

Assessing market-based environmental policy using a case  
study of North Pacific fisheries

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## **Abstract**

This paper uses a case study to provide a critical assessment of arguments underlying market-based environmental policy. Market approaches, which rely on economic incentives and property rights to achieve environmental goals, have become increasingly popular in the past two decades. Proponents argue that market approaches should replace “command and control” regulation, which works by penalizing environmentally harmful behavior. Synthesizing results of previous research on political economy of the North Pacific pollock fishery, this paper provides evidence that contradicts hypotheses derived from the logic of market approaches. First, a lack of property rights is not the underlying cause of problems in this fishery, but instead problems were created by the institutional context of fishery development. Second, market and regulatory approaches to this fishery are not necessarily contradictory and inherently incompatible. Both markets and regulation create both economic opportunities and constraints, markets alone are not enough to protect the environment, and markets require regulation to function. Because the market approach is based on a general logic that is supposed to be universally applicable, results from this case reveal potential flaws in the market approach more generally.

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**Running headline:** Assessing market-based policy

## **Introduction**

Market-based environmental policies, which rely on economic incentives as the primary means to achieve environmental goals, have become increasingly popular since the 1980s. Harvard economist Robert Stavins (2002, p. 173), himself a supporter of these market approaches, recently remarked that in the United States “the concept of harnessing market forces to protect the environment has evolved from political anathema to political correctness.” Market approaches are also increasingly popular in Europe and elsewhere around the world (Aidt and Dutta, 2004, Jordan et al., 2003, Stavins, 2003). Market approaches are being used to address a variety of environmental issues, from air pollution to habitat loss, and there are a variety of instruments to harness market forces (Hahn, 2000, Hahn et al., 2003). Examples include fees for using public lands, government subsidies for low-emission automobiles, tradable permits as called for in the Kyoto protocols to reduce carbon emissions, and selling development rights to land for conservation purposes. Proponents argue that because market approaches link economic rationality to environmental outcomes, they are the most efficient and effective way of meeting environmental goals (e.g. Anderson and Leal, 2001, Kosobud and Zimmerman, 1997b, Stavins, 2003). Unlike regulatory approaches, which work by penalizing environmentally harmful activity, market approaches rely on profits to generate environmental protection. At the same time that market approaches have become popular there is widespread criticism of them (Gowdy, 2004, Lawrence, 2001, McCarthy and Prudham, 2004). Critics argue that market approaches fail to address underlying causes of environmental problems and that not all environmental values can be captured in benefit-cost calculations. They also argue these approaches reward those

who degrade the environment and exacerbate poverty by increasing the likelihood that the poor will lose access to land and resources.

This paper evaluates market-based environmental policy using the author's research on fisheries in the US North Pacific, with emphasis on property rights and use of tradable quotas as a market mechanism. The paper does not evaluate the extent to which real outcomes match those proposed by proponents, nor does it evaluate the claims made by critics. Instead, the paper examines the market approach by assessing the extent to which real situations and policies reflect the underlying arguments on which market approaches rely. These underlying arguments are not simply claims made by proponents of market approaches, but rather are the logical ground on which claims are made. The strengths of this approach are that it assesses the market approach on its own terms rather than using external criteria, and it assesses necessary elements of the market approach rather than epiphenomena. The first argument the paper challenges is that environmental problems are created by a lack of property rights. Second, it challenges the idea that markets and regulation are contradictory and inherently incompatible. Overall, the paper finds that several of the basic tenets of market-based environmental policy do not hold true in all situations, and thus the case material suggests that the underlying logic of market approaches contains important flaws.

The next section of the paper reviews the market approach, followed by a section that discusses the application of this approach to fisheries. The paper then turns to the North Pacific pollock fishery, first providing general background and then offering an

alternative account of the political economy of the fishery. This alternative account addresses the two issues identified above by presenting evidence regarding four central hypotheses about the fishery derived from the logic of market approaches. The conclusion ties these case study threads together to argue that this case challenges the validity of some of the basic propositions of the market approach.

### **Market-based environmental policy**

Proponents of market-based environmental policy promote the general idea that market mechanisms work because they link firms' and individuals' self-interest to environmental outcomes; that is, they "induce—rather than command—changes in behavior" (Anderson et al., 1997, p. 16). By creating markets where none existed before—e.g., a market for pollution credits—this approach provides an economic incentive for individuals and firms to act in ways that are environmentally beneficial. Proponents draw their ideas from neoliberal economic and political thinkers such as Ronald Coase and Friedrich Hayek, who themselves draw on liberal thinkers such as Adam Smith. In this liberal, free market tradition, priority is given to private, individual decision making rather than public, governmental intervention (Adler, 2000, Kula, 1998).

In this vein, proponents contrast market approaches with more traditional "command and control" forms of environmental protection, which rely on detailed governmental regulation of activities that might harm the environment (e.g. Adler, 2000, Aidt and

Dutta, 2004, Kosobud and Zimmerman, 1997c, Stavins, 2002, see also Donahue, 2002, Kamarck, 2002). Market approaches are explicitly designed to replace these regulatory approaches; for example, tradable emissions permits are designed to replace uniform emissions standards, while wetland mitigation banking is designed to replace prohibitions on development in wetlands. Proponents of market approaches generally argue that traditional regulation is inflexible and therefore inefficient. Because the uniform standards of regulation are “one-size-fits-all” measures, they do not allow firms to develop and implement the most cost-effective means of reducing environmental impacts. The lack of flexibility also creates a disincentive for firms to invent, innovate, and diffuse new technologies and ways of doing things (Jaffe et al., 2003). Regulations could, in theory, be designed to be more flexible, but this would require that regulators have detailed information that is either not available or too costly to acquire; markets avoid this information problem because prices incorporate multiple types and sources of information—including personal values—as expressed in myriad decisions about buying and selling (Adler, 2000, Kula, 1998, Smith, 2000b, Stavins, 2002). Because of this range of drawbacks, therefore, regulatory approaches create economic hardships, are often ineffective, and are divisive. In contrast, market approaches do not command people to act in certain ways, but provide incentives in the form of opportunities for individuals and firms to profit from environmentally beneficial activities. These incentives and opportunities mean that market approaches are flexible, which is argued to increase innovation and efficiency. Because they harness the profit motive, market approaches are offered as the new paradigm for achieving environmental goals, and

have even been called the “*natural* consequence of more ambitious environmental targets” (Aidt and Dutta, 2004, p. 460, emphasis added).

Despite this shared rationale and intellectual history, there are differences in approach. As one commentator put it, some proponents are in a “conversation about market governance,” which includes some role for government, while others are in a different “conversation about markets, *not* government” (Donahue, 2002, p. 23, emphasis in original). For example, authors such as Hahn and Stavins include mechanisms such as fees, taxes, and subsidies and treat market incentives as a means to achieve goals that are set politically. In contrast, authors such as Anderson and Leal (2001) and Smith (2000a, 2000b), who identify themselves as “free market environmentalists,” dismiss taxes, fees, and subsidies as unnecessary government intervention and focus instead on assigning complete property rights. In this view, private property is not only a means to achieve previously set goals, but is also the means to set those goals in the first place. Even instruments such as tradable permits are not fully adequate, because they require that government agencies set overall limits.

### Property in the market logic

Underlying these basic claims proponents make about effectiveness of market mechanisms is a deeper analysis of problems and their solutions. In the market logic the problems themselves are caused by a lack of markets, and in particular by a lack of property rights. This lack creates externalities (including environmental problems),

which can only be solved by assigning property rights and creating markets. While not all mechanisms rely on complete property rights, markets cannot exist without such rights: “Establishment of property rights is a necessary precursor to the use of markets” (Starrett, 2003, p. 101). Although, all market mechanisms—from trade in wildlife to tradable pollution permits—create and use property rights in some form (e.g. Goldstein, 1991, Kosobud and Zimmerman, 1997a), this point remains implicit in a large segment of the literature on market mechanisms, especially in the work of those scholars identified above as being in a conversation about “market governance.” As Stavins (2002, p. 174) stated, “Environmental policies typically combine the identification of a goal with some means to achieve that goal. Although these two components are often linked within the political process, I focus... exclusively on the second component, the means—the ‘instruments’—of environmental policy.” In this way, these commentators present their approach as a technical one, based on choosing between regulation and markets by evaluating monetary costs and benefits. But this presentation of the market logic as a purely technical issue misrepresents the approach. It hides the particular logic of property upon which market mechanisms depend and it hides that the market already has a goal embedded in it, i.e. profit, and that this goal inherently comes first in the market logic.

The necessity of a particular logic of property and profit is quite explicit in the other set of literature on market mechanisms, identified above as being about “free market environmentalism” (for recent general discussions see Anderson and McChesney, 2003, Jacobs, 2004). As these commentators explain the market logic, property rights are an

especially powerful means to create positive incentives because, as Anderson and Leal (2001, p. 4) put it, with property rights “a discipline is imposed on resource users because the wealth of the property owner is at stake if bad decisions are made.” In this view, environmental problems fundamentally result from a lack of markets, which is rooted even more fundamentally in a lack of property rights. For example, Smith argued that “problems are not the result of market forces, but rather of their absence... Therefore, those concerned with protecting the environment and ensuring human prosperity should seek to expand capitalism, *through the extension of property rights*” (2000a, p. 27, emphasis added). A lack of property rights is seen to create economic disincentives to environmental protection because without property rights, individuals and firms do not bear all the costs of their actions, and so have increased incentives to use and abuse environmental amenities. This is the underlying logic of the “tragedy of the commons” model of environmental decision making (Hardin, 1968). Thus, assigning property rights and building markets is seen not only as a solution to existing problems but also as a way to prevent problems in the first place.

### **Market approaches in fisheries**

Fisheries play an important role in this drive toward market-based environmental policy. Many commentators use the example of fisheries to promote their more general argument about the importance of market mechanisms for the environment (e.g. Adler, 2000, Anderson and Leal, 2001, De Alessi, 2000, Kula, 1998). From within a neoliberal framework, fisheries seem to present a clear argument not only for market mechanisms in general, but specifically for property rights (Hannesson, 2004). Even today, fisheries

are mainly open access, and around the world they face crises of overfishing and overcapitalization. Regulators have tried to address these problems using a wide-variety of mechanisms, from gear limits and limited entry to seasons and protected areas, but problems continue to exist. Citing this confluence of features—open access, intractable problems, and ineffective regulation—proponents of market approaches argue that assigning property rights is the only way to address problems associated with fisheries. As a general argument, proponents make the case that open access offers perverse incentives that encourage overcapitalization, rent dissipation, and, eventually, overfishing; that is, these incentives make it economically rational for the individual to overcapitalize and overuse resources, even though the larger outcome is negative. Thus, the central argument is that assigning property rights is an essential move away from traditional, command and control approaches.

Emphasis on the role of property in fisheries actually precedes by several decades the more recent emphasis on market-based environmental policy in general (Mansfield, 2004a). From the time economists began to address fisheries directly, the question of the commons has been a central theme and fisheries economists have looked for ways to enclose fisheries by developing various types of property regimes (Gordon, 1954, Scott, 1955, Christy and Scott, 1965). Fisheries economists encouraged extended political jurisdiction as a first step toward enclosure that would allow governments to implement limited entry regimes. By the close of the 1980s, economists were increasingly arguing that limited entry was unsuccessful, and that such programs should be replaced by “rights based” approaches that develop private property in fisheries (Scott, 1989, Neher

et al., 1989). More recently, Francis Christy argued that this move from open access to property rights is “inexorable” because there is no possible alternative to rights based approaches (1996, p. 288). The implication is that such market approaches are both necessary and entirely natural, and therefore normatively right.

### Tradable quotas

Within this rights-based paradigm in fisheries, tradable quotas are lauded as an innovative way of assigning property rights to a resource that is notoriously difficult to privatize. Supporters have suggested that tradable quotas “are part of one of the great institutional changes of our times: the enclosure and privatization of the common resources of the ocean” (Neher et al., 1989, p. 3). While most such quotas come in the form of Individual Transferable Quotas (ITQs), there are actually numerous variations on the theme, including fishery co-operatives as well as strictly individualized approaches.

Tradable quotas work not by assigning property rights to particular living fish or areas of water, but by assigning marketable rights to access to the fishery (for general discussion, see Copes, 1986, Grafton et al., 1996, Hannesson, 1991, Hannesson, 2004, National Research Council, 1999). Quota holders are assigned a share of each year’s total catch, which is set by regulators. Quota holders can then sell and/or lease their share to other qualified fishers. The logic of such programs is that individual fishers avoid the “race to fish” because they no longer have to worry that someone else will get

the fish first, which increases technical efficiency, product quality, safety, and so forth. Expected outcomes are a reduction in overall capacity, increase in capacity utilization among remaining operations, and, therefore, increase in industry-wide efficiency, which is thought to lead not only to increased profits, but also environmental protection. The first applications of tradable quota were in the 1980s in New Zealand and Iceland, and although not yet ubiquitous, tradable quotas now exist in various situations around the world (Hannesson, 2004). Most current research on tradable quotas takes the desirability of such programs for granted, and focuses instead on particular aspects of design and implementation related to issues such as rent seeking behavior (e.g. Bergland et al., 2002) and the possibility of replacing the widely used crew share system with wages (e.g. Hannesson, 2000).

While support for tradable quotas is widespread among fisheries economists, tradable quotas in fisheries have been quite controversial. Tradable quota programs raise a host of issues regarding distribution, equity, and spatial unevenness (McCay, 1995, National Research Council, 1999). One fear is a reduction in employment opportunities in fishing and processing. A more general fear is that tradable quotas will lead to increased concentration of property in a few hands at the expense of small-scale fishers, marginal coastal communities, and future generations of potential fishers. In addition to equity issues, some economists point out that tradable quotas do not address all externalities, and may create new ones (Copes, 1986, Bergland et al., 2002). Further, even among supporters of the market paradigm, not everyone sees tradable quotas as the final solution. While some supporters argue that quota programs are a form of full

property rights that can yield first-best solutions to the commons problem (e.g. Danielsson, 2000), others argue that the ongoing government role is incompatible with the market logic. For example, Batstone and Sharp (2003) draw on the work of Hayek to argue that regulators should not set total catch levels, because they have to rely on imperfect and incomplete information to do so. Instead, quota prices contain most of the information necessary for setting total allowable catches. Other commentators argue that quota programs should eventually be replaced by full ownership of the fishery, by either individuals or groups (e.g. Christy, 1996, see also Scott, 1955, Scott, 1989). This echoes arguments of those who support market approaches more generally, who argue that while tradable quotas are a start, in the end only full property rights are satisfactory (e.g. Anderson and Leal, 2001, De Alessi, 2000). Thus, some commentators argue that tradable quotas go too far because they ignore equity in favor of extending the market, while other commentators argue that tradable quotas do not go far enough because they do not fully extend the market to all aspects of the fishery.

### **The North Pacific pollock fishery in economic and environmental context**

The fishery for Alaska pollock (*Theragra chalcogramma*) is the largest food fishery in the world, with global catch of 2.7 million metric tons in 2002 (FAO Fisheries Department, 2004). A highly abundant but very bland fish, pollock is familiar to consumers mainly in the forms of fish sticks, fast food sandwiches, and surimi products such as imitation crab. Concentrated in the Bering Sea, this fish is caught mainly in US and Russian fisheries. The focus here is on the US portion of this fishery, which has a catch of 1.5 million metric tons in 2002 (NMFS, 2003). This fishery started in the

1960s, when fish firms from Japan sent factory trawlers to the North Pacific. In the late 1970s the US extended jurisdiction over coastal waters to 200 nautical-miles, enclosing the main fishing grounds as domestic resources. Catch by the US fishery rose from almost zero in 1978 to a high of 1.7 million metric tons in 1991 (Hiatt and Terry, 2000).

By the late 1980s, the fishery faced several environmental and economic problems. A central environmental concern has been the possibility that the pollock fishery contributes to the decline of the endangered Steller sea lion (Steller; *Eumetopias jubatus*). Stellers overlap geographically with the pollock fishery, they eat pollock, and their decline correlates in time with the start of the fishery in the 1960s. Although the cause of decline is still not well understood—current scientific thinking is that there are multiple causes—a central hypothesis has been that the pollock fishery depletes food on which the Steller depends (National Research Council, 2003). After the Steller was listed as threatened in 1990 (it was listed as endangered in 1997), the North Pacific Fishery Management Council (the Council) and its parent agency the US National Marine Fisheries Service (NMFS) developed a series of regulatory measures that restrict when, where, and how much pollock can be caught. These measures became more restrictive over time, as NMFS was sued successfully by environmental groups for not adequately protecting the Steller (Mansfield and Haas, 2006).

During the late 1980s and early 1990s, regulators at NMFS and the Council also began to argue that the pollock fishery was overcapitalized, with too much fishing capacity. Citing economic inefficiencies and “irrational” incentives of open access fisheries, in

1992 the Council started a process of “rationalizing” not only pollock, but all federally managed fisheries of this region. Rationalization entails creating markets to govern resource use by enclosing fisheries within increasingly more delimited regimes of property rights. Mechanisms the Council has used include a vessel moratorium, limited entry program, and ITQs for several species of fish and crab. Rationalization for the pollock fishery was created through federal legislation. The 1998 American Fisheries Act (AFA) created a co-operative based quota program that is similar to ITQs, except that it is co-ops of fishers, rather than individuals, that are assigned quota shares. These co-ops then allocate rights to fish to their individual members, who can lease them among themselves. There are currently nine co-ops in the pollock fishery: one “offshore” coop composed of 21 catcher-processor vessels, one “mothership” coop composed of three processing vessels and the twenty fishing vessels associated with them, and seven inshore co-ops each composed of a single land-based processor and the vessels that deliver to it (there are about 100 such vessels). The Council manages the co-op system, and has made a series of changes to how the system works. These co-ops comprise a market approach to fisheries management in that the quota creates a property right in the fishery (putting an end to the open access fishery), and individuals and co-ops of individuals can then market this property to each other. It is this market logic that underpins the co-op system.

The Council justifies its comprehensive rationalization program by drawing directly from the economic logic that is used to support market approaches more generally. As the Council recently described it, “Rationalization programs derive their name from

their rationalizing effect on investment in the fishery... Typically, rationalization programs are management programs that create a market in the fishery through the allotment of shares to participants. Investment decisions of share holders in the fishery are then geared toward receiving maximum returns on their allotted shares. The end result of these incentives is economic investments in the fishery commensurate with the amount of fish that can be efficiently harvested and processed” (NPFMC, 2004, p. 1:6). In this way, they argue that quota programs provide economic incentives that end “the race for fish” and thereby increase efficiency, reduce capacity, increase safety, and provide environmental protection for both the targeted resources (i.e. the fish) and the marine ecosystem more generally (e.g. the Steller). This standard account of the situation in the North Pacific is also promoted by fisheries economists. For example, in his description of the Alaska groundfish fisheries (of which pollock is the most important species), Holland states that throughout the “1980s, the size and exclusivity of user groups and associated catch rights were not tightly controlled. Although groundfish stocks and harvests were maintained at relatively high and steady levels through limits on total allowable catch (TAC), a ‘race for fish’ and accompanying ‘race to process’ led to dissipation of resource rents through overcapitalization and reduction in product value. Over time, the industry and the North Pacific Fisheries [sic] Management Council implemented a variety of measures that more clearly delineate the catch rights of groups or individuals enabling them to curtail or eliminate the ‘race for fish’ and to increase efficiency at the individual and industry level.” (2000, p. 141). These accounts of the North Pacific all present the case as a classic commons problem,

the solution to which is some kind of property rights, either individual (e.g. ITQs) or collective (e.g. AFA co-ops), that create market incentives.

### **Assessment of market approaches to the pollock fishery**

The market approach contains a general logic regarding empirical problems and their solutions. In this logic, a lack of clear property rights creates environmental problems; these problems are inadequately addressed by government regulation, which can even make problems worse; and when finally utilized, market mechanisms replace government regulation and solve problems by creating new economic opportunities that provide incentives that lead to environmental protection. From this general logic, it is possible to deduce a series of hypotheses about the North Pacific pollock fishery. The first hypothesis is that existing problems are caused by the property regime: the open access situation in these fisheries is the underlying cause of problems. Second, when market mechanisms are finally utilized, in the form of tradable quotas, they provide economic *opportunities* that replace the *constraints* imposed by prior regulatory approaches. Third, tradable quotas, as a form of property, provide incentives that are positive for the environment. Fourth, because market and regulatory approaches are inherently contradictory, tradable quotas replace traditional regulation. The standard account of problems and solutions in this fishery, as presented above, accepts these hypotheses as objectively true.

However, detailed study of this fishery and its governance generates evidence that contradicts all of these deduced hypotheses about market approaches. The standard account does not carefully analyze the political economy of fishing but instead applies a supposedly universal logical model. A more thorough analysis of the political economy of the pollock fishery generates a different historical account that shows that the standard account presents an inaccurate story about problems and solutions in this fishery. In this way, more careful analysis reveals flaws in the underlying logic of market approaches as a universal model. The approach taken in this paper, in which a detailed case study is used to evaluate the claims of a general model of environmental change, draws on work in political ecology on environmental narratives. In this literature, exemplified by works such as Stott and Sullivan (2000) and Adger and colleagues (2001), researchers identify common narratives—taken as objectively true by many people—about the existence of environmental change and what causes it (e.g. narratives about desertification or about human population). Researchers then assess whether evidence from research actually supports these narratives. The point is not to challenge the existence of environmental problems, but rather to better understand what the problems are and what influences how we understand and solve them. This paper contributes to this effort by using case study evidence to evaluate the logic behind market-based environmental policy.

To develop this alternative account of the pollock fishery, the following sections synthesize prior research on the fishery in policy context. This research comprises a series of studies, each of which addressed different aspects of the fishery, including its

history, the process of rationalization, and the relationship between rationalization and other environmental policies. The evidence presented here summarizes key results of these studies, each of which is cited for further reference on conceptual framework, methods, and details of results. The following sections are organized around each of the above hypotheses, which are combined into two themes regarding property and the relationships between markets and regulation.

### Is property the underlying problem?

Whereas market approaches contain a general logic regarding property and its links to environmental and economic outcomes, actual historical analysis yields more complete understanding of the complex causes of particular outcomes. To understand the pollock fishery, it is necessary to examine the institutional history of fisheries development after the US extended jurisdiction over coastal waters (Mansfield, 2001b). Even though extended jurisdiction gave the US legal control over much of the pollock, there still was no US fishing or processing capacity for pollock, so there was no domestic pollock fishery. To address this, the US government initiated an active fisheries development program designed to take control of the new 200 mile zone by displacing foreign fishers with a domestic fishery. To be able to “kick out the foreigners,” it was necessary for the US to actively take control of their new territory by “Americanizing” these fisheries, as the rhetoric of the time went.

Americanization happened in a variety of ways. First, federal loans and loan guarantee programs helped individual fishers and processors finance investments in this fishery, such that the government bore some of the cost and the risk of development. These programs were less important in this region than further south along the Pacific coast (Mansfield, 2001a), but were a factor in the pollock fishery. Second, a key policy initiative of this fishery development program was the American Fisheries Promotion Act of 1980, in which the US formulated a series of criteria, now known as “fish and chips”, designed to compel foreign countries wanting access to the 200-mile zone to assist with domestic fisheries development in return. Under the fish and chips policy, the federal government negotiated with the Japanese government and individual firms to create two form of assistance. There were non-equity joint venture agreements, in which US fishers caught fish and sold them directly to Japanese processing vessels stationed within the 200-mile zone; these lasted throughout the 1980s. There was also direct investment from Japanese processing firms, which built processing plants in Alaska in the 1980s; these firms have maintained their presence to today. Both forms of assistance provided a market for US fishers which made it possible for them to enter the fishery. Third, through bilateral negotiations and formal GATT proceedings, the US government urged the Japanese government to reduce both tariff and non-tariff barriers to import of pollock and pollock products. This was largely successful only after Japanese firms were active in the US fishery, so it is not clear if this is the direct outcome of US pressure or is the indirect effect of inviting Japanese firms to Alaska. These fishery development efforts were quite successful, and by the early 1990s there was no direct foreign fishing or joint venture fishing within the 200-mile zone.

What does this case tell us about property regimes as the underlying factor causing problems in this fishery? First, it is a fallacy to ascribe problems of overcapitalization in the pollock fishery to the property regime. Throughout history this region had been open access, but problems only arose in the 1980s to 1990s, so open access in itself explains very little. Problems occurred after the US government spent a decade actively encouraging fishers and processors to join and develop this fishery. Regulators and others certainly know about and acknowledge these development programs, but they fail to take them into account analytically. For example, Holland, the economist cited above, mentions Americanization in his descriptive history of the fishery, but does not treat this as analytically significant. He treats it simply as a shift from foreign to domestic, rather than as fisheries development program that might explain overcapitalization, the race for fish, and so on.

Second, this story also highlights the significance of institutional factors that shape behaviors. Market proponents focus largely on individual decision making, which they treat as deriving almost exclusively from calculations of individual profit maximization. Private property is supported in large part because it seems to match individual benefits and their costs, while common property and open access provide individual benefits and reduce individual costs, leading to degradation. This view of property and behavior ignores the ways that individual behavior is embedded within various institutional contexts. These include institutions in the “narrow sense of formal organizations” but also in the “broad sense of socially habituated behavior” and norms (Hodgson, 1994, p.

64). Drawing on these ideas about institutions and collective behavior, the individualistic view of property has been challenged for decades by scholars who have argued that common property also has a range of institutions—in the broad sense—that influence behaviors that lead to economically and environmentally beneficial outcomes (e.g. Berkes et al., 1989, McCay and Acheson, 1987). What the pollock case shows is that neither of these views of property are able to account for institutions that shape behavior *in open access situations* (see also Mansfield, 2001a, 2004a). The history of development of the pollock fishery shows that there were a variety of factors shaping people's behavior even in what was a de facto open access situation: people *always* exist in various institutional contexts. Americanization was clearly institutional in the narrow sense, in that US government agencies created programs that influenced behaviors. But it was also institutional in the broader sense of shaping rules, norms, and habituated behaviors. Americanization—as the term itself indicates—was about making a domestic Pacific fishery seem not only possible, but normal and even patriotic. It made entering and developing this fishery into the right thing to do. This provides one indication of how behavioral decisions regarding this fishery were not in any simple sense determined by the property regime. Treating property as deterministic ends up missing crucial causal factors. The pollock case, then, contradicts the first hypothesis. Overcapitalization of this fishery resulted not from the open access regime, but from the institutional context of fishery development in the name of Americanization.

## Are market and regulatory approaches contradictory?

Market and regulatory approaches are generally described in terms of a series of contrasts that make them seem contradictory: free market vs. government control, opportunity vs. constraint, flexibility vs. inflexibility, and so on. As one market proponent stated, “The two alternative perspectives on environmental policy—free markets and central planning—differ dramatically. One relies upon individual ingenuity and economic liberty to harness the progressive nature of market forces. The other rests upon political manipulation and government coercion. In point of fact, *these approaches are antithetical*. There is little hope of developing a ‘third way.’” (Smith, 2000a, p. 35, emphasis added). As this contrast indicates, markets and regulation are considered to be inherently different things with different underlying logics. Despite these assertions about how different market approaches are, analysis of market mechanisms in the pollock fishery yields a different, less schematic understanding of the relationship between markets and regulation.

### *Economic opportunity and constraint under rationalization and regulation*

To their proponents, markets provide flexibility and create economic opportunities whereas regulation lacks flexibility and creates economic hardship: markets equal opportunity while regulation equals constraint. This perspective is echoed in how the Council describes the combined effect of AFA rationalization and regulations to protect the Steller. The Council argued that rationalization helped mitigate negative economic effects of closed areas and seasons protecting the Steller. In particular, they argued that rationalization provided individual fishers with increased flexibility in the face of these

constraints. Instead of having to race for fish to compete with all other fishers, under the quota program they know in advance how much fish they can catch. This gives them flexibility to plan when and where to fish, which allows fishers to adjust to constraints imposed in the name of environmental protection. As the Council put it, “Perhaps the most significant beneficial effect of the AFA...has been to serve as a mitigation measure to allow the Alaskan groundfish fisheries to take place in an economically viable way in the face of subsequently imposed Steller sea lion protection measures” (NPFMC, 2001, p. 46). “Implementation of the AFA likely helped the fleet in their effort to comply with the mandates imposed in the [Steller regulations] by providing [the Bering Sea-Aleutian Islands] pollock fleet greater flexibility in their fishing operations by eliminating the need to race to harvest [Bering Sea-Aleutian Islands] pollock” (NPFMC, 2001, p. 7). The Council also argued that flexibility most helps small boat fishers, who in the past would have been likely to fish inside nearshore areas now closed to protect the Steller, and for whom moving offshore is a more costly and risky undertaking. The Council’s account thus creates a contrast: Steller protections create hardships, especially for small boat fishers, while pollock rationalization offers broad-based benefits.

Evidence suggests that this is an incomplete account of opportunities and constraints of both pollock rationalization and Steller regulations (Mansfield, 2006). Both rationalization and regulation create constraints. While Steller protections do constrain the activities of fishers, and these constraints have greater impact on small boat fishers, pollock rationalization has similar effects. The goal of rationalization was to reduce

overall capacity by getting the least efficient operations to leave the fishery, and these are more often smaller operations. Since implementation of the AFA, there has been a reduction in the total number of fishing vessels active in the fishery, and the vessels that lease their quota—either leaving the fishery or reducing their activity in it—are, on average, smaller than those that do not. Thus, while impacts on smaller vessels are the unintended effect of Steller regulations, they are the explicit goal of pollock rationalization. The inverse of the idea that both regulation and rationalization create constraints is that both also create opportunities. While rationalization did create opportunities, particularly for the larger vessels and firms that were able to take advantage of them, Steller regulations also created opportunities for these vessels and firms. Because Steller regulations changed the competitive landscape by allowing fishing only in places that are difficult for small vessels to reach, these regulations create conditions conducive to larger boats, giving them the opportunity to expand their operations. In terms of opportunities and constraints, Steller regulations and pollock rationalization are quite consistent with each other and are mutually reinforcing. With either, the result is consolidation within the inshore fishery as independent, small boat fishers leave and remaining owners expand their operations accordingly. This contradicts the second hypothesis. Markets do not create opportunities that replace the constraints of regulation, but rather both markets and regulation create both opportunities and constraints.

### *Market incentives for and against environmental protection*

The flexibility discussed in the previous section was also used to argue that the market

approach directly helps the Steller. Flexibility allows fishers to disperse their fishing efforts across space and over time, which is good for the Steller because it reduces the likelihood that fishers create localized depletions of prey. This was the primary goal of Steller regulations. The Council argued that concentration in time and space was the result of the former competitive regulatory regime. Competition led to temporal concentration (i.e. short seasons), which contributed to spatial concentration (i.e. individual vessels did not have time to disperse their effort across a large area). Once privatization gave them the flexibility to disperse their effort, fishers would do so, with the unintended effect of benefiting the Steller. As NMFS stated, rationalization is “expected to have conditionally positive effects on Steller sea lions as a result of the expected temporal and spatial dispersion of fishing effort” (NMFS, 2002, p. 4:255). Thus, just as market proponents suggest, the Council and NMFS present rationalization as good for the environment.

This is an incomplete account of the relationship between markets and incentives (Mansfield, 2006). While tradable quota under pollock rationalization provides fishers with flexibility to disperse fishing activity, it is not clear that this translates into incentives to do so. NMFS provides evidence that fishing activity has been dispersed in both space and time (e.g. NMFS, 2002), but the cause of this is impossible to determine: the cause may be either pollock rationalization or Steller regulations, as these were implemented at the same time. The Council and NMFS regularly acknowledge this difficulty. In addition, they note there are still market incentives to concentrate fishing activity. Spatially, it still costs less to fish in nearshore areas, especially if those areas

are near onshore processing plants. Temporally, there are still incentives to fish when pollock are carrying roe (eggs), which is a commodity in itself. Further, they also note that pollock rationalization actually created new market incentives to concentrate, rather than disperse, fishing activity. In particular, the AFA allocated fishing shares from the offshore sector to the inshore sector of the fishery, which is comprised of smaller boats that are more likely to concentrate their activity in nearshore areas. These economic incentives to concentrate indicate that rationalization is not, in itself, enough to protect the Steller. This contradicts the third hypothesis. Markets can create complex economic incentives with contradictory environmental implications.

### *Coexistence and dependence of market and regulatory approaches*

One of the main assertions of the market paradigm is that it can and must replace traditional regulatory approaches, which are inherently faulty. However, the actual relationship between rationalization and regulation in this fishery indicates that market approaches do not replace traditional regulation. First, there is no evidence that tradable quotas have replaced command and control regulations in the pollock fishery (Mansfield, 2004b, Mansfield, 2006). None of the traditional regulations, such as seasons, gear limits, and prohibitions on roe stripping, have been dismantled in the wake of rationalization. In addition, Steller protections, including strict area closures and seasons, were designed and implemented simultaneously with, yet separately from, the pollock rationalization program. Also, because co-ops are penalized for exceeding their allocated catch, under rationalization fishers have the new responsibility of planning and negotiating leases so as to catch all their allocation without exceeding it. This evidence

indicates that market approaches have not replaced regulatory approaches, but rather co-exist with them. Rather than *reducing* regulation, tradable quota becomes yet *another form* of regulation that fishers and processors must negotiate. To the extent that market approaches create new requirements to which fishers must comply—such as requirements to self-monitor their operations to be sure they are not exceeding their quota—the tradable quota becomes a type of regulation used to govern behavior.

Second, there is substantial evidence that the pollock rationalization plan *requires* regulation to make it work. Although this notion is anathema to the market logic, analysis shows that there is a complex mix of intensely detailed rules—linked to the rationalization plan of the AFA—designed to make the market function properly (Mansfield, 2004b). One set of regulations protects the competitive context. The tradable quota program freed pollock companies from certain kinds of competitive *pressure* in the pollock fishery, which gave the benefiting companies a competitive *advantage* in other fisheries in which these companies are active, such as the lucrative crab fisheries. To address this, the AFA contains a series of protective measures, collectively known as “sideboards,” that use “catch history” to explicitly limit pollock entities from expanding operations in any of these other fisheries beyond the extent to which they participated in the years leading up to the AFA. To make this basic mechanism work, moreover, the Council had to develop complex regulations that further define catch history. In developing these regulations, the Council had to address a series of detailed issues regarding what to count when calculating catch history (e.g. what years, what kind of catch, by whom and so on), what kind of variation in definition

(e.g. by sector, region, direct catch vs. bycatch), and what kinds of exemptions they would include. These regulations were nested within decisions about at what level to apply and manage these sideboard limits, an issue that was particularly vexing for processing sideboards. Applying them in the aggregate (all pollock processing plants) is very different from applying them to individual firms, and in any case they then had to define a firm. Defining it as the facility, its direct owner, or every facility that is connected to that facility through any number of ownership linkages each has different implications for when a cap kicks in and therefore what kinds of protections are provided to non-pollock processors. The Council chose the option of applying sideboards to individual firms, and defined those firms broadly via both horizontal and vertical connections. What all of these regulations do is *restrict* the competitive market—limiting firms’ ability to respond to market conditions, changes in technology, innovations in business management, and so on—but they do so in order to *protect* the competitive market.

A second set of regulations to make the market work manages dynamics among different groups, particularly among fishers and processors. There was intense controversy about the extent to which inshore co-ops gave the individual processor inordinate control over fishing (e.g. timing of fishing or the price of fish) such that fishers would lose their independence and become like employees of the processor. Regulations to govern co-ops were particularly important for making the whole system work because fishers had the option to opt-out of the co-ops and stay in an “open access” fishery. The Council worked to make opting out *less* enticing and make joining

co-ops *more* enticing. They further varied the definition of “catch history” in several ways to make more fish available to those fishers in co-ops. They also regulated the extent to which each fisher is tied into a coop, and therefore to a single processor. They placed limits on the ability of fishers to move between co-ops, thus giving more power to processors in the fisher-processor relationship. Finally, the Council enhanced marketization by giving fishers the option of leasing across co-ops in addition to leasing within the coop.

In all these decisions—both about competition in other fisheries and about coop structure—it is not that the Council chose between social engineering by the state or letting the market run itself; instead they chose under which regulations the market would operate, and some of these regulations radically *decreased* the flexibility of individual fishers and processors. A truly free market was not an option. Thus, there is a basic contradiction in the market approach, as rationalization simultaneously involves micro-managing the dynamics of power and competition among firms, sectors, and the different fisheries of the North Pacific, all in the name of protecting the competitive, market context. In other words, the market system depends on getting the rules right, and market approaches cannot simply replace regulatory ones. To do so is to invite failure: just as individuals always exist in institutional context, so do markets. Markets themselves are sets of institutions (they are socially habituated behaviors shaped by rules and norms), and as such cannot be free but must be constantly fostered—which is a necessary form of regulation (Polanyi, [1944] 1957). In contrast to the fourth

hypothesis, then, market and regulatory approaches are not necessarily contradictory, and markets cannot replace traditional regulation.

## **Conclusion**

This paper has shown that the market logic applied to the North Pacific pollock fishery is flawed in that it misrepresents the complexity of problems in the fishery and complexity of relationships between regulation and markets. Market approaches are based on the idea that a lack of property rights and markets is the underlying problem, but problems of overcapacity are not due to the open access nature of the fishery. Instead they are due to an institutional context of fisheries development that encouraged entry into the fishery. Market approaches are based on the idea that markets create economic opportunities while regulation creates constraints, but in the pollock case markets and regulation create a complex set of constraints and opportunities that have consistent outcomes. Market approaches are based on the idea that property rights create incentives that lead to environmental protection, but pollock rationalization creates multiple different market incentives, some of which may lead to environmental protection while others may not. Market approaches are based on the idea that they are antithetical to—even the opposite of—regulatory approaches, yet not only do rationalization and command and control approaches co-exist in the pollock fishery, but the tradable quota program itself requires complex rules and regulations to make it work. This is not because it is a faulty market program—not market enough—but because markets are institutions that are embedded in social frameworks that make them work: market competition has to be created and fostered. A truly competitive system

existed under open access, but, according the market logic, this was the wrong kind of competition because it was not based on property rights. To create the property rights required for markets, it is necessary not only to create and enforce the property (i.e. tradable quota) but also to create and foster the competitive environment within which the property can work; the market alone does not do this. Therefore, although market approaches are premised on a strong differences between markets and regulation, this paper has shown that tradable quotas do not offer a clear alternative to command and control regulatory approaches to this fishery.

This account of the political economy of a single fishery raises questions about the underlying rationale of market-based environmental policy more generally. Because the market approach is based on a general logic that is supposed to transcend particular contexts and be universally applicable, even a single case contradicting this logic can be illuminating (for an overview of generalizing from cases, see Silverman, 2000, ch. 8). In the market logic, a lack of property rights always leads to environmental problems, while the presence of property rights always creates positive incentives, and these lead to environmental protection. Command and control regulation is inherently flawed because it is inflexible and constraining, while markets are inherently about flexibility and reward for hard work and good decisions. Because the market approach relies on these universals, a single deviation from these expectations weakens the market approach—and does so on its own grounds. Clearly, this paper has not tried to assess market approaches in terms of the economic and environmental outcomes predicted and promoted by proponents. That is, the paper has not assessed whether tradable quota is

more efficient than the race for fish, leads to more innovation, or even decreases overfishing. At the same time, this paper has tried to assess the market logic *on its own terms*. It has avoided assessing market approaches in terms of completely different criteria, such as equity or ability to incorporate diverse environmental values into market accounting. All of these—internal predictions of efficiency and innovation and external critiques based on equity and values—are important issues that can and should be evaluated. The goal of this paper, however, has been to identify and assess the general logic that supports and justifies market approaches, with a focus here on the role of property and the relationship between market and regulatory approaches. The central finding is that this general logic does not work when applied to the reality of this case. This does not simply indicate that logical arguments must be modified when applied to real world contingencies, but instead suggests that neither individuals nor markets are as “free” as is posited within the logic. Where the market logic reduces everything to individuals and their incentives, the single case of the North Pacific pollock fishery points out multiple ways that both individuals and markets are fundamentally embedded in larger webs of relations that shape what they do and how they work. Because of this, decisions about whether to use market approaches are not simply technical choices, but instead are political choices that require making difficult decisions about socio-environmental tradeoffs and outcomes.

## References

Adger, W. N., Benjaminsen, T. A., Brown, K. and Svarstan, H. (2001) Advancing a political ecology of global environmental discourses. *Development and Change*, **32**, 681-715.

Adler, J. H. (2000) Introduction. In *Ecology, Liberty & Property: A Free Market Environmental Reader* (Ed, Adler, J. H.) Competitive Enterprise Institute, Washington DC, pp. 9-21.

Aidt, T. S. and Dutta, J. (2004) Transitional politics: emerging incentive-based instruments in environmental regulation. *Journal of Environmental Economics and Management*, **47**, 458-479.

Anderson, R. C., Carlin, A., McGartland, A. M. and Weinberger, J. B. (1997) Cost savings from the use of market incentives for pollution control. In *Market-Based Approaches to Environmental Policy: Regulatory Innovations to the Fore* (Eds, Kosobud, R. F. and Zimmerman, J. M.) Van Nostrand Reinhold, New York, pp. 15-.

Anderson, T. L. and Leal, D. R. (2001) *Free Market Environmentalism*, Palgrave, New York.

Anderson, T. L. and McChesney, F. S. (Eds.) (2003) *Property Rights: Cooperation*,

*Conflict, and Law*, Princeton University Press, Princeton.

Batstone, C. and Sharp, B. (2003) Minimum information management systems and ITQ fisheries management. *Journal of Environmental Economics and Management*, **45**, 492-504.

Bergland, H., Clark, D. J. and Pederson, P. A. (2002) Rent seeking and the regulation of a natural resource. *Marine Resource Economics*, **16**, 219-233.

Berkes, F., Feeny, D., McCay, B. J. and Acheson, J. M. (1989) The benefits of the commons. *Nature*, **340**, 91-93.

Christy, F. T. (1996) The death rattle of open access and the advent of property rights regimes in fisheries. *Marine Resource Economics*, **11**, 287-304.

Christy, F. T. and Scott, A. (1965) *The Common Wealth in Ocean Fisheries: Some Problems of Growth and Economic Allocation*, Johns Hopkins Press, Baltimore.

Copes, P. (1986) A critical review of the individual quota as a device in fisheries management. *Land Economics*, **62**, 278-291.

Danielsson, A. (2000) Efficiency of ITQs in the presence of production externalities. *Marine Resource Economics*, **15**, 37-43.

De Alessi, M. (2000) Fishing for solutions. In *Ecology, Liberty & Property: A Free Market Environmental Reader* (Ed, Adler, J. H.) Competitive Enterprise Institute, Washington DC, pp. 127-136.

Donahue, J. D. (2002) Market-based governance and the architecture of accountability. In *Market-Based Governance: Supply Side, Demand Side, Upside, and Downside* (Eds, Donahue, J. D. and Nye, J. S., Jr.) Brookings Institution Press, Washington DC, pp. 1-25.

FAO Fisheries Department (2004) *The State of World Fisheries and Aquaculture 2004*, UN Food and Agriculture Organization, Rome.

Goldstein, J. H. (1991) Economic incentives for environmental protection: the prospects for using market incentives to conserve biological diversity. *Environmental Law*, **21**, 985-1015.

Gordon, H. S. (1954) The economic theory of a common-property resource: the fishery. *The Journal of Political Economy*, **62**, 124-142.

Gowdy, J. M. (2004) The revolution in welfare economics and its implications for environmental valuation and policy. *Land Economics*, **80**, 239-257.

Grafton, R. Q., Squires, D. and Kirkley, J. E. (1996) Private property rights and crises in world fisheries: turning the tide? *Contemporary Economic Policy*, **14**, 90-99.

Hahn, R. W. (2000) The impact of economics on environmental policy. *Journal of Environmental Economics and Management*, **39**, 375-399.

Hahn, R. W., Olmstead, S. M. and Stavins, R. N. (2003) Environmental regulation in the 1990s: a retrospective analysis. *The Harvard Environmental Law Review*, **27**, 377-416.

Hannesson, R. (1991) From common fish to rights based fishing: fisheries management and the evolution of exclusive rights to fish. *European Economic Review*, **35**, 397-407.

Hannesson, R. (2000) A note on ITQs and optimal investment. *Journal of Environmental Economics and Management*, **40**, 181-188.

Hannesson, R. (2004) *The Privatization of the Oceans*, MIT Press, Cambridge, MA.

Hardin, G. (1968) The tragedy of the commons. *Science*, **162**, 1243-1248.

Hiatt, T. and Terry, J. (2000) *Economic Status of the Groundfish Fisheries off Alaska, 1999*, Alaska Fisheries Science Center, National Marine Fisheries Service, Seattle.

Hodgson, G. M. (1994) The return of institutional economics. In *The Handbook of*

*Economic Sociology* (Eds, Smelser, N. and Swedberg, R.) Princeton University Press, Princeton, pp. 58-76.

Holland, D. S. (2000) Fencing the fisheries commons: regulatory barbed wire in the Alaskan groundfish fisheries. *Marine Resource Economics*, **15**, 141-149.

Jacobs, H. (Ed.) (2004) *Private Property in the 21st Century: The Future of an American Ideal*, Edward Elgar, Cheltenham, UK.

Jaffe, A. B., Newell, R. G. and Stavins, R. N. (2003) Technological change and the environment. In *Handbook of Environmental Economics*, Vol. 1 (Eds, Maler, K. G. and Vincent, J. R.) Elsevier, Amsterdam, pp. 461-516.

Jordan, A., Wurzel, R. K. and Zito, A. R. (2003) 'New' instruments of environmental governance: patterns and pathways of change. *Environmental Politics*, **12**, 3-24.

Kamarck, E. C. (2002) The end of government as we know it. In *Market-Based Governance: Supply Side, Demand Side, Upside, and Downside* (Eds, Donahue, J. D. and Nye, J. S., Jr.) Brookings Institution Press, Washington DC, pp. 227-263.

Kosobud, R. F. and Zimmerman, J. M. (1997a) From journal articles to actual markets: the path taken. In *Market-Based Approaches to Environmental Policy: Regulatory Innovations to the Fore* (Eds, Kosobud, R. F. and Zimmerman, J. M.) Van Nostrand

Reinhold, New York, pp. 49-60.

Kosobud, R. F. and Zimmerman, J. M. (Eds.) (1997b) *Market-Based Approaches to Environmental Policy: Regulatory Innovations to the Fore*, Van Nostrand Reinhold, New York.

Kosobud, R. F. and Zimmerman, J. M. (1997c) Regulatory reform and reinvention. In *Market-Based Approaches to Environmental Policy: Regulatory Innovations to the Fore* (Eds, Kosobud, R. F. and Zimmerman, J. M.) Van Nostrand Reinhold, New York, pp. 3-14.

Kula, E. (1998) *History of Environmental Economic Thought*, Routledge, London.

Lawrence, R. J. (2001) Special Issue: Property, rights, and fairness. *Environment and Planning C: Government and Policy*, **19**, 633-728.

Mansfield, B. (2001a) Property regime or development policy? Explaining growth in the US Pacific groundfish fishery. *Professional Geographer*, **53**, 384-397.

Mansfield, B. (2001b) Thinking through scale: the role of state governance in globalizing North Pacific fisheries. *Environment and Planning A*, **33**, 1807-1827, with Erratum 34 (1).

Mansfield, B. (2004a) Neoliberalism in the oceans: "rationalization," property rights, and the commons question. *Geoforum*, **35**, 313-326.

Mansfield, B. (2004b) Rules of privatization: contradictions in neoliberal regulation of North Pacific fisheries. *Annals of the Association of American Geographers*, **94**, 565-584.

Mansfield, B. (2006) Exploring limits to neoliberalism: articulation between environmental regulation and neoliberal privatization of industrial fisheries. *Environment and Planning A*, **forthcoming**.

Mansfield, B. and Haas, J. (2006) Scale framing of scientific uncertainty in controversy over the endangered Steller sea lion. *Environmental Politics*, **forthcoming**.

McCarthy, J. and Prudham, S. (2004) Special Issue: Neoliberal nature and the nature of neoliberalism. *Geoforum*, **35**, 275-393.

McCay, B. J. (1995) Social and ecological implications of ITQs: an overview. *Ocean and Coastal Management*, **28**, 3-22.

McCay, B. J. and Acheson, J. M. (1987) *The Question of the Commons: The Culture and Ecology of Communal Resources*, The University of Arizona Press, Tucson.

Global Environmental Change: Assessing market-based policy

National Research Council (1999) *Sharing the Fish: Toward a National Policy on Individual Fishing Quotas*, National Academy Press, Washington DC.

National Research Council (2003) *Decline of the Steller Sea Lion in Alaskan Waters*, National Academies Press, Washington DC.

Neher, P. A., Arnason, R. and Mollett, N. (1989) Introduction. In *Rights Based Fishing* (Eds, Neher, P. A., Arnason, R. and Mollett, N.) Kluwer Academic Press, Dordrecht, The Netherlands, pp. 1-10.

NMFS (2002) *Final Environmental Impact Statement for American Fisheries Act Amendments 61/61/13/8*, National Marine Fisheries Service, Alaska Region, Juneau, AK.

NMFS (2003) *Fisheries of the United States, 2002*, National Marine Fisheries Service, Silver Springs, MD.

NPFMC (2001) *Impacts of the American Fisheries Act: Report to the US Congress and the Secretary of Commerce*, North Pacific Fishery Management Council, Anchorage.

NPFMC (2004) *Bering Sea Aleutian Islands Crab Fisheries: Final Environmental Impact Statement*, North Pacific Fishery Management Council, Anchorage.

Polanyi, K. ([1944] 1957) *The Great Transformation: The Political and Economic Origins of Our Time*, Beacon Press, Boston.

Scott, A. (1955) The fishery: the objectives of sole ownership. *The Journal of Political Economy*, **63**, 116-124.

Scott, A. (1989) Conceptual origins of rights based fishing. In *Rights Based Fishing* (Eds, Neher, P. A., Arnason, R. and Mollett, N.) Kluwer Academic Press, Dordrecht, pp. 11-38.

Silverman, D. (2000) *Doing Qualitative Research: A Practical Handbook*, Sage, London.

Smith, F. L., Jr (2000a) The market and nature. In *Ecology, Liberty & Property: A Free Market Environmental Reader* (Ed, Adler, J. H.) Competitive Enterprise Institute, Washington DC, pp. 25-38.

Smith, F. L., Jr (2000b) Markets and the environment: a critical reappraisal. In *Ecology, Liberty & Property: A Free Market Environmental Reader* (Ed, Adler, J. H.) Competitive Enterprise Institute, Washington DC, pp. 39-62.

Starrett, D. A. (2003) Property rights, public goods and the environment. In *Handbook of Environmental Economics*, Vol. 1 (Eds, Maler, K. G. and Vincent, J. R.) Elsevier,

Amsterdam, pp. 97-125.

Stavins, R. N. (2002) Lessons from the American experiment with market-based environmental policies. In *Market-Based Governance: Supply Side, Demand Side, Upside, and Downside* (Eds, Donahue, J. D. and Nye, J. S., Jr.) Brookings Institution Press, Washington DC, pp. 173-200.

Stavins, R. N. (2003) Experience with market-based environmental policy instruments. In *Handbook of Environmental Economics*, Vol. 1 (Eds, Maler, K. G. and Vincent, J. R.) Elsevier, Amsterdam, pp. 355-435.

Stott, P. and Sullivan, S. (Eds.) (2000) *Political Ecology: Science, Myth, and Power*, Arnold, London.