Marine Resource Economics, Volume 9, pp. 253–273
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0738-1360/94 $3.00 + .00

Ownership of Renewable Ocean Resources

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Abstract *Much of the recent fisheries economics literature promotes usufructuary rights policies to lessen the dissipation of resource rents. However, this literature does not count institutional inefficiencies which result from rent-seeking and the principal-agent problem when a centralized government controls access to renewable ocean resources. As a result, the efficiency of usufructuary rights programs, including ITQs, throughout the economy could be exaggerated. From a dynamic standpoint, though, usufructuary rights policies remain an important avenue for residual claimants to contract for less attenuated institutions of common or private property rights. These conclusions are drawn from a survey of the property rights and public choice literatures.*

Keywords U.S. fisheries, fisheries management, open access, common pool resources, property rights, economic efficiency, rent-seeking, principal-agent problem, common property, self-governance, private property.

> Rather than attempting to find "optimal" solutions to economic problems, [economists] should concentrate on finding good decision rules, which all individuals and interest groups will find in their own long-run interest to adopt for the solution of still unidentified conflicts over resource allocation. Sandmo (1990: 52)

Introduction

Gordon's (1954) seminal work on dissipation of resource rents in non-exclusive fisheries spawned an as yet unresolved debate about which form of ownership—"a cooperative, a government board, a private corporation, or an international authority" (Scott 1955: 116)—would best manage renewable ocean resources for society. Cheung (1970) appeared to prefer private ownership of fish resources because the transactions costs of contracting resource use most likely would be less if carried out by the private sector than by government. However, Copes (1972: 160) reported that "[m]anagement of a fishery by a regime of private sole ownership is generally non-optimal from a social standpoint [when compared to government regulation] and is not inherently superior to unlimited entry." In contrast, although not dealing exclusively with economic efficiency, Ciriacy-Wantrup and Bishop (1975) argued the case of collective ownership of common pool resources such as fish stocks.

I am grateful for the helpful reviews and advice provided by Joel Dirlam, Mort Miller, Guilio Pontecorvo, Sam Pooley, Bruce Rettig, Jason Shogren, and John Walden at various stages in the development of this manuscript as well. Steve Clark, Phil Logan, and the journal's reviewers also helped me improve the final product. The contents do not necessarily represent the views or policy of the National Marine Fisheries Service, and one should not assume endorsement by the federal government.

Although not overlooked, my impression is that much of the subsequent economics literature on fisheries management set aside this debate and focused on the immediate problem of steering government towards optimum tax or quota policies, such as individual transferable quotas (ITQs), for exploiting renewable ocean resources within its territorial seas or extended fisheries management zones (Anderson 1977; Crutchfield 1961; Crutchfield and Pontecorvo 1969; Neher *et al.* 1989; Pearse 1980; Rettig and Ginter 1978). Nevertheless, we have been reminded from time to time of the unresolved debate. Scott (1979) drew attention to the relevance of early economics theories of regulation and public choice to fisheries management, and later he fit fishing rights into a more general taxa of property rights (Scott 1988). Pearse (1980) also considered the nature of property rights in fisheries, particularly with regards to the influence of exclusivity on transactions costs and choice of government regulation, while Wilson (1990) examined the implications of open access for producing and sharing knowledge of the resource. Cross (1979) showed how a collective of fishermen might appropriate scarcity rents by affecting a change in property rights which excludes other fishermen from the fishery, provided that expected benefits outweigh the costs of exclusion and enforcement. However, Johnson and Libecap (1982) hypothesized that common pool losses persist in fisheries because of both political opposition to private territorial rights and the high costs of contracting among heterogeneous claimants. Finally, Karpoff (1987) explained that traditional fisheries regulations result from rational maximizing behavior of less efficient fishermen who exploit the political process for redistributive gains, and Scott (1993) pondered the effects of distribution on self-governance.

This paper merely offers a further synthesis of the property rights, public choice, and fisheries management literatures already begun by the above economists. I hope to draw more attention to comparisons of alternative property rights institutions by discussing a broad range of inefficiencies inherent to state ownership and by highlighting the possibility of common or private ownership in technologically advanced countries such as the United States.

The nexus of property rights and behavior and its relationship to ocean fisheries is presented next, followed by a summary of the public choice view of government. Subsequent sections discuss theoretical and empirical aspects of common ownership and private ownership. In the final section, I conclude that the opportunity costs of state usufructuary rights policies, such as limited entry and ITQs, have been underestimated, but that these policies could beget more efficient forms of common or private ownership. Throughout, the focus is on how property rights institutions are likely to affect economic efficiency (hereafter, efficiency) by influencing the behavior of individual decision-makers—*e.g.*, a commercial or recreational fisherman, an environmentalist, an agency head, or a politician—*i.e.*, on "good decision rules" as recommended in the introductory quote from Sandmo (1990: 52).

Property, Property Rights, and Property Rights Institutions

Bromley (1992: 2) stresses that property is *not* a physical object; "[p]roperty is a benefit (or income) stream, and a property right is a claim to the benefit stream that some higher body—usually a government—will agree to protect through the assignment of duty to others who may covet, or somehow interfere with, the

benefit stream." Accordingly, property involves an institution, or a "social decision system that provide[s] rules for adjusting and accommodating, over time, *conflicting* demands . . . from different interest groups in a society" (Ciriacy-Wantrup and Bishop 1975: 714).

A complete bundle of property rights to an asset consists of the rights "to use it [or not use it], to change its form and substance, and to transfer *all rights* through, *e.g.*, sale, or *some rights* through, *e.g.*, rental" (Furubotn and Pejovich 1972: 1140). Such rights promote efficiency because they are well-defined to minimize uncertainty, divisible to take advantage of the range of possible simultaneous or sequential uses, exclusive of other users to control free-riding and encourage rational use, investment, and innovation, alienable to facilitate transfer to the highest valued use(s), and enforced. Yet, few, if any, property rights are not attenuated to some degree. Restrictions might be legal in nature, possibly to protect the public's safety, such as speed limits and residential zoning. Property rights are also attenuated because most commodities have some attributes which are too costly to measure, police, enforce, or exchange, thereby making part of the potential rents a residual (Barzel 1989; Cheung 1970).

As noted above, institutions serve the economic purpose of allocating scarce resources, but, "[b]y defining the parameters for the use of scarce resources and assigning the associated rewards and costs, the prevailing system of property rights [also] establishes incentives and time horizons for investment, production, and exchange" (Libecap 1986: 227), thereby affecting efficiency. Property rights both establish the potential capitalized value of an object (Demsetz 1964) and, with associated transaction costs and legal barriers, constrain choices (De Alessi 1980; Furubotn and Pejovich 1972). Absent the right or ability to exclude, a usufructuary right—*i.e.*, "the legal right of using and enjoying the fruits or profits of something belonging to another" (Webster New collegiate Dictionary)—alone provides comparatively little incentive to conserve because free-riding prevents users from fully capitalizing their actions into market prices (Alchian and Demsetz 1973; De Alessi 1980) and because the owner, possibly government, might expropriate or not renew the rights (Anderson and Hill 1975). Furthermore, without transfer, owners of exclusive rights lack incentive to consider valuations by others, including the expected demand of future generations, thereby constraining efficiency and encouraging too rapid use (Alchian and Demsetz 1973; Demsetz 1964).

The property rights taxa reported by Schlager and Ostrom (1992) matches property rights with incentives faced by residual claimants who exploit natural resources. Although intended to classify collectives, their taxa is applied here to ownership in general. Specifically, access and harvest are usufructuary rights as exemplified by limited entry licenses and ITQs, respectively, in government-regulated and collective fisheries. More extensive is the right to manage a resource which allows determination of use patterns and improvements. Of interest is the evolution of stock enhancement, research, and policing activities by fishermen in some ITQ fisheries (Pearse and Walters 1992; Scott 1993), although these fishermen do not own de jure management rights per se. As noted above, however, without the additional right to exclude people from one's asset—*i.e.*, to determine who has usufructuary rights and whether or how these rights may be transferred—the future benefits of restraint, investment, and innovation are at risk. A number of traditional fishing communities and private parties throughout

the world own exclusion rights to fishing grounds (*e.g.*, Agnello and Donnelley 1979; Dyer and Leard 1992; Ruddle et al., 1992). Finally, alienation is the right to sell or lease—*i.e.*, transfer—exclusion and management rights. Alienation is essential to fully capitalize the future value of an asset, and it moves resources to their most economically valued uses.

Given the range of property rights and related behavioral incentives, the phrase, sole ownership, is too ambiguous for analytical purposes. Instead, a rudimentary ownership taxonomy from the literature on exploitation of common pool resources will be used here.[1] Accordingly, government-sponsored license limitation, ITQs, and other usufructuary rights policies are parts of government institutions which are overseen by a politically organized body of a country—hereafter called state ownership. That is, the state exercises ownership of renewable ocean resources on behalf of the general public, but it may allocate private usufructuary rights to harvesters. However, management, exclusion, and alienation are separated from actual use in state ownership. In contrast, in a common ownership institution—not to be confused with Garret Hardin's "tragedy of the commons"[2]—ownership of rights is held in common, such as by individuals in a kinship group, a local community, or a marketing cooperative. Finally, an individual entity owns the rights to manage, exclude, and alienate property rights in a private ownership institution. The owner could be a commercial fisherman or corporation, a charter boat enterprise, a sport fishing club, a conservation organization, an oil company, and so on.

The next three sections discuss state, common, and private ownership of natural resources from the standpoint of how residual claimants and government stakeholders (especially managers, agency heads, and politicians) behave.[3] I begin with state ownership in which the attenuation of property rights constrains harvesters and provides government stakeholders with opportunities to pursue personal utility.

State Ownership

State usufructuary rights—In the United States, ownership of renewable ocean resources was impractical until Congress enacted the Fishery Conservation and Management Act of 1976 (FCMA), thereafter sharply restricting foreign fishing within 200 miles of the coast. Contrary to vast public holdings of forests, grazing land, and petroleum resources, however, the federal government practiced exclusion in only two ocean fisheries until this decade—limited entry in both the surf clam and ocean quahog fishery and the purse seine component of the Atlantic bluefin tuna fishery. Instead, the eight Regional Fishery Management Councils (Councils) established by the FCMA, the National Marine Fisheries Service (NMFS), and Congress regulated catch and fishing effort in otherwise open access fisheries. However, harvest from 42% of the nation's fish resources for which data are available dropped below long term potential yield since 1976 (NOAA 1991). In

[1] See Acheson (1989), Bromley (1992), and Ostrom (1987).

[2] Acheson (1989) discusses the differences between true common property and Hardin's metaphor.

[3] A residual claimant seeks to benefit financially from use of a non-exclusive resource (*e.g.*, fish resource) or economic policy (*e.g.*, tariff or monopoly power) which is controlled by the state.

fact, the trend has been for overutilized fish resources to become even more depleted (*e.g.*, Atlantic cod and other groundfish), for fully-utilized resources to become overutilized (*e.g.*, Atlantic sea scallops), and for previously underutilized resources to become fully-utilized (*e.g.*, Alaskan groundfish).

The 1990s appear to mark a change in U.S. fisheries policy from open access to state usufructuary rights policies, however.[4] At the time of this writing, the Councils implemented usufructuary rights in five of 32 federally managed fisheries—three plans with license limitation, and ITQs in the Atlantic surf clam and ocean quahog fishery and the South Atlantic wreckfish fishery. In addition, ITQs will be implemented in 1995 in Alaska's Pacific halibut and sablefish fisheries. Thus, there appears to be momentum for usufructuary rights in U.S. federal waters as well as in New Zealand, Canada, Iceland, and Australia.[5]

The economic waste which accompanies open access fishing is generally acknowledged by the fishery management community; but will state ownership of renewable ocean resources actually increase efficiency throughout the *economy?* Clearly, fish resources become valuable in state usufructuary rights fisheries, judging from the sale of licenses and harvest quotas (Townsend 1990). There is also ample evidence of gains in a fleet's technical efficiency from retirement of excess capital in ITQ fisheries (*e.g.*, Gauvin *et al.* 1994 and NOAA 1992). Nevertheless, economical use of usufructuary rights and fishing capital is insufficient evidence of gains in efficiency throughout government and the economy. Indeed, economists have reported considerable waste from state ownership of grazing lands, energy resources, forests, and water supplies resulting from residual claimant behavior and the actions of government stakeholders (*e.g.*, Gardner 1983; Libecap 1989; Stroup and Baden 1983; Wahl 1989). Therefore, one must also ask whether the total opportunity costs of state ownership and government regulation outweigh gains in the fishery.

Government failure—"Government failure", or, more generally, non-market failure, refers to the inability or disinclination of government stakeholders to produce, regulate, manage, or monitor the production of goods and services efficiently (Wolf 1988). Thus, as for markets, the state is being compared to an impossible standard of a hypothetical, purely competitive economic system which is characterized in part by zero transactions costs and completely unattenuated property rights to all resources. However, unlike market failure which is usually attributed to non-exclusiveness, non-rivalry, or interdependence among individual utility and/or technological production functions, government failure arises because it is difficult to define or quantify a commodity, demand is not known, a lack of competition inhibits accountability and innovation, or government stakeholders are able to gain pecuniary and non-pecuniary sources of income (Wolf 1988). In this paper, I am particularly interested in what public choice theory says about the last two sources of government failure because they address the separation of ownership of renewable ocean resources by citizens, management by government stakeholders, and use (or nonuse, *e.g.*, species preservation) by residual claimants, all of whom face different property rights and, therefore, behavioral incentives. Specifically at issue are rent-seeking, the economic theory of regulation, and the principal-agent problem.

[4] This information was provided by Andy Rosenberg of the NMFS.
[5] See Townsend (1990) for a survey of controlled access programs around the world.

Rent-seeking, or using scarce resources to appropriate an economic rent created by the state, is characteristic of firms seeking state-sponsored advantage as a means to increase profits (Buchanan *et al.* 1980; Krueger 1974; Tullock 1967). Rent-seeking is costly for society, though, because the resources used to acquire monopoly power, tariffs, subsidies, franchises or other artificial advantage over competitors are not productive. At the same time, competitors, including consumer organizations, are obliged to spend resources to protect themselves, the state spends resources to address all concerns, and the process continues ad infinitum as claimants seek to modify or protect positions.

Rent-seeking also occurs when residual claimants spend resources to acquire subsidies or privileged access to or allocations of common pool natural resources from the state, thereby dissipating resource rents. Rent-seeking has been thoroughly documented for use of U.S. holdings of hard minerals (Libecap 1978; Umbeck 1977), forests (Deacon and Johnson 1985), water (Anderson 1983; Wahl 1989), oil and gas (Libecap and Wiggins 1985; Mean *et al.* 1985), and grazing land (Anderson and Hill 1975; Libecap 1981). Rent-seeking also characterizes state-owned fisheries as numerous and heterogeneous residual claimants vie for the potentially substantial resource rents (Johnson and Libecap 1982; Karpoff 1987). Disputes within and among groups of commercial fishermen (distinguished by port and gear), recreational fishermen, native peoples, and environmentalists over renewable ocean resources take place daily and involve numerous meetings with politicians and fishery managers and considerable—but, to my knowledge, unmeasured—expenses for lobbyists, lawyers, and consultants. For example, after over 10 years of concerted effort, the sport fishing industry gained exclusive use of most billfish species in the U.S. Atlantic Ocean and Gulf of Mexico in 1988 from east coast Councils; other gamefish species in the east—*e.g.*, sharks, striped bass, and Atlantic bluefin tuna—are being sought with equal zeal by commercial fishermen, sport fishermen, and environmentalists. On the west coast, allocation of valuable Alaskan groundfish quota between offshore and inshore claimants was recently settled in court for now, but the four-year battle heavily involved NMFS, the North Pacific Fishery Management Council, Alaskan politicians, industry associations, lobbyists, consultants, and lawyers as well as the court (Herrick *et al.*, n.d.). Rent-seeking does not end with court decisions or with establishment of exclusive licenses or ITQs, however. Owners of state usufructuary rights still battle over catch limits and effort restrictions, and those not receiving rights seek access (Hide and Ackroyd 1990). Indeed, in the United States, Councils state that exclusive usufructuary policies, such as moratoria or ITQs, are indefinite.[6] Rent-seeking in state-controlled fisheries is ubiquitous and continuous.

Another consequence of rent-seeking—other than the its opportunity costs—is that the state often takes actions which benefit the very industries it is supposed to regulate, at the expense of consumers or taxpayers (Jordan 1972). Thus, it is not surprising when the state chooses standards or input controls rather than the economists' preferred Pigovian taxes (Buchanan and Tullock 1975). In the extreme, a regulatory agency might be captured by industry (Stigler 1971). Producer protection or capture occurs because of political influence, superior technical

[6] See Gauvin *et al* (1994) for the possibility in the south Atlantic wreckfish fishery. In the Northeast Region, amendments to the Atlantic groundfish and sea scallops plans propose moratoria that may be ended if the stocks recover.

knowledge which the regulatory agency requires, appointees being selected from the regulated industry or the possibility of future employment in that industry, or the agency's need for recognition and informal cooperation from the industry when dealing with Congress or the Executive Branch.

The actions of fisheries managers and other government stakeholders are consistent with the producers protection hypothesis. The FCMA's exclusion of foreign fishermen from U.S. waters was noted above, but the FCMA also favors joint ventures over directed foreign fishing which would yield resource rents for the nation from some resources. Furthermore, Congress has passed a number of acts throughout this century which subsidize vessel construction and insurance in open access fisheries.

In contrast to the producer protection theory of regulation which does not explicitly deal with their motivations, principal-agent theory addresses the preferences and decisions of government stakeholders. Also originally developed as part of a theory of market production, the principal-agent problem occurs when interests differ among principals (*i.e.*, owners), who desire income from their investment, and managers, who perform as agents for owners but who are further interested in personal income and utility (Furubotn and Pejovich 1972; Williamson 1963). High transaction costs caused by dispersed ownership and, where it applies, government regulation of profit or production attenuate the rights of owners and, thereby, provide managers with opportunities to pursue personal benefits, including non-pecuniary income such as travel, plush offices, and large, congenial staffs (Alchian and Kessel 1962; De Alessi 1969). Furthermore, under these circumstances, which can be exacerbated by a lack of competition (Boardman and Vining 1989), managers are less inclined to oversee employees who, in turn, engage in shirking (Alchian and Demsetz 1972; De Alessi 1980).

Although operating in the private sector—particularly in industries regulated by the state—the principal-agent problem is believed to be most severe in government because ownership of government agencies and state enterprises is nontransferable (De Alessi 1969, 1980) and because the output of many government agencies is a mixture of intangible services which are difficult to quantify or evaluate (Jordan 1972; Zeckhauser and Horn 1989).[7] Consequently, taxpayers have less incentive to oversee government stakeholders than stockholders have to oversee corporate managers, and, unlike private sector managers, government stakeholders are rarely rewarded for efficiency nor penalized for inefficiency. Furthermore, state enterprises and government agencies often have monopolies in output markets or in their regulatory purviews (De Alessi 1983). Indeed, Niskanen's (1968) seminal analysis of non-market decision making illustrated how "utility-maximizing bureaucrats," behaving like price discriminating monopolists, might maximize their agency's budgets and increase factor surpluses (*i.e.*, surpluses to businesses and labor—including themselves—which supply goods and services to the agency) at a net loss of economic surplus from society, including a total loss of consumers' surplus. In contrast, in the private sector, the principal-agent problem is thought to be limited by the ability of owners to sell their hold-

[7] See Niskanen (1989) for comments on the severity of principal-agent problem in government. State enterprises, such as the U.S. Postal Service, Amtrak, and the Tennessee Valley Authority, sell goods and services to the public. National defense, V.A. hospital care, multiple-use parks, species preservation, and biological diversity are examples of some of the goods and services supplied by the state which are difficult to measure.

ings, by competition for positions within the firm or in other firms, and by pecuniary rewards based on performance (Alchian and Demsetz 1972; Crain and Zardkoohi 1980; De Alessi 1980; Furubotn and Pejovich 1972).

The empirical evidence supports principal-agent theory, although not without exception. Based on reviews of several state enterprises and regulated industries in utilities, banking, and transportation, De Alessi (1980, 1983) found the range of inefficiencies outlined above to be worse in government—*i.e.*, state enterprises had higher unit operating costs, produced lower quality and lesser variety of output, were slower to adopt cost-minimizing input combinations and to introduce cost-reducing innovations, and invested less in research and development. Similarly, Boardman and Vining (1989), who controlled for government regulation and market power in their empirical work, reported state enterprises to be less productive and profitable than either regulated or unregulated firms in comparable industries. There is also evidence from New Zealand's Forest Service and State Coal Mines that government agencies are less efficient than even state enterprises (Zeckhauser and Horn 1989).

Studies of natural resource agencies in the United States also report much evidence consistent with the principal-agent problem and Niskanen's "utility-maximizing bureaucrat" (*e.g.*, Anderson and Leal 1991; Deacon and Johnson 1985; Gardner 1983; Stroup and Baden 1983), including in fisheries (*e.g.*, Johnson and Libecap 1982). In fact, government agencies have, at times, intentionally undercut efforts by residual claimants to manage state-owned natural resources in order to reclaim authority (*e.g.*, Anderson and Hill 1975; Higgs 1982; Johnson 1985; Libecap 1981, 1985; Rucker and Fishback 1983); at other times, professional goals appear paramount, such as when the Forest Service and Bureau of Land Management undermined oil production on public forest and grazing lands, respectively (Libecap 1985). Also, antitrust legislation was used during the 1940s and 1950s to bust fishermen's unions and trade associations in the Gulf of Mexico shrimp fishery (Johnson and Libecap 1982), even though the federal government condoned the cartel policies of small oil producers during the same period (Libecap 1986).

It is interesting, though, that the behaviors just described have been cast in a positive light where co-management is involved. Co-management is the process whereby residual claimants are empowered by the state to manage use of common pool resources, while the state sets guidelines or restrictions (*e.g.*, total allowable catch or illegal gears) and provides enforcement (Hanna 1990; Pinkerton 1992). Co-management is weakened by internal conflicts and disputes which arise among heterogeneous claimants, however (McCay 1988; Pinkerton 1987, 1988). The state can also undermine co-management by denying the right of exclusion, as in Canada's Bay of Fundy herring fishery.[8] Nevertheless, co-management has sustained use of common pool resources and, apparently, reduced rent-seeking, including in marine fisheries (Asada 1973; Hanna 1990: Jentoft 1989; Pinkerton 1988). Furthermore, by authorizing residuals claimants to make resource management decisions, co-management probably is more likely that centralized government regulation to preserve part of the potential resource rents (Anderson and Hill 1983).[9]

In summary, state ownership is vulnerable to special-interest groups of resid-

[8] See Jentoft (1989: 141) for a brief discussion and unpublished reference.
[9] See Dyer and Laird (1992) and Wilson (1977) for examples in fisheries.

ual claimants and to self-interest of government stakeholders. With no clear residual claimant, politicians responding to re-election pressures, and agency heads and the general workforce capitalizing on the principal-agent problem, it is arguable how much usufructuary policies alone will preserve resource rents. Furthermore, rent-seeking expends untold resources on attempts to influence government allocations and subsidies. These costs—*i.e.*, agency loss and rent-seeking—augment the use of labor and capital in fisheries research, management, and enforcement and the disappointing performance of some state usufructuary rights fisheries (Squires and Kirkley 1993; Wilen 1989). Co-management might offer cost-savings because residual claimants, who internalize benefits and costs, determine at least part of management policy, but the objectives of government stakeholders can still be salient, and the transaction costs of contracting can be great in a heterogeneous, market-based, rent-seeking society such as the United States.

Common Ownership, or Self-Governance[10]

Garret Hardin, in his controversial metaphor of the "tragedy of the commons,"[11] offered only government regulation or private enterprise as possible solutions to overexploitation of common pool natural resources. In reality, though, common property institutions have managed natural resources on a sustainable yield basis throughout the world since pre-history (Berkes 1989; McCay and Acheson 1987; Ostrom 1990; Rushkin 1986), including renewable ocean resources (*e.g.*, Acheson 1989; Asada 1973; Berkes 1985; Christy 1982). The very regulations that coastal states now attempt to impose on fishermen who do not share or own management, exclusion, or alienable rights (*e.g.*, minimum fish size, closed seasons or areas, gear restrictions, and limited entry) have long been part of self-governance regimes (Acheson 1989; Johannes 1978; McGoodwin 1990).

The United States does not have to look far for examples of self-governance. Before Europeans discovered North America, native Indians were collectively managing wildlife, such as fur-bearing animals (Demsetz 1967) and salmon (Pinkerton 1988). Later in U.S. history, mining camps, claims associations, and livestock boards emerged throughout the West to limit access to "disposed" federal lands and to enforce the collectives' rules (Anderson and Hill 1975; Libecap 1989; Stroup and Baden 1983). Oil producers sometimes contract to economize production from a common oil pool, a process called unitization (Libecap and Wiggins 1985). Regarding fisheries, small communities surrounding some of Maine's ports have controlled access to nearby lobster grounds for some time (Acheson 1977). Community management also has been practiced since the mid-1800s in Louisiana's Gulf of Mexico where kinship determines exclusive use of oyster beds (Dyer and Leard 1992). Gulf of Mexico shrimper unions and trade associations limited entry and negotiated price agreements with packaging houses (Durrenberger 1992; Johnson and Libecap 1982). Finally, McCay (1980) described a cooperative of whiting fishermen in the New York Bight area which began to

[10] Anthony Scott recently reviewed the literature on self-governance (Scott 1993); therefore, my account is brief.
[11] See footnote 2.

influence landings prices during the 1950s by limiting entry and actually assigning quotas to individual vessels.

Begging forgiveness from epistemologists, these and the many other examples of common ownership might be classified as either community management or marketing cooperatives. As used here, community management would stem from kinship, tradition, or a shared culture or ethnicity, and the overall community being defined, in large part, by their dependence on fish resources (Durrenberger 1992; Dyer and Leard 1992). Although a marketing cooperative is sometimes part of a fishing community—*e.g.*, Barra's shellfish marketing company on the remote Western Isles of Scotland (Prattis 1987)—it is distinguished from community management by integration with markets. However, unlike many traditional fishing communities (*e.g.*, Ruddle *et al.* 1992), cooperatives often lack exclusive use rights (*e.g.*, Berkes 1986; Durrenberger and Palsson 1987; McCay 1980).

Clearly, there is a history of self-governance of use of natural resources, but "[c]an common ownership of resources perform well in a market economy?" (Ciriacy-Wantrup and Bishop 1975: 718). Yes, at times, particularly when a small, culturally homogeneous group has exclusive control of the resource, and its economic activity is embedded in the community (Berkes 1986; Dyer and Leard 1992). Perhaps more to the point, a small, homogeneous group is more inclined to share information required for management and enforcement, and conflicts which arise from an inequitable distribution of wealth are less prevalent and, when they occur, less costly to resolve (Scott 1993).

Situations which seem to meet these conditions are common. Sustainable, common use of forests, grazing lands, and water supplies in remote peasant farming villages of Switzerland and Japan are often cited (Ciriacy-Wantrup and Bishop 1975). In fisheries, these conditions characterize some oyster fisheries in Louisiana's Gulf of Mexico (Dyer and Leard 1992) and the Fal River in England (Cove 1973), lagoon and coastal fisheries in the Solomon Islands (Ruddle *et al.* 1992), the coastal fishing rights fisheries for shellfish and seaweed in Japan (Asada 1973; Ruddle 1989), the southern seas pelagic fisheries in Turkey (Berkes 1986), and some salmon fisheries conducted by native Indians in North America (Pinkerton 1988).

Yet, community management often succumbs to market forces. In Great Britain, for example, technological advances in planting row crops and increases in the price of sheep's wool prompted feudal lords to exclude peasant farmers and ranchers from the commons, with considerable assistance from the state (Hanna 1990). Similarly, on the European continent, common forests previously used for grazing, firewood, and building materials by the peasantry were enclosed by feudal lords after the value of timber rose (Ciriacy-Wantrup and Bishop 1975). These examples illustrate a tendency for higher prices and technological change to initiate more precise definitions of property rights (Anderson and Hill 1975; Demsetz 1967).

Marketing cooperatives would benefit from the same homogeneity and smallness of traditional fishing communities (*e.g.*, Prattis 1987). Furthermore, given their economic purpose, cooperatives appear better able to function in market economies. Notable are the whiting cooperative mentioned earlier which used limited entry and individual vessel quotas (McCay 1980) and the producer organizations in England which manage sectoral quotas issued by the state (Jentoft

1989). Nevertheless, cooperatives, too, can be vulnerable to market forces, particularly cooperatives which lack exclusive rights to resources. For example, a porgy cooperative in New Jersey dissolved after both introduction of purse seine gear and increases in the price of porgies relative to menhaden spurred entry and eventual depletion of the stocks (McCay 1987). Similarly, despite the presence of cooperatives, fish resources have been depleted in parts of Turkey where nearby urban demand for fish is strong, the state opposes limited entry, and fishermen from different gear-oriented cooperatives compete with each other, sport fishermen, and the tourism industry (Berkes 1986). Also, it is notable that the New York Bight whiting cooperative failed in numerous attempts to organize other whiting fishermen because its safe access to fishing grounds during times of bad weather and high landings prices created an insurmountable distributional issue (McCay 1980).

At least three conclusions can be drawn from this brief review of the common property literature. First, exclusion is essential to a common property institution.[12] When possessing either de facto or de jure ownership, residual claimants are sometimes able to control access to and exploitation of common pool resources, thereby capitalizing on expected future benefits from restraint, investment, and innovation.[13] Also, self-governance should be much less costly than external, centralized government regulation because residual claimants have greater incentive to internalize benefits and costs (Anderson and Hill 1983).

Second, common property institutions are more able than the state to respond to changes in the resource (Jentoft 1989; Ruddle *et al.* 1992) and, I would stress, markets as illustrated in the Barra, Scotland lobster fishery (Prattis 1987). In contrast, real-time flexibility is not a feature of centralized state ownership regimes.

Finally, the costs of monitoring and enforcing non-binding agreements among heterogeneous claimants probably precludes community management of renewable ocean resources in open, market economies and weakens marketing cooperatives, especially when the right to exclude is attenuated. In Iceland, for example, despite a long history of self-governance, dependence of the nation's economy on fisheries, and co-management, fish resources have been depleted (Durrenberger and Palsson 1987). Similarly, in Turkey, overcapitalization and overfishing resulted from competition among gear-oriented cooperatives and between commercial and sport fishing interests for non-exclusive fish resources (Berkes 1986). However, although the whiting cooperative from New York Bight failed to contract with other, competing fishermen (McCay 1980), it was not for a lack of trying. Had the cooperative and other whiting fishermen owned usufructuary rights or territorial use rights, unitization might have resulted.[14] Or the

[12] Exclusion is part of territorial use rights fisheries, or TURFs (Christy 1982; Panayotou 1984); however, owners of a TURF area do not necessarily own de jure or even de facto rights to the fish resources, particularly when they are mobile.

[13] There are cases, though, of traditional societies depleting some natural resources; see Johannes (1978).

[14] Even after the agreement was broken, the whiting cooperative continued to work to contract with other whiting fishermen, including ship-to-ship radio calls to advertise the benefits of restraint.

cooperative might have purchased usufructuary rights from other fishermen and sought private ownership from the state.

Private Ownership

Some time ago, Knight (1928: 163) remarked that "[i]t is in fact the social function of [private] ownership to prevent . . . excessive investment in superior situations," where by superior situations he was referring to unowned farmland of superior quality. Concerning this paper, "[i]f a fishery could be divided into separate units and disposed of to private owners, if these rights could be freely traded, if there would be enough separate owners to ensure competitive behavior, and if the individual owners had enough knowledge and financing to manage their holdings judiciously, then private ownership might suffice to prevent overfishing and to ensure efficient use of the resource" (Crutchfield and Zellner 1963: 21). Furthermore, by reducing the costs of contracting, private property rights should facilitate transfers of resources to their most economically valuable uses or nonuses (Alchian and Demsetz 1973; Cheung 1970; Coase 1960; Demsetz 1967). Residual claimants could invest resources more productively in market allocation to commerce, recreation, or environmentalism than in rent-seeking. And although future generations would not be singled out for special consideration, their demands are factored into the expected capitalized value of a resource (Demsetz 1964).

Private property rights are also thought to internalize benefits and costs of an activity (Alchian and Demsetz 1973; De Alessi 1980; Demsetz 1964, 1967), at least to a degree. Demsetz (1964) described this possibility in terms of "tie-ins" and "sales-in-combination," citing Coase's (1960) example of a railroad company, whose trains spark fires in crops, buying contiguous farms. In fisheries, one can imagine a commercial fishing corporation which leases or sells its alienable rights to charter boat companies or to recreational fishermen. Such was the case in England during the eighteenth century when aristocrats purchased the net rights of commercial and subsistence salmon fishermen (McCay 1987). Similarly, conservation organizations might solicit funds to purchase usufructuary or ownership rights in areas where marine mammals feed or mate. Baden and Stroup (1981) described an analogous situation involving cattle grazing and oil production on the Audubon Society's Rainey Wildlife Sanctuary in Louisiana. Finally, also conceivable are companies which contract to internalize bycatch, or a company which acquires ownership of fish resources in order to facilitate oil exploration and production on outer continental shelf lands, possibly leasing usufructuary rights to fishermen. That the Weyerhauser Corporation—primarily a timber products producer—ventured into salmon farming in southern Oregon is illustrative (R. J. Smith 1980).

These theoretical advantages of private ownership seem to be contingent on a number of "ifs," though, as noted above. Furthermore, the transactions costs involved with defining and enforcing ownership over renewable ocean resources are still believed by many to preclude privatization. Yet, the issue is not whether the ideal conditions for private ownership—or state ownership or common ownership—are perfectly met; of interest is a comparison of how the imperfections affect the behavior of residual claimants and government stakeholders across institutions. Furthermore, the existence of private forms of ownership in marine

fisheries should focus attention on its empirical requirements. Clearly, sessile, nearshore, single-species resources, such as oysters, are most easily owned (Agnello and Donnelley 1979). There are other cases, though. For example, in parts of Mexico's Caribbean spiny lobster fishery, private territories have been delineated in shallow bays (Miller 1989). Unlike in nearby open access zones, owners of private territories invest in artificial lobster habitat which increases growth and is thought to protect lobsters from predators. These lobster fishermen also adhere to closed breeding seasons, police their territories, and, at times, lease access to overlying waters to gillnetters. Similarly, a local processor monopsony in Western Australia's Shark Bay and Exmouth Gulf prawn fisheries—which also owned some of the limited entry fishing licenses—is credited with preventing overcapitalization and sustaining harvest and resource rents during the first 12 years of the fishery (Meany 1979).

Although as a rule enforcement costs are likely to be high, exclusive, private use of fur seals (Young 1981) and salmon (R. J. Smith 1980) illustrate that private ownership of even fugitive ocean resources can be feasible and involves weighing the expected benefits of exclusion and transfer against the costs of first negotiating contracts and then enforcing them (Agnello and Donnelley 1979; Cheung 1970).[15] Potential benefits are affected by shifts in relative prices and changes in production and enforcement technology (Anderson and Hill 1975; Demsetz 1967). For example, using trends in real prices and in technological change implicit in catchability parameters of a bioeconomics model, Edwards and Murawski (1993) estimated the potential resource rents from efficient harvest of New England groundfish (*e.g.*, Atlantic cod, haddock, and flounders) to be about $130 million annually—a sizeable benefit. Also, some technologies to define and enforce private property rights to renewable ocean resources are available. For example, many lines are already "drawn" in the water, including the Extended Economic Zones of coastal states and oil leases on continental shelves. Also, fish aggregating devises can be stationed or patrolled by boats (Christy 1982). In larger or distant areas, helicopter patrols and satellite surveillance are conceivable.

On the cost side of the equation, both the geographic and, especially in multispecies (*e.g.*, groundfish) cases, ecological scales of exclusion would most likely be quite large because of potential stock and fishing "externalities" discussed by V. L. Smith (1969),[16] having a commensurate effect on enforcement costs.[17] In my opinion, however, the most significant barriers to private property have been the costs of negotiating contracts among literally thousands of residual claimants from a divergent range of commercial, recreational, and environmental interests and with government stakeholders.[18]

[15] Several economists have proposed widespread, private ownership of fugitive resources (Anderson and Leal 1991; Gardner 1983; R. L. Smith 1980; V. L. Smith 1982; Stroup and Baden 1983). Other fugitive resources which have been assigned private rights include groundwater (Wahl 1989) and oil pools (Libecap and Wiggins 1985).

[16] Cheung (1970) dislikes the phrase, externality, because it implies something *inherently* external to economic decision-makers. Externalities actually exist because the right to contract is absent or transaction costs are too high.

[17] Cheung (1970) discussed ownership of entire fishing grounds. Similarly, Keen (1988) envisions entire seaboards subject to private ownership.

[18] Jentoft (1989) and Johnson and Libecap (1982) emphasize the effects of heterogeneity on contracting.

I wish to emphasize, though, that the utility-maximization model of decision-making is no more an indictment of residual claimants and government stakeholders than it is of consumers. Instead, its use in the property rights and public choice paradigms is to explain how such individuals will satisfy personal preferences subject to constraints on choices. Furthermore, the principal-agent problem exists in regulated firms and firms with some market power, although apparently less severe than in the public sector (*e.g.*, Boardman and Vining 1989; De Alessi 1980). Whether this more general comparative advantage holds in fisheries requires separate study, though, including the costs of exclusion in large scale, multi-species fisheries.

Also, it is at least conceivable that some species might be extinguished by commercial or recreational exploiters when personal discount rates exceed biological or economic rates of growth (Clark 1973). Whether this is a problem for fecund ocean fish resources is arguable, though. Furthermore, the extinction argument overlooks legal options to attenuate fishing rights in an effort to preserve species (*e.g.*, the Marine Mammal Protection Act) or for conservation organizations to purchase usufructuary or ownership rights to marine mammals or other vulnerable species from harvesters.

Finally, a third challenge to private ownership is deadweight losses resulting from monopoly or monopsony market power. Gates (1988) reported, however, that even the worst behavior by a monopsonist could cause less economic inefficiency than which results under open access. Furthermore, the monopoly issue also might be exaggerated, particularly when *comparing* the total opportunity costs of alternative ownership institutions, as discussed above.[19] For example, Zeckhauser and Horn (1989) suggest that, given a choice between a state enterprise and a private firm with market power, the latter should be chosen because inefficiencies resulting from the principal-agent problem would be less. Yet, whether monopoly power would emerge from ownership of even vast areas of fish resources is unclear. Cheung (1970), for example, noted that private owners of separate resources might compete with each other and/or importers in the marketplace. Furthermore, antitrust legislation might be used against lateral or vertical integrations in the seafood sector.

The empirical possibility of private ownership of renewable ocean resources needs reconsideration in light of dynamic demand, technological, and political forces. It would be worthwhile to consider the species composition and areal extent of renewable ocean resources for private ownership and the implications of such units for market structure, competition, and enforcement costs. As for common ownership, private residual claimants are more likely to preserve resource rents than are non-claimant, government stakeholders (Anderson and Hill 1983). Furthermore, private ownership could internalize a not so insignificant part of benefits and costs from use (or non-use) of renewable ocean resources and to economize on allocation through market mechanisms. Nevertheless, the costs of negotiating contracts among numerous dissimilar residual claimants and non-claimants could be great.

[19] Perhaps a greater social concern is the possibility of monopsony power in local labor markets.

Conclusions

This foray into the property rights and public choice literatures raises several research and policy questions regarding state ownership of renewable ocean resources. Certainly in a static sense the economic costs of ITQs and other types of state usufructuary rights policies have been underestimated because the costs of rent-seeking and principal-agent problems in government are not counted. Nevertheless, do state usufructuary rights improve efficiency in the economy when compared to traditional government regulations on harvest and fishing effort? Possibly, given gains in the technical efficiency of fleets; however, it is important to realize that actual usufructuary rights policies typically attenuate even these limited rights by restricting use and transfer and/or by making tenure and exclusion uncertain.[20] Furthermore, state usufructuary rights policies could increase the scope for dissipation of resource rents because the benefits they create are subject to rent-seeking and because government agencies could use the existence of resource rents as part of the rationale for agency growth. I am not aware of a comprehensive, ex post assessment of the relative benefits and costs of ITQ programs which includes the costs of rent-seeking and the principal-agent problem.

Regardless of whether they are likely to promote efficiency in static comparisons, though, economic evaluations of state usufructuary rights could advance to a few dynamic considerations. First, state usufructuary policies appear to be a good way for resource conserving residual claimants to gain a foothold and begin to contract with the state and each other for more complete rights, namely management, exclusion, and alienation. The anecdotal evidence thus far of contracting for research, management, and enforcement in New Zealand's abalone and orange roughy ITQ fisheries (Pearse and Waters 1992; Scott 1993) is a promising step toward common or private ownership.

Similarly, how might specific usufructuary rights policies affect evolution to common or private ownership, or, from an obviously normative point of view, how might state usufructuary rights be designed to facilitate such change? Although Scott (1988, 1993) sees a natural progression from ITQs to private property, other economists (*e.g.*, Johnson and Libecap 1982; Libecap 1986) and anthropologists (*e.g.*, McCay and Acheson 1987; Ostrom 1987) are skeptical, citing impasses that can arise whenever wealth will be redistributed. Thus, not only is institutional change incremental, but it depends on the extant distribution of property and rights (Libecap 1989). Both the forces which shape state usufructuary policies and the characteristics which facilitate or weaken further contracting might be learned from field studies of limited entry, ITQ, and co-management programs.

Also, property rights theory and empirical comparisons of private enterprise with other forms of economic organization rank private ownership as most efficient. However, would contracting for private property rights to renewable ocean

[20] In the United States, fishery management plans which control access usually place limits on transfer and concentration of the usufructuary right and include other, traditional management measures which the fishing industry does not necessarily agree with. Also, the Councils tend to create indefinite rights, not permanent rights.

resources (if it happens at all) completely dissipate resource rents over time? As noted above, Anderson and Hill (1983) argue from both theory and observation of the U.S. Forest Service and the U.S. Bureau of Land Management that total dissipation is likely when utility-maximizing stakeholders in government control use of natural resources. That is, the costs of defining and enforcing property rights, including rent-seeking as well as transaction costs, are augmented by the behavior of utility-maximizing government stakeholders when the principal-agent problem is significant. The limits to contracting—numerous and heterogeneous claimants and non-claimants, information problems, and redistribution of wealth (Libecap 1989)—are extreme in many of the world's ocean fisheries, especially where endangered species of marine mammals or sea turtles are bycatch. Whether the process of privatizing renewable ocean resources contributes to efficiency over time is another empirical question worthy of research.

Finally, the generic discussion of ownership institutions in this paper could be vastly improved by comparative analyses of specific types of economic organizations, how they match resource characteristics, and how they relate to market structure. State enterprise (Young 1981), marketing cooperatives (McCay 1980), and processor-monopsony (Meany 1979) are a few real world fisheries examples. Such comparative analyses might also address confusion about the implications of market structure and competition for efficiency. For example, Cornes *et al.* (1986) reported that an efficient optimum would require more than one firm to exploit a common fish pool when output is sold in an imperfectly competitive market. In contrast, Munro (1982) showed the comparative benefit of a bilateral monopoly when a processor-monopsonist and harvest-monopolist contract side payments. However, neither theoretical study incorporated rent-seeking, the principal-agent problem, contracting costs, or legal impediments as costs or constraints—all factors which can not be omitted when discussing the economic efficiency of ownership of renewable ocean resources.

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