# COMMUNITY FISHING RIGHTS: SOME BASIC PRINCIPLES*

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## ABSTRACT

It is now widely recognized that property rights based fisheries management regimes are well suited for generating efficiency in fisheries. Apart from access licences, which are very low quality property rights, individual quotas (IQs) and individual transferable quotas (ITQs) are the most widely applicable and, indeed, the most commonly applied fisheries property rights around the world. These systems, in particular, ITQs have shown themselves capable of generating very substantial economic rents.

Unfortunately, ITQs, just as sole ownership and TURFs, do not seem applicable to all fisheries. In many fisheries, the cost of enforcing ITQ constraint is simply prohibitively high. This applies not the least to the numerous artisanal fisheries around the world. In many societies, moreover, there is a high degree of antagonism to the market focus and economic rationalization that ITQs entail. This often translates into political opposition that makes it impossible to adopt ITQs.

The fact that ITQs are well-suited to all fisheries has drawn attention to the possibility of allocating not individual but collective rights to groups of harvesters. While noting that the type of rights conferred as well as the group receiving them may be quite varied, it is customary to refer to this type of arrangements generally as *community fishing rights*. Community fishing rights, of course, do not constitute a fisheries management regime. They merely endow the community with the formal powers and opportunity to install an efficient fisheries management regime. Obviously, there is no guarantee that this opportunity will be used.

This paper is concerned with identifying conditions under which community fishing rights are likely to enhance the economic efficiency of fishing. Due to the complexity of the community bargaining game, it appears that not many powerful results may be available in this area. The paper, nevertheless, attempts to delineate a collection of conditions or principles under which the probability of successful fisheries management is increased. These principles may be used to guide fishing authorities around the world interested in establishing community fishing rights.

Keywords: Fisheries management, community fishing rights, community fisheries management, fishing rights.

## INTRODUCTION

Experience has shown that sufficiently high quality individual property rights in fisheries (Arnason 2000) are well suited to substantially enhance the economic efficiency of fishing operations (Shotton 2000). Among these kinds of strong fisheries property rights are (i) sole owner rights, (ii) territorial user rights in fisheries(TURFs) and (iii) individual transferable quotas (ITQs).

Of the most commonly used individual fisheries property rights, ITQs are most widely applicable and, indeed, the most widely applied (Arnason 2005). However, ITQs are not feasible in all fisheries for primarily two reasons; (i) enforcement problems —the cost of enforcing ITQ property rights are in some circumstances simply excessively high, and (ii) socio-political problems — it is simply not politically feasible to introduce private property rights. These obstacles to ITQs apply in particular to the so-called artisanal fisheries. These are fisheries usually characterized by numerous small vessels, small locally consumed catches and numerous primitive landing places.

A very substantial part of the world's fisheries are artisanal. In terms of landed value, they may account for up to half of the world's fisheries. Given that ITQs and other efficient individual property rights are not feasible in many of these fisheries, it is obviously of some importance to devise alternative ways for enhancing their economic efficiency. Communal fishing rights constitute one of these options.

Community fishing rights is a label for the arrangement where a group of people, which may be referred as a community, has the collective right to operate and manage a fishery. An obvious advantage of community fishing rights is that they often go a long way toward solving the dual problem of enforcement and socio-political opposition that often plagues ITQs and other individual property rights regimes. The disadvantage is that community fishing rights do not as such constitute a fisheries management regime — they only institute a framework for setting up such a regime. Under this framework, the community still has to find ways to solve the fisheries problem.

Obviously, the broad description of community fishing rights contains a range of arrangements. Some of them may be conducive to economic efficiency. Others may not. This paper explores this issue. Its main objective is to identify community fishing rights arrangements that are likely to promote economically efficient fishing as well as arrangements which are likely to have the opposite effect..

It should be pointed out that economic efficiency is here defined in terms of what the community wants. More precisely economically efficient fishing is what maximizes the sum total of the benefit functions of the members of the community. This, pretty obviously, is not necessarily what comes out of the community decision process. So the task is to find and describe arrangements that make this outcome as likely as possible. Note that even when that objective is attained, the community might not be managing its fishery in a way that would be optimal from the wider social perspective. That, however, is another problem.

The analysis of community fisheries management is quite complicated. This is not surprising. Community fisheries management involves the political and social interactions of many heterogeneous individuals. These interactions have not been reduced to the comparatively simple bilateral transactions made possible by the twin institutions of individual property rights and the market. Thus, when it comes to community fisheries management, the scope for individual action is much wider than just market transactions. It involves political acts; threats, persuasion, coalition forming and dismantling, bribes and cheating. It even involves the setting up of social institutions, instead of taking them for granted, which could well include systems of individual property rights to facilitate social interactions by means of a market transactions.

The standard method to study this kind of situation is, of course game theory. Game theory, however, is not particularly powerful, and has difficulties in generating equilibrium predictions even for relatively simple games. To apply game theory systematically and thoroughly to the community fisheries management situation seems a very complicated undertaking and definitely one well beyond the scope and allowable length of this paper.

Our ambition in this paper is much more modest. We will seek to set up a reasonably tractable model of the community fisheries management situation and, having done so, attempt to identify certain principles for economically efficient community fisheries management. Since the subject is complicated and the paper is limited to 12 pages, our presentation strategy is to list these principles as propositions, leaving most of the formal argumentation to the reader and, to a certain extent, appendices.

## ANALYTIC FRAMEWORK

We consider a community consisting of a number of economic agents or members. The community is assigned collective fishing right. We seek to answer the question how this right is going to be used. This situation is complicated. A priori, a great number of different outcomes seem possible. To make headway, we resort to a number of simplifying assumptions are in order. The following lists some of the more important ones.

A-1 The community fishing right is perfect (in the sense of Arnason 2000).

A-2 The community consists of a finite but possibly nonconstant number of members indicated by $I$

A-3 Community members differ with respect to (i) their utility functions and (ii) their opportunity sets (abilities).[1]

A-4 Each member is only concerned with his own utility.

A-5 The fisheries situation is described by the following simple fisheries model (see e.g. Hannesson, 1993):

Biomass growth: $\dot{x} = G(x) - \sum_{i=1}^{I} q(i)$, where $x$ represents biomass, $G(x)$ the natural growth function of the biomass and $q(i)$ the harvest of community member $i$.

Fisheries profit functions: $\Pi(q(i), x; i),\ i = 1, 2, \ldots I$.

$\exists q^*(i^*), x^*\ s.t.\ \Pi(q^*(i^*), x^*) > 0$.

A-6 Each member has full knowledge of the basic fisheries situation described in A-5.

A-7 The community decides on fisheries policy.

A-8 The fisheries policy consists of allocating harvest (rights) to members.[2]

A-9 Community members have perfect property rights over their own harvests.

A-10 Community bargaining is over harvest (rights) allocations and the corresponding compensations.

A-11 Transactions (bargaining) costs are zero.

### The scope for fisheries policy

It will be realized that the scope for a fisheries policy or fisheries management within the simple fisheries model defined by A-5 is quite narrow. Basically it can only be effected by constraining harvests. Thus, within this formal framework, there is no room for common biological management methods such as area closures and fishing gear regulations or direct technical measures such ach as effort restrictions or capital constraints. By assumption A-8, this scope is further limited. However, since the interest of this paper is primarily in general principles facilitating efficient community fisheries management this limitation on the scope of management possibilities is apparently of little consequence. What counts here is that this particular method of management can generate any economically feasible path of the fishery over time and it covers the range from fully inefficient fisheries to fully efficient ones. It can thus be regarded as a proxy for any fisheries policy that might be considered by the community. In any case this restriction can be relaxed in a straight-forward manner. The cost, however, is a considerably more complicating analysis.

### Types of members

A community normally consists of many types of individuals or, to use a more game-oriented terminology, players. These players will in general have different benefit functions and opportunity sets and this will affect how the community management game is played.

Obviously, there is a great number of member types possible. This topic is pursued at some length in Appendices 1-3. For analytical purposes it is helpful to consider a limited number of player types. In this paper we consider only three ideal-types; (i) fishers, (ii) fishing industry customers (direct and indirect suppliers to the fishing industry and demanders for fish products), and (iii) those gaining direct utility from fish stocks and/or disutility from harvests which we refer to as conservationists.

Fishers and fishing industry customers are (for simplicity) assumed to get utility from consumption goods. As explained in Appendix 3, this leads to the following two objective functions:

$\Pi(q(i),x;i)$, any fisher, $i$.

$\Pi(\sum q;j)$, any fishing industry customer, $j$. $\sum q$ represents aggregate catch.

Conservationists get utility from the size of the biomass and they generally dislike harvests. Thus, as explained in Appendix 3, their instantaneous benefit function can be expressed as:

$$\Pi(\sum q, x; k), \text{ any conservationist, } k.$$

Clearly, these three classes of objective functions are contained in — and, therefore, also special cases — the following more general benefit function.

$$\Pi(q(l), \sum q(i), x; l), \; l=1,2,\ldots I$$

where $I$ is the number of community members. This comprehensive benefit function, is useful for analytic work. It will obviously take different forms for different community members. Thus, if the member is a fisherman, $\Pi_2 = 0$ and so on. This is further discussed in Appendix 4. We take it that this function is smooth and concave in all its arguments.

## PROPOSITIONS

The following is a list of proposition about what would happen in the fisheries community defined in the analytic framework in section 1. I believe all of these propositions to be true. Most are quite intuitive and I have worked out proofs for most of them. Some proofs or seemingly convincing arguments are presented in the text or the appendices. Other proofs should be easy to reconstruct on the basis of the material in the appendices.

Proposition 1
*Members of a fisheries community will generally disagree about the optimal fisheries policy.*

*Arguments*:
This follows immediately from heterogeneous members. This is formally shown and elucidated in appendices 6-8. However, it applies even to homogenous players, provided they are fishermen. To see this note that homogenous members implies that all of them are fishers. Otherwise the fisheries problem doesn't arise. Homogenous fishers will agree about the aggregate fisheries policy, i.e. the path of the biomass, but will surely disagree about who should get the harvesting rights.

It follows immediately from Proposition 1 and the collective fishing rights (see in particular assumption A-7 above) that members of the community find themselves in a situation of a bargaining game. How this game will be played depends of course very much on the rules of the game. These rules are defined by the community structure. More precisely they are defined by how collective decisions may be taken within the community and, what largely amounts to the same thing, the rights of individual members.

Before proceeding note that an important aspect of this game is that it is a positive sum game. There is a non-empty set of agreements that will improve the overall benefits of the members of the community. This follows immediately from our specification that the fishery can be profitable (A-5).

It is similarly obvious that there is one best solution to the game, i.e. one that maximizes aggregate benefits to the community members. This also follows from the bounded nature of the fishery specified in A-5.

Proposition 2 (Closed shop)
*To attain and maintain efficient fisheries management, the community must be able to restrict new membership.*

*Arguments*:
This is one more fairly obvious proposition. If fisheries management generates benefits and new members can partake in these benefits, they will. If the benefits are rival (can be reduced by consumption), the process of entry will mean that each member's share will converge to zero. Therefore, under these conditions, efficient fisheries management will not be a worthwhile to maintain or even temporarily aim for.

It is important to interpret this proposition with care. It does not say that new membership should be forbidden. New membership where new members pay an appropriate entrance fee for full rights or where new members pay nothing but receive no rights that can influence fisheries policy directly[3] will not have this negative effect. Therefore, the operative point of proposition 2 is that the community should be able to restrict new entry or the rights conferred by new entry[4].

Proposition 3
*With heterogeneous players and no side payments, the Nash bargaining solution to the fisheries game will generally not be efficient.*

*Arguments*:
This is shown in appendix 9. However, the result is fairly obvious. The Nash bargaining solution is fundamentally a convex combination of the parties marginal benefit functions with weights being determined by the ration of their respective benefit functions. There is no reason to expect this rule to be economically efficient unless the benefit functions are identical. One easy way to see this is to note that aggregate profit maximization may easily entail that one of the firms has no harvest. Without transferable benefits, however, this can never constitute a bargaining solution.

The importance of this result is that it suggests that to attain economic efficiency, community management may have to involve certain compensation schemes.

Proposition 4 (Compensation)
*If a fisheries policy is selected that increases total benefits then there exists a compensation scheme such that every community member is at least as well off as before the policy.*

*Arguments*:
This it intuitively obvious. It is formally proven in appendix 10.

Proposition 4 is important because it implies that an economically efficient fisheries policy satisfying the Pareto-distribution principle can be an equilibrium solution to the community fisheries management game.

Propositions 3 and 4 suggests the following proposition which is actually more methodological than substantive.

Proposition 5
*The community fisheries management game can be seen as selecting the time path of harvest allocations and compensations, i.e.* $(q(i), \Psi(i))$, *for each community member..*

*Arguments*:
This is obvious.

Note, however, that, as already indicated, this is very restrictive compared to the options in real communities. It may however, be sufficient for analytical purposes, i.e. to work out the basic principles of community fisheries management.

The following proposition presents a general compensation or distribution scheme that will make the efficient fisheries policy the Nash equilibrium solution of the game.

Proposition 6
*If all members of a fisheries community receive pay-offs that are monotonically increasing in aggregate benefits, then the Nash bargaining solution is economically efficient.*

*Arguments*:
This is proven in Appendix 11. However, it is intuitively obvious that if every community member benefits from an improved fisheries policy all will support such policies.

According to proposition 6, once the monotonic benefit sharing scheme has been set up, the most efficient fisheries policy is likely to emerge. Note, however, that if this sharing scheme is not one of the exogenous rules the game, the real game will be about the parameters of this sharing scheme

It is interesting to note that ITQs constitute one such monotonic sharing scheme for ITQ holders. Limited companies constitute another monotonic sharing scheme for shareholders. With fishing industry customers and conservationists in the game, the appropriate sharing scheme becomes a bit more complicated. However, proposition 6, the compensation theorem, shows that such schemes exist.

Proposition 7
*Voting is unlikely to lead to an economically efficient fisheries policy.*

*Arguments*:
Any voting scheme basically just allocates power between members of the community. If they are heterogeneous with respect to what the voting is about, the outcome will just be some weighted average of the individual wishes, quite similar to the outcome of the Nash bargaining

game without side payments in proposition 3. This obviously is very unlikely to lead to an efficient solution. .

The situation changes if the voting procedure is accompanied with the formation of blocks and trading in votes. This, especially trading in votes, may lead to an economically efficient outcome.

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## APPENDICES

Appendix 1
**Number of community member types**

Consider two dimension for types; (i) independent variables in their utility functions and (ii) their opportunity sets.

*Utility functions*:

Let the possible variables in the utility functions be (a) the quantity of consumptions goods, $z$, (b) aggregate fish harvest, $\sum q(i)$, and (c) biomass, $x$. Assume, moreover, that $z$ enters the utility function of each. Then, it is easy to verify that we have four different utility types with utility functions as follows:

I. $U(z)$
II. $U(z,\sum q(i))$
III. $U(z,x)$
IV. $U(z,\sum q(i),x)$.

Types II.-IV. Are different kinds of conservationists.

*Opportunity sets*:

All types want to maximize their consumption of consumption goods but are constrained in this by their incomes. Let there be three types of activities generating income (a) fishing income, $p\cdot q-C(q,x)$, where $p$ is the price of landed catch and $C(q,x)$ the cost of generating it, (b) fishing industry supplying and fish processing income, (a) $s\cdot\sum q-C(\sum q)$, where $s$ is the unit value of this activity with the level of the activity is bounded by total catch and the production cost function $C(\sum q)$, and (c) $y$, independent (possibly labour) income. These possibilities generate six possible opportunity sets as follows:

A. $p\cdot q-C(q,x)\geq w\cdot z$
B. $s\cdot\sum q-C(\sum q)\geq w\cdot z$
C. $y\geq w\cdot z$
D. $p\cdot q-C(q,x)+s\cdot\sum q-C(\sum q)\geq w\cdot z$
E. $p\cdot q-C(q,x)+y\geq w\cdot z$
F. $p\cdot q-C(q,x)+s\cdot\sum q-C(\sum q)+y\geq w\cdot z$,

where $w$ represents the unit price of consumption goods.

*Number of community member types*

The above possibilities generate 24 different community member types. Each will normally prefer a different fisheries policy. Obviously, by further specifying the different trait of community members, we can identify more types. In the limit the number of different types equals the number of members in the community. Since the community evolves over time, the number of potentially different member types is perhaps just as relevant. This clearly is much higher.

Appendix 2
**How individuals select their profession (type)**

This appendix outlines, how utility maximizing individuals will select their profession.

On the basis of the formulation in Appendix 1, a general utility function encompassing any individual is:

$$U(z,\sum q(i),x).$$

Each individual can allocate his time, $T$, between the three income generating activities; (i) fishing, (ii) fish processing and supplying and (iii) other activities, i.e. select his profession. Let α, β and γ indicate the time allocated to fishing, fish processing and other income generating activity respectively. Then we have the time constraint:

$$T\geq\alpha+\beta+\gamma.$$

If the inequality sign applies, some time is non-income generating, i.e. idle.

Generalizing the utility function to take account of the time allocation we have:

$$U(z,\sum q(i),x,\alpha,\beta,\gamma)$$

The momentary budget constraint (opportunity set) is now:

$$\alpha\cdot\left(p\cdot q-C(q,x;i)\right)+\beta\cdot\left(s\cdot\sum q-C(\sum q;i)\right)+\gamma\cdot y(i)\geq w\cdot z.$$

Assuming for analytic simplicity an arbitrary life time, $\tau$, each community member will attempt to solve the following maximization problem:

$$\underset{\alpha,\beta,\gamma,q(i),\forall i}{Maximize} \int_0^{\tau} U(z,\sum q(i),x,\alpha,\beta,\gamma)\cdot e^{-rt}dt$$

$$s.t. \quad \dot{x} = G(x) - \sum_{i=1}^{I} q(i)$$

$$\int_0^{\tau} \Big(\alpha\cdot(p\cdot q - C(q,x;i)) + \beta\cdot\big(s\cdot\sum q - C(\sum q;i)\big) + \gamma\cdot y(i) - w\cdot z\Big)\cdot e^{-rt}dt \geq 0$$

$$T \geq \alpha+\beta+\gamma.$$

The solution to this problem will describe the chosen profession of the person. This profession depends among other things on (i) the member's utility function and (ii) his comparative advantage in the various professions. It may obviously be mixed and it may vary over time.

The importance of this is that the preferences of any member regarding fisheries management which do not only depend on his utility function but also his profession, depend on the overall situation including the actual fisheries management and may change over time.

Appendix 3

**Objective functions of different member types**

Consider three types of community members, fishers, fishing industry customers (suppliers and demanders) and conservationists. The utility functions of these three types are discussed in appendix 1.

***Fishers*** want to maximize their utility from their fishing operations. In a simplified static framework we may define their problem as:

$$\text{Maximize } U(z(i);i) \text{ s.t. } p\cdot q(i) - C(q(i),x;i) \geq w\cdot z(i),\ \forall i.$$

The function $U(z(i);i)$ is fisher's $i$ utility function with $z(i)$ his consumption of consumer goods. $p$ is the price of landings and $q(i)$ his landings. The function $C(q(i),x;i)$ is his fishing cost function and $w$ the price of consumption goods which may be normalized to unity. On this basis we may define the objective function for fisher $i$ as follows

$$U(p\cdot q(i) - C(q(i),x;i)) = \Pi(q(i),x;i),$$

where the function $\Pi(q(i),x;i)$ which (since any monotonically increasing utility function is as good as any else, may as well be seen simply as the fisher's profit function. As usual this function is taken to be monotonically rising in biomass level, $x$.

***Fishing industry customers*** seek to maximize their utility from their operations. Let us assume their operations depend on the scale of the fishing industry measured by $\sum q(i)$. Then in a simple context we may define their problem as:

$$\text{Maximize } U(z(i);i) \text{ s.t. } s\cdot\sum q - C(\sum q;i) \geq 1\cdot z(i),\ \forall i.$$

The function $U(z(i);i)$ is the utility function of fishing industry customer $i$ with $z(i)$ his consumption of consumer goods. $s$ is the price of his output and the function $C(\sum q;i)$ is his production cost function. On this basis we may define his objective function as follows

$$U(s\cdot\sum q - C(\sum q;i)) = \Pi(\sum q;i).$$

Note that this function does not directly depend on the biomass level although it does so indirectly via its biomasses impact on total catches.

***Conservationists*** as the other two types seek to maximize their utility. In a simple static context this amounts to:

$$\text{Maximize } U(z,\sum q(i),x) \text{ s.t. } y \geq w \cdot z, \forall i.$$

The function $U(z,\sum q(i),x)$ is conservationist $i$'s utility function. $y$ represents his autonomous income. On this basis we may define his objective function as follows

$$U(y,\sum q(i),x) = \Pi(\sum q(i),x;y;i).$$

Note that this benefit function is declining in the last two of its arguments.

For mathematical convenience we will assume that all three objective functions are smooth ($S^1$) and differentiable.

Appendix 4
**A comprehensive objective function**

The following general objective function subsumes those of the three types: fishers, customers and conservationists, discussed in Appendix 3.

$$\Pi(q(i),\sum q,x;i), \forall i$$

For mathematical convenience, this function is taken to be differentiable and concave in all three arguments. For the three types the fist derivatives of this function are as follows:

| $i$ is a | $\Pi_{q(i)}$ | $\Pi_2$ | $\Pi_x$ |
|---|---|---|---|
| Fisher | > 0 up to a point | ≡0 | >0 |
| Customer | ≡0 | >0 | ≡0 |
| Conservationist | ≡0 | <0 | >0 |

Appendix 5
**Optimal Community Fisheries Policy**

The community fisheries management problem is to allocate harvests so the present value of benefits (utility is maximized).

$$\underset{q(i),\forall i}{Maximize} \int_0^\infty \sum_{i=1}^{I} \Pi(q(i),\sum q,x;i) \cdot e^{-rt} dt$$

$$\text{s.t. } \dot{x} = G(x) - \sum_{i=1}^{I} q(i),$$

$$q(i) \geq 0, \ \forall i.$$

The corresponding Hamiltonian equation may be written as:

$$H = \sum_{i=1}^{I}\left(\Pi(q(i),\sum_{i=1}^{I} q(i),x;i)\right) + \lambda \cdot (G(x) - \sum_{i=1}^{I} q(i)) + \sum_{i=1}^{I} \mu(i) \cdot q(i).$$

The necessary conditions for solving this problem (Kamien and Schwartz 1981) include:

(a) $\Pi_{q(i)}(i) + \sum_{j=1}^{I} \Pi_2(j) + \mu(i) = \lambda$, $i$=1,2,..$I$

(b) $\dot{\lambda} - r\cdot\lambda = -\sum_{j=1}^{I}\Pi_x(j) - \lambda\cdot G_x$

(c) $q(i)\geq 0,\ \mu(i)\geq 0,\ \mu(i)\cdot q(i) = 0$.

Conditions (a) and (c) prescribe the optimal fishing behaviour for each member. It implies several noteworthy features of the optimal community fishery policy:

First, it implies that all community members should adjust their behaviour to the shadow value of biomass, λ, which should, moreover, be identical for all community members. This implies that if biomass could be individually bought, there should be uniform price for it.

Second, if biomass is always beneficial, as we have assumed, λ must be positive.

Third, if a community member is sufficiently inefficient doing fishing, maximum $\Pi_{q(i)}(i)$ sufficiently low, it should not do any fishing in which case would be optimal.

Fourth, if community members benefit a great deal from the aggregate supply of catch (i.e. $\sum\Pi_2(j)$ is high meaning substantial processing and fishing industry supply benefits), then harvesting rates should be correspondingly higher. The reverse applies when $\sum\Pi_2(j)$ is high negative, reflecting a great deal of conservation sentiments.

The key features of the optimal solution may be usefully characterized by the single equation:

$$G_x + \frac{\sum_{j=1}^{I}\Pi_x(j)}{\Pi_{q(i)}(i) + \sum_{j=1}^{I}\Pi_2(j) + \mu(i)} \equiv G_x + \Lambda = r,$$

where Λ is Clark-Munro's (1975) marginal stock effect. Obviously, given the exogenous rate of discount, the marginal stock effect determines the biomass exploitation rate in equilibrium. On our assumption, it must be positive, but it can be very small.

If community members benefit greatly from aggregate catch $\sum\Pi_2(j)$ is very high and Λ correspondingly small. In the limit when $\Lambda\rightarrow 0$, the equilibrium condition converges $G_x = r$, which would be the MSY if the rate of discount, *r*, was zero.

If, the community is very conservation minded, $\sum\Pi_x(j)$ would be very high, $\sum\Pi_2(j)$ would be negative and the denominator of Λ, i.e. λ, would be small in equilibrium. Thus, Λ would be very high and the equilibrium biomass level would be correspondingly high. In the limit, there would be no fishing and biomass would converge to its virgin stock equilibrium.

## ENDNOTES

* For reasons of space appendices 6-11 are not included but can be accessed via the link http://oregonstate.edu/Dept/IIFET/210appendices.pdf

1 Members and member types are extensively discussed in Appendices 1-3. This discussion is summarized below.

2 This apparently severe limitation on fisheries policy or management is discussed ad justified below

3 The term "directly" is important here. If new entrants influence fishery policy by convincing a rights holder, that will amount either to an altered utility function or an entrance fee and should not undermine efficiency.

4 New births within the community and the rights of descendants constitute interesting practical aspects of the question of entry. Corresponding problems with different implications apply to exits.