered twenty-nine calls from sinking ships in a single season. Tipton, *supra* note 2, at 392.

51. *Id.*

the industry toward frozen as opposed to fresh fish, even if consumers prefer the latter.⁵²

In theory, both overcapitalization and wasteful fishing behavior can be addressed by regulatory measures, but effective regulation is both politically and practically challenging. Governments can force some participants out of the market, but will face focused political opposition from identified losers. Even if they are able to gather the necessary nerve to mandate market contraction, governments may not correctly identify the most efficient participants; they may end up forcing out the wrong group. Waste has been effectively dealt with by regulation or the imposition of liability in another common property context, that of the “capture” of oil and natural gas.⁵³ But those operations are fixed on the landscape, and observable, in ways that fishing practices are not.

Property rights are certainly a conceptually appropriate tool for addressing inefficiency. Not surprisingly, this is the goal catch shares have most effectively served. Most observers agree that catch shares have improved economic efficiency and reduced overcapitalization.⁵⁴ There also is substantial evidence that catch shares in some fisheries have reduced wasteful fishing practices,⁵⁵ and improved the value or yield of market products.⁵⁶

2. Wealth Distribution

Economists, who have been the primary proponents of property rights approaches, typically do not prioritize wealth distribution as an important aspect of solving the fishery problem. Their major professional goal is efficiency. One reason they tend to gravitate toward market approaches is that in a smoothly functioning market voluntary transactions should achieve efficient outcomes regardless of the initial allocation of entitlements.⁵⁷

52. **Sharing the Fish**, *supra* note 49, at 2–3. In some fisheries, the derby may be so extreme that harvested fish cannot even be frozen before they rot. Tipton, *supra* note 2, at 392.

53. Jim Rossi, The Political Economy of Energy and Its Implications for Climate Change Legislation, 84 *Tulane L. Rev.* 379, 384 (2009).

54. *See, e.g., Sharing the Fish*, *supra* note 49, at 65, 85, 99. For a somewhat less enthusiastic take on cap-and-trade programs in fisheries and other resource management contexts, see Bonnie G. Colby, Cap-and-Trade Policy Challenges: A Tale of Three Markets, 76 *Land Econ.* 638, 640 (2000) (“Actual transactions have been fewer, markets less competitive and efficiency gains less impressive than predicted.”).

55. **Sharing the Fish**, *supra* note 49, at 74–75 (after introduction of IFQs halibut discards and the frequency of exceeding the TAC fell sharply).

56. **Sharing the Fish**, *supra* note 49, at 34.

57. This is the famous “Coase Theorem.” *See* R.H. Coase, The Problem of Social Cost, 3 *J.L. & Econ.* 1 (1960).

Societies, however, are not necessarily indifferent to distributional consequences. Whether distributional outcomes are “equitable,” as the relevant society defines that term, can depend critically on the allocation of entitlements. Achieving equity may be in tension with achieving efficiency. In the fishery context, for example, programs that reduce overcapacity almost necessarily decrease employment. Whether improvements in the employment conditions for the remaining jobs outweigh the cost of the job losses is a question on which reasonable minds are likely to differ.

Distributional concerns have driven much of the opposition to property rights-based fishing regimes in the United States.⁵⁸ The notion of private rights in fisheries is inherently inconsistent with long-standing egalitarian norms about access to fishery resources.⁵⁹ Opponents of catch shares worry that small fishers will be priced out of the industry, that fishing-dependent communities will suffer or even disappear, and that crew members of fishing vessels will be transformed from the economic partners of vessel owners to subordinate wage earners.⁶⁰

There is evidence that some catch share programs have had precisely these sorts of distributional effects, reducing employment and increasing the market share of large operators.⁶¹ These concerns can be addressed by limiting the transferability of catch shares, but such limitations inevitably have efficiency costs. The relative importance assigned to efficiency and equity, therefore, is important not only to the decision to use catch shares or not, but also to the design of any catch share program.

58. Colby, *supra* note 54, at 646.

59. On those norms, see, for example, Ronald N. Johnson and Gary D. Libecap, Contracting Problems and Regulation: The Case of the Fishery, 72 *Amer. Econ. Rev.* 1005, 1006–07 (1982).

60. See, e.g., Hsu and Wilen, *supra* note 38, at 808 (noting that individual fishing quota strategies “will almost certainly have distributional consequences,” including a likely reduction in employment in the fishing industry, and potential impacts on related industries in fishing-dependent communities); *id.* at 809 (noting that Greenpeace opposition to IFQs rests in part on the desire to “keep[] fisheries in the hands of small entrepreneurs”); **Sharing the Fish**, *supra* note 49, at 87 (noting concerns in Icelandic fisheries about “the emergence of the relations of dependency associated with ‘fishing for others’”).

61. See, e.g., Evelyn Pinkerton & Danielle N. Edwards, The Elephant in the Room: The Hidden Costs of Leasing Individual Transferable Fishing Quotas, 33 *Marine Pol’y* 707 (2009); B. Timothy Heinmiller, The Politics of “Cap and Trade” Policies, 47 *Nat. Res. J.* 445, 463–64 (2007) (reporting that the introduction of individual quotas in the U.S. surf clam/ocean quahog fishery has increased the incidence of absentee quota ownership); **Sharing the Fish**, *supra* note 49, at 64 (noting that employment in the U.S. surf clam/ocean quahog fishery decreased after the introduction of catch shares); *id.* at 85 (noting increase in market concentration in the Icelandic herring fishery).

3. Resource Stewardship: Target and Non-Target Species

In the 1950s, when Gordon and Scott called for the assignment of property rights in fisheries, stewardship, to the extent it was a concern at all, was strictly an aspect of the economic problem. Long-term sustainable yield of target species might be sufficiently valuable that it would justify restraint in short-term harvesting behavior. So long as fisheries remained open-access, however, no participant would have the economic incentive to exercise self-restraint. Property rights, by providing the promise of long-term security, could help fishery participants make the socially optimal trade-off between long and short-term economic gains.⁶²

Modern societies tend to take a broader view of resource stewardship, although the priority assigned to stewardship in relation to maximizing industry profitability certainly varies among nations. Sustainable long-term yield of target species remains the core of stewardship, but some societies also have a goal of protecting non-target resources, such as other fish species and more broadly marine ecosystems. Even where that is not an independent goal, fishery participants are more aware than they were fifty years ago of the linkages between target species and other ecosystem features, and therefore of the potential need to protect more than the target species.⁶³

Modern proponents of property rights-based fisheries management contend that secure property rights encourage greater concern for stewardship. Fishers who expect to have a long-term stake in the future of the fishery should be more interested in the fishery's long-term health.⁶⁴ Furthermore, by removing pressure to race to capture the fish, catch shares should allow more careful fishing practices, helping to avoid overruns of the TAC and reducing bycatch and discards.⁶⁵

Conceptually, the position that property rights will increase incentives for stewardship is sometimes, but not always, compelling. If a stock is highly valuable but slow to reproduce, or if there is substantial risk that the future will reduce demand for the product, it will be economically rational for property rights

62. Gordon, *supra* note 2, at 141; Costello et al., *supra* note 23, at 1679.

63. In the United States, for example, Congress has explicitly recognized that “[o]ne of the greatest long-term threats to the viability of commercial and recreational fisheries is the continuing loss of marine, estuarine, and other aquatic habitats.” 16 U.S.C. § 1801(a)(9) (2006).

64. See, e.g., David Festa, Diane Regas, & Justin Boomhower, *Sharing the Catch, Conserving the Fish*, *Issues in Sci. & Tech.*, Winter 2008, at 75; Costello, *Fisheries Collapse*, *supra* note 25.

65. See *supra* note 48; Karol de Zwager Brown, *Truce in the Salmon War: Alternatives for the Pacific Salmon Treaty*, 74 *Wash. L. Rev.* 605, 683–87 (1999).

holders to deliberately court a “boom-bust” cycle, or even to knowingly extirpate a stock.⁶⁶ Without an effective regulatory backstop, quota holders may also be tempted to “high-grade,” discarding less valuable (generally smaller) fish in order to fill their quota with the most marketable specimens.⁶⁷ Finally, catch shares, like other cap-and-trade allocations but unlike property rights in land, typically are not guaranteed to be permanent.⁶⁸ To the extent that the issuer retains the prerogative to reduce or withdraw shares without compensation, catch shares will not provide firm incentives for sustainable practices.⁶⁹

The evidence that property rights have actually increased the health of fisheries remains limited. A 2008 study comparing the depleted status of fisheries with their use of a catch share approach offered tantalizing results. The comparison revealed that catch share fisheries were roughly half as likely as others to have collapsed and that the longer catch shares had been in use, the further from collapse the fishery tended to be.⁷⁰ It is hard to tell, however, whether other features might explain those results. Catch share fisheries, for example, necessarily have a TAC. Not all fisheries are managed by TACs, and it might be that the imposition of a total catch limit is a more important driver in preventing collapse than how the TAC is divided among fishery participants.⁷¹

Two more recent studies have tried to separate the effects of catch shares from other factors. They came to less enthusiastic conclusions. Both studies found little relationship between the use of catch shares and the exploitation rate

66. Bromley, supra note 48, at 282; see also Sumaila, supra note 41. The whaling industry of the early- to mid-20th century showed both these characteristics. Not surprisingly, even in an industry with a small number of players and substantial barriers to entry, restraint was conspicuously missing. In that context, profit maximization calls for rapid exploitation, even if property rights are secure. C.W. Clark & R. Lamberson, An Economic History and Analysis of Pelagic Whaling, 6 **Marine Pol’y** 103, 111–14 (1982).

67. See, e.g., Hsu & Wilen, supra note 38, at 809; **Sharing the Fish**, supra note 49, at 108–10.

68. See **Sharing the Fish**, supra note 49, at 97 (“Most of the existing IFQ programs define the legal status of an IFQ as a ‘revocable privilege,’ not a permanent enfranchisement.”). In the U.S., the law authorizing “limited access privilege programs,” as they are termed, specifically says that they may be revoked or modified at any time without compensation. 16 U.S.C. § 1853a(b)(2)–(3).

69. See, e.g., Ransom E. Davis, Individually Transferable Quotas and the Magnuson Act: Creating Economic Efficiency in Our Nation’s Fisheries, 5 **Dickinson J. Envtl. L. & Pol’y** 267, 308–09 (1996).

70. Costello, Fisheries Collapse, supra note 25, at 1680.

71. Bromley, supra note 48, at 284; see also Patrick W. Gilmour et al., Beyond Individual Quotas: The Role of Trust and Cooperation in Promoting Stewardship of Five Australian Abalone Fisheries, 35 **Marine Pol’y** 692, 692 (2011) (suggesting that factors other than catch shares might be responsible for the results reported by Costello et al.); Josh Nowlis & Arthur A. Van Benthem, Do Property Rights Lead to Sustainable Catch Increases?, 27 **Marine Resource Econ.** 89 (2012) (suggesting that improved monitoring and catch reporting could be a factor).

(proportion of biomass harvested) or population status.⁷² The authors concluded that “many of the elements of the fishing system—including the economic and social systems—that promoted overexploitation prior to catch shares largely persisted after catch shares were implemented.”⁷³ An earlier study of fisheries that converted to catch shares found that about two-thirds experienced at least temporary declines in stock levels.⁷⁴

There is also indirect evidence that catch shares reduce pressure on target species. The National Research Council, in a landmark 1999 study on individual fishing quotas, found that catch share fisheries were less likely to exceed the regulatory TAC,⁷⁵ presumably because fishing can be carried out more carefully and over a greater period of time. On the other hand, there is also evidence of “high-grading” in some fisheries.⁷⁶

There is little evidence on the question of whether catch share approaches affect stewardship of non-target resources. There are theoretical reasons both for optimism—because catch shares reduce economic incentives for wasteful practices, including some that increase bycatch—and for skepticism—because catch shares do nothing to produce a long-term profit incentive for preservation of resources that are not marketable. What evidence there is suggests that the answer is context-specific. In some cases, catch share fisheries seem roughly equivalent to those managed by conventional regulation in terms of bycatch and discards.⁷⁷ On the positive side of the ledger, in the Alaska halibut fishery, the elimination of derby fishing by an individual quota approach seems to have sharply decreased “ghost fishing” by lost or abandoned gear.⁷⁸ On the negative side, environmentalists have complained that Alaska pollock quota holders have shown little concern for the status of the endangered Steller sea lion.⁷⁹

72. Timothy E. Essington et al., Catch Shares, Fisheries, and Ecological Stewardship: A Comparative Analysis of Resource Responses to a Rights-Based Policy Instrument, 5 **Conservation Letters** 186 (2012); Michael C. Melnychuk et al., Can Catch Share Fisheries Better Track Management Targets?, 13 **Fish & Fisheries** 267 (2012).

73. Essington et al., supra note 72, at 193.

74. Tom Tietenberg, The Tradable-Permits Approach to Protecting the Commons: Lessons for Climate Change, 19 **Oxford Rev. Econ. Pol’y** 400, 405 (2003).

75. **Sharing the Fish**, supra note 49, at 35.

76. **Sharing the Fish**, supra note 49, at 108–10.

77. Id. at 36 (citing C.M. Dewees & E. Ueber, **Effects of Different Fishery Management Schemes on Bycatch, Joint Catch, and Discards: Summary of a National Workshop** (Cal. Sea Grant Coll. Program, Report No. T-CSGCP-019, 1990)).

78. **Sharing the Fish**, supra note 49, at 3, 73–74.

79. Wyman, supra note 14, at 540. The decline of the western Alaska Steller sea lion population remains poorly understood, but one hypothesis is that the large-scale commercial fisheries in the region, including the highly valuable pollock fishery, could be taking such a large share of the sea lions’ prey that they are contributing to nutritional stress. For a detailed account of

4. Conflict Reduction

Another goal of management strategies may be to reduce conflict. There is some evidence from the pollution context that cap-and-trade approaches, especially combined with grandfathering, have reduced one specific brand of conflict, industry opposition to the imposition of emission caps.⁸⁰ But that evidence is equivocal and difficult to interpret. Caps have often been set unrealistically high,⁸¹ which makes them easy for industry to accept. And the industry view of caps depends heavily on the political context, which varies with the political strength of environmental advocates. Emphasizing a market-based approach, for example, did not get greenhouse gas emission reduction mandates through the U.S. Congress in 2009.⁸² While industry clearly prefers a market approach (at least a lax market approach) to command-and-control regulation, it prefers no regulation at all to cap-and-trade.

In the fisheries context, the primary discussion of conflict has focused on conflict between regulators and commercial fishers over TAC limits. There is a strong perception that the fishing industry has pushed constantly, and often successfully, for unrealistically high catch limits.⁸³ Property rights proponents argue that property rights approaches can address this problem by reducing incentives for fishery participants to push for larger and larger allowable catches. The idea is that fishers who have a long-term stake in the fishery have less reason to resist short-term catch reductions imposed with the aim of increasing the prospects for long-term sustainability. Improving the profitability of fisheries can further reduce conflict by reducing the extent to which conservation regulations

the controversy, see Beth C. Bryant, Adapting to Uncertainty: Law, Science, and Management in the Steller Sea Lion Controversy, 28 *Stan. Envtl. L. J.* 171 (2009).

80. See, e.g., Carol A. Casazza Herman et al., Breaking the Logjam: Environmental Reform for the New Congress and Administration, 17 *N.Y.U. Envtl. L. J.* 1, 5 (2008); Thomas W. Merrill, Explaining Market Mechanisms, 2000 *U. Ill. L. Rev.* 275, 297–98; Carol M. Rose, Hot Spots in the Legislative Climate Change Proposals, 102 *Nw. U. L. Rev. Colloquy* 189, 192 (2008).

81. See Lesley K. McAllister, The Overallocation Problem in Cap-and-Trade: Moving Toward Stringency, 34 *Colum. J. Envtl. L.* 395, 410 (2009) (“The empirical evidence from existing cap-and-trade programs suggests that caps have not been very stringent. Rather, there has been a tendency in program design and implementation toward overallocating allowances.”).

82. See, e.g., H. Joseph Drapalski, The Viability of Interstate Collaboration in the Absence of Federal Climate Change Legislation, 21 *Duke Envtl. L. & Pol’y F.* 469, 470 (2011).

83. See, e.g., J.R. Beddington, D.J. Agnew & C.W. Clark, Current Problems in the Management of Marine Fisheries, 316 *Science* 1713, 1713 (2007) (“[O]vercapacity can, via the political process, lead to the erosion of management control.”).

“are perceived as threats to livelihood and fishing cultures,”⁸⁴ and therefore strenuously resisted.⁸⁵

I am not aware of any systematic comparison of conflicts over catch limits in fisheries with and without catch shares, but there are reports that holders of catch shares have lobbied for reductions in total catch,⁸⁶ or have voluntarily kept harvests under the regulatory limit.⁸⁷ Others, however, note that conflict and political maneuvering around TAC levels have not ended in fisheries managed by catch shares.⁸⁸

There are at least three reasons why catch share approaches do not necessarily reduce conflict over TACs. One is that fishery participants might have a higher discount rate than regulators, which would mean that fishers are, rationally, more interested in short- than long-term gains. That could be true if the fishers believe that short-term profits can be invested profitably,⁸⁹ that if the current fishery collapses there will always be another one to which they can turn, or that their catch shares are likely to be limited or revoked in the future. Another possible explanation is psychological. In general, people are inclined to see the world as they would like it to be, interpreting equivocal or conflicting evidence in the way that most favors their interests.⁹⁰ Fishers, therefore, will not necessarily accept that fisheries are declining just because scientists or regulators say they are. Holders of catch shares who genuinely believe their target species are not overfished will rationally push for higher TAC levels even if they seek a sustainable outcome.

Catch share and other property rights approaches also create conflict over allocation of rights. In an open access fishery, no allocation decisions are

84. Rod Fujita & Kate Bonzon, Right-Based Fisheries Management: An Environmentalist Perspective, 15 **Revs. in Fish Biology & Fisheries** 309, 310 (2005).

85. Id. Regulators who are less worried about causing bankruptcy and unemployment may also be more willing to set realistic catch limits. See R. Quentin Grafton et al., Incentive-Based Approaches to Sustainable Fisheries, 63 **Can. J. Fisheries & Aquatic Sci.** 699, 701 (2006).

86. See, e.g., id. at 702.

87. See Sharing the Fish, supra note 49, at 69–70 (reporting that pressure to increase the South Atlantic wreckfish TAC disappeared after individual quotas were introduced and landings fell to less than 25% of the TAC); id. at 110 (giving other examples of “underfishing,” that is, catches below the TAC, in quota-managed fisheries).

88. Heinmiller, supra note 61, at 455.

89. See supra note 62 and accompanying text.

90. See, e.g., Daniel Sarewitz, How Science Makes Environmental Controversies Worse, 7 **Envtl. Sci. & Pol’y** 385, 390–92 (2004); Naomi Oreskes, Science and Public Policy: What’s Proof Got to Do With It?, 7 **Envtl. Sci. & Pol’y** 369, 375 (2004); Barton H. Thompson, Jr., Tragically Difficult: The Obstacles to Governing the Commons, 30 **Envtl. L.** 241, 258–59 (2000); Jeffrey J. Rachlinski, The Psychology of Global Climate Change, 2000 **U. Ill. L. Rev.** 299, 304–06 (2000).

required. Anyone who wants to can participate in the fishery; success is determined by the skill or luck of the fishers. Property rights strategies, by contrast, require political decisions about who will have access at what cost. Because industry participants are deeply invested in the outcome of these allocation decisions, they frequently become the subject of high-stakes political battles.⁹¹ Furthermore, participants with an emotional or cultural stake in the industry involved often demand limits on trading to protect the initial rights allocation.⁹² Small fishing enterprises, for example, may want assurances that large firms will not be able to buy up the entire quota.

But demand for trading limits can go well beyond market share concerns. One of the economic arguments for tradable permits is that they allow environmentalists who want resources left unharvested or unsullied to put their money where their mouths are by buying and retiring use rights. Industry participants, however, tend to resist opening the market to conservation interests. Property rights enthusiasts frequently point out that the U.S. acid rain market includes annual auctions in which environmental groups can purchase SO₂ emission allowances for the purpose of retiring them.⁹³ It's important to realize, though, that the SO₂ market is the exception rather than the rule. Even in that market, only a very small proportion of allowances are auctioned,⁹⁴ and the environmental benefits of conservation purchases have been negligible.⁹⁵

In other contexts, industry participants have fiercely resisted the attempts of conservation interests to enter a resource allocation market. In the United States, for example, the federal government offers permits to graze livestock on federal lands. Conservationists seeking to acquire permits in ecologically sensitive locations for the purpose of removing livestock have come up against a statutory framework that does not allow them to do so.⁹⁶ A similar dynamic has played out in other cap-and-trade contexts, where “[r]ather than quietly exiting production, some lower valued users resist trading their rights, often through political action

91. See Heinmiller, *supra* note 61, at 456–61 (providing examples from cap and trade programs for water, fisheries, and greenhouse gases).

92. See Heinmiller at 461–463.

93. See Jacob Kreutzer, *Cap and Trade: A Behavioral Analysis of the Sulfur Dioxide Emissions Market*, 62 *N.Y.U. Ann. Surv. Am. L.* 125, 129 (2006).

94. See 42 U.S.C. § 7651o(b) (2006) (requiring that EPA hold 2.8% of allowances for periodic auction).

95. Kreutzer, *supra* note 93, at 138.

96. See *Pub. Lands Council v. Babbitt*, 167 F.3d 1287 (10th Cir. 1999), *affirmed* 529 U.S. 728 (2000) (striking down regulation allowing issuance of conservation use permits); David G. Alderson, *Buyouts and Conservation Permits: A Market Approach to Address the Federal Public Land Grazing Problem*, 12 *N.Y.U. Envtl. L.J.* 903 (2005) (proposing statutory amendments to permit conservation use).

seeking to preserve or erect barriers to free entitlement trading.”⁹⁷ This is especially likely when, as is the case with fisheries, participants attach emotional or cultural, as well as monetary, value to the behavior in question.⁹⁸

Another potential source of conflict is disagreement about the morality of the permitted behavior, or about the message that commodifying the behavior may send. One objection to trading of air pollution allowances in the United States has been that “turning pollution into a commodity to be bought and sold removes the moral stigma that is properly associated with it.”⁹⁹ That concern has been answered primarily by pointing out that the “cap” in “cap-and-trade” limits the amount of pollution just as more traditional regulatory approaches do, and by efforts to clarify the costs cap-and-trade systems impose on heavy polluters.¹⁰⁰ Public opinion has not crystallized around strong moral objections to trading in pollution rights, perhaps because there is general agreement that pollution cannot, as a practical matter, be completely eliminated. The strong moral objection will have real force, though, if a significant portion of the relevant population views the permitted activity as *per se* unacceptable. Most fishing does not carry the same ethical overtones as pollution but, as discussed in more detail below, the recent proposal for tradable whale harvest permits has brought this objection to markets to the fore.¹⁰¹

A related objection, that tradable permits improperly privatize public resources, has more general force in the fisheries context because of the strong tradition of public ownership of fisheries in many nations. Even if environmentalists are allowed to participate in a resource market, if they regard the rights to a healthy resource as a public entitlement they will object to being expected to pay to ensure that entitlement is respected.¹⁰²

5. Fisheries Goals in the International Context

97. Heinmiller, *supra* note 61, at 451; see also Colby, *supra* note 54, at 644 (noting resistance of agricultural interests to development of water markets in the western United States).

98. Heinmiller, *supra* note 61, at 461.

99. Michael J. Sandel, *It's Immoral to Buy the Right to Pollute*, **N.Y. Times**, Dec. 15, 1997, at A23.

100. See Jonathan Remy Nash, *Too Much Market? Conflict Between Tradable Pollution Allowances and the “Polluter Pays” Principle*, 24 **Harv. Envtl. L. Rev.** 465, 529–32 (2000) (rejecting the argument that commodifying pollution is immoral, but acknowledging that there may be “pedagogical” concerns about the message the public takes away from institution of trading schemes).

101. See *infra* Part III.A.

102. See Colby, *supra* note 54, at 645 (noting in the context of western U.S. water markets that “environmental advocates resent the fact that they must pay off irrigators in order to acquire water for ecosystem restoration”).

Individual nations often have multiple goals for management of their fisheries. In the United States, legislatively declared goals remain primarily economic, focused on maximum long-term harvest by a robust domestic fishing industry. The federal Magnuson-Stevens Fishery Conservation and Management Act includes among its listed purposes promotion of domestic commercial and recreational fishing;¹⁰³ maintaining the “optimum yield” from each fishery;¹⁰⁴ and fully developing under-utilized domestic fisheries.¹⁰⁵

Economic efficiency, however, is not the only goal of U.S. fisheries management. All management measures must “consider” efficiency, but none can “have economic allocation as its sole purpose.”¹⁰⁶ Ecological stewardship is an implicit goal. It is national policy to minimize bycatch¹⁰⁷ and to foster and maintain the diversity of fisheries.¹⁰⁸ “Optimum yield” is defined as the harvest level which “will provide the greatest overall benefit to the Nation . . . taking into account the protection of marine ecosystems.”¹⁰⁹ Equitable allocation is also a goal. The Act’s purposes provision does not explicitly mention equitable allocation of the harvest, but it does note the special dependence of coastal areas on fishing¹¹⁰ and calls for consideration of the social and economic needs of states and their citizens.¹¹¹ The national standards governing fishery management plans require that any allocation of fishing privileges be “fair and equitable to all [U.S.] fishermen,”¹¹² and prevent excessive concentration of catch shares.¹¹³ Management measures are supposed to minimize adverse economic impacts on fishing communities to the extent practicable.¹¹⁴

International fishery management goals are at least as diverse. The United Nations Convention on the Law of the Sea (UNCLOS), ratified by nearly all coastal nations,¹¹⁵ is the primary statement of international goals for ocean

103. 16 U.S.C. § 1801(b)(3)(2006).

104. *Id.* § 1801(b)(4).

105. *Id.* § 1801(b)(6).

106. *Id.* § 1851(a)(5).

107. *Id.* § 1801(c)(3).

108. *Id.* § 1801(c)(6).

109. *Id.* § 1802(33)(A).

110. *Id.* § 1801(a)(3).

111. *Id.* § 1801(b)(5), (c)(3).

112. *Id.* § 1851(a)(4)(A).

113. *Id.* § 1851(a)(4)(C).

114. *Id.* § 1851(a)(8).

115. The U.S. remains the conspicuous exception. Despite strong support from the administration, the military, the Chamber of Commerce, and former presidents of both political parties, ratification efforts fell short yet again this year. See Keith Johnson, [GOP Scuttles Law-of-Sea Treaty](http://blogs.wsj.com/washwire/2012/07/16/gop-opposition-scuttles-law-of-sea-treaty/), **Wall St. J. Washington Wire** (July 16, 2012, 5:06 PM), <http://blogs.wsj.com/washwire/2012/07/16/gop-opposition-scuttles-law-of-sea-treaty/>; Stewart M. Patrick, [\(Almost\) Everyone Agrees: The U.S. Should Ratify the Law of the Sea Treaty](#), **Atlantic**

resource management. It explicitly endorses efficiency, equitable allocation, and ecological protection.¹¹⁶ UNCLOS declares the sovereign rights of coastal nations to exploit the resources of their EEZ,¹¹⁷ but qualifies those rights with duties to consider the economic needs of coastal fishing communities¹¹⁸ and to maintain the populations of both target and non-target species.¹¹⁹ Despite the nods to ecological goals, the objective of maximum sustainable yield retains primacy. The management target for living resources is described as “optimum utilization;”¹²⁰ coastal states without sufficient domestic capacity to harvest the total allowable catch must allow other states access to the “surplus.”¹²¹ UNCLOS maintains the traditional rights of all nations to fish on the high seas,¹²² subject to a duty to cooperate in developing measures to conserve both target and non-target species.¹²³

Conflict reduction is not an explicit goal of either U.S. fisheries law or UNCLOS, but it is implicit in most resource management regimes. As noted earlier, conflict over quota allocation is a common feature of domestic cap-and-trade strategies. Conflicting views of fairness and the voluntary nature of international law make allocation conflicts both sharper and more significant in the international context.

The conflicts are sharper because the extent and intensity of disagreement tends to be greater. Differing contexts, histories and cultures mean that nations and their peoples take very different views of what constitutes a fair distribution of resources. The challenges of negotiating the Kyoto Protocol on greenhouse gas emissions and the so-far fruitless search for a successor agreement illustrate the depth of these differences, and the difficulty of bridging them. The Kyoto Protocol adopted emission reduction targets based on past emissions for industrialized nations. It imposed no limits on emissions by developing countries. Each side of this divide objected to the way the other sides’ obligations (or lack

(June 10, 2012, 7:21 AM), available at <http://www.theatlantic.com/international/archive/2012/06/almost-everyone-agrees-the-us-should-ratify-the-law-of-the-sea-treaty/258301/>.

116. United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397, Preamble [hereinafter UNCLOS], available at http://www.un.org/Depts/los/convention_agreements/texts/unclos/unclos_e.pdf (parties recognize the desirability of establishing a legal order which will promote “the equitable and efficient utilization of [marine] resources, the conservation of [marine] living resources, and the study, protection and preservation of the marine environment”).

117. *Id.* at Art. 56(1)(a).

118. *Id.* at Art. 61(2).

119. *Id.* at Art. 61(4).

120. *Id.* at Art. 62(1).

121. *Id.* at Art. 62(2).

122. *Id.* at Art. 116.

123. *Id.* at Arts. 117–120.

thereof) were calculated.¹²⁴ Developing nations took the view that it would be unfair to restrict their development progress given their low past emissions. The United States took a very different view, refusing to ratify the Protocol largely on the ground that the exemption of rapidly developing countries like China and India was unfair to their economic competitors.¹²⁵ The search for an allocation scheme acceptable to all the major players continues to dog negotiations over a successor treaty.¹²⁶ The populous developing nations urge a per capita allocation system,¹²⁷ but that approach is unlikely to prove acceptable to the United States.¹²⁸

Fishery catch share programs don't arouse the same level of allocation conflict as greenhouse gas emissions because they have much smaller economic and social impacts. Nonetheless, there are very real divisions between developed and developing nations, coastal and landlocked nations, and nations with established as opposed to new fishing fleets about how ocean resources should be fairly divided.

Differing views about fairness are especially problematic in the international context because of the need for voluntary commitments. Within nations, distributive conflicts of this sort can certainly be uncomfortable, and can delay or soften action, but there are at least mechanisms for overcoming the objections of a minority if the majority can muster sufficient political will. The politics of creating property rights systems are daunting in the domestic context;¹²⁹ they are even more so in the international sphere. There is no international law procedure for overriding the objections of sovereign nations, even if the will to do so exists. They are free to remain outside any agreement, as the United States has remained outside UNCLOS and the Kyoto Protocol. That makes negotiating international agreements among nations with very different interests and value systems extraordinarily challenging.

124. See, e.g., Paul Baer, Equity, Greenhouse Gas Emissions and Global Common Resources, in **Climate Change Policy: A Survey** 393, 394 (Stephen H. Schneider et al. eds., 2002); Michael Grubb, The Economics of the Kyoto Protocol, 4 **World Econ.** 143, 145 (2003).

125. Baer, supra note 124, at 394.

126. Norichika Kanie et al., Allocation and Architecture in Climate Governance Beyond Kyoto: Lessons from Interdisciplinary Research on Target Setting, 10 **Int'l Envtl. Agreements** 299, 300-01 (2010).

127. See Eric A. Posner and Cass A. Sunstein, Should Greenhouse Gas Permits Be Allocated on a Per Capita Basis?, 97 **Cal. L. Rev.** 51, 53 n.6 (2009) (collecting sources).

128. Id. A variety of other proposals have been advanced, focusing on emissions compared to GDP or distinguishing between "essential" and "luxury" emissions. See **Daniel Bodansky, Pew Ctr. on Global Climate Change, International Climate Efforts Beyond 2012: A Survey of Approaches** 13-14 (2004), available at <http://www.c2es.org/docUploads/2012%20new.pdf>.

129. See, e.g., Colby, supra note 54, at 655.

Catch shares, which cannot be introduced without resolving both the initial allocation issue and issues of subsequent transferability, bring that challenge squarely front and center. If an agreement can be reached at all, the unwillingness or inability to confront difficult allocation questions is likely to bring in through the back door the pressure on TACs that catch share programs are supposed to reduce.

B. Information and Trust

The major source of conflict in domestic fisheries regulated by conventional management methods has been over the details of regulatory conservation measures. A TAC is often the primary such measure; it may be replaced or supplemented by seasonal or geographic closures and gear restrictions. Conservation measures are the focus of persistent and intense conflict in many fisheries.

Because information is often limited and equivocal, setting conservation measures is a difficult technical challenge, one that leaves plenty of room for argument.¹³⁰ Just as cap-and-trade pollution programs do not eliminate the challenge of determining the acceptable pollution level, catch share and other rights-based fishery programs do not remove the technical problem of setting a TAC.¹³¹ Rights-based fisheries may also require other regulatory measures, such as seasonal or area closures, since both the biological impact and the economic value of harvest may vary with time and place.¹³²

The evidence supporting regulatory measures for specific fisheries is often fraught with uncertainty.¹³³ To complicate matters further, the multiple elements of that uncertainty are difficult to identify, much less quantify. Fishery managers are only beginning to systematically take on that task.¹³⁴ For the moment, not only

130. See, e.g., **George Lapointe et al., Ctr. for Am. Progress, Counting Fish 101: An Analysis of Fish Stock Assessments** (2012), available at <http://www.americanprogress.org/issues/green/report/2012/09/27/39347/counting-fish-101/>.

131. **Sharing the Fish**, *supra* note 49, at 107.

132. Robert T. Deacon et al., **Improving Efficiency by Assigning Harvest Rights to Fishery Cooperatives: Evidence from the Chignik Salmon Co-op**, 50 **Ariz. L. Rev.** 479, 504–05 (2008).

133. See, e.g., R. Ian Perry et al., **A Framework for Providing Scientific Advice for the Management of New and Developing Invertebrate Fisheries**, 9 **Rev. in Fish Biology & Fisheries** 125, 130 (1999) (noting the “potential for large errors” in the stock estimates needed to support TAC determinations “and the relatively high cost of reducing these errors”).

134. See Stephen Ralston et al., **A Meta-Analytic Approach to Quantifying Scientific Uncertainty in Stock Assessments**, 109 **Fishery Bulletin** 217 (2011).

is there much managers don't know about the fisheries they are in charge of, they often do not know how much they don't know.

High, and uncertain, levels of uncertainty about sustainable catch levels or the need for other management measures foster overly optimistic thinking,¹³⁵ invoking a phenomenon psychologists call “motivated reasoning.” People selectively interpret information and access memories and beliefs in ways that lead to their desired conclusion.¹³⁶ This process can influence the interpretation of scientific evidence. People are more critical of studies they are motivated to disbelieve.¹³⁷ Motivated reasoning is not intentional; desires influence conclusions even when people intend to objectively evaluate the evidence, and sincerely believe they are doing so.¹³⁸ Evidence perceived as sufficiently strong can force people into uncomfortable conclusions. But motivated reasoners may never get to the point of recognizing even a robust scientific consensus, because people tend to look harder for information supporting their beliefs and to place greater trust in the expertise of others who share their worldviews.¹³⁹

Motivated reasoning is quite likely to operate in the fishery management context. Fishery participants with powerful emotional and financial ties to their occupation will be strongly motivated to believe the fishery is healthy, and that conservation measures that would reduce their harvest or increase their costs are not necessary. High levels of uncertainty in the data will exacerbate the tendency of fishery participants to see it in the most optimistic light.¹⁴⁰ Although this insight is supported by theoretical and experimental psychology, it is really just common sense. Resource users who don't believe the resource is under threat will not happily reduce their use, even if they hold secure property rights.¹⁴¹

Catch shares might reduce the motivation for that belief somewhat by lengthening fishers' time horizons or reducing financial strain, but they will not

135. Ezra M. Markowitz & Azim F. Shariff, Climate Change and Moral Judgment, 2 **Nature Climate Change** 243, 244 (2012).

136. Ziva Kunda, The Case for Motivated Reasoning, 108 **Psychol. Bull.** 480, 483 (1990).

137. Id. at 489–90.

138. Indeed, reminding people of the importance of objectivity can actually reinforce motivated reasoning. Dan M. Kahan, Neutral Principles, Motivated Cognition, and Some Problems for Constitutional Law, 125 **Harv. L. Rev.** 1, 22–23 (2011).

139. Dan M. Kahan et al., Cultural Cognition of Scientific Consensus, 14 **J. Risk Res.** 147, 149–50 (2011).

140. See, e.g., Daniel Sarewitz, How Science Makes Environmental Controversies Worse, 7 **Envtl. Sci. & Pol'y** 385, 390–93 (2004); Naomi Oreskes, Science and Public Policy: What's Proof Got to Do With It?, 7 **Envtl. Sci. & Pol'y** 369, 375 (2004); Barton H. Thompson, Jr., Tragically Difficult: The Obstacles to Governing the Commons, 30 **Envtl. L.** 241, 258–59 (2000); Jeffrey J. Rachlinski, The Psychology of Global Climate Change, 2000 **U. Ill. L. Rev.** 299, 304–06 (2000).

141. Gilmour, supra note 71, at 701.

eliminate motivated reasoning. Larger TACs and fewer other conservation measures are going to look better to fishery participants with or without catch shares. That catch share holders might genuinely desire to maintain a sustainable fishery will not protect them against unconsciously interpreting ambiguous or conflicting stock assessments as supporting a large catch.

Distrust of the scientists who provide technical information about the status of the fishery, or of the regulators charged with determining what consequences follow, will exacerbate the dynamic of doubt. This phenomenon is already observable in domestic fisheries, where regulators have tended to set TACs at or even above the high end of the uncertainty range offered by their technical advisors.¹⁴² It seems likely to be worse in the international context, where fishery participants are further removed, politically and culturally, from those they are being asked to trust, and where the participants distrust not just the regulators but each other.

Together, conflicting goals and heightened distrust make specifying conservation measures even more of a challenge in international than in domestic fisheries. In the early years of its existence, for example, the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), a regional fishery management organization, regularly failed to reach agreement on a TAC. Finally, after a ten-year, multi-million dollar development process, the CCSBT adopted a process for setting TACs that does not require annual negotiation.¹⁴³

C. Administration and Enforcement

The third challenge for catch share programs is their dependence on effective administration, monitoring, and enforcement. This problem is not unique to a catch share strategy, of course. Conventional fishery management also carries administrative costs and requires monitoring and enforcement efforts. But property rights strategies impose some unique challenges, which are magnified in the international context.

As explained above, conventional fishery management requires the development, imposition, and enforcement of a TAC and other measures such as gear limits, area closures, and seasonal restrictions. Shifting to a catch share strategy does not eliminate the need for these difficult and controversial technical decisions. Instead, property rights-based fishery management actually adds a new administrative dimension. Regulators must be able to track ownership of quota

142. Josh Eagle & Barton H. Thompson, Jr., Answering Lord Perry's Question: Dissecting Regulatory Overfishing, 46 *Ocean & Coastal Mgmt.* 649 (2003).

143. Tom Polacheck, Assessment of IUU Fishing for Southern Bluefin Tuna, 36 *Marine Pol'y* 1150, 1160 (2012).

shares, monitor individual catch, and compare catch to share holdings. The administrative tasks are particularly complex in multispecies fisheries, leading some observers to argue that catch shares are impractical in the multispecies context.¹⁴⁴

Beyond setting conservation measures, enforcing them has long been a significant problem in many fisheries, because harvest activities occur over large and often remote geographic areas and landings and sales can be difficult to track through decentralized and informal markets. Moving to catch shares does not remove the enforcement challenges.¹⁴⁵ Enforcement problems are common, even in developed nations¹⁴⁶ and even in catch share fisheries.¹⁴⁷ In some fisheries, catch shares may even increase the costs of enforcement because they make longer seasons possible¹⁴⁸ and provide incentives for high-grading.¹⁴⁹ “Quota busting,” illegal harvest in excess of quota shares owned, can be extensive.¹⁵⁰ This is not surprising. Shifting to catch shares reduces the number of individuals with a legal right to fish; those left out of the system, if they lack other options, will be motivated to continue fishing illegally.

Because of this dynamic, increased monitoring of catch and landings has been necessary following a shift to catch shares in some fisheries.¹⁵¹ New Zealand and Iceland, where catch share approaches are widespread, have among the highest per vessel fisheries management costs.¹⁵² Increased enforcement costs need not be an insurmountable problem, however. In theory, at least, they can be financed from the increased profitability of the fishery.¹⁵³

Enforcement is, institutionally as well as practically, especially difficult in international fisheries. Illegal, unreported, and unregulated (IUU) fishing within EEZs and on the high seas is a major obstacle to developing sustainable global

144. See, e.g., Copes, supra note 37, at 285–86. But see James N. Sanchirico et al., Catch-Quota Balancing in Multispecies Individual Fishing Quotas, 30 **Marine Pol’y** 767 (2006) (arguing that flexibility mechanisms can be used to make multispecies catch share fisheries both profitable and sustainable).

145. Setareh Khalilian et al., Designed for Failure: A Critique of the Common Fisheries Policy of the European Union, 34 **Marine Pol’y** 1178, 1179 (2010).

146. Landings in the European Union have regularly exceeded the TAC in a variety of fisheries. José-María da Rocha et al., The Common Fisheries Policy: An Enforcement Problem, 36 **Marine Pol’y** 1309, 1311 (2012).

147. **Sharing the Fish**, supra note 49, at 98.

148. **Sharing the Fish**, supra note 49, at 107.

149. Beddington, Agnew & Clark, supra note 83, at 1714.

150. **Sharing the Fish**, supra note 49, at 92.

151. **Sharing the Fish**, supra note 49, at 83.

152. See Org. for Econ. Co-operation & Dev., The Costs of Managing Fisheries 31 (2003).

153. **Sharing the Fish**, supra note 49, at 176.

fisheries.¹⁵⁴ IUU fishing encompasses both fishing that contravenes applicable regulations and fishing that is entirely outside the regulatory system.¹⁵⁵ It “has proved stubbornly resistant to recent international attempts to control it.”¹⁵⁶

Institutionally, IUU fishing is facilitated by systematic gaps in the international fisheries regulatory regime. On the high seas (those areas that lie outside national EEZs), fisheries are regulated, if at all, by regional fishery management organizations (RFMOs). Nations that do not voluntarily become parties to these organizations are not legally subject to their conservation measures.

Even nations that are members of RFMOs do not always vigorously implement their provisions.¹⁵⁷ It is difficult to control fishing by or under the auspices of rogue nations because UNCLOS generally gives the flag state exclusive jurisdiction over ships on the high seas.¹⁵⁸ Multilateral agreements can expand inspection authority, but only with respect to nations that choose to join those agreements.¹⁵⁹ Several notorious “flag of convenience” states refuse to sign on. This allows large-scale vessels bearing their flag to fish legally without regulation, ignoring conservation measures,¹⁶⁰ even though they may be owned by nationals of parties to the relevant agreements.¹⁶¹

Practically, the economic rewards of IUU fishing swamp the resources available for enforcement. “IUU fishing is a high reward, low risk activity.”¹⁶² Fish are a valuable commodity in global markets. Enforcing fishery regulations is costly¹⁶³ because harvests occur over wide areas, and illegally caught fish can be disguised by processing or mixed with legal catch without much risk of detection. In less developed countries, those resources are simply unavailable. Even in wealthy nations, fishery management and enforcement often do not get the resources they need because they are not seen as high priorities.¹⁶⁴ Furthermore,

154. **High Seas Task Force, Closing the Net: Stopping Illegal Fishing on the High Seas 2** (2006) [hereinafter **Closing the Net**]; Elise Anne Clark, Strengthening Regional Fisheries Management—An Analysis of the Duty to Cooperate, 9 **N.Z. J. Pub. Int’l L.** 223, 229 (2011).

155. **Closing the Net**, supra note 154, at 16.

156. Id. at 3.

157. It appears, for example, that the Japanese longline fleet has been responsible for a significant amount of IUU catch of southern bluefin tuna. Polacheck, supra note 143, at 1154.

158. UNCLOS, supra note 116, art. 92(1).

159. **Closing the Net**, supra note 154, at 35–36.

160. Id. at 36.

161. Id. at 36.

162. Id. at 25.

163. The European Union and its member states, for example, reportedly spend about \$362 million annually monitoring fishing activities, or roughly 5% of the value of landings in the region. Id. at 25.

164. Id. at 24.

IUU fishing activities often cross national borders; fish caught illegally on the high seas may be trans-shipped in one nation's territory and sold in the markets of one or more other nations. Detecting and punishing those activities requires that authorities in all the relevant nations have the technical means and the willingness to share data in real time. Institutional frameworks for that sharing have proven elusive.¹⁶⁵ Finally, the penalties for IUU fishing, which UNCLOS limits to fines rather than imprisonment for activities occurring beyond any nation's territorial sea, may not provide adequate deterrence,¹⁶⁶ especially in light of the low probability of apprehension. Ironically, the IUU problem has been made worse by the adoption of catch share programs within EEZs. By reducing fleet capacity in domestic waters, as they are designed to do, those programs have pushed excluded vessels onto the high seas.¹⁶⁷

III. NOT EVERY PROBLEM IS A NAIL

The previous Section demonstrated that catch share approaches can effectively serve some goals in some places, but are less well suited to other goals and other contexts. Of course, the question is never whether property rights approaches would function perfectly, but how they stack up against possible alternatives. Even if catch shares have serious problems, they might still be the best available choice. Determining that requires context-sensitive consideration of the specific problem being targeted. At minimum, however, it should not be blithely assumed that every fishery problem is best solved by a property rights approach.

Closer examination of two recent proposals for adoption of property rights strategies for global fisheries provides concrete examples of two ways such approaches can fall short. The first, the proposal for tradable whale harvest permits, simply does not connect with the essence of the problem. Rather than a solution to the gridlock plaguing the Whaling Convention, it is a distraction, diverting attention from the fundamental reasons for that gridlock. The second, dealing with southern bluefin tuna, is a situation in which property rights are a more conceptually appropriate solution, but their application presents substantial practical difficulties which are likely to be common in the international context.

A. Tradable Whale Permits

165. *Id.* at 28–29.

166. *Id.* at 32–33.

167. *Id.* at 49.

Recently in the high-profile journal Nature, economist Christopher Costello and ecologists Steven Gaines and Leah Gerber proposed the introduction of tradable whale hunting permits.¹⁶⁸ Their focus on tradable permits (essentially catch shares for whales) is understandable, but off target. In order to understand why tradable permits won't solve the whaling problem, we must briefly review the history of international whaling regulation.

Whales were one of the first ocean resources to arouse international concern. By the late nineteenth century, technological advancements including steamships and explosive harpoons had sparked a global whale rush that threatened several species with extinction.¹⁶⁹ A few whaling nations introduced domestic restrictions, and attempts to craft an international agreement limiting whaling began early in the twentieth century.¹⁷⁰ By the late 1930s, some but not all of the largest whaling nations had agreed to size, species, and area restrictions.¹⁷¹ Continued unsustainable pressure on whale stocks finally led to negotiation of the Whaling Convention,¹⁷² which took effect in 1948.

At its origin, the Whaling Convention was aimed at sustainable exploitation, not preservation.¹⁷³ In its first quarter century, it failed miserably at that aim. By the early 1970s, whale stocks were crashing as the nascent environmental movement raised global concern.¹⁷⁴ In 1972, the United Nations Stockholm Conference on the Human Environment called for a whaling moratorium.¹⁷⁵ The United States, which had decided to end domestic commercial whaling, proposed a moratorium in subsequent meetings of the International Whaling Commission (IWC), the regulatory body established by the Whaling Convention.¹⁷⁶ The IWC rejected the proposal.¹⁷⁷

168. Costello, Market Approach, supra note 33. These authors are not the first to suggest a tradable whale quota system, but their proposal has gotten the most attention. Earlier versions include: Anthony Matera, Whale Quotas: A Market-Based Solution to the Whaling Controversy, 13 Geo. Int'l Env'tl. L. Rev. 23 (2000); Clark and Lamberson, supra note 66, at 116.

169. Gerry J. Nagtzaam, The International Whaling Commission and the Elusive Great White Whale of Preservationism, 33 Wm. & Mary Env'tl. L. & Pol'y 375, 390 (2009).

170. Id. at 391–92.

171. Id. at 395; Carlarne, supra note 9, at 4–5.

172. See ICRW, supra note 10.

173. In the Convention's Preamble, the parties recognized an interest in "safeguarding for future generations the great natural resources represented by the whale stocks," but went on to assert that "properly regulated" whaling would allow increased harvest "without endangering these natural resources." Id. at Preamble. Their stated goal was "to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry." Id.

174. Nagtzaam, supra note 169, at 404–05.

175. Carlarne, supra note 9, at 7 n.38.

176. Nagtzaam, supra note 169, at 408.

177. Id.

The Whaling Convention, however, had sowed the seeds of a radical change in institutional direction when it structured the IWC to give each member nation one vote¹⁷⁸ and invited any nation to join.¹⁷⁹ Whaling opponents mounted a campaign in the late 1970s to recruit non-whaling states to sign on to the Whaling Convention.¹⁸⁰ Environmental NGOs such as Greenpeace were actively engaged in this campaign; their pitch was not that whaling was at unsustainable levels, but that it was “morally repugnant.”¹⁸¹ By 1982, enough non-whaling nations had signed on to the Whaling Convention to tip the balance. The IWC adopted a moratorium on commercial whaling, effective in 1986.¹⁸²

The moratorium has been hotly debated since its adoption. Although the rhetorical battle has been largely fought in scientific terms, it remains grounded in the moral intuitions that originally motivated the moratorium.¹⁸³ Within the IWC, whaling opponents have strategically couched their objections in terms of sustainable harvest.¹⁸⁴ This sort of dissonance between motives and rhetoric is familiar in environmental conflicts. Science has long struck environmentalists as a sounder political ground for their arguments than ethics,¹⁸⁵ so that underlying moral objections are often submerged in the formal debate. Moreover, the Whaling Convention itself requires scientific rhetoric, since it mandates that IWC regulations “be based on scientific findings.”¹⁸⁶ The result is a classic “science charade;”¹⁸⁷ both supporters and opponents of the moratorium couch their dispute

178. ICRW, *supra* note 10, at Art. III(1).

179. *Id.* at Art. X(2).

180. Nagtzaam, *supra* note 169, at 413–14.

181. *Id.* at 414.

182. Carlarne, *supra* note 9, at 8–9.

183. Whaling opponents might hold one or more of at least three moral positions: first, they could regard all whaling as ethically wrong, because whales are sentient creatures, because of their complex social structure, or because for some other reason whales are entitled to a right to live; second, they could regard whaling as wrong to the extent it causes whales pain and fear, and be convinced that commercial whaling cannot be conducted without employing unacceptable methods; or third, they could regard whales as species of incalculable value, so that any anthropogenic increase in the risk of whale extinction is wrong, or at least must be balanced by an extraordinarily high human benefit. Of course, objections to whaling are not necessarily that consciously considered. As one observer puts it: “most people in the United States [a leading proponent of the IWC moratorium] find the thought of whaling utterly barbaric, and the idea of eating whales utterly disgusting...” Alyson Decker, *Save the Whales—Save the Whalers—Wait, Just Save the International Whaling Commission: A Fresh Look at the Controversy Surrounding Cultural Claims to Whale*, 16 *S. Cal. Interdisc. L.J.* 253, 253 (2006).

184. Nagtzaam, *supra* note 169, at 418–19.

185. See generally Holly Doremus, *The Rhetoric and Reality of Nature Protection: Toward a New Discourse*, 57 *Wash. & Lee L. Rev.* 11 (2000).

186. ICRW, *supra* note 10, Art. V(2)(b).

187. Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 *Colum. L. Rev.* 1613 (1995).

in scientific terms, hiding the persistent value differences that divide them. At the Stockholm conference, for example, when Japan objected that a whaling moratorium was not scientifically justified, anti-whaling nations asserted that their scientists said otherwise.¹⁸⁸ When it finally adopted the moratorium, the IWC promised that the data supporting it would be continuously reviewed, and suggested that it would remain in place only as long as the science justified it.¹⁸⁹

Rather than ending whaling, the moratorium, which is “riddled with loopholes and exceptions,”¹⁹⁰ has made whaling more difficult for the international community to regulate.¹⁹¹ Norway, which took an exception to the moratorium and therefore is not legally bound by it, openly engages in commercial whaling.¹⁹² Iceland briefly left the Whaling Convention only to return subject to an exception to the moratorium. Like Norway, it has resumed commercial whaling.¹⁹³ Japan makes extensive use of the scientific research exception in the Whaling Convention.¹⁹⁴

Whaling has become a perennial source of international controversy, and a flashpoint for friction between otherwise allied nations.¹⁹⁵ The conflict is not

188. A.W. Harris, The Best Scientific Evidence Available: The Whaling Moratorium and Divergent Interpretations of Science, 29 *Wm. & Mary Env'tl. L. & Pol'y Rev.* 375, 376 (2007).

189. “This provision will be kept under review, based upon the best scientific advice, and by 1990 at the latest the Commission will undertake a comprehensive assessment of the effects of this decision on whale stocks and consider modification of this provision and the establishment of other catch limits.” See Marian Nash Leich, Contemporary Practice of the United States Relating to International Law, 79 *Am. J. Int'l L.* 431, 435–36 n.4 (1985) (reproducing the text of the moratorium).

190. Carlarne, supra note 9, at 9.

191. Including commercial, research, and subsistence whaling, “[a]lmost 2,000 whales are now harvested each year.” Costello, Market Approach, supra note 33, at 139.

192. Peter Davies, Iceland and European Union Accession: The Whaling Issue, 24 *Geo. Int'l Env'tl. L. Rev.* 23, 26–27 (2011).

193. See Letter from Gary Locke, Sec'y of Commerce, to President Barack Obama (July 19, 2011), available at http://www.noaa.gov/stories2011/pdfs/pellygrantsignedletter_final.pdf (certifying “that Iceland, by permitting its nationals to engage in commercial whaling and exporting endangered fin whale meat, is diminishing the effectiveness of the IWC conservation program”).

194. ICRW, supra note 10, Art. VIII(1). Iceland, Norway, and Russia have also granted themselves scientific research permits in the past, but have discontinued that practice. Nagzaam, supra note 169, at 429–31.

195. Ongoing Efforts Within the International Whaling Commission (IWC) Regarding Its Future: Testimony Before the H. Subcomm. on Int'l Org., Human Rights, and Oversight, and Subcomm. on Asia, the Pacific and the Global Env't, 110th Cong. (2010) (statement of David A. Balton, Deputy Assistant Secretary, Bureau of Oceans and Int'l Env'tl. and Scientific Affairs, U.S. Dep't of State), available at <http://www.state.gov/e/oes/rls/remarks/2010/143167.htm>.

confined to diplomatic arenas. Sea Shepherd, an NGO which describes itself as “the most aggressive and most successful whale-saving organization in the world,”¹⁹⁶ actively confronts whalers at sea, going so far as to ram or attempt to disable their vessels.¹⁹⁷ Sea Shepherd has lost some of its own boats through these tactics,¹⁹⁸ which have drawn charges of piracy.¹⁹⁹ In 2011, however, Sea Shepherd succeeded in forcing the Japanese fleet to end its research whaling season early.²⁰⁰

Entrenched positions on both sides have left the IWC “mired in a prolonged stalemate.”²⁰¹ Whaling proponents have adopted the strategy that worked so well for the other side in the 1980s, recruiting their own allies to join the IWC.²⁰² The moratorium remains in place, but perpetually contested. The situation has undermined respect for the IWC, which is now widely regarded as both ineffectual and dysfunctional.

Costello and his co-authors offer tradable whale catch shares, which they term “whale shares,” as a solution to the IWC crisis.²⁰³ They propose that “‘whale shares’ would be allocated in sustainable numbers to all member nations of the IWC, who would have the choice of exercising them, leaving them unused for a year or retiring them in perpetuity.”²⁰⁴ Whale shares would be tradable in a global market.²⁰⁵ Costello et al. assert that their tradable permit proposal “stands a good chance of being acceptable both to anti- and to pro-whaling constituents.”²⁰⁶

In light of the current dysfunction of the IWC, no possibility should be dismissed out of hand. The whale shares prescription, however, is highly unlikely

196. The History of Sea Shepherd Conservation Society and Whaling, **Sea Shepherd Conservation Soc’y**, <http://www.seashepherd.org/whales/sea-shepherd-history.html> (last visited Sept. 3, 2012).

197. Anthony L.I. Moffa, Two Competing Models of Activism, One Goal: A Case Study of Anti-Whaling Campaigns in the Southern Ocean, 37 **Yale J. Int’l L.** 201, 209 (2012). Sea Shepherd claims to have sunk at least 5 whaling ships. **Sea Shepherd Conservation Soc’y**, supra note 196.

198. Editorial, Whales for Sale, 481 **Nature** 114 (2012).

199. A U.S. court rejected that charge, but did find that Sea Shepherd had likely violated international shipping regulations. *Institute of Cetacean Research v. Sea Shepherd Conservation Society*, 860 F. Supp. 2d 1216, 1226, 1233, 1235 (W.D. Wash. 2012).

200. Martin Fackler, With Whaling Ships Under Attack, Japan Will Recall Fleet, **N.Y. Times**, Feb. 18, 2011, at A8.

201. Balton, supra note 195.

202. See Nagtzaam, supra note 169, at 422–23; Decker, supra note 183, at 261. Whaling opponents also continue to play the numbers game. Nagtzaam, supra note 169, at 445.

203. Costello, Market Approach, supra note 33, at 139–40. See also Casey Watkins, Whaling in the Antarctic: Case Analysis and Suggestions for the Future, 25 **N.Y. Int’l L. Rev.** 49, 76 (2012) (proposing to combine a regulated whale harvest with “a market based exchange for whaling permits”).

204. Costello, Market Approach, supra note 33, at 140.

205. Id.

206. Id.

to improve the health of the IWC.²⁰⁷ Putting aside for the moment the fact that it would require renegotiation of the Whaling Convention,²⁰⁸ a barrier that is likely insurmountable, it simply does not match the problem. Catch shares are primarily good at reducing overcapacity, increasing the profitability and economic efficiency of fisheries. Overcapacity and inefficiency are not the cause of the IWC's gridlock. Instead, the gridlock follows directly from the divergent, deeply held values of the parties. A tradable quota system would not address that conflict.

The whale share proposal would not break the existing gridlock because it would provide little advantage to those most deeply invested in the issue. The proposal's authors are naïve to expect either side of the conflict would back their proposal. The whaling nations will not like the idea because they are deeply invested in their continuing right to whale, not primarily as an economic matter but as a cultural one.²⁰⁹ Whaling has become a marker for their sovereign right to self-determination.²¹⁰ Whaling restrictions are seen both as objectionable in their own right and also as a potential harbinger of inroads on other fishing rights.²¹¹

The whaling nations are not likely to endorse a system that requires them to share the initial allocation of quota with nations lacking any history of whaling, and even with nations deeply opposed to whaling.²¹² They would also undoubtedly strongly resist a trading system open to conservation interests, because it would undermine what they see as the purpose of the IWC, facilitating development of a sustainable whaling industry.²¹³

207. For a similarly skeptical view of an earlier proposal for tradable whale quotas, see Decker, *supra* note 183, at 278 (arguing that a tradable whale quota system “would most likely lead to further unrest within the IWC”).

208. The convention authorizes the ICW to adopt regulations fixing species, seasons, locations, size limits, maximum catch, gear, measurement methods, and record requirements. ICRW, *supra* note 10, at Art. V(1). It specifically precludes, however, regulations on the “number or nationality of factory ships” and the allocation of “specific quotas to any factory ship or land station or to any group of factory ships or land stations.” *Id.* at Art. V(2). At best it is open to question whether that language allows any kind of tradable quota system, much less the allocations by nation that Costello et al. recommend.

209. Decker, *supra* note 183, at 262.

210. *Id.* at 270.

211. Phillip J. Clapham et al., *The Whaling Issue: Conservation, Confusion and Casuistry*, 31 *Marine Pol’y* 314, 318 (2007).

212. Indeed, there is a very pragmatic shortcoming of that allocation proposal, which is that it would encourage nations with no interest in the whaling issue to join the Whaling Convention simply to obtain potentially valuable quota allocations.

213. Whaling Convention, *supra* note 10, at Preamble (reciting that the parties have “decided to conclude a convention to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry”).

Costello et al. do not explain why they think whale shares would be attractive to whaling nations. They note that a similar proposal floated before adoption of the moratorium went nowhere, and they speculate that it might have been ahead of its time or doomed by the fact that permits would have been auctioned rather than allocated without charge.²¹⁴ Although the idea will be familiar this time, it still will not offer any substantial advantage over the current situation to whaling nations. They would get their shares for free, but would still have to buy shares from other nations if they wanted to harvest the full sustainable quota.

One might argue that the whaling nations face a different situation now, with the moratorium in effect, than they did when the earlier proposal was made. In fact, however, the moratorium has relatively little effect on them given the availability of objections and the research exemption. It is not clear that their whale harvest would increase under the whale share proposal. Indeed, to the extent that the whaling nations think IWC quota decisions will be tainted by political pressures from anti-whaling nations, they might well prefer not to return to whaling under IWC regulation.

Alternatively, one could argue that the whaling nations currently escape the moratorium only at the cost of international condemnation. It's not clear, however, that catch shares would change that dynamic, to the extent it exists. As explained below, catch shares would not change the views of those most opposed to whaling, or their attempts to bring global public pressures to bear. As for other nations, in fact continued whaling since adoption of the moratorium has brought few consequences. In the United States, the Pelly Amendment to the Fishermen's Protective Act of 1967²¹⁵ and the Packwood Amendment to the Magnuson-Stevens Conservation Act²¹⁶ require that the Secretary of Commerce to identify foreign fishing operations which diminish the effectiveness of the Whaling Convention. Such nations must be denied access to fishing in U.S. waters, and may be subject to trade sanctions.²¹⁷ No sanctions have ever been imposed under these amendments, however, and threats of sanctions in recent years have had little effect.²¹⁸ International pressure seems unlikely to provide a strong motivation for the whaling nations to endorse whale shares.

Opponents of whaling are equally unlikely to find whale shares attractive. Those who view whaling as a moral wrong will not be mollified by introduction of a whale share market, even if they are allowed to participate. Costello et al. suggest that Sea Shepherd ought to support a market because it could save money

214. Costello, Market Approach, *supra* note 33, at 139.

215. 22 U.S.C. § 1978 (2006).

216. 16 U.S.C § 1821(e)(2) (2006).

217. Carlarne, supra note 9, at 39.

218. Id. at 39-40.

by turning from its present campaign of harassment of whaling ships to the purchase of whale shares.²¹⁹ That suggestion shows just how little thought these authors have given to the activists' goals or psychology. Anti-whaling activists are not going to change their tactics based on an analysis of the dollar cost per whale life saved. They are committed to convincing the world that whaling is morally unacceptable. The IWC moratorium, even with its loopholes, sends that message, which can be amplified by dramatic anti-whaling harassment campaigns. A whale permit trading system would send the very different message that whaling is acceptable within limits. Expecting Sea Shepherd to support a whale share market is like expecting anti-abortion activists to welcome a market in abortion permits. Conflicts grounded in fundamentally divergent moral views cannot be solved by the introduction of markets, and the whaling moratorium controversy is precisely that sort of conflict.

Even if that value conflict could be overcome, setting a sustainable and politically acceptable TAC would remain problematic under a catch share approach. One major driver of the moratorium was the IWC's history of authorizing unsustainable harvests. The latest whale share proposal would not reduce the pressure for high TACs. It calls for shares to have a short life, on the order of ten years.²²⁰ That is not likely to be long enough to encourage economic whalers to prefer sustainable harvests. Even permanent catch shares probably would not have that effect; whale fisheries have long been held up as the paradigmatic example of a context in which even those holding permanent property rights could rationally prefer a "boom-and-bust" approach.²²¹ The whale shares proposal might even exacerbate the pressure for high TACs, since quota would offer a potential economic windfall to Whaling Convention members that have never before had a financial stake.

Another problem for the IWC has been credible enforcement. It has always relied on voluntary enforcement by the parties,²²² who have not been strongly motivated to comply. Before the moratorium, even the unrealistically high TACs were routinely exceeded.²²³ The United States has played a back-up enforcement role through its willingness to threaten trade sanctions against nations whose whaling undermines the effectiveness of the IWC.²²⁴ That threat, however, has become less credible, and less effective, over time.²²⁵ Concerns

219. Costello, Market Approach, *supra* note 33, at 140.

220. Id.

221. See sources cited supra note 61.

222. Carlarne, *supra* note 9, at 38.

223. Nagtzaam, *supra* note 169, at 401-02.

224. Carlarne, *supra* note 9, at 38-40; see also Locke *supra* note 193 (letter certifying Iceland as subject to sanctions).

225. Carlarne, *supra* note 9, at 40.

about the effectiveness of enforcement have provided one significant ground for objections to lifting the moratorium.²²⁶ Moving to a catch share approach would further complicate enforcement efforts by diffusing responsibility. It would be difficult to blame any particular nation for the failure of whalers who buy shares on the open market to adhere to their share limits. That difficulty would be magnified if share ownership were open to vessels flying flags of non-parties.

In sum, a catch share approach is not likely to offer much benefit to the IWC. It would not solve the core dispute, borne of differing values and cultures, over whether harvesting whales is ethically permissible and if so under what circumstances. Nor would a catch share approach reduce the key technical and practical barriers to setting and implementing sustainable whale quotas. It would, however, pose new and difficult questions about how quota should be divided, who could participate in the market, and who would be responsible for assuring that both official market players and others abide by the quota limits. Arguing about those questions would be an unhelpful distraction from addressing the very real problems of the IWC. There is no easy answer to those problems. Pretending (or hoping) that catch shares will provide one will simply facilitate further avoidance of the root causes of the conflict.

B. Bluefin Tuna Management

The bluefin tuna is a wonder of nature—large, fast, long-lived and beautiful. As marine scientist Carl Safina puts it:

The bluefin tuna (*Thunnus thynnus*) is a creature of superlatives. Growing to 1500 pounds (700 kilos), traveling on trans-oceanic migrations, and reputedly capable of swimming 50 miles (90 km) per hour, it is one of the largest, most wide-ranging and fastest of animals. To anyone who has seen this saber-finned giant explode through the surface of the sea, it is among the most magnificent.²²⁷

It is also exceptionally valuable; early in 2012, a single bluefin sold at auction in Tokyo for \$736,000 or well over \$1200 per pound.²²⁸ Not surprisingly, fishing pressure on the bluefin has been intense, resulting in steep population declines.

226. See, e.g., Clapham et al., *supra* note 211, at 317.

227. Carl Safina, *Bluefin Tuna in the West Atlantic: Negligent Management and the Making of an Endangered Species*, 7 *Conservation Biology* 229, 229 (1993).

228. Malcolm Foster, *Bluefin Tuna Auctioned in Tokyo for Record \$736,000*, *Christian Sci. Monitor* (Jan. 5, 2012) <http://www.csmonitor.com/Business/Latest-News-Wires/2012/0105/Bluefin-tuna-auctioned-in-Tokyo-for-record-736-000>.

Two of the three bluefin species, the Atlantic bluefin and the southern bluefin, are at high risk of extinction.²²⁹ In 2010, the United States unsuccessfully sought a ban on international trade in Atlantic bluefin through the Convention on International Trade in Endangered Species.²³⁰

Because bluefin are highly migratory, their management requires international cooperation. Tuna are managed by five RMFOs; the Atlantic bluefin is under the jurisdiction of the International Commission for the Conservation of Atlantic Tunas (ICCAT), while the southern bluefin is managed by both the Indian Ocean Tuna Commission (IOTC) and by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). Each sets a TAC for bluefin catch within its jurisdiction, and allocates that total catch among its parties and cooperating non-parties.

The current paradigm is widely recognized as an international failure. Recent performance reviews of the three RFMOs responsible for bluefin management have been highly critical. All three suffer from difficulties setting TACs, including reluctance to accept the advice of scientific advisors. They also have all had trouble allocating the TAC among parties and cooperating non-parties, monitoring compliance with the TAC, and controlling IUU fishing.²³¹

Frustration with the current state of bluefin management has produced a range of proposals, including tradable quotas. A thoughtful student note has argued that, while not without difficulties, a catch shares approach to Atlantic bluefin management would significantly improve conservation outcomes.²³² An observer of the IOTC's struggle to develop a viable quota allocation system does not go so far as to advocate an international catch share scheme, but does note that "[t]echnical advice as to what management regime for international tuna fisheries is best or most effective does seem to be moving towards a concept of rights based management involving transferable quotas."²³³

229. B.B. Collette et al., High Value and Long Life—Double Jeopardy for Tunas and Billfishes, 333 *Science* 291, 291 (2011).

230. David Jolly & John M. Broder, U.N. Rejects Shielding Bluefin and Polar Bears, *N.Y. Times*, Mar. 19, 2010, at A8. A year later, the U.S. itself found that the Atlantic bluefin does not warrant listing under the Endangered Species Act. Endangered Species Act Listing Determination for Atlantic Bluefin Tuna, 76 Fed. Reg. 31,556 (June 1, 2011). The U.S. continues to authorize fishing for the Atlantic bluefin in accordance with ICCAT prescriptions.

231. See Indian Ocean Tuna Commission, Report of the IOTC Performance Review Panel 33 (Jan. 2009); Int'l Comm'n for the Conservation of Atlantic Tunas, Report of the Independent Review, (Sept. 2008); Comm'n for the Conservation of S. Bluefin Tuna, Report of the Independent Expert (Sept. 2008).

232. Seth Korman, Note, International Management of a High Seas Fishery: Political and Property-Rights Solutions and the Atlantic Bluefin, 51 *Va. J. Int'l L.* 697 (2011).

233. Jeremy Noye & Kwame Mfodwo, First Steps Toward a Quota Allocation System in the Indian Ocean, 36 *Marine Pol'y* 882, 887 (2012).

Unfortunately, catch shares are unlikely to improve the lot of the bluefin or its ecosystem because the catch share solution is not well-suited to the bluefin overfishing problem. First, as detailed above, what catch shares do best is reduce over-capacity, where there is broad recognition that over-capacity is a problem and willingness to let the market decide the identity of fishery participants. Over-capacity is a problem in bluefin fisheries,²³⁴ but with a unique twist. In some areas, longline fishing for swordfish and other tuna produces bluefin bycatch.²³⁵ This bycatch is difficult to predict or control, especially on an individual boat basis, so it would be difficult for participants in those other fisheries to acquire the necessary catch shares. There also are operators in other fisheries who target bluefin opportunistically; given its great value, bluefin is a kind of lottery fish offering the potential for an occasional high payoff.²³⁶ Additionally there are charter operators and recreational fishermen who target bluefin among other species, but cannot easily predict the likelihood of one or more catches in a particular year. That adds another dimension to allocation disputes, and indeed recreational fishermen have been among the fiercest opponents of proposals for a U.S. domestic bluefin catch share program.²³⁷

Second, the economics of the bluefin fishery do not create incentives for long-term sustainable fisheries. With big fish carrying six-figure price tags and the species already dwindling, fishers might rationally conclude that their best strategy is to get what they can while they can. Tuna fishing nations seem to have been pursuing that strategy, constantly pushing for higher quotas, within the framework of the RFMOs. Catch share fisheries still require TACs, which would still have to be set by the RFMOs, which so far have proven unwilling or unable to follow the advice of their own scientists.

234. Ussif Rashid Sumaila & Ling Huang, Managing Bluefin Tuna in the Mediterranean Sea, 36 **Marine Pol’y** 502, 502 (2012) (“[V]essel capacity, vessel power and new storage innovations for BFT [Blue Fin Tuna] experienced tremendous increases in the 1980s and 1990s, which imposed severe pressure on the BFT stock.”); see also Harry N. Scheiber, Kathryn J. Mengerink & Yann-huei Song, Ocean Tuna Fisheries, East Asian Rivalries, and International Regulation: Japanese Policies and the Overcapacity/IUU Fishing Conundrum, 30 **U. Haw. L. Rev.** 97, 104 (2007) (noting international calls for Japan to reduce capacity in its longline tuna fishing fleet).

235. Richard Gaines, Feds Eye New Rules for Bluefin Tuna Catch, **Gloucester Times**, May 18, 2012.

236. See Charles A. Witek III, Comment to Can Catch Shares Help the Bluefin Tuna Fishermen and Stocks?, **Save the Bluefin Tuna** (Dec. 24, 2009, 8:46 AM), <http://savethebluefin.com/profiles/blog/show?id=2166344%3ABlogPost%3A5382&commentId=2166344%3AComment%3A5384>.

237. See Letter from Jeff Miller & Mike Ross, Cong. Sportsmen’s Caucus, to Doug Boyd, Gulf of Mexico Fishery Mgmt. Council (July 25, 2012) (urging the Council to “refrain from instituting . . . catch shares in the Gulf of Mexico until further scientific, economic, and demographic assessments have taken place.”).

Third, catch share approaches are already possible in the bluefin fishery at a domestic level, as they are for many fisheries managed by RFMOs. The tuna RFMOs allocate the total allowable catch among parties and cooperating non-parties. Quota-holding nations are, with some restrictions on transfer to other nations, free to allocate their share of the catch as they see fit. Australia has used a catch share program to allocate its southern bluefin tuna quota since 1984.²³⁸ Some of the Australian catch shares are leased by Japanese vessels.²³⁹ The United States is considering a catch share program for its quota of Atlantic bluefin.²⁴⁰ The benefits of catch shares, in other words, are already available in the bluefin fishery, through domestic regulation. At least some of those shares are available on a transnational market.

It seems unlikely that an international trading scheme would add sufficient conservation benefits to offset the transaction costs of creating it. Developing nations with artisanal fisheries would surely oppose such a scheme, because it would almost certainly end up concentrating quota in the hands of distant water fishing fleets from wealthy nations. Nations with significant recreational fisheries might also be opposed to a universal trading system. There would be little benefit for conservation interests. Even if trading were open to them, quota prices would likely be too high to be attractive. Even the most ardent conservationist would likely balk at spending hundreds of thousands of dollars to save a single fish.

Fourth, trading would not address the many technical challenges of bluefin management. Bluefin fishing would still have to be overseen in a spatially explicit, and complex, way. Geography matters in the bluefin fishery, in ways that remain poorly understood. There is considerable uncertainty about both spawning and migration behavior.²⁴¹ Any market in bluefin catch shares would have to be geographically limited, which would increase the complexity of oversight while reducing the efficiency gains from allowing trades. Bycatch regulation would also remain necessary. Global tuna fisheries produce substantial bycatch of seabirds, sea turtles, marine mammals, sharks, and unmarketable finfish.²⁴² Catch shares by themselves would do nothing to control that bycatch.

Catch shares also would do little to close the enforcement gap. IUU fishing has been a notorious problem for bluefin management, and not just for the

238. Carl McCamish, Fisheries Management Act 1991: Are ITQs Property?, 22 **Fed. L. Rev.** 375, 376 (1994).

239. Korman, *supra* note 232, at 745.

240. Gaines, *supra* note 235.

241. Benjamin Galuardi et al., Complex Migration Routes of Atlantic Bluefin Tuna (Thunnus thynnus) Question Current Population Structure Paradigm, 67 **Can. J. Fisheries & Aquatic Sci.** 966 (2010).

242. Eric L. Gilman, Bycatch Governance and Best Practice Mitigation Technology in Global Tuna Fisheries, 35 **Marine Pol'y** 590, 591–93 (2011).

developing nations participating in the fishery. According to a Pew Environment Group study, the amount of Atlantic bluefin traded in the market in 2010 was two-and-a-half times the official quota.²⁴³ Another study implicated European governments in that trade.²⁴⁴ The root problem seems to be a lack of political will to take bluefin fishing restrictions seriously. Catch shares, in theory, could provide increased resources for enforcement, but only if enough shares are auctioned to the highest bidder. That seems unlikely on the international stage, where nations can be expected to jealously guard the interests of their industry. Catch shares also should put share holders on the side of better regulation, because illegal catch drives down the value of their shares. That assumes, however, that the share holders or their governments can take effective enforcement steps. In a far-flung deepwater fishery involving disparate participants, share holders themselves can do little to stop IUU fishing. Under current law, individual nations (outside their own EEZs) and the RFMOs also have only limited authority. International catch shares are not the answer to the enforcement problem. They are just as dependent on improved enforcement will and capacity as conventional management.

IV. CONCLUSION

To date, most of the enthusiasm for catch share strategies comes from economists. There may be particular reasons for skepticism when economists promote property rights approaches. Their disciplinary training and orientation tends to make them see efficiency as an especially important goal and markets as a particularly useful tool for achieving that goal.²⁴⁵ Looked at from a broader perspective, catch shares, like other policy prescriptions, are tools that are right for some jobs but not others. Their usefulness for management of any fishery cannot be answered in isolation. The answer is not uniformly yes or no; the correct answer is “it depends on the context.” Before a property rights approach (or any other broad policy strategy) is adopted, it should be evaluated in context from a variety of disciplinary perspectives. After implementation, evaluation should continue.

243. David Jolly, Industry Flouts Bluefin Catch Limits, Study Says, **N.Y. Times Green** (Oct. 18, 2011), <http://green.blogs.nytimes.com/2011/10/18/industry-flouts-bluefin-catch-limits-study-says/>.

244. Id.

245. This is not a swipe at economists. Every discipline has its ingrained professional biases, and every discipline is likely to systematically overvalue its own tools. As a lawyer, I have no difficulty acknowledging that lawyers may be overly sensitive to distributional equity and undoubtedly systematically overvalue litigation as a tool for achieving policy outcomes.

The first step in deciding whether catch shares have a role to play in the management of a specific fishery is identification of management goals, and prioritization among goals that are or may be in tension. The next step is to compare the goals to what catch shares can do, identifying the benefits they are intended to provide and any costs they may impose. A property rights-based approach is most likely to be helpful if reducing industry inefficiency is a high priority goal. But reducing inefficiency often has distributional costs; in deciding whether to use a property rights approach and if so how to bound trading, the relevant policymakers must decide whether or not efficiency gains outweigh distributional costs.

Other conclusions about the efficacy of catch shares are more difficult to draw with confidence, at least at the broadest scale. There is some evidence that introduction of catch shares may have positive effects on stewardship of target species, but so far that evidence is more of correlation than of causation. There are sound theoretical reasons to believe that catch shares can encourage stewardship behavior, provided that the economics of the fishery are right. So far there is very little evidence about the impact of catch shares on ecosystems and non-target species, but again theory suggests that impact is likely to be context-specific. If the ecological problems result from the need of financially strapped fishers to cut costs or from the frenzy of a short-term derby fishery, catch shares should help. If they come from other sources, however, such as a close association between target and non-target species or the gear used in the fishery, catch shares alone will do little to help. There is both theoretical and empirical reason to believe that catch shares can reduce resistance to lowered TACs, and perhaps to other conservation measures. Again, this effect is a function of the economics of the particular fishery. It will occur if, but only if, fishery participants have a sufficiently long time horizon, view their property interest as secure for the relevant time, and believe that conservation measures are necessary for sustainable exploitation of their target species. The shift to a catch share strategy will increase conflict over allocation of rights, and will not reduce value conflicts over the ethical acceptability of resource exploitation.

In no case is specification of property rights a complete substitute for fishery regulation. Total allowable catches must still be determined, and gear limits and seasonal restrictions may still be necessary for sustainable harvest and to protect non-target species. Enforcement of these restrictions will remain a challenge, particularly in far-flung fisheries with many available landing sites and direct retail marketing opportunities. Catch shares themselves introduce the need for another layer of administration and enforcement, tracking share ownership and ensuring that it matches catch or landings.

None of this is to say that catch shares are not a useful fishery management approach. Although more empirical study of their impacts is needed,

it seems clear that catch shares can provide a path to reduced capacity and increased long-term sustainability of target species harvest in many domestic fisheries in developed nations. Where these are the key management goals, catch shares will often be the preferred strategy.

That preference should not be automatically imported to the trans- or inter-national context. Value conflicts, which may not be readily apparent on the surface, may mean that nations that share an interest in a stock have irreconcilable management goals. Catch shares will not solve those conflicts, and may even make them more intractable. Even if their goals coincide, nations and individuals engaged in international fisheries may deeply mistrust one another's motives, or the motives or interpretations of the management entity. That sort of mistrust may make it impossible to agree on the nature of "the fisheries problem," or on essential details such as the appropriate allocation of rights among nations or extent of restrictions on transfer. Finally, enforcement is a special challenge in the international fishery context. Lack of capacity for and commitment to enforcement will exacerbate the trust issues between participants.

Property rights approaches to resource management problems seem to be on the rise globally, and have become especially dominant in domestic fisheries. They have understandable appeal in the high seas context, in light of concerns about rapidly declining global fisheries. They are not, however, the right tool for addressing the current woes of the world's oceans. Their implementation would face high practical and political barriers, without promising concomitantly high conservation benefits. Only after clarifying joint goals and overcoming the enforcement challenges should the international fishery community worry about how to introduce catch share management strategies.