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SOCIAL IMPACTS OF FISHERIES MANAGEMENT REGIMES BASED ON INDIVIDUAL QUOTAS

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INTRODUCTION

The objective of this paper is to present an analytical description and classification of observable impacts that individual quota (IQ) regimes may have on social conditions affecting fishers and fishing communities. It should be stressed that no attempt will be made to evaluate empirically the various social impacts of IQ regimes, much as such a larger task may be of value for public policy purposes. Rather, the aim is to develop through illustration and *a priori* reasoning an appreciation for the scope and variety of these impacts, as well as an understanding of the nature of their causes and effects. This should help to provide a framework for measurement of these impacts, and for in-depth exploration of their sources and their consequences.

Further reflection and research undoubtedly will turn up additional identifiable impacts. The ones that are discussed in this paper are representative particularly of fishing industry conditions in industrially advanced "western" countries. This should cater to the presumed interests of the greater part of this paper's expected readership.

IQ regimes require the setting of a total allowable catch (TAC)[1] at the beginning of a fishing period or season. The TAC is then divided into *individual* quotas, which are defined amounts or shares of the TAC assigned to individual fishers, boats, crews or enterprises. The term IQ, as used here, does not apply to quotas assigned to entire communities or other such collectivities, though it is recognized that some of the features of individual quota regimes would be present also in the case of community quotas.

It may be observed that an academic interest in *social* impacts frequently finds its origin in a concern for negative impacts on vulnerable or disadvantaged population groups. This concern is addressed by the findings of this paper, where the social impacts identified most often have a negative connotation with respect to the welfare of the economically weaker stakeholder groups in the fishery. The strength and direction of opinions in this matter no doubt will vary with the value judgements of the beholders. It will also be influenced by their assessment of indirect consequences of the impacts, which may or may not be discounted because they are remote in place or time. No attempt will be made to discuss or argue the merits of conflicting opinions that would emerge from any attempt to evaluate the extent of negativity of the impacts identified in the paper.

[1]In the literature TACs frequently are referred to as "total quotas" or "global quotas", or simply as "quotas" for short. At times this leads to a confusion as to whether a quota referred to is a whole or a part, which is quite unnecessary given the availability of the perfectly descriptive TAC term. In any case, it may be noted that the (Concise Oxford) dictionary definition of a *quota* is "the share that an individual person or company is ... entitled to receive from a total." Thus a total or global quota is a contradiction in terms and I plead that reference to it be expunged from the fisheries literature.

THEORETICAL CONSIDERATIONS

The subject matter of this paper is at the interface of two contrasting analytical paradigms. On the one hand it is faced with a structured neo-classical economic analysis, providing a narrowly defined efficiency rationale for the design and implementation of IQ regimes. On the other it is confronted with a broader social science identification and assessment of social impacts, relying on general notions of collective advantage and distributive justice, which are necessarily imprecise and contestable on the basis of subjectively varied value judgements.

IQ regimes are economic contrivances designed to pursue "social optimality" in terms of improved "efficiency" in fisheries management. The relevant calculations are meant to show how an IQ regime may raise net benefits to society through an increase in the value of output produced in the fishery over the cost of producing that output. At first sight, the pursuit of greater net benefits to society that is the purported purpose of IQ regimes, suggests compatibility with a general goal of greater social welfare. However, there are a number of reasons why IQ regimes may fail in this regard and instead may be the cause of adverse impacts on social welfare. In the following paragraphs three such reasons are discussed under the headings: (1) conceptual exclusion, (2) conventional disregard, and (3) injection of negative externalities.

(1) *Conceptual exclusion*

The first reason—and the most basic one—has to do with the restrictive interpretation that many economists customarily place on the concepts of "efficiency" and "social optimality," which help to make efficiency calculations tractable and a social optimum quantifiable. Holding that distributional questions are a matter of value judgement, and outside the scope of economic determination, conventional economic calculations of maximum efficiency to produce the social optimum place no value—positive or negative—on changes in income distribution *per se.*[2] Such changes, however, are widely considered to be particularly significant indicators of social impact. If "social optimum" is to have meaning in terms of maximizing *social* benefits it needs to take distributional outcomes into account.

Even when one accepts a definition of "efficiency" that excludes distributional considerations, conventional economic calculations of the social optimum are theoretically flawed and ambiguous with respect to value judgements. Typically such calculations use as value indicators whatever (competitive) market prices are found in existence at the point, in place and time, from which the calculations are made. Despite the aforementioned aversion to value judgements, this implies one, namely that the value indicators chosen are to be preferred over all others.

In fact, there is an infinite number of price (value) sets from which one may make comparative efficiency calculations for any fishery under alternative management scenarios. One must choose, explicitly or implicitly, not only the market place and time for the calculation of base values, but also a host of alternative institutional circumstances that may prevail, including different initial and subsequent distributions of rights and endowments that will rearrange markets and consequent prices. This again serves to

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[2]**It is true that standard theoretical "welfare economics" recognizes the concept of "Pareto optimality" whereby it is possible in highly restrictive circumstances to determine whether a certain combined change in production *and* distribution enhances welfare (Graaff 1967). But the theoretical restrictions offer virtually no opportunity to apply this theory to real-life policy decisions.**

demonstrate the futility of trying to undertake efficiency calculations independent of value judgements. Such judgements, be they implicit only, cannot be avoided: the interdependence of efficiency calculations and distributional choices is inescapable. Bromley and Bishop (1977: 287), noting the theoretical indeterminacy of conventional efficiency calculations, comment that "... to talk of efficiency in public policy issues is totally without normative meaning;" and add for emphasis *"efficiency is without meaning in isolation from reference to distribution."*

The foregoing discussion reveals flaws in the theoretical foundations of efficiency calculations. In practical terms there may often be no great differences in the price sets one might reasonably use for computation, in which case they will not much influence the calculated efficiency gains. But the choice of management system that is promoted as the efficient solution may well have a very significant impact on income distribution. Thus choosing to switch to an IQ system that results in a substantially greater concentration of fisheries-generated wealth in the hands of the relatively few, no doubt will be considered by most observers to carry with it an adverse social impact.

The central problem in all of the above is that of the "size-distribution dichotomy" (Graaff 1967:90). In attempting to improve welfare we are faced simultaneously with trying to increase the size of "the pie" and distributing it in a socially more equitable (valuable) way. The task is rendered difficult and ambiguous because of changes in size and composition of the value-measured pie consequent to interdependent changes in wealth and income distribution, production and market values. Pursuit of greater size of the pie (i.e., greater value of output) and socially more valuable distribution are interdependent, but not fully compatible, so that any notion of maximizing social welfare requires a designation to be made of an optimal trade-off. Formally, this would require the adoption of a "social welfare function" in which value judgements of some kind are implicit or explicit.

Fortunately, for policy purposes there is an analytical device that allows informed choices to be made in trading off conventionally measured economic efficiency gains against other quantifiable indicators of welfare, such as employment rates, coefficients of distributional equality, etc. Multiattribute or multiobjective modelling allows trade-offs to be specified according to agreed-upon value-weights applied to the various component welfare measures.

(2) *Conventional disregard*

Economists, generally, are cognizant of the (near) universal interdependence of economic activities. Practical considerations, however, incline many economists to make generous use of the *ceteris paribus* clause, confining economic analysis of a problem to a narrow purview with the neat assumption of "other things being equal." Given the inclination of many economists to avoid the value-judgement-laden issues of distributional equity, it should not be surprising that many analyses in fisheries economics use *ceteris paribus* (explicitly or implicitly) to exclude from consideration interdependencies that may be important for their distributional repercussions, but that are of less consequence for their conventional efficiency calculations. Examples will come under discussion below.

(3) *Injection of negative externalities*

Over the past two decades proposals for the development of fisheries management systems based on the use of individual quotas—and particularly of individual transferable quotas (ITQs)—have been widely accepted by fisheries economists, so much so that the acceptance of ITQs as the preferred management choice has become an article of

conventional wisdom. The base case for ITQ superiority is a theoretical one. Arnason (1995) argues that "... by appealing to standard economic efficiency theorems, we may be justified in asserting that the ITQ system must generate economically optimal results. In fact it is easy to show, within the framework of standard economic fisheries models that the ITQ system is in fact optimal in this sense." The problem is that this theoretical case for superiority is highly dependent on gross simplifications imbedded in the implicit or explicit assumptions, which remove the ITQ model from the real world of fisheries.

The high level of ITQ acceptance among economists, no doubt is related to the substantial benefits that are indicated by the naive models with which this management device was initially popularized. In response to the theoretical argument for ITQ superiority, one may say empirical observations suggest that "in fact it is easy to show" that ITQs are inordinately prone to external diseconomies that impose a variety of costs on society, invalidating in large measure the theoretical claims of efficiency (Copes 1986, 1995 and 1996). As will be argued in this paper, these social costs are the embodiment of a host of direct and indirect social impacts.

THE ANALYTICAL FRAMEWORK

An important feature of this paper is a focus on transferability of fishing rights as a source of distributional impacts with frequently adverse equity implications. This highlights a significant difference between individual transferable quota (ITQ) and individual non-transferable quota (INTQ) regimes (Copes 1994). It also confirms the similarities between ITQs and transferable limited entry licenses in terms of their social impacts. While the basic economic rationalization objectives of the two types of IQ regimes tend to be similar, INTQ regimes are generally less effective in the direct pursuit of these objectives.

The analysis that follows is concerned not only with direct social impacts of IQ regimes, but also with indirect ones that are perceived to be important. Impacts related to the transferability of fishing rights, in general, are considered to be direct impacts. Important indirect impacts result particularly from the mechanics of ITQ management and from IQ-induced behaviour in fishers which have adverse effects on fish stocks. These tend to lower sustainable catch levels and consequently to lower general benefits to fishers and fishing communities.

In line with the preceding discussion, the sources of social impacts in IQ systems may be divided into four general categories, related to certain broad aspects of such systems, as follows:

A. IQ management requirements
B. IQ system-induced behaviour
C. ITQ transferability
D. INTQ non-transferability

For analytical purposes, this paper recognizes a further division into 11 sub-categories, each representing a particular feature of IQ systems that can be identified as the source of a particular kind of impact.

In the paper the various categories and sub-categories of social impact are traced from their specific IQ-imbedded source to their incidence, as identified by the nature of such incidence and the interest groups thereby affected. The cause-and-effect relationships are shown diagrammatically in a flow chart (Figure 1). They are discussed in the following four sections, each of which deals with one of the general source categories identified above.

A. IQ MANAGEMENT REQUIREMENTS

IQ systems have been devised and recommended by economists for the specific purpose of improving the economic efficiency of fisheries through a process of "rationalization." Policy measures focussed on rationalization objectives to the exclusion of other considerations may well impact adversely on some aspects of social welfare. Furthermore, the technical requirements of implementing IQ regimes may have further effects with adverse social consequences.

(A1) *Rationalization objectives*

Conventionally, improved efficiency is measured in terms of the increase in discounted net benefits achieved over time in the exploitation of a fish stock. Historical conditions of open access have resulted in the "overfishing" problem, with excessive numbers of boats and fishers entering a fishery, often depressing catches to levels well below maximum sustainable yields. A straightforward requirement of rationalization is to reduce the number of vessels and fishers in the fleet, which will cut aggregate costs of fishing operations. With proper control of catch levels stocks may be restored to yield optimal sustainable harvests with consequently increased revenues. The higher revenues and lower costs are evidence of improved efficiency. They provide additional net benefits as returns to participants in the fishery or as revenues from fees and taxes to the government.

A variety of management regimes have been developed to rationalize fishing operations in industrialized countries. ITQ regimes are particularly effective in drawing down excess capacity in a fishery because the transferability of quotas makes it easy to accumulate fishing privileges in the hands of smaller numbers of operators (Moloney and Pearse 1979, Copes 1986). From a social standpoint an important down-side in rationalization often is the reduction in employment. Much of the fishing industry—and particularly of the labour-intensive inshore or small-boat fishery—is located in relatively isolated coastal communities with few alternative employment opportunities. The often low mobility of fishers from such communities makes it difficult and sometimes near-impossible to provide them with alternative employment.

Fisheries rationalization may pose a severe policy dilemma (Copes 1972b). On the one hand, a reduction in the numbers of boats and fishers may be urgently required for long-term economic viability and biological sustainability of the fishery. On the other, in the short and intermediate term rationalization may be attended by serious social problems with real economic content, the costs of which tend to be excluded from the efficiency calculations with which rationalization is promoted. One-sided solutions in this dilemma may be very costly. Compromises guided by sensitive cost-benefit analysis are obviously called for, but this paper is not the place for the extensive discussion that this subject entails.

A further likely impact of fisheries rationalization is a reduction in the size of fishing communities, and possible elimination of some of them. This involves implicit costs from abandonment or underutilization of social capital in these communities, requiring replacement expenditures for those resettled elsewhere. In this context it may be noted that insofar as ITQ management may produce lower than optimal catches [see the discussion below in section A2], the ITQ-induced reduction of population in fishing communities may in any case be economically excessive. More important still may be the psychic costs of change and rupture of social connections experienced by the people concerned. Once more, compromises may be called for to bring about the most essential features of economic viability and biological sustainability in the fishery, while limiting

the extent and the speed of hurtful social change.

One feature of fisheries rationalization that has received scant recognition in the literature is the reduction in the extent of intramarginal rents that may take place. These rents consist largely of the extra returns enjoyed by fishers with superior skills, of which "highliners" are the supreme example (Copes 1972a and 1990). These extra returns are measured by the difference between the net labour income enjoyed by the more skilled fishers and that accruing to marginal fishers. The number of fishers required and retained in the fishery is likely to decline significantly in the course of rationalization. The marginal and lower skilled intramarginal fishers are the ones most likely to be dropped in the crew selection process. Fishers, formerly at medium skill levels thereby become the new marginal fishers. Highliners may remain at the top of the skill hierarchy, but with the lower demand for labour in the fishery and the smaller post-rationalization difference between highliners and marginal fishers, the highliners are likely to find the returns to their skills reduced. Highly skilled hired skippers and crew members are likely to lose income in the process. Vessel owner-operators who have been allocated licenses or quotas, however, may gain more income from the rationalization process than they lose in terms of reduced returns to their labour contribution.

There is another social impact of IQ rationalization that should be mentioned. The introduction of an IQ regime requires an initial assignment of quotas, which is likely to unleash a painful process of "rent seeking". It has been a common government practice in setting up a fisheries rationalization regime to "grandfather-in" all fully established ("bona fide") participants in the fishery. In recognition of their established stake in the fishery they are then offered limited entry licenses or individual quota allocations free or at a nominal charge. In the case of licenses in a limited entry fishery this is a relatively simple matter of allowing established participants to carry on as before, with rationalization taking the form of a buy-out of licenses.

The initial allocation in a quota scheme may be a much more difficult matter (Grafton 1993). Should all participants be offered equal amounts of quota? Or should the quotas be scaled according to vessel tonnage, vessel value, number of crew, or some other proxy of catching capacity or equitable return on investment? Should ordinary crew members receive a share of quota? Should allocations be prorated according to historical catch performance, and if so over what period should that performance be measured? There are many different bases of distribution of quota that might be used and one may suppose that participants will agitate and lobby variously for the particular allocation scheme under which they themselves expect to benefit most. Resources will be wasted in the lobby process and hard feelings of losers may persist.

(A2) *Firm periodic TACs*

Promoters of IQ systems have often contended that they offer particular advantages in furthering conservation. Lee Anderson, a prominent spokesman for this view, in public testimony before the U.S. House of Representatives Subcommittee on Fisheries Management stated (Anderson 1994: 331): "There are two main benefits of ITQs. First, a quota based management system is better suited to achieve conservation on a consistent basis because it directly limits the amount of catch." However, on closer consideration it may be argued that this is precisely the biggest conservation problem with IQs, because they are bound to limit the catch frequently at the wrong level.

The rationale for an IQ fishery, requires that quotas (and thus the TACs from which they are derived) are set in advance of the fishing season, so that fishers may plan their operations to maximum economic advantage. Credibility of, and confidence in the

IQ system demand that quotas, once set for the season, are honoured by the management authority. TACs in IQ fisheries therefore tend to be inflexible, unlike the indicative TACs of real-time management systems that are monitored continuously and close the fishery when stock conditions require it. The inability or reluctance to respond in-season to deteriorating stock conditions makes IQ fisheries risk-prone and incompatible with the "precautionary approach" required to safeguard fishery sustainability.[3] As a result IQ systems face the need either to be risk-averse and accept permanently lower TACs (and permanently lower catches) than flexible management systems can afford, or to set TACs at the same level and accept periodic "accidental" stock damage that may involve serious short-run as well as long-run catch losses (Copes 1996).

There is a supplementary risk to conservation in ITQ systems (much less so in INTQ systems) from the circumstance that the implementation of ITQ systems tends to be irreversible, or nearly so. Where a new ITQ system is successful in rationalizing fishing capacity through the consolidation of quota in the hands of a smaller number of operators, the value of tradeable quotas may escalate greatly. If after a while, serious concerns develop over conservation aspects of the fishery (or any other biological, economic, or social aspects) it will likely be difficult to cancel ITQ management. Current quota holders, many of whom may have purchased quota at high prices, will likely consider they are entitled to property rights to their quotas. For equity, if not for legal reasons governments will likely feel that they would have to buy out quota holders if they wanted to cancel ITQ management. This could be a very expensive proposition, as well as an admission of failure, that might well inhibit governments from acting so that the faulty ITQ system would remain in place.

B. IQ SYSTEM-INDUCED BEHAVIOUR[4]

Particularly noticeable among the negative externalities of IQ systems are several that may be traced to fisher behaviour in response to perverse incentives induced by these systems. They are identified and discussed in the following paragraphs. Their direct impacts generally are in the nature of stock and harvest losses. Indirectly they impact adversely on the welfare of fishing communities, insofar as harvest losses translate into income losses. In addition they have distributional impacts, where the fortunes of various fishers are differentially affected, in part by behaviour of some fishers that is illegal or considered unethical. A resulting sense of inequity may damage social relations in fishing communities.

(B1) *Quota busting and poaching*

An obvious weakness of the IQ system is the need to prevent fishers from taking more than their allowed quota of a species (quota busting) or from taking fish for which they have no quota at all (poaching). Particularly in small-boat fisheries, where there may be

[3]Pearse, otherwise a strong supporter of ITQ management, in a co-authored paper (Walters and Pearse 1996), concedes that the shift to an ITQ fishery "calls for much more accurate and timely stock assessments" and that "under existing assessment systems, quotas may need to be so conservative that foregone catches could wipe out the economic gains from quota management." These authors suggest ITQ systems need to invest in a higher level of data gathering and utilization. However, this cannot overcome the main problem, which is the inability or reluctance in ITQ (or IQ) systems to change TACs in-season.

[4]Much of the analysis of this section has been drawn from another paper of the author (Copes 1996), where it is presented in a different context.

hundreds or thousands of vessels out on the water fishing legally with valid quotas, it may be well nigh impossible to spot transgressions and prevent fishers so inclined from taking catches in excess of quota, especially if there are many landing sites and many channels through which they may dispose of the fish. Most of the world's fish catch is taken in geographically dispersed small-boat fisheries, where the cost of any effective attempt at enforcement might well be prohibitive. Successful quota busting and poaching leads to an excessive draw-down of stocks and brings the management system into disrepute. It encourages previously law-abiding fishers to join the transgressors in their illegal activities for fear of being put at a disadvantage. This can only further imperil stock protection efforts.

(B2) *High-grading*

To obtain the greatest net value from a species quota, a fisher naturally will want to fill the quota with fish of that species that fetches the highest price per pound. This provides an incentive to discard fish (usually dead or dying) that has a lower value per unit weight, because it is of a non-preferred size or of lesser quality for one reason or another. This practice, referred to as high-grading (Copes 1986).[5] It is recognized that high-grading takes place in many IQ fisheries, on a smaller or larger scale, and that it represents an unjustifiable waste of fish (e.g., Copes 1992, Dewees 1989).

A possible measure to discourage high-grading would be to issue quotas in value terms, rather than in physical quantity terms (Copes 1986, Turner 1996, Willmann 1996), so that fishers would not lose any total revenue by retaining fish and would not dump fish for the sake of higher-value catches later. But there are serious problems with this alternative, including the cost and complexity of administering it in the face of ever-changing prices over time and among buyers, with opportunities for cheating on reported values through trade collusion. A value-based quota system might also threaten the quality of fish landed by capping harvester revenues and thus removing the incentive that quantity-restricted harvesters have to increase revenues through value-added improvements to their catch. For these various reasons the prospects for successful value-based quotas appear tenuous.

(B3) *Price dumping*

In many fisheries port prices for fish vary considerably from day to day (or within a day), according to the vagaries of local supply and demand conditions. In a quota fishery it is possible for a fisher returning with a catch to hear on the radio that the port price has dropped drastically. It is known that under these circumstances some fishers will dump their catch so that it will not count against quota, in the hope and expectation that prices will be much better on a subsequent occasion.[6] Obviously, this practice damages stocks. The incentive to dump does not hold in a non-quota fishery, where landing the catch will not reduce opportunities for future catches at higher prices.

(B4) *Ratcheting of quotas*

The precarious nature of the fishery inclines fishers, on the whole, to have notably short

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'High-grading pertains to the dumping of fish that has a value in excess of the social cost of landing it. This should be distinguished from the discarding of trash fish that is not worth the (social or private) cost of landing it.

The blackcod fishery in British Columbia provides an example of a fishery where this practice has been reported to take place (personal communication from Catherine Stewart, Greenpeace representative).

time horizons and high discount rates. To paraphrase a well-worn saying: "A fish in the hand is worth ten in the water." Thus, the surety of an immediate catch weighs heavily in relation to speculation on a better catch in the future. Consequently, fishers may be inclined to press for increases in TACs (and thus in ITQs), and to resist reductions, unless they are persuaded of an imminent danger of stock collapse, in which case they may be most insistent on closing a fishery. For political and other reasons fisheries managers and politicians are often sensitive to pressure from fishers. At times, against biological advice, they will give in to such pressure and increase permissible catches, or fail to lower them when needed. Thus one may observe a tendency for quotas to be ratcheted upwards when stocks are stable or growing, but often a failure for them to drop when stocks are declining (Duncan 1993). This, of course, is contrary to the requirements of the precautionary approach. It is true that upward ratcheting of TACs may also occur for the same reasons in non-IQ fisheries. However, as argued above, other systems typically are better able to react quickly to evidence of declining stocks with swift closures, so that IQ fisheries may be expected to be more at risk from upward ratcheting.

(B5) *Data fouling*

As indicated in the preceding paragraphs, ITQ systems induce a number of behavioural responses in fishers that are quite inimical to good fisheries management and conservation. All of these have a secondary effect of "data fouling" that adds further to ITQ management problems and puts greater strains on conservation. Quota busting and poaching are illegal and operators engaging in these practices undoubtedly will fail to report them. Officially recorded catches therefore will understate real catches and the real drain they impose on fish stocks. Discarding of fish through high-grading and price dumping may or may not be illegal, but it is as a rule not reported and thereby represents an unrecorded and largely unknown drain on fish stocks. All of these problem practices have the effect of "fouling" the data used by scientists to calculate the TACs that need to be prescribed to ensure that fisheries remain sustainable at high catch levels.

Unfortunately, scientists have sometimes assumed that what they do not know concerning drains on the stock, does not exist. By either ignoring or underestimating unreported and discarded catches, they are liable to assume higher stock densities than actually exist and consequently recommend catch levels that are not sustainable. In any case, with "fouled" data they will not be in a position to calculate TACs with an appropriate degree of accuracy, which is liable to have adverse consequences for fisheries management. Data fouling, for instance, has been notoriously high in EC national quota fisheries, which has been of great concern to the scientists responsible for their management (Gulland 1985, Copes 1986).

C. ITQ TRANSFERABILITY

In discussion of IQ systems and transferability provisions it is useful, at the outset, to make a distinction between two major segments of the fish harvesting industry. One is the "large-scale" corporate sector, with a small number of firms operating fleets, usually of larger vessels, often in combination with fish processing and marketing. The other is the "small-scale" sector consisting of large numbers of smaller, individually owned vessels, most often owner-operated, sometimes single-handedly but usually with the aid of a small crew. Smaller numbers of vessels may conform to different arrangements, with vessels run by a partnership, or with individuals owning more than one vessel and having family members or hired skippers running some of them.

When we talk about social impacts in the fishery, we are usually not speaking about impersonal corporations, but about what happens to vulnerable individuals in the industry. In fisheries rationalization we may expect corporations to operate in a business-like fashion. If they acquire or sell valuable access rights to fish stocks we may expect these to be paid for at the going market price. Where corporations have an unlimited lifetime, such access rights that they have bought outright may be held in perpetuity. Economically, corporations are prepared to mind the bottom line, look after themselves, and watch for opportunities elsewhere if their current business conditions deteriorate. Overall, there is little reason not to treat ITQs for companies (or CTQs or "enterprise allocations" as they may be called) as assets to be freely traded. There are no obvious equity or distributional concerns, in this case, except that it may be questionable to make a free initial allocation of ITQs. Companies may be expected to purchase their commercial assets and not to receive them as windfall gains from a public resource. Individuals working for fishing corporations, of course, may be socially impacted by low wages and poor working conditions. Their remedy would appear to lie with collective bargaining, perhaps aided by supportive legislation.

With individual fishers we may confront quite different economic circumstances, having important social dimensions. Through a variety of factors, small-scale fishers in many parts of the world, including several industrially advanced countries, are often found in small, relatively isolated communities with low income conditions, as well as poor opportunities and poor preparation for alternative work (Copes 1989). Governments, recognizing responsibility towards citizens caught in substandard economic conditions, may feel obliged to seek means of improving income conditions for small-scale fishers through economic reforms in fisheries management. Sharing of rents in a fishery rationalized through such reforms would provide the opportunity to raise the earnings of low-income fishers and thereby address a chronic social problem in a positive and non-demeaning manner.[7] For this to constitute a lasting solution to a local fisheries income problem the benefits would have to be spread over all categories of fishers (i.e., both owner-operators and crew) and over successive generations of fishers. It is here that the extent, nature and conditions of the transferability of access rights may be of decisive importance.

Economists who strongly favour IQ systems, usually also insist that individual quotas should be in the form of property rights that are freely transferable at whatever price may be obtained. The argument in favour of quota systems based specifically on ITQs relates to the potential effectiveness of such systems in rationalizing fishing operations, leading to the generation of profits in the nature of resource rents that might otherwise be dissipated. In orthodox "welfare economics" the achievement of maximum resource rents is portrayed as an unalloyed contribution to the "social surplus." The meritorious pursuit of resource rent as a social benefit may then appear to absolve the pure-theory economist from scientific or moral concern over distributional consequences that are unrecognized in a narrow conception of the discipline's theoretical framework. Preoccupation with "making the market work" to maximize resource rents thus has often been accompanied by unconcern regarding distributional equity and other social impacts related to transferability.

The institutional setting in which ITQ systems have been introduced in western countries, as a rule has been ordered by political forces impelled by a different set of

[7]**There is a companion problem of providing for fishers displaced by rationalization. This paper is not meant to address that problem (but see Copes 1972b).**

concerns than those of their economic advisers. Scott (1979), while arguing for fisheries rationalization programmes that would remove redundant labour and capital, observed that governments of the time were not really very interested in that feature of rationalization, as they were intrinsically more concerned with maintaining or expanding employment opportunities. In Canada it is clear that a major concern of government in restructuring the fishing industry has been to bring about a lasting improvement in fishing incomes, which would help to pacify a highly politicized sector, large parts of which have chronically suffered from low and uncertain incomes (Copes 1989 and 1994). The first major fisheries rationalization programme in the country was introduced in 1968 by fisheries minister Davis as: "Measures to increase the earning power of British Columbia salmon fishermen and to permit more effective management of the salmon resource ...."[8]

The Canadian government's priority concern for higher fishing incomes has been noted by IQ advocates. Thus Moloney and Pearse (1979) observed: "... in all cases we are aware of where governments have intervened to improve the economic performance of fisheries, an important objective has been to raise the chronically low incomes of fishermen. Any regime that precludes fishermen from sharing in resource rents is not likely to be acceptable wherever governments adhere to this redistributive goal." ITQ proponents advising governments seem generally to have accepted this reality and reconciled it with any aversion to dealing with matters of distributive justice. The rationale appears to have been that as long as quotas are made transferable the objective of rent generation through economic rationalization will be achieved and their intellectual concerns will be satisfied.

The long-standing concern for improvement of fishing incomes by the Canadian government, while still being acknowledged, has been compromised in recent years. In the climate of the horrendous budget deficits of the late eighties and nineties, government concerns for cost cutting have taken on added weight. ITQ promises of efficiencies that will develop greater economic self-reliance in the fisheries sector have helped to shift government policy towards acceptance of ITQ regimes as a preferred choice in fisheries rationalization, though some of their limitations are being recognized (Sutherland 1990).

Many western countries are now experimenting more or less extensively with ITQ and ENTQ regimes, while New Zealand and Iceland have been fully committed to ITQs for some years. A body of experience now exists that allows for an increasingly informed discussion of both favourable claims and adverse judgements made in respect of IQ systems in practice. The following discussion on the social impacts of ITQ transferability will draw on the accumulated experience.

(C1) *Transitional gains trap*

When an ITQ system is introduced to rationalize a fishery, it appears to be a universal practice to recognize the rights of principal stakeholders and to "grandfather" them into the new ITQ fishery with an allocation of quota. The stakeholders thus recognized usually are confined to owners of licensed fishing units (most often identified as vessels) with a record of regular participation in the fishery concerned. In part this practice appears to be based on considerations of equity and in part on the practical consideration that the cooperation of existing license holders is needed to bring about effective implementation of the new management system.

Rationalization is about the removal of excess capital and labour from a fishery.

[8] Press release, Minister of Fisheries, 6 September 1968.

An ITQ system is expected to achieve this by allowing quotas (in appropriate units) to be bought and sold and thus to be accumulated in the hands of a smaller number of operators. These are expected to build up their quota entitlements to amounts allowing for the most efficient use of most efficiently configured vessels and equipment. Operators ready to retire, or prepared to do so at the prices offered for their quotas, will thus withdraw from the fishery with their vessels and equipment. The ultimate result anticipated is that operators remaining in the fishery will have higher net incomes, because reduction in the number of vessels and the number of fishers will lower aggregate operating costs of the fishery, while catch revenues will remain approximately the same. Operators withdrawing from the fishery presumably will also draw some benefit through the voluntary sale of their quota.

An ITQ fishery that is successfully rationalized will produce profits in the nature of resource rents. These generally will accrue to the owners of quota, except to the extent that they may be captured by government levies or by buyers exercising monopsonistic powers or financial control through loans to quota holders. The financial worth of a transferable quota entitlement amounts to the present value of the stream of rent benefits that the quota is expected to produce for its owner. Values of these quota entitlements, which in most systems were obtained free of charge in the original distribution, are now often very substantial. For instance, in 1994 in the Icelandic fishery for demersal species the value of quota possessed by holders of the 229 smallest shares of quota averaged around U.S.$95,000.[9] For the 26 (company) holders of the largest shares of demersal quota the average value of quota held was about U.S.$4.78 million.

It should be noted that the argument for ITQ rationalization focuses on benefits to the (license-holding) owners of vessels who will be the recipients of quota entitlements. After all, they are the ones that need to be convinced of the benefits so that their cooperation may be secured, without which governments have shown themselves unwilling to proceed with rationalization. In small-boat fisheries most of them may be owner-operators. In some cases non-operating individuals own vessels, while fishing companies tend to own a number of larger vessels and sometimes fleets of smaller boats.

Typically, the argument for rationalization has ignored the fate of the majority of fishers who are crew members or hired skippers. There is evidence they are often made worse off. For a start, many lose their jobs in the process of rationalization which is designed to reduce the number of boats and workers in the fishery. Rationalization brings with it a reduced demand for boat crews, which tends to reduce their economic bargaining power. Thus it is reported that with the introduction of ITQs in the Nova Scotia small dragger fishery, the new "lay" arrangement is for a reduced share of the revenue going to crew members (McCay et al. 1996). On the other hand, with fuller utilization of the boats remaining in this fishery, catches and revenues of individual vessels have increased, so that the total cash income of remaining crew members may not be reduced. By the same token, however, crews are required to work more days and longer hours, causing complaints of fatigue and increased work hazards. Increased working time on the boats also reduces opportunities to earn supplementary income in kind (e.g., from hunting, subsistence farming, fuel-wood cutting, home building, etc.), which may be quite important in some fishing communities. Overall, many crew members who have retained their place on a fishing boat may still be worse off after rationalization.

In pre-rationalization days many crew members would aspire to save enough for a down payment on a boat and to go fishing for themselves. In the days of easy access

[9] **Estimates derived from data in Palsson and Helgason (1996) and Arnason(1996).**

to the fishery this was a realistic proposition. With the reduced number of authorized boats in the ITQ fishery and the cost of quota often being far in excess of the cost of a boat, fewer crew members, displaced or otherwise, can at all expect to become boat owners. Those that do commit themselves to a boat and quota purchase, likely will find the conditions for investing in a fishing enterprise substantially worse than before the implementation of the ITQ. The price of the quota is designed to absorb all of the rent the quota is expected to earn. The purchaser therefore has little reason to anticipate more than a break-even return on investment in the quota. As the total capitalization of the fishing enterprise (including quota) will be much higher than in pre-rationalization days the average size and cost of a loan to get into the fishery will be considerably greater than before. With the low investment required in pre-rationalization days, a fisher in a poor year might be able to keep up loan payments by cutting personal expenditures. With much higher post-rationalization loans that may not be possible, so that fishers in a poor year may run a significant risk of losing the boats and quotas pledged as security for their loans.

It is clear that the ITQ transferability provision, together with the practice of making a gift of quota to first-generation license holders in the ITQ fishery, has created a "transitional gains trap" (Copes 1994). The benefits of rationalization generally are enjoyed only transitionally by the first-generation of license holders and their heirs. In the usual rationalization scenario, fishers without vessel licenses and quotas are more likely to be worse than better off. Where governments have had a longstanding policy position to use fisheries reform for the purpose of permanently raising socially substandard incomes in the industry, this has been subverted by transferability. Ironically, under transferability the one element of income improvement that is offered to first-generation license holders, is the very instrument by which generations aspiring to succeed them in the fishery are deprived of a share in the benefits. Where their incomes are substandard, they are likely to remain so.

Any critique of transferability needs to be tested against one or more plausible alternatives that may claim superior results in areas under debate. If the debate concerns fisheries with recognized socially deficient income levels—of which there are many—I would suggest that the double alternative of a limited entry licensing regime with non-transferable licenses provides a plausible general response to an ITQ proposal (Copes 1990 and 1994). Such a regime would allow for rationalization, with rent generation through buy-back of vessels that are surplus to capacity requirements. A permanent improvement in incomes of successive generations could be achieved by allowing fishers to retain an appropriate share of the rent generated, with surrender of non-transferable licenses on retirement, and reallocation on a seniority basis to crew members waiting their turn for a license. Of course, a debate on management alternatives for particular fisheries needs to be conducted in terms of the specifics of those fisheries, which may vary greatly from one to another. While this paper is designed to focus on (mostly adverse) social impacts of ITQ systems, it needs to be recognized that there will be fisheries where the recognized advantages of ITQs are so strong in relation to any adverse impacts that a reasonable consensus in favour of ITQ management may obtain.

Evidence that introduction of transferability of fishing rights has adverse social impacts over time on the majority of workers in many fisheries has had little influence on the convictions of rent-fixated economists. Crutchfield (1979) provides a good illustration in a context parallel to that of ITQ rationalization, namely that of limited-entry license limitation. He comments: "Even less purpose is served by debate over transferability. Efficiency in use, continuity of operation, and ease of administration are

eloquent arguments for relatively free and costless transferability of limited fishing rights." Acknowledging a windfall gain to the initial license owners when a limited entry program is initiated he suggests: "If the windfall to the original holders causes too much of a lump in the throat, it can be readily reduced by a tax on landings (and a consequent reduction in present value of the license)." However, the advocates of ITQ and limited entry license transferability generally have noted that the windfall gains are needed to entice the cooperation of current license holders, without which governments have shown themselves unwilling to proceed with implementation of their proposals.

There is no doubt that very large windfall gains have been made in several rationalized fisheries as a result of full transferability of licenses and/or quotas issued free to first generation holders.[10] This has often caused discontent not only among subsequent holders of purchased licenses and quotas, but also among the general public, scandalized by the inequitable disposition of benefits from a public resource. To many this gift may seem particularly inappropriate in the case of large and financially sound fishing corporations.

Transferability advocates generally appear to be have been little concerned about the windfall gains inherent in their scheme. Indeed success for ITQ schemes is often claimed with reference to the greatly enhanced incomes of first-generation license holders. Tellingly, the promoters of transferability show no evident concern over substandard fishing incomes among the majority of fishers who have not been allocated licenses or quotas.[11] There is no recognition of the adverse discrimination this implies against fishers who have simply been too young in years, experience, and/or accumulation of family funds to have reached the point of acquiring a licensed vessel at the time of free quota distribution.. Denying them a share in the benefits of a rationalized fishery provides a notable illustration of intergenerational and interfamily inequity.

(C2) *Quota concentration*

Ever since the first proposals for ITQ systems were advanced, widespread concerns have been expressed regarding the concentration of quota in the hands of a smaller number of holders. Indeed, protests in favour of small operators at the time of establishment of IQ systems resulted in many cases in the setting of limits as to the proportion of the total quota for any species that could be held by one corporate or individual fishing entity (see, e.g., McCay et al. 1996). Nevertheless, research on working ITQ systems has universally confirmed that a notable concentration of quota has taken place (e.g., Dewees 1989, McCay et al. 1996, Pálsson and Helgason 1996). This should be no surprise and up to a point it should be applauded. After all, it is widely recognized that for many good biological, economic and social reasons the excessive inputs of capital and labour in the fishing industry need to be substantially reduced and the economic viability of individual vessel operations needs to be improved through larger catches.

It remains relevant to question whether the degree of quota concentration that is taking place is not excessive from both a social and economic standpoint. One issue at

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[10]For example, it is reported that in South Australia "abalone permits" are being sold for Aus$3 million and that Spencer Gulf "prawn authorities" are going for about the same amount. Personal communication, dated 14 November 1996, from A.M. Olsen, retired Director of Fisheries for the State of South Australia.

[11] It should be acknowledged that one finds occasional reference to the need to safeguard access to the fishery resource for specially vulnerable groups, such as aboriginal peoples in isolated communities (see, e.g., Crutchfield 1979).

stake is that of owner operation of individual vessels against company operation of fleets of vessels with hired captains and crew. From long experience a common pattern developed in western industrial countries, where fisheries appropriate to small-boat operations were usually exploited by craft that were individually owned and operated, while corporations employed fleets of large capital-intensive vessels in fisheries to which such equipment was most suited. There was economic logic in this division. Only substantial corporations were likely to have the financial means to acquire expensive large vessels, to provide them with sophisticated technical back-up services, and to integrate their harvesting schedules with shore-based processing and marketing.

It has been a different matter with small-boat operations. An owner-operator of a small boat has a strong self-interested motivation to run his vessel most economically, maintain it well, supervise the crew directly and effectively, produce optimal catches and secure maximum net returns from his operations. The experience of companies in trying to run large fleets of small boats has usually not been encouraging. Control of a small-boat fleet requires an extra layer of administration, with extra costs, and yet may lack effectiveness in several respects. Vessels operated by hired skippers and crews, by the nature of fishing operations, must remain largely unsupervised. The phenomenon of "moral hazard" comes into play. The hired hands may be induced by catch-share remuneration to fish hard, but will have much less motivation for economical operation and responsible maintenance of the vessel, or care in handling of the catch. And some, given the opportunity, may take liberties in appropriating part of the catch to their own use or profit. Company attempts to operate fleets of small vessels have frequently ended in failure and a sell-off to individual fishers.

There remains one important factor in company motivation to own or control small-boat fleets, and that is control and security of raw material supply on favourable terms for their processing and marketing operations. Often fishing companies will attempt to tie independent fishers to them financially, offering advantageous loans and services on condition that their catches be sold to the company on its terms. Such arrangements have not always worked to full satisfaction of the companies, with fishers finding ways to dispose of some of their catch at higher prices elsewhere, or regaining financial independence from the company.

The introduction of ITQ systems has opened new opportunities for companies to extend their economic power in the fishery. The concentration of large quota holdings in the hands of a small number of companies, not only provides them with the increased security of supply they seek, but also with opportunities to draw monopsonistic and monopolistic advantage from increasingly dominant positions in local area fish harvesting and supply of market segments. In fisheries which are technically exploitable by both smaller and larger vessels, companies may use their superior access to cheap financing to outbid small-vessel operators for quota and expand employment on larger vessels that they operate. This will result in shrinkage of the small-boat fleet, even where experience suggests superior economic performance from that fleet under competitive conditions. As an alternative, companies may buy up large blocks of quota and arrange for independent fishers to fish their quotas for them on terms that are financially advantageous to the company. In either case the accretion of economic power over the fishery by companies is likely to shift opportunities for rent capture towards them and away from independent fishers. The resulting redistribution of income may be expected to be to the advantage of company owners and against fishers deprived of quota and dependent on employment or contract fishing controlled by the companies.

The ITQ-driven shift of quota holdings towards larger companies brings with it

an increased geographical concentration of shore-based fishery facilities in the ports from which these companies operate (McCay et al. 1996 and Pálsson and Helgason 1996). Many independent plants in smaller ports are bound to disappear. The shift of vessel quotas towards home-port based company vessels will further tend to reduce fishing and feeder plant activity in smaller fishing centres. From a social cost-benefit standpoint the question needs to be asked whether the improved private profitability of the enlarged company operations will be able to offset the diseconomies suffered in smaller communities with a shrunken economic base. The latter will include the effects of job losses, reduced aggregate incomes, shrunken business turnover, reduced scale economies and service levels, higher unemployment, outmigration, assets lying waste, requirement for additional infrastructure in receiving communities of migrants, etc. To this should be added non-tangible losses in terms of stress to the dislocated, rupture of personal relations of those required to move, and a reduction of community webs in rural locations. Of course, such phenomena have also been observed historically in a process of urbanization and industrialization that resulted eventually in higher levels of affluence. The real question here is whether in present circumstances quota concentration is either necessary or helpful in a process of economic and social advance. It may not be, or it may depend on the particular case, but a convincing verdict in any case would have to be based on careful and comprehensive analysis.

(C3) *Class distinction and reduced mobility*

As the preceding discussion has indicated, transferable quotas bestow sometimes very large benefits on limited groups within the fishing industry, namely companies and individuals who have received free allocations of quota. Particularly in smaller communities, with previously egalitarian relationships among fishing families, the quota windfalls will create a wider dispersion of income and may tend towards a community division between quota-haves and have-nots. Families with quotas have an opportunity to perpetuate their higher socio-economic status by keeping the rent-earning quota in the family or by selling it and investing in other income-producing ventures. Families without the endowment of free quotas face conditions of lower socio-economic mobility within the fishery. Working up to owner-operator status, which in pre-quota days might have been routine, may not be possible if it requires the purchase of expensive quota. If quota-less fishing families do succeed in borrowing enough to purchase quota, the burden of interest and loan repayment may keep them in pinched economic circumstances.

D. INTQ NON-TRANSFERABILITY

ITQ and INTQ systems share some common advantages in terms of flexible in-season operations, where fishers can choose the best time to harvest, land and sell their catch. In a variety of ways this may help to cut costs, increase revenues and operate safely. On the subject of transferability, in which the systems differ, the discussion so far has concentrated on considerable adverse social impacts of transferability, at least as they appear in the case of income-deficient small-boat fisheries. Intermittent references have been made to the advantages ITQs offer for effective input rationalization of capital and labour. The obverse of this, of course, amounts to an adverse effect of INTQ non-transferability, which will now be reviewed briefly.

(D1) *Continuing allocation questions*

One convenience of ITQs is that they provide a self-perpetuating and self-regulating

mechanism for the allocation of harvesting rights, which is useful for purposes of continuing economic rationalization and ease of management administration. While INTQs may be used in order to produce a more equitable allocation of rights, they have the disadvantage of requiring a more cumbersome continuing process of rights allocations.

In an INTQ system, when fishers retire their quotas revert to the management authority. If, at the time, stock conditions suggest the need for a cut in the TAC, or if the remaining fleet is able to absorb readily the released quotas (presumably by proportional increases in the quotas of vessels remaining in service), it may be decided not to replace retiring fishers and their vessels. However, with a continuous flow of retirements the time will come to add vessels to the fleet in order to keep its fishing capacity in line with harvest prospects. It will then be necessary to decide who will become entitled to take up a replacement quota. As we are speaking here of small-boat fisheries in localized coastal areas, a convenient and equitable system of succession may be to give priority rights to local deckhands with skipper's qualifications, in order of seniority. In that fashion all fishers in the community, if they so desire, may expect to get their turn at a license and a share of the rents accruing to quota holders.

While INTQ regimes offer a potentially workable system of quota succession that may be considered to have equity advantages, they still present some drawbacks relative to ITQ regimes. There may be continuing controversy over the formula for succession or its applicability in individual cases, so that rent-seeking activity may continue. There may also be continuing pressure from current quota holders to switch to ITQs so that they may enjoy a windfall in selling their quota at the time of retirement.

(D2) *Impairment of rationalization*

ENTQs do not offer all of the advantages in capacity rationalization that are provided by ITQs. With INTQs a reduction in the number of vessels in the fleet has to come not from quota trading, but from buy-back or non-replacement of retiring vessels. This is a feasible process, but a potentially cumbersome one requiring administrative intervention. It also does not offer the advantage of infinite variability in the amounts of quota assembled to suit the particular business plans and operational strategies of individual fishers. One may expect, then, that INTQ rationalization will be less complete and feature greater uniformity in the operations of participating fishers of participating vessels. Depending on the nature of the fishery and the diversity of participating fishers, this may or may not be a matter of much weight.

In choosing between ITQ and ENTQ systems, with social implications in mind, the former may often be the most appropriate choice for urban-based or region-wide fisheries conducted by fishers or fishing companies with adequate financial resources for ambitious business ventures. The latter may be more appealing in smaller community-based fisheries with egalitarian relationships among fishers.

CONCLUSION

The discussion of social impacts of IQ systems in this paper has been bifurcated. On the one hand are the mostly indirect impacts affecting the general social conditions of fishers and fishing communities. These commonly apply equally to ITQ and ENTQ systems. They stem from IQ-driven conservation-risky management procedures and the perversely altered fishing behaviour they induce in fishers. The adverse impacts here result from "technological externalities," which are compared against the presumed outcome of best alternative management practices. They are felt through the effect of stock, harvest and

employment losses on the general welfare of fishing communities.

On the other hand the paper has explored direct social impacts, affecting individual fishers and groups of fishers differentially and involving, in particular, intergenerational inequities. Here the adverse social effects are generally attributable to ITQ systems only. It is noted, however, that INTQ systems in avoiding these negative social effects, also lose some of the positive effect of ITQs in terms of economic rationalization. The negative ITQ impacts are largely in the nature of gross distributional inequities in assigning benefits from public resources, with all of die windfall benefits being bestowed upon that smaller segment of the fishing population happening to hold vessel licenses at the time of ITQ implementation.

This paper has concentrated on identifying social effects of IQ (and more particularly ITQ) systems in fisheries, categorizing them, tracing them to their source, and analyzing the mode, incidence and object of their impact. Because of the lack, as yet, of a large body of empirical data on the performance of IQ systems, the analysis of this overview paper has necessarily been qualitative, rather than quantitative in nature. The case has been made that social impacts of IQs are extensive in scope and have substantial adverse effects. However, there can be no verdict on the ultimate desirability of these systems in various cases, without a quantitatively more substantive assessment of their social as well as economic costs and benefits in relation to those offered by the best available management alternatives. This latter point is important insofar as promoters of ITQ systems have often claimed success on the basis of comparisons with disaster-prone open-access systems.

The debate over IQ and (more essentially) ITQ merit features a contest of different analytical paradigms and value systems. The ITQ base case is put most forcefully by a neo-classical economic argument for a narrowly conceived and simplistically executed efficiency test. It is vulnerable to the charge that it ignores or minimizes real-life economic externalities and is insensitive to important social values it is unable to incorporate in its analysis. Against this are fuzzier social science arguments for consideration of descriptively identified and measured social impacts that are well understood but not in a way that permits objective value comparisons. In choosing a fisheries management system, the challenge now is to reach consensus on a multiobjective decision-making process which will give agreed weights in trading off measures of economic efficiency and social desirability that need to be taken into account. It won't be easy but should not be beyond the capacity of human ingenuity.

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Figure 1.

SOURCE AND INCIDENCE OF SOCIAL IMPACTS IN IQ SYSTEMS