Political Economy and Profit Maximization in the Eastern Bering Sea Fishery for Walleye Pollock

Keith R. Criddle and Seth Macinko*

July 12, 2000

Abstract. Despite their apparent economic benefits to harvesters, Individual Fishing Quotas (IFQs) have only been adopted in three U.S. fisheries: Mid-Atlantic surf clam and ocean quahog; South Atlantic wreckfish; and, North Pacific halibut and sablefish. During the 1996 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act, Congress temporarily blocked implementation of additional IFQ programs in U.S. fisheries. This Congressional action led directly to the emergence of a new institutional structure, the fishing cooperative. Cooperatives offer the advantage of eliminating production externalities that may remain under an IFQ program with relatively large owner classes. Development of IFQ programs appears to be increasingly overwhelmed by the proliferation of both equity concerns and seemingly interminable rent-seeking behavior—both issues that can effectively block adoption of IFQs. By reducing the scope of the equity issues acknowledged, the cooperative alternative narrows the pool of claimants and modifies the behavior of the remainder so as to make implementation more likely. Ironically, while IFQs are widely thought to be best designed at the local/regional level, part of the appeal of the cooperative model is that it appears to shortcut the often-protracted nature of the local/regional political process.

Keywords: Individual fishing quotas, Fishery cooperatives.

Introduction

Individual Fishing Quotas—The classic papers by Gordon (1953, 1954) and Scott (1955, 1979, and 1988), among others, reasoned that the multiplicity of users characteristic of open access commercial fisheries would dissipate potential resource rents in a race for fish whereas a sole owner endowed with comprehensive property rights would, acting as a monopolist, harvest the stock in such a way to capture the available rent. Because sole ownership was not politically feasible, economists began to explore alternatives that might achieve comparable benefits. Entry limitation emerged as a politically feasible alternative to sole ownership that was argued to potentially achieve comparable efficiency gains (Christy and Scott, 1965; Gulland and Robinson, 1973). Based on these arguments, several limited entry schemes were implemented in the 1970's. However, it quickly became apparent that where there existed unrestricted inputs that were at least imperfect substitutes for the restricted input(s), entry limitation *per se* could not control the race for fish and dissipation of resource rents (Rettig and Ginter, 1978; Adasiak, 1979; Fraser, 1979; Meany, 1979; Pearse and Wilen, 1979; Wilen, 1979).

This led most economists to recommend abandonment of input controls (such as entry limitation) in favor of output controls in the form of individual quotas (Moloney and Pearse, 1979; Pearse, 1980; Morey, 1980). Individual Fishing Quotas (IFQs) are allocations of fish harvesting quotas to individuals or firms, specifying that a certain amount of fish or shellfish of a certain species may be caught in a specific area during a specific time frame. IFQs are best suited to fisheries managed by setting a Total Allowable Catch (TAC). Indeed, IFQs are usually expressed as shares of the TAC, so that the amount of fish that can be harvested for a given share of quota fluctuates with changes in the level of the TAC.[1] The TAC is usually determined on an annual basis by applying a target exploitation rate to an estimate of the current stock size. Determining the target exploitation rate and measuring the stock size are both subject to considerable uncertainty because of large variability in the relationship between stock size and subsequent recruitment and to general difficulty of accurately counting and measuring fish in the wild. Wilen (1985) and Scott (1988), among others, argue that the set of individuals endowed with IFQs will behave in a manner analogous to the sole owner. This conclusion is driven by the assumptions that the harvest right is secure, that cheating does not occur, that there are no unique spatial or temporal concentrations that could lead to a race for fish, and that any returns to scale are captured. Some authors (e.g. Johnson and Libecap, 1982; and Keen, 1983), drawing on the property rights literature (e.g. Demsetz, 1967; Cheung, 1970; and De Alessi, 1980), argue that usufructuary harvest rights without authority to independently determine harvest levels, are insufficient to induce the resource stewardship expected under sole-ownership.

IFQs are defined in the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) as

[1] Although the TAC in IFQ fisheries is usually expressed in weight (biomass), the Wisconsin lake trout IFQ is expressed in number of fish.

***** Criddle is a professor in the Department of Economics, Utah State University. Macinko is an assistant professor in the Department of Geography, University of Connecticut.

limited access permits to harvest quantities of fish. They represent quasi-privatization of the fisheries, in that permittees hold exclusive usufructuary privileges—such as the authority to decide when and how to use the quota shares—but not others, including ownership of the resource itself or the ability to decide how much of the resource can be harvested in aggregate. The latter remains the domain of state and federal governments, which have responsibilities to manage fishery resources for the public in terms of broad public welfare conceptions and the more specific obligations implied by the public trust doctrine.[2]

Several IFQ programs were implemented during the 1980's and 1990's, including three in the U.S.: Mid-Atlantic Surf Clam-Ocean Quahog (MAFMC 1990); South Atlantic Wreckfish (SAFMC 1992); and, North Pacific Halibut-Sablefish (NPFMC 1991). Two additional IFQ programs: Gulf of Mexico Red Snapper (GMFMC 1997) and Pacific Sablefish (PFMC 1995) were approved by their respective regional fishery management councils, but expressly blocked from implementation by language included in the 1996 reauthorization of the MSFCMA.

While many post-implementation analyses have concluded that IFQs have resulted in the hypothesized benefits (see e.g. Crothers, 1988; Geen and Nayer, 1988; Dewees, 1989; Arnason, 1993; Gauvin et al. 1994; Casey et al. 1995; Wang, 1995; Annala, 1996; Arnason, 1996; Herrmann, 1996; Weninger, 1998) other analyses and theoretical papers have identified potential shortcomings (Copes, 1986; Boyce, 1992; Linder et al. 1992; Edwards, 1994; McCay, 1995; Matulich et al. 1996; Copes, 1997; Matulich and Sever, 1999).

Evidence from the three U.S. IFQ fisheries suggest that IFQs have increased net revenues for the harvesters and integrated harvester-processors that were initial recipients of the IFQ, consolidated the number of active harvest platforms, and distributed landings over longer seasons (Gauvin et al. 1994; Casey et al. 1995; Wang, 1995; NRC, 1999; Herrmann, 2000). Evidence with respect to quota busting, highgrading, and bycatch is mixed. In addition, stock and production externalities have not been eliminated, wealth and opportunity of other stakeholders, e.g. processors, may have been reduced, and rent-seeking associated with acquisition and defense of the IFQ may have dissipated much of the windfall gain associated with the initial distribution.

Fishery Cooperatives—A recent innovation, the cooperative, has emerged as an alternative to IFQs in fisheries off the Pacific Northwest and Alaska. In a manner analogous to unitized-field management in the petroleum industry, cooperative members rely on civil law to enforce contracts that partition the catch among a limited set of participants and rely on government to enforce usufructuary rights to a fraction of the resource. The first of these new entities, the Pacific Whiting Conservation Cooperative (PWCC) was established in 1997 following a series of critical formative events. Creation of the PWCC hinged on three components of the management regime for the whiting fishery. First, the fishery is run under an overall TAC established by the Pacific Fishery Management Council (PFMC). Second, the PFMC had created a distinct "offshore" sub-allocation of the overall TAC. Third, the PFMC had limited entry into the offshore sector of the whiting fishery. The combined effect of these three elements of the management regime is that participants in the offshore fishery were free from external rivals and could contemplate the benefits of cooperation without confronting free-rider problems. The final critical element was a review letter indicating that the Department of Justice did not anticipate that the PWCC, as outlined, would trigger prosecution under per se provisions of antitrust law. PWCC is, effectively, the sole owner of a fixed percentage of the Pacific whiting TAC and, through negotiated contract, has partitioned that ownership among the co-op members. (See Larkin and Sylvia (1999) for a brief description of the formation of PWCC.)

Heartened by their experience in the whiting fishery, members of the PWCC who also participated in the Bering Sea and Aleutian Islands (BSAI) pollock fishery joined with other BSAI catcher-processors to lobby Congress for authority to create a similar structure in the BSAI pollock fishery. The reasons why the industry turned to Congress are rooted in the historical context of the groundfish fishery off Alaska. The Americanization policies embodied in successive reauthorizations of the MSFCMA led to an evolution of participation in the groundfisheries off Alaska, from nearly 100% foreign in the mid-1970's to almost entirely joint venture by the mid 1980's and fully domestic by 1990. By 1991, harvesting capacity was estimated to be double what was needed to harvest the TAC and processing capacity was about 150% of processing needs. In the first of a sequence of allocation battles, the NPFMC established Community Development Quotas (CDQ) and a directed fishing allocation between inshore and offshore[3] fleets (NPFMC 1991). The inshore-offshore allocation was revisited again in 1995 and 1998 (NPFMC 1995, 1998). In 1996, the Council belatedly adopted a moratorium on entry to the BSAI groundfisheries. Despite these measures, harvesting and processing power continued to expand under the ever-escalating stimulus of the race for fish. Between 1994 and

[2] Confusion between general "public interest" mandates and the "public trust doctrine" is widespread. On the latter generally see McCay (1998), on the relationship between the latter and IFQs see Macinko (1993), and for an attempt to bridge between the two concepts see NRC (1999).

[3] The offshore sector included catcher-processors, motherships, and catcher vessel that delivered to them. The inshore sector includes catcher vessels that deliver to shore based processors or permanently anchored floating processors.

1998, half of the catcher-processors operating in the BSAI underwent bankruptcy or forced sale of their vessel holdings (APA 1999).

Congressional action was sought because the North Pacific Fishery Management Council (NPFMC) had not created a sufficiently closed group of offshore participants and corresponding sub-allocation of the TAC. The catcher-processors were not alone in petitioning Congress for specific intervention in the management of the BSAI pollock fishery. Shore-based pollock processors, floating "mothership" pollock processors, Alaska Native groups, and an assortment of pollock catcher boat interests all sought to advance or simply protect their respective interests in a lobbying fray that was united only in the sense of mutual frustration with the decade-long attempts of the NPFMC to address economic and social aspects of the BSAI pollock fishery.[4] The result was the American Fisheries Act of 1998 (AFA). In the AFA, Congress provided a legal mechanism to permanently cap entry, directly identified the eligible members of the pollock catcher-processor sector (by vessel name), specified their collective sub-allocation of the BSAI pollock TAC, and provided a mechanism for $75 million in side-payments to buyout 9 of the 29 catcher-processors then operating. In direct response to the AFA, the nine companies that control the 20 AFA-authorized catcher-processor vessels formed the Pollock Conservation Cooperative (PCC). PCC was operational in late January of 1999, the beginning of the first pollock season following passage of the AFA. During the initial pollock season the PCC consolidated the number of active vessels, reduced harvest and throughput rates, increased yield rates from harvested fish, and changed their production mix to higher valued product forms. The allocation of harvest shares within the PCC (i.e., the partitioning of the Congressional 'offshore' allocation to individual PCC member firms and their respective vessels) is accomplished through private contract negotiations. These contracts are, like any private contract, backed by relevant civil and state authority.

The AFA included a provision that allocated 3.4% of the directed fishing allocation to seven catcher vessels that had traditionally delivered to catcher-processors. The owners of these vessels formed the High Seas Catchers' Cooperative (HSCC) in 1999 to rationalize their harvests. Most members if HSCC sold or leased their pollock catch shares to PCC members in 1999 and 2000. Harvesters that deliver to shore-based and permanently anchored floating processors, and motherships and the catcher vessels that regularly deliver to them were also empowered to form cooperatives as early as January 2000, and are currently fishing under their inaugural season. Table 1 shows the allocation shares just prior to and immediately following implementation of the AFA.

Table 1—Allocation of pollock TAC before and after implementation of the AFA.

	1998	1999
Bycatch set aside	~5%	~4.7%
CDQ	7.5%	10.0%
Shore based	30.6%	42.7%
Mothership	8.8%	8.5%
Catcher-Processor	45.2%	31.2%
Catcher Vessels that Deliver to Catcher-Processors	3.0%	2.9%

Under AFA, 9 companies operating 20 catcher-processors are assured harvest rights to 36.6% of the directed fishing allocation (~31% of the TAC). While this is a substantial reduction from the 1998 catcher-processor share of approximately 45% of the TAC, the AFA included a provision to buyout nine of the 29 then active catcher-processors, consequently the average catch per AFA-qualified catcher processor did not decline (Table 2). In fact, because only 16 of the AFA-qualified catcher-processors participated in the 1999 Winter-Spring season, the average catch per AFA-qualified catcher-processor increased in 1999 relative to what it would have been in the absence of the AFA and with all 29 catcher-processors active.[5] Average catch per catcher-processor is expected to increase further in 2000 with the sale of Alaska Trawl Fisheries, Inc. to other PCC members.

Table 2—Average catches (1,000 mt) in 1999 and 2000 with and without the AFA.

	W/O AFA		W/ AFA	
	1999	2000	1999	2000
AFA-qualified Catcher-Processors	15.5	17.8	15.5	17.8
Active AFA-qualified Catcher-Processors	15.5	17.8	19.4	23.7
Catcher Vessels that Deliver to Catcher-Processors	4.2	4.9	4.1	4.7

Under the PCC, the operating season for catcher-processors increased from 75 days in 1998 to 149 days in 1999. In addition, PCC members increased product recovery by 20% per fish through slower paced harvesting, increased trawl mesh size, and shorter hauls (APA 1999). Although the overall mix of surimi and fillet production only changed slightly, the fraction of high value fillets (deep-skin) increased substantially with offsetting decreases in the production of lower grade mince and block fillets.

Significantly, participants in the Gulf of Alaska and Bering Sea scallop fishery and in the Bering Sea crab fisheries have been actively pursuing design of AFA-style

[4] Although the NPFMC initiated discussion of a Comprehensive Rationalization Plan in 1992, consideration stalled when arguments were advanced to suggest that efficiency considerations should include processors and other entities (Matulich et al. 1996; Matulich and Sever 1999).

[5] Average catches declined in 1999 relative to 1998 due to a reduction in the pollock TAC.

cooperatives and proposals for various forms of cooperatives for groundfish fisheries in the Gulf of Alaska are under preparation by participants in those fisheries. Finally, and perhaps most tellingly, the National Marine Fisheries Service has identified the cooperative model (to the exclusion of IFQs) as *the* management tool to address all concerns related to the social and economic character of the North Pacific fisheries (NMFS 2000).

It thus appears that after only an embryonic trial, IFQs may be displaced by the apparently greater appeal of the cooperative model. In the remainder of this paper, we examine in further detail the reasons why this evolution away from IFQs is occurring and its implications.

Sole Owners, Quota Share Holders, and Cooperatives: The view from economic theory and beyond.

Three conventional arguments for rationalizing fisheries are: 1) Increased economic efficiency; 2) Improved conservation and stewardship; and 3) Improved safety. The basis for each of these arguments is relatively straightforward. Excess capacity leads to compressed seasons, reduced exvessel prices, and compromised safety. Gear loss and gear conflict are commonly reported problems in temporally compressed fisheries. Economic theory and empirical observations suggest that the economic rents potentially available to harvests will be dissipated under the race for fish that commonly results under the combination of TAC management and either open access or input restrictions. In the following sub-sections, we review each of these three arguments by contrasting IFQs with the cooperative alternative.

Efficiency—Early speculation about the potential efficiency gains of IFQs stressed the discontinuation of high-cost fishing practices followed during the derby fishery. While these may be significant, much of the capital invested in fishing is durable and is unlikely to be subject to immediate replacement. Recent attention has focused on potential increased exvessel prices that arise from improved product handling and improved product flow to market. Figure 1 illustrates these effects with an example parameterized on the Alaska region fishery for Pacific halibut (Criddle 1994).

The by now standard critique of open access fisheries holds that the steady-state open-access solution equates total revenues and total costs and fails to produce economic profits. By contrast, a sole-owner equates marginal revenue and marginal cost, harvests an amount h_{sy}^*, and earns $\Pi\left(h_{sy}^*\right)$. That is, in the above example, the open access solution is to produce a sustainable yield of about 72 million pounds at an exvessel price of $1.50 per pound and resulting in zero net revenues. The sole owner would choose to harvest a sustainable yield of about 41 million pounds at an exvessel price of $2.25 per pound for net revenues of about $75 million, in this example.

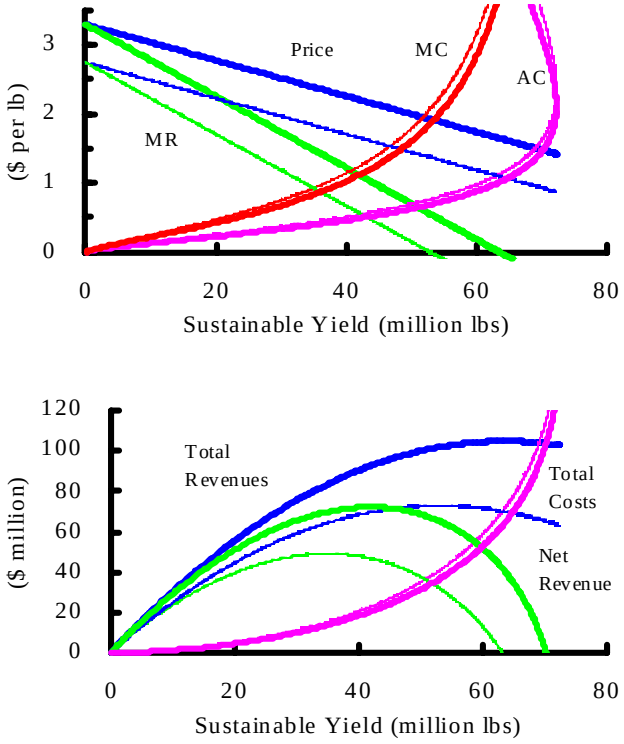

Figure 1—The effect of a $0.55/lb. increase in the exvessel price and a 10% reduction in harvest costs. Thin lines reflect conditions prior to the price increase and cost decrease (Criddle 1994).

Suppose that there *n* identical IFQ shareholders. If they act together to restrain catch, they each harvest $\frac{1}{n}\left(h_{sy}^*\right)$ and each gains $\frac{1}{n}\Pi\left(h_{sy}^*\right)$, and together they earn $75 million. If one shareholder chooses to overproduce by δ then the total profit will be reduced by the difference between $\Pi\left(h_{sy}^*\right)$ and $\Pi\left(h_{sy}^*+\delta\right)$. The profits earned by the shareholders who stick to the agreed harvest are reduced to $\frac{1}{n}\Pi\left(h_{sy}^*+\delta\right)$. The cheater's profits increase to $\frac{1}{n}\Pi\left(h_{sy}^*+\delta\right)+\Pi\left(\delta\right)$. As long as the difference between $\frac{1}{n}\Pi\left(h_{sy}^*\right)$ and $\frac{1}{n}\Pi\left(h_{sy}^*+\delta\right)$ is less than $\Pi\left(\delta\right)$, it pays to cheat. But if the shareholders are homogenous and everyone cheats, they each earn $\frac{1}{n}\Pi\left(h_{sy}^*+n\delta\right)$ and all are worse off because $\Pi\left(h_{sy}^*+n\delta\right)$ is less than $\Pi\left(h_{sy}^*+\delta\right)$ and less than $\Pi\left(h_{sy}^*\right)$. Recommended solutions to this *n* person common-pool dilemma include moral suasion and private or public policing of the agreement to hold individual harvests to $\frac{1}{n}\left(h_{sy}^*\right)$, (Ostrom et al. 1994). When *n* is large and shareholders are heterogeneous, moral suasion is unlikely to be efficacious and the transactions costs associated with negotiating and enforcing private

agreements may be prohibitive. Thus, government intervention in the form of "rationalization" programs such as IFQs is frequently called for (Coase, 1960; Cheung, 1970; Johnson and Libecap, 1982; Schlager and Ostrom, 1992; Ostrom et al. 1994).

The strict economic perspective on fisheries management is focused on rational "allocation" in the pursuit of efficiency and usually pays little attention to what are regarded as mere "distributional" issues. However, distributional issues tend to dominate the real world setting of fisheries management. The trend in U.S. IFQ programs has been one of an ever-broader suite of stakeholders, increased restriction on consolidation, and increased provisions against absentee ownership. The Mid-Atlantic Surf Clam-Ocean Quahog IFQ program (MAFMC 1990) used catch history as a basis for the initial IFQ distribution, allowed for transferability and leasing, and did not set ownership concentration limits. The South Atlantic Wreckfish IFQ program (SAFMC 1992) based 50% of the initial allocation on catch history with the remainder allocated as equal shares among the initial recipients. Permanent transfers are unrestricted, but leasing is only allowed among IFQ owners. An ownership cap of 10% was imposed on the initial IFQ allocation, but not on subsequent transfers. The North Pacific Halibut-Sablefish IFQ program (NPFMC 1995) settled on a catch history based initial allocation to vessel owners and bare-boat leaseholders. Although ownership shares were not capped in the initial allocation, subsequent transfers are subject to region specific caps between 0.5 and 1 percent of the regionally apportioned TAC. Initial recipients and individuals with prior crew-experience are the only eligible quota share buyers and transfers are not allowed from small vessel classes to large vessel classes. With a few minor exceptions, leasing is prohibited. Inclusion of skippers and crew in the initial allocation was summarily dismissed (Macinko 1993), as were potential impacts on processors. However, a subsequent consideration of IFQs for all remaining North Pacific groundfish fisheries featured prolonged considerations of these entities in addition to vessel owners (NPFMC 1991). The Pacific Sablefish (PFMC 1995) and Gulf of Mexico Red Snapper (GMFMC 1995) IFQ programs blocked by the 1996 reauthorization of MSFMA include provisions that continue the trend towards recognition of an expanded class of stakeholders and restrictions on concentration and absentee ownership. The Gulf of Mexico Red Snapper program would have included skippers in the initial allocation. The Pacific Sablefish program would have imposed 1% ownership caps and restricted leasing. Recognition of an ever-broadened set of stakeholders increases the number and heterogeneity of participants. Ownership caps and restrictions on transfers between vessel categories preserve heterogeneity and set a lower bound on the number of participants. Under these conditions, it is unlikely that the *n*-person common-pool dilemma will be solved in a manner that maximizes net revenues across included shareholders.

In addition, the Council process encourages rent-seeking that dissipates potential rents and dilutes the quota share pool. While this is most evident in the processes leading up to the adoption of an IFQ program and the accompanying initial allocation, it continues as IFQ shareholders defend the value of their quota shares from efforts to increase the share pool. For example, North Pacific halibut-sablefish IFQ shareholders have fought proposals to increase the amount of halibut allocated to CDQ and sport fisheries, proposals to create a subsistence fishery set aside, proposals to create additional shares (dilute the existing shares) for individuals who established catch histories after the control date, proposals to create additional shares (dilute the existing shares) for crew and skippers, proposals to restrict the regional transfer of quota share ownership, and proposals to require that halibut be landed at ports within the region where it was caught.

In contrast to the ever-widening pool of stakeholder/claimants to IFQ programs, Cooperatives offer the advantage of small numbers and greater homogeneity, thereby reducing transactions, monitoring, and enforcement costs (that is, these outcomes are perceived as advantages by those recipients of the benefits cooperatives offer, obviously those excluded may regard these same outcomes as disadvantages). But cooperatives offer further distinct advantages (again as understood from a particular perspective) besides simply defining a smaller pool of beneficiaries—cooperatives are administratively and procedurally efficient and are unencumbered by the restrictions on share concentration, absentee ownership, leasing, and transfer that have characterized recent IFQ programs.[6] By negotiating private agreements and securing Justice Department acquiescence and Congressional support, cooperatives have largely avoided the public hearing process and analysis requirements of the Environmental Protection Act (Environmental Assessment), the Regulatory Flexibility Act (Regulatory Impact Review/Initial Regulatory Flexibility Analysis), and the MSFCMA (National Standards).[7]

Resource Conservation and Stewardship—Under IFQs, there is greater flexibility in selecting fishing time and area, with the possibility of reduced bycatch and greater product recovery. In addition, IFQ fishers may set (and

[6] Note that we are fully aware of and stress that what appears to be "efficient" to some appears equally abusive of established public processes to others.

[7] Ironically, although cut out of the decision-making process, the Councils have been required to demonstrate that the cooperatives conform with MSFCMA national standards and to develop supportive post hoc EA/RIR/IRFA analyses.

lose) less gear, thereby reducing ghost fishing and damage that lost gear may cause to the marine environment. IFQs may create opportunities and incentives for highgrading and quota busting. However, sorting and discarding fish will occur only if the expected benefits exceed the cost of sorting and the cost of catching replacement fish (including the opportunity cost of time and the expected cost of penalties and sanctions). Quota busting is most likely to occur when overage penalties are low and there is little chance of detection. Actual conservation benefits are an empirical question with mixed answers.

The argument that the community of IFQ holders will internalize stock externalities suffers from the common-pool dilemma described above. Because quota shares are usufructuary rights to a share of the common resource and not rights to particular fish, shareholders have no assurance that others will refrain from practices that prevent the sustainable use of fish stocks and may conserve at less than the socially optimal level, especially when shareholders are numerous and heterogeneous.

To the extent that cooperatives feature smaller and more homogeneous memberships, stock externalities will be internalized to a greater degree than they would be in an IFQ program. Moreover, violations of cooperative contracts (such as exceeding catch shares may trigger financial disincentives that far exceed penalties allowed under the MSFCMA. Because evidentiary standards are less stringent under civil law, overages that are too small to be successfully prosecuted under IFQ programs could be successfully litigated as breaches of contract. Moreover, because the entire cooperative is subject to an overall allocation, an overage by one member directly harms all other members, thus all cooperative members have standing to bring action against the offender.

Nevertheless, under both IFQs and cooperatives, the fish stocks remain fugitive resources that are fully susceptible to truly external threats such as pollution events. Similarly, both IFQ holders and cooperative participants may (influenced by private discount rate calculations) arrive at a conclusion regarding optimal strategies that deliberately does not sustain the resource (Clark 1973). In summary, the cooperative model may resolve certain externalities relative to IFQs while sharing most of the same stewardship incentives and disincentives.

Safety—Because IFQs increase the opportunity for fishers to choose when to fish, weather conditions, the condition of the vessel, or other safety factors can be considered and hazardous conditions can be avoided. Nevertheless, fishers may choose to ignore hazardous conditions in order to service contracted deliveries. Moreover, fishers who are not themselves owners of the IFQ may not have as much flexibility as those who are (NRC 1999). Similar constraints and incentives will be present in cooperative fisheries. On balance, it can be expected that given the additional flexibility offered under IFQs and cooperatives, fishers will choose to avoid hazardous weather and load conditions, but there is no accounting for greed.

Although unrelated to the foregoing discussion of efficiency, conservation, and safety characteristics, it is worth noting that existing IFQ and co-op programs differ in the extent to which they reveal catch share values. For example, the North Pacific halibut and sablefish IFQ program requires that the terms of share transfer agreements be reported. This requirement provides information about quota share value that could be used to determine the extent to which the quota share holders could contribute to the recovery of management costs and resource rents. Current co-op programs do not mandate a reporting of the terms of share transfers and thus deprive managers of information that could be used in cost and rent recovery.

The Talk About Cooperatives

One way to assess why cooperatives are preferred over IFQs is to simply listen to the way cooperative proponents talk about the two systems in comparative terms. Participants in the debates over cooperatives and IFQs perceive distinct and fundamental differences between the two options:

> [T]here is a fundamental policy to think about for IFQs vs. co-ops. IFQs in future programs have a trail of people who want a piece of the pie—environmentalists, crewmembers, and communities. Co-ops don't have these restrictions in place for the needed giveaways that would occur. (NPFMC 1999)

As we have alluded to, stakeholder diversity is perceived to be problematic under IFQs whereas cooperatives offer the possibility of defining a narrower group of beneficiaries. What is interesting is how this narrower group is perceived to be beneficial. The captains of industry who are proponents of cooperatives do not stress elimination of production externalities or preservation of aggregate rents. Rather, what is important is the rather obvious conclusion that including fewer stakeholders means sharing available rents amongst fewer rent-seekers. In economic terms, the choice of cooperatives over IFQs (like so many other debates in fisheries management) turns on issues of distribution rather than allocation. Aggregate rents are important in theory but relative rents drive the political process.

The second category of distinction between cooperatives and IFQs (transactions costs) is noticeably absent from the public talk about cooperatives. Clearly fewer stakeholders ought to facilitate inter-stakeholder negotiations but the pronounced focus is on rents as noted above. That is not to say, however, that there is little public attention to the implications for organizational dynamics involved in the choice between IFQs and

cooperatives. Commenting on the choice, one self-avowed supporter of IFQs noted that he:

> …didn't like the way the sablefish and halibut program turned out with all the bells and whistles…[and was] more in favor of co-ops, because it takes the government out of the equation of managing fishermen. (NPFMC 1999)

While not directly commenting on either rents or transactions costs, this comment is notable for highlighting an aspect of the cooperative model that has received relatively little attention. The bypassing of the NMFS/Regional Fishery Management Council system established by Congress in the MSFCMA is one of the major benefits perceived by proponents of cooperatives. Ironically, it appears that the local/regional decision-making basis that is recommended for future IFQs (see NRC 1999) is precisely what cooperative proponents seek to avoid. One possible explanation is that the Council process enfranchises broader stakeholder participation and requires a lengthy public process, defined in law and regulation, of identifying alternatives and exploring the economic and social effects of those alternatives. While the costs of currying Congressional favor could rise to the level of rent-seeking costs involved in obtaining a favorable rights-allocation through the Council process, the current interest in cooperatives suggests that industry anticipates that it would be more costly (or likely to produce lower windfall gains) to work through the Council.

Conclusion

What conclusions can be reached on the basis of the brief comparative review presented above? Perhaps a better way to phrase this question is to ask whether the comparative review provides an explanation for the relative abandonment of IFQs and the embrace of cooperatives? On the one hand, it is hard to distinguish cooperatives from IFQs on the basis of the conventional points of emphasis in rationalization debates. The clearest distinctions discerned were that cooperatives narrow the group of beneficiaries and pursue adoption and implementation via truncated approval processes. But viewed in this manner, these distinctions have rarely featured as primary arguments for *any* rationalization scheme. On the other hand, it is clearly possible to cast these distinctions in terms of conventional arguments. Reducing the scope of the stakeholders recognized could mean preservation of potential rents through the elimination of production externalities and the reduction of transactions costs involved in the adoption and implementation process. Nevertheless, because the MSFCMA requires that where they are created, harvest rights must be assigned gratis, the development and initial allocation phases of IFQs and cooperatives will induce rent-seeking behavior that, when coupled with the rent-seeking costs associated with defending the harvest right from being diluted through recognition of additional claimants, could dissipate the relative benefits of rationalization. Shifting the venue for rent-seeking from the local/regional level represented by the Council to the more remote level represented by Congress, may affect who emerges with the fishing right, but doesn't eliminate the rent-seeking behavior that reduces the net benefits of IFQs or cooperatives. The policy tool of choice for many proponents of 'rights-based fishing'—the IFQ—is thus poised at a precarious moment in history. The Congressional moratorium on IFQ programs in the U.S. expires at the end of this year and while no one can be certain whether Congress will renew the moratorium, it seems likely that IFQs will soon be back in the policy tool kit. IFQs also appear to be better suited than cooperatives to fisheries with large numbers of diverse participants. Yet, the empirical evidence suggests that cooperatives have political momentum and pose a serious challenge to the future of IFQs.

Acknowledgements

This research was made possible by financial support of the Utah Agricultural Experiment Station. Approved as UAES journal paper 7312.

Literature Cited

Adasiak, A. 1979. Alaska's experience with limited entry. *Journal of the Fisheries Research Board of Canada* 36: 770-782.

Annala, J.H. 1996. New Zealand's ITQ system: Have the first eight years been a success or a failure? *Reviews in Fish Biology and Fisheries* 6: 43-62.

Arnason, R. 1993. The Icelandic individual transferable quota system: a descriptive account. *Marine Resource Economics* 8: 201-218.

Arnason, R. 1996. On the individual transferable quota fisheries management system in Iceland. *Reviews in Fish Biology and Fisheries* 6: 63-90.

At-sea Processors Association (APA). 1999. Preliminary assessment of the pollock conservation cooperative. Seattle, WA. 23p.

Boyce, J.R. 1992. Individual transferable quotas and production externalities in a fishery. *Natural Resource Modeling* 6: 385-408.

Casey, K., C.M. Dewees, B. Turris, and J. Wilen. 1995. The effects of individual vessel quotas in the British Columbia halibut fishery. *Marine Resource Economics* 10: 211-230.

Cheung, S.N.S. 1970. The structure of a contract and the theory of a non-exclusive resource. *Journal of Law and Economics* 13: 49-70.

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

Clark, C. 1973. Profit maximization and the extinction of animal species. *Journal of Political Economy* 81: 950-961.

Coase, R. 1960. The problem of social cost. *Journal of Law and Economics* 3: 1-44.

Copes, P. 1986. A critical review of individual quotas as a device in fisheries management. *Land Economics* 62: 278-291.

Copes, P. 1997. Social impacts of fisheries management regimes based on individual quotas. In G. Pálsson and G. Pétursdóttir (editors), *Social Implications of Quota Systems in Fisheries*, Nordic Council of Ministers, Copenhagen.

Criddle, K.R. 1994. Economics of resource use: a bioeconomic analysis of the Pacific halibut fishery. In D. Shaw (Editor). *Proceedings of the Fourth International Symposium of the Conference of Asian and Pan-Pacific University Presidents.* Alaska Sea Grant College Program, University of Alaska Fairbanks p. 37-52.

Crothers, S. 1988. Individual transferable quotas: The New Zealand experience. *Fisheries* 13: 10-12.

De Alessi, L. 1980. The economics of property rights: a review of the evidence. *Research in Law and Economics* 2: 1-47.

Demsetz, H. 1967. Towards a theory of property rights. *American Economic Review* 57: 347-359.

Dewees, C.M. 1989. Assessment of the implementation of individual transferable quotas in New Zealand's inshore fishery. *North American Journal of Fisheries Management* 9: 131-139.

Edwards, S.F. 1994. Ownership of renewable ocean resources. *Marine Resource Economics* 9: 253-273.

Fraser, G.A. 1979. Limited entry: experience of the British Columbia salmon fishery. *Journal of the Fisheries Research Board of Canada* 36: 754-763.

Gauvin, J.R., J.M. Ward, and E.E. Burgess. 1994. Description and evaluation of wreckfish (*Polyprion americanus*) fishery under individual transferable quotas. *Marine Resource Economics* 9: 99-109.

Geen, G. and M. Nayar. 1988. Individual transferable quotas in the southern bluefin tuna fishery: an economic appraisal. *Marine Resource Economics* 5: 365-387.

Gordon, H.S. 1953. An economic approach to the optimum utilization of fishery resources. *Journal of the Fisheries Research Board of Canada* 10: 442-457.

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

Gulf of Mexico Fishery Management Council (GMFMC). 1997. Amendment 15 (red snapper individual fishing quotas) to the fishery management plan for the reef fish fishery of the Gulf of Mexico. GMFMC, Tampa, FL.

Gulland, J.A. and M.A. Robinson. 1973. Economics of fishery management. *Journal of the Fisheries Research Board of Canada* 30: 2042-2050.

Herrmann, M. 1996. Estimating the induced price increase for Canadian Pacific halibut with the introduction of the individual vessel quota program. *Canadian Journal of Agricultural Economics* 44: 151-164.

Herrmann, M. 2000. The individual vessel quota price induced effects for Canadian Pacific halibut: before and after Alaska IFQs. *Canadian Journal of Agricultural Economics* (in press).

Johnson, R.N. and G.D. Libecap. 1982. Contracting problems and regulation: the case of the fishery. *American Economic Review* 72: 1005-1022.

Keen, E.A. 1983. Common property in fisheries: is sole ownership an option? *Marine Policy* 7: 197-211.

Larkin, S., and G. Sylvia. 1999. Intrinsic fish characteristics and intraseason production efficiency: a management level bioeconomic analysis of a commercial fishery. *American Journal of Agricultural Economics* 81: 29-43.

Linder, R.K., H.F. Campbell, and G.G. Bevin. 1992. Rent generation during the transition to a managed fishery: the case of the New Zealand ITQ system. *Marine Resource Economics* 7: 229-248.

Macinko, S. 1993. Public or private? United States commercial fisheries management and the public trust doctrine, reciprocal challenges. *Natural Resources Journal* 32: 919-955.

Matulich, S.C. and M. Sever. 1999. Reconsidering the initial allocation of ITQs: The search for a Pareto safe allocation between fishers and processors. *Land Economics* 75: 203-219.

Matulich, S.C., R.C. Mittelhammer, and C. Reberte. 1996. Toward a more complete model of individual transferable fishing quotas: Implications of incorporating the processing sector. *Journal of Environmental Economics and Management* 31: 112-128.

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

McCay, B.J. 1998. *Oyster Wars and the Public Trust: Property, Law, and Ecology in New Jersey History*. University of Arizona Press Tucson.

Meany, T.F. 1979. Limited entry in the Western Australia rock lobster and prawn fisheries: an economic evaluation. *Journal of the Fisheries Research Board of Canada* 36: 789-798.

Mid-Atlantic Fishery Management Council (MAFMC). 1990. Amendment #8 Fishery Management Plan for the Atlantic Surf Clam and Ocean Quahog Fishery. MAFMC, Dover, Delaware.

Moloney, D.G. and P.H. Pearse. 1979. Quantitative rights as an instrument for regulating commercial fisheries. *Journal of the Fisheries Research Board of Canada* 36: 859-866.

Morey, E.R. 1980. Fishery economics: an introduction and review. *Natural Resources Journal* 20: 827-851.

National Marine Fisheries Service (NMFS). 2000. *Scoping Summary Report: Alaska Groundfish Fisheries Supplemental Environmental Impact Statement*. March, 27.

National Research Council (NRC). 1999. *Sharing the Fish: Toward a National Policy on Individual Fishing Quotas.* National Academy Press, Washington, D.C. 422 pp.

North Pacific Fishery Management Council (NPFMC). 1999. Minutes of the Bering Sea/Aleutian Islands Crab Co-Op Meeting, November 22, 1999, Seattle, Washington. Agenda Item C-1 Supplemental, December, 1999. NPFMC, Anchorage, AK

North Pacific Fishery Management Council (NPFMC). 1998. Amendment 51/51 (inshore-offshore allocation) to the Bering Sea and Aleutian Islands and Gulf of Alaska fishery management plans. NPFMC, Anchorage, AK.

North Pacific Fishery Management Council (NPFMC). 1995. Amendment 38/40 (inshore-offshore allocation) to the Bering Sea and Aleutian Islands and Gulf of Alaska fishery management plans. NPFMC, Anchorage, AK.

North Pacific Fishery Management Council (NPFMC). 1994. Environmental Assessment/Regulatory Impact Review for License Limitation Alternatives for the Groundfish and Crab Fisheries in the Gulf of Alaska and Bering Sea/Aleutian Islands. NPFMC, Anchorage, AK.

North Pacific Fishery Management Council (NPFMC). 1991. Amendment 20/15 (individual quotas for halibut and sablefish longline and pot gear fisheries) of the Groundfish Fishery Management Plans for the Gulf of Alaska and the Bering Sea/Aleutian Islands. NPFMC, Anchorage, AK.

North Pacific Fishery Management Council (NPFMC). 1991. Amendment 18/23 (inshore-offshore allocation) to the Bering Sea and Aleutian Islands and Gulf of Alaska fishery management plans. NPFMC, Anchorage, AK.

Ostrom, E., R. Gardner, and J. Walker. 1994. *Rules, Games, and Common-Pool Resources.* University of Michigan Press, Ann Arbor, MI. 369 pp.

Pacific Fishery Management Council (PFMC). 1995. Amendment 8 (Fixed gear sablefish individual quotas) to the Pacific coast groundfish fishery management plan. PFMC, Portland, OR.

Pearse, P.H. 1980. Property rights and the regulation of commercial fisheries. *Journal of Business Administration* 11: 185-209.

Pearse, P.H. and J.E. Wilen. 1979. Impact of Canada's Pacific salmon fleet control program. *Journal of the Fisheries Research Board of Canada* 36: 764-769.

Rettig, R.B. and J.J.C. Ginter. 1978. *Limited Entry as a Fishery Management Tool: Proceedings of a National Conference to Consider Limited Entry as a Tool in Fishery Management.* University of Washington Press, Seattle.

Schlager, E. and E. Ostrom. 1992. Property rights regimes and natural resources: a conceptual analysis. *Land Economics* 68: 249-262.

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

Scott, A.D. 1979. Development of the economic theory on fisheries regulation. *Journal of the Fisheries Research Board of Canada* 36: 725-741.

Scott, A.D. 1988. Development of property in the fishery. *Marine Resource Economics* 5: 289-311.

South Atlantic Fishery Management Council/Gulf of Mexico Fishery Management Council (SAFMC/GMFMC). 1992. Regulatory amendment to the spiny lobster fishery management plan for the Gulf of Mexico and South Atlantic. GMFMC, Tampa, Florida.

Wang, S.D. 1995. The surf clam ITQ management: an evaluation. *Marine Resource Economics* 10: 93-98.

Weninger, Q. 1998. Assessing efficiency gains from individual transferable quotas: an application to the mid-Atlantic surf clam and ocean quahog fishery. *American Journal of Agricultural Economics* 80: 750-764.

Wilen, J.E. 1979. Fisherman behavior and the design of efficient fisheries regulation programs. *Journal of the Fisheries Research Board of Canada* 36: 855-858.

Wilen, J.E. 1985. Towards a theory of the regulated fishery. *Marine Resource Economics* 1: 369-388.