THE ECONOMIC CONFRONTATION OF LIMITED ENTRY WITH THE FREE ENTERPRISE SYSTEM

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By passage of the Fishery Conservation and Management Act of 1976 (FCMA)** the United States fisheries were given the unparalleled opportunity to show the world how the protein and recreational resources of the sea can be developed fully without risk of depletion. This is a difficult task and a weighty responsibility.

The legislation established eight regional fishery management councils which are responsible for preparing a management plan for each fishery within its authority. Both the New England fishermen and Regional Fisheries Management Council are confronted by a hope of expansion and/or the tragedy of the commons (GORDON, 1954 and HARDIN, 1968). The fishermen think that the fishing industry needs more fish, more men, more boats and more profits; and the way to accomplish this was to get a 200-mile fishing limit and kick the foreigner out (SMITH and PETERSON, 1977). On the other hand, depletion of high-valued species has been serious, and planners feel a further need of some effective regulation to prevent overfishing. As a result, limited entry strategies have been proposed, but rejected except for a variation on limited entry, a license moratorium, in the lobster fishery in Massachusetts.

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Fishermen, in general, feel that the most dangerous thing about limited entry is that it attempts to solve the problem by limiting individual freedom. Although limited entry has been successful in many parts of the world, such as in Japan (OKA, 1962) and South Africa (GERTENBACH, 1973), further problems have been adressed. These concern how to handle problems pertaining to discrimination, compensation, reduction of flexibility, undesirable income distribution effects, structural change, employment, inflation and enforcement.

Thus, limited entry issues in fisheries consists of two dimensions: 1. acceptability of limited entry within a framework of the free enterprise system, and 2. degree of compatibility among different forms of limited entry. There is an increasing need to provide a basis for answering these issues. In Section 1, the characteristics of the present fisheries management problems are reviewed. Then, acceptability of limited entry within a framework of the free enterprise system is discussed in Section 2. Alternative forms of limited entry are described and analyzed using freedom criteria in Sections 3 and 4, respectively. These are summarized in Section 5.

Section 1. The Characteristics of the Present Fisheries Management Problems

The present fishing industry is suffering from a unique combination of critical problems which aggravate the difficulties of management, and which are unlike the problems of other land-based industries. These problems stem from natural dependency; characteristics of fish which live freely in a natural commons (D'AMATO and HARGROVE, 1974); the nature of the environment; common property nature of the fish and fishing grounds; coexistence of imbalanced technological advancement; the technological inability to cope effectively with by-catch (SCHMECK, 1974), fishing mortality (other than landed catch) (RICKER, 1976), and discard problems (McCONNELL and NORTON, 1978); an inadequate data basis for prediction of the amount of resources, partly due to a lack of scientific understanding of nature itself and partly due to distrust and communication problems among people concerned (SMITH and PETERSON, 1977); a lack of cultivation or production process (TEZUKA, 1967); and power plays among interest groups (CRUTCHFIELD and PONTECORVO, 1969).

Since GORDON demonstrated in 1954 that an overfishing problem in fisheries has its roots in the economic organization of the industry (open access), a considerable amount has been written about the economic waste generated when fisheries are managed under open access condition (CHRISTY and SCOTT, 1965; CRUTCHFIELD and PONTECORVO, 1969; BELL, 1972; and KEEN, 1978). Professor Brewster C. DENNY best

summarized the problems of fishing in his foreword to The Fisheries: Problems in Resource Management edited by J. A. CRUTCHFIELD in 1965:

> "Examination of the fisheries resource raises all the key issues of natural resources public policy and, ultimately, of public policy in general. The concept of the 'public interest' is nowhere clearer than with the fisheries resource: a great natural resource, 'owned' by no one, where competitive exploitation may lead to destruction, where some economic and social values defy measurement (the sport fishery) and where other (unemployed fishermen, boats and gear) are only too clear. In the fisheries resource is found the conservation issue, written large: the natural state-of-nature argument versus the economic needs of man; the question of sustained yield versus optimum yield; and all the emotional and practical questions that conservation raises. The fisheries resource raises the classic modern issue of technical expertise versus lay judgement on public issues having a heavy technical and scientific context-witness the premature public debate on how 'magical new development' in fish farming and controlled fish breeding may or may not make fish ladders, pollution control, and protection of fish spawning grounds unnecessary.
>
> Fisheries also raise the problems of competing government jurisdictions: salmon spawned in the Idaho headwaters of a Columbia River tributary eventually swim through jurisdiction of four states, one province, numerous public utility districts, national forests, city watersheds, several different and competing federal and state agencies, and much private land. In the course of their wanderings on the high seas, they come under the jurisdiction of international law, several treaties, and the varied fishing practices of several powerful nations. The fate of a single fish, at one time or another (or simultaneously) at the mercy of the Department of the Interior, the Corps of Engineers, the Idaho Power Company, the State Pollution Control Agency, or the Soviet Ministry of Fish Industry, is not unlike the problem of the average urban dweller faced with an array of governmental and private agencies to whom he must appeal to improve transportation to his job, the quality of the water he drinks, or the air he breathes.
>
> Most importantly, the fisheries resource problem, looked at 'in the round', raises the critical public policy question for democratic societies in the second half of the twentieth century: can we effectively plan for

and make wise use of our limited resources through the democratic political process and the free-market economy?"

In 1969 CRUTCHFIELD and PONTECORVO described the Pacific Coasts salmon resources which have received millions of dollars in research, propagation, and regulatory activity. At best the resource is holding its own, and in some areas it is clearly subject to continuing depletion due to irrational conservation measures resulting from perpetuating regulations with little basis in scientific knowledge, power plays by competing fishing and processing groups, research and regulation emphasis on reduction in efficiency, and from the unrestricted access.

On the other hand, GULLAND questions the fishermen's qualifications. The perfect management scheme for the individual fishermen is "sink every other boat but mine". No management scheme seems to have gone quite so far as this, though many are weighted in favor of the existing fishermen and their individual interests. Further, enforcement is a problem because when a fisherman is at sea he is not under the eye of the local policeman, and fishermen are quite capable of breaking rules if they are convinced that it is in their interests to do so, and particularly if they believe that other fishermen are already flouting the rules (GULLAND, 1974).

Awareness of common property problems has a long history. The meaning of the concept of common property is well established in formal institutions such as the Roman Law, the Anglo-Saxon Common Law, the German Land Law &their successors. The term "common property" refers to a distribution of property rights in resources in which a number of owners are co-equal in their rights of usage. Their rights are not lost through non-use, but co-equal owners are not necessarily equal with respect to the quantities of the resource used by each over a period of time. Common property is not everybody's property; potential resource users who are not members of a group of co-equal owners are excluded. Thus the concept of common property is a valuable tool in the economic analysis and solution of problems of natural resources (CIRIACY-WANTRUP and BISHOP, 1973).

Although the idea of community is a very real part of American property ownership and we are gradually recognizing the social nature of property, as in environmental crises, we in fact remain very compartmentalized. The common land concept developed to protect individuals in their enjoyment of private land use rights, but the concept now provided the framework and analytical methodology needed to protect individuals in their enjoyment of public land use rights (JUERGENSMEYER and WADLEY, 1974).

On the other hand, natural regulation in common property

has often developed such as cattlemen's associations in the range cattle industry on the Great Plains (DENNEN, 1976) and in lobstermen's communities in Maine (ACHESON, 1972 and BOWLES, 1973). Cattlemen organized in cattlemen's associations to prevent the overuse of common property range land through the establishment of a limited entry scheme, including "range rights" and "water rights", while Maine lobstermen have excluded "outsiders" to protect their fishing area through informal methods. The areas which yield the highest incomes to the fishermen and where the resource show the least signs of depletion are those areas where fishermen have been most successful in limiting the number of participants. Areas where traditional methods of controlling access have broken down due to intrusion of "outsiders" show the highest signs of depletion.

Among the major methods of fisheries management, limited entry has received most attention and stirred up the greatest controversy. Possibly limited entry represent an effort to restrict freedom of entry into an occupation noted for its tradition of independence (CICIN-SAIN, 1978).

We should, therefore, reexamine our free enterprise system in order to clarify the meaning of the economic confrontation of limited entry with the free enterprise system.

The Wealth of Nations written by Adam SMITH in 1976 is the Bible of the concept of the free enterprise system. Adam SMITH primarily inquires how the simple system which started with individual initiative then allocates, accumulates, and reallocates resources via free markets so as to release and stimulate more effectively than any other system of the economic forces which make for progress (HUTCHISON, 1976). Under the simple system, the system of natural liberty, the individual in search of his own security and gain could be led, as "by an invisible hand to promote an end which was no part of his intention", namely, the welfare of other men, of society (SPENGLER, 1977). SAMUELSON (1977) supports the validity of SMITH's model. However, SMITH's assumptions must be kept in mind. These are: (1) goods are produced in a time-phases way out of land and "doses" of labor-cum-raw-materials; (2) to arrive at near consumable outputs of goods, one must substract from the gross production of each the amount of that respective good used as input components of the variable industry doses; (3) a ration of subsistence goods per laborer is required to produce and reproduce the population: when the worker's money wage can buy more than the subsistence vector, population grows at a positive rate, and vice versa. At the subsistence wage, population is constant; (4) perfect competition prevails: land use is auctioned off for rentals, free entry and constant returns to scale prevail, and knowledge is general; and (5) a favorable legal framework exists.

SMITH's perfect competition assumption is in fact questionable in the real world. HOBBES has earlier recognized the problem of order when men, selfish, passionate, fearful, aggressive, and yet rational, seek to satisfy their individual and diverse desires with scarce resources. According to HOBBES, we have inherited, occupy, and will bequeath a world of scarcity; resources are not adequate to provide all our wants and needs. It is a world, therefore, of limitations, constraints, and conflicts, requiring the bearing of costs and calling for communal coodination. But, HOBBES solutions, the introduction through a social contract of an absolute sovereign "to keep them in awe, and to direct their actions to the common benefit", has been philosophically unsatisfactory and is dubious in logical and empirical terms.

HUME disagreed with the HOBBES solution and sought an alternative solution. Eventually HUME indicated that men act in partial awareness of personal advantage, but within individual time horizons that are too brief and interests too particular to ensure social efficiency and stability. The social order must be based on firmer ground than a sense of sacrificial moral obligation to the collectively or a mythical contractual requirement. Rather, what is requied is that members of the group find constitutional constraints, social conventions, and institutional options to provide, an acceptable approximation of the anticipated optimal possibilities for indivisual gain and benefit, but with "the avidity and partiality of men restrained by some general and inflexible principles". But "rules without a supportive ethic" may be fragile. In stipulating and enforcing minimal "rules of the game", a society and its economy require some coercion: a "free" society cannot be a situation of anarchy (ALLEN, 1976).

The free enterprise system at present is generally defined as the exchange economic system in which the owners of resources -- i.e., land, labor, and capital -- are free to enter into the production of commodities or to sell the services of their resources to others who engage in the production of commodities.

Although the free enterprise system is a very popular concept, the socio-economic arrangements in the United States are in fact much more complex and indeed are characterized by a mixed economy where both public and private institutions exercise economic control and various degrees of imperfect competition exist in both resource and product markets. The maximum social welfare is achieved only when all markets are operated under perfect competition. However, perfect competition is unattainable in reality because of a lack of homogeneous character, divisibility, mobility, and perfect knowledge of every commodity. In addition, inefficiency arises from the present institutional arrangements such as existence of imperfect competition due to imbalanced bargaining power and legal enforcements;

uncertainty; resource limitations; and market limitations. Thus, judgement about the best thing to do depends on what can be done (TURVEY, 1964). A rational entrepreneur is a profit-maximizing organization, not a social welfare satisfying organization. Therefore, it is reasonable that the entrepreneur seeks for the higher degree of imperfect market situation preferable for him, although the lesser degree of imperfect market situation may be desirable for society as a whole.

Present market situation in the United States are summarized in Table 1. In reference to entry conditions, fisheries is a unique industry based on open access. While open access is a precious condition for social welfare, it also means more severe economic competition than in any other sectors with limited entry. This does not mean that consumers enjoy unreasonable benefits from fisheries products. In between fisheries and consumers are sectors such as suppliers, processors and services who might take advantage of fisheries.

Table 1. Market situations in the United States

Industry	Entry condition	Government intervention	Resource market		Product market		Benefits from imperfect markets*	Contribution to other sectors**
			Seller	Buyer	Seller	Buyer		
Land based production and manufacturing industries except for agriculture	+***		+/-	-/+	+/-	-/+	High	Low
Agriculture	+***	+****	+	-	-	+	Low	High
Fisheries	-***	-****	+	-	-	+	Lowest	Highest
Service	+***		+/-	-/+	+	-	Highest	Lowest

* Per unit profitability
** Per unit loss
\+ Price maker at the market
\- Price taker at the market
+*** Entry to the industry is limited
-*** Entry to the industry is unlimited
+**** Benefits to the industry are positive in the short run
-**** Benefits to the industry are negative in the short run

In the resource and product markets, the one who holds a stronger bargaining power will be a price maker, while the other will be a price taker. It is common sence for sellers to set a price that is based on costs in general production, manufacturing and service industries, but it is uncommon in the product markets of agriculture and fisheries. In agriculture and fisheries, the bargaining power of the sellers in the resource market and that of the

buyers in the product market are generally superior than that of farmers and fishermen. As a result, farmers and fishermen tend to be price takers in both the resource and the product markets. Thus, agriculture and fisheries are in a more rigorous economic environment than are any other sectors of the United States economy.

This industrial weakness in agriculture has been recognized for a long time. Farmers organized into organizations such as the Grange, the Farmers Union, the Farm Bureau, Farmers Association and cooperatives to prevent low and unstable income. Government also has supported agriculture through parity, equal bargaining power and supply management and sharing abundance (foreign aid) goals because of its role in economic, political and social stability in economic growth and of the family farm as a symbol of the free enterprise system (HATHAWAY, 1963). However, the family farm goal has been less clear during the last two decades due to the change in American society from farming oriented society to urban oriented society. Agriculture population has declined, efficiency increased; farm size increased; government expenditure for farm program decreased; government restrictions increased; support of organized labor for farm income program lessened; part-time farmers increased; and adjustment to mixed economy has developed. Farming is no longer a way of life, but a business.

On the other hand, there have been fewer efforts to prevent severe competition in fisheries than in agriculture. Most fisheries regulations have limited fishermen's activities through closed areas or seasons, quotas, mesh or fish size limit, and gear limitations. The few exceptions have related to the improvement of living resources and limited entry. Fisheries cooperatives have not been well developed, and fishermen still prefer unconditional freedom to any further government regulations. However, ACHESON (1975) argues that opposition to fisheries regulations would be minimized if such regulations were congruent with the existing economic system. In fact, the Fisheries Conservation and Management Act of 1976 (FCMA) has been over-whelmingly welcomed by the United States fishermen, except for tuna and shrimp fishermen, because of its intention to reduce competition in their fishing grounds.

Foreigners are no longer to blame for resource depletion. Now the United States fishermen and managers again confront the question raised by Professor DENNY: "Can we effectively plan for and make wise use of our limited resources through the democratic political process and the free market system or the free enterprise system?"

Section 2. The Economic Confrontation of Limited Entry with the Free Enterprise System

Among the major fisheries management schemes, limited entry versus open access has received most attention and stirred up the greatest controversy. However, the economic confrontation of limited entry with the free enterprise system is unclear. In this section, the goal and objectives of fisheries management, issues pertaining to open access and limited entry and nature of the economic confrontation are clarified.

1. The Goal and Objectives of Fisheries Management

It is generally accepted that the goal of fisheries management within the Fisheries Conservation and Management Zone is "to prevent overfishing or depletion of fisheries resources while achieving, on a continuing basis, the optimum yield from each fisheries which enhances the industrial health and stability of fisheries and generates the greatest possible social and economic values to the people of the United States (FCMA)". In order to achieve this goal, specific objectives must be identified. These objectives are characterized by ecological, technological, economic, social, political and administrative measures. Ecological measures might include 1) the improvement of stock assessment capability, 2) the determination of the total allowable catches, 3) the conservation of fisheries resources, and 4) the enhancement of fisheries resources. Technological measures are 1) to minimize discards, 2) to minimize incidental catches, 3) to minimize fishing mortality other than landed catches, and 4) to develop underutilized species use. Economic measures may be 1) to increase net income, 2) to increase employment, 3) to improve economic health and stability, and 4) to attain the maximum economic yields. Social measures are 1) to supply more and cheaper fish, 2) to achieve the optimum yields, 3) to improve equitability, 4) to minimize social disruption, 5) to increase revenue for the nation, and 6) to minimize adverse effects. Political measures include 1) to maintain or increase political freedom. Administrative measures include 1) to minimize management and administrative costs, and 2) to improve enforceability. These objectives interact within and among each categories and these relationships may be positive, negative or neutral.

2. Issues Pertaining to Open Access and Limited Entry

In order to accomplish the generally accepted goal, there are many ways but no one best solution for every individual. Conflicting interests in fisheries resource use exist within and among the people concerned: qualified people vs. unqualified people, commercial fishermen vs. recreational fishermen, full-timers vs.

part-timers, fishermen vs. processors, fishermen vs. consumers, fishermen vs. tax-payers, fishermen vs. other marine users, coastal states vs. other states, and present generation vs. future generations.

1) Open access

Open access means that the resource cannot be used exclusively by one or a few members of a community, but is open to free use by all on a basis of equality in the cooperative pursuit of the greatest possible production and sharing of value. The only way in which wealth can be obtained is by the exercise of this right of access -- only those who actually fish share in the distribution of fisheries. Further, the fishermen able to employ highly efficient methods are receiving greater relative shares of the sea's wealth while those not so able are receiving much smaller - often negligible - net returns. A system that maintains free and open access requires liquidation of historical rights of any fishermen or industry and preferential rights to any coastal states.

A modified open access by historical power plays among individuals and industries is the dominant form of entry condition in fisheries at present. Issues pertaining to this form of entry are the following:

Legal issues. Major legal issues are based on institutional arrangements pertaining to property rights on fishing grounds or stock. For example, natural regulation which excludes "outsiders" from entering into a fishery has been a common form of fisheries management in Maine lobster fishery (ACHESON, 1972 and BOWLES, 1973). Although the natural regulation is illegal, this tends to develop under the open access arrangement. Further, this form of arrangement is not always bad from the administrative cost and resource conservation points of view. However, the question is whether this is justifiable from the legal point of view.

On the other hand, regulatory history of fisheries management under open access has repeated numerous emergency changes in regulations, resulting from power plays based on the different resource assessment between fisheries scientists and fishermen. This is particularly true where the harvesting capacity is greater than the total allowable catch or overcapitalization is obvious (VIDAEUS and MUELLER, 1978). The question is whether this is practical in the long run?

Conservation issues. Conservation issues revolve around three major problems: resource depletion, pollution and no resource improvement efforts. Resource depletion due to over fishing has been discussed often in fisheries management literature (GORDON, 1954; CRUTCHFIELD

and PONTECORVO, 1969; and BELL, 1972). Futher, there is little incentive to prevent pollution or improve the resource situation under open access. The main cause of pollution is general population pressure along the coasts, and fisheries production has been reduced. SASAKI et al. (1976) assessed the effects of pollution on fisheries in Japan and reported no significant decrease in total catch, but great changes in species composition in which oceanic types tended to decrease while others increased. Causes of water pollution include agricultural and individual waste and an increase in the flux of waste water dischrge originating both from industrial and domestic sources in urban areas. The least incentive to prevent pollution among fishermen is due to problems of defining and enforcing property rights as well as diversified sources of pollution and difficulties of measuring the impact of pollution on fisheries resources. Furthermore, under open access no individual can afford to invest to improve the resource since the burden of investment is on the individual while the returns are shared by all users (KEEN, 1978).

Economic issues. Major economic issues pertain to problems assocated with appropriation and dissipation of wealth, inequality, overcapitalization and technological externalities, low labor productivity, no incentives for the crucial technological development and increasing administrative cost.

Open access results in a pattern of competition among fishermen which culminates in the dissipation of economic wealth: some grounds could be exploited at a level of negative marginal productivity (GORDON, 1954). Such a system might dictate that some people starve from lack of income while others get inadequate or excessive income (SAMUELSON, 1970 and CHRISTY, 1972). Unless entry to fisheries is controlled, further increase in price because of rising consumer demand for fish could destroy the resource as more capital and labor are attracted to the fishery. Under an overcapitalization situation, an increase in catch efforts results in a decrease in catch efficiency (BELL, 1972). Other sources of external diseconomies result from the fact that while the catch of the individual fisherman is proportionate to his own fishing effort, the same is not true to all fishermen collectively. Also, by catching small fish, fishermen reduce the number of large fish to be caught later (TURVEY, 1964).

Property rights are generally regarded as a very substantial component of the structure of incentives guiding economic decisions (RANDALL, 1975) and low labor productivity in the U. S. East and Gulf Coast oyster industry is associated with lack of such property rights, resulting from disinvestment, congestion, overexploitation and government restriction (AGNELLO and DONNELLEY, 1975). Although important technological issues are to minimize discards, incidental

catches and fishing mortality and to develop underutilized species use, there is far less incentive to cope with these problems under the present system than is needed. Further, increasing administrative costs associated with increasing complexity and sophistication in recent fisheries management strategies have been questioned (VIDAEUS and MUELLER, 1978). If we can afford fisheries as a welfare sector, the present system suffices. However, if we seek for good industrial health in the fisheries, those who obtain the privilege of fishing must pay for this privilege (CHRISTY, 1972).

Social issues. Major social issues are problems pertaining to inequality and reduction of social welfare. Unlimited access in fisheries widens the inequality within fisheries and between fisheries and other sectors. The efficiency has been the immediate cause of most of the problems of fisheries (GULLAND, 1974). A small number of efficient vessels may wipe out the resources such as shrimp within a short period, while less mobile large numbers of fishermen who depend on inefficient methods of catching suffer from low production. The greater the immobility of such a fisherman, the more serious the inequality problems within fisheries and between fisheries and other sectors. Further, overfishing due to open access results in not only less supply of fish but also higher harvesting cost, correspondingly much higher consumer prices: an apparent decrease in social well-being.

Political issues. Despite the formal acceptance of the open access principle in the New England fisheries, the present fisheries reflect the "historical rights" of traditional fishermen and preferential rights of coastal states. Territorial behavior of Maine lobster fishermen is still strong and open access to the lobster fishery has been informally rejected by "insiders" (ACHESON, 1972 and BOWLES, 1973). Increasing number of recreational fishermen has been creating tension between recreational and commercial fishermen and power plays by competing fishing and processing groups repeated (CRUTCHFIELD and PONTECORVO, 1969). More recently, conflict between fisheries and oil exploitation has become serious.

Even within commercial fisheries, conflicting methods of catching are observed due to difference in fishing efficiency and/or the interaction among catches. Further, the most important political issue is conservation of resources. This represents a conflict between present generation vs. future generations. However, it is important to recognize that an individual fisherman cannot himself gain by restricting his present catch in the interest of future returns simply because this would mean a loss rather than a postponement in earnings (VIDAEUS and MUELLER, 1978).

Administrative issues. The responsibility of fisheries managers is to manage fisheries resources in the best interest of the owners of

the resources: people of the nation or the nation's taxpayers (SINCLAIR, 1978). Under the present open access system fishermen cannot afford the costs of research, development, enhancement, regulation and enforcement (CHRISTY, 1977). Thus the fisheries industry is a burden to the nation's taxpayers. In particular, where depletion of high value species has been serious and overcapitalization is a problem, the managerial strategy under open access has become very complex and sophisticated. Correspondingly, administrative costs as well as time and efforts involved have increased rapidly (VIDAEUS and MUELLER, 1978).

2) Limited entry

Thus, there are many reasons to seek more efficient alternative fisheries management schemes and limited entry is one such alternative. In contrast, limited entry denies access to the resource to specific individuals or groups in order to preserve the economic health of the industry. The goal of limited entry is to get capital and/or labor out of fishing and into other industries until an efficient balance is reached. Issues pertaining to limited entry are the following:

Legal issues. Several provisions in the FCMA significantly affect the adoption of limited access system by the fisheries and, in consequence, insures the long run health of the industry. First, no return to society is received from the use of publicly owned resources as FCMA is now written. Second, the costs of research, development, enhancement, regulation and enforcement are borne by the taxpayers rather than by the beneficiaries: the fishermen. Ultimately these factors will force the Office of Management and Budget to limit funds for fisheries research and management, and the fishing industry will suffer as well. The consumer must pay higher prices for fish produced by domestic fishermen because of the exclusion of foreigners who provided low priced imports; and the prohibition against fees and taxes will severely hamper effective management of fisheries (CHRISTY, 1977).

In contrast, BURKE (1977) is more optimistic about recapturing economic rent under the FCMA. According to BURKE:

> "There is considerable basis for doubt about the inclusiveness of the term "fees" in sections 303 (b) (1) and 304 (d). By itself, the term is oddly chosen if it was intended to embrace all taxes, charges, or payments for items other than a vessel permit... At the very least, it is an ambiguous term, and its reference is unclear and open to question. In resolving lack of clarity, ambiguity, and doubt, the principal guide in interpretation is the major purpose of the Act... the aim

> of the Act is to benefit the United States fishing industry by conserving living resources in the fisheries zone by managing them to secure the optimum yield therefrom... Among the advantages of recapturing the rent through taxes or payments of one kind or another would be the provision of major assistance in building a more profitable and attractive industry, the major goal of the FCMA... Failure to provide means for recapturing rent will harm tax payers, the fishing industry, and consumers, and will virtually guarantee that the Act will be unsuccessful if not a disaster... it is indeed difficult to understand why the Act, if it is unclear in this respect, must necessarily be interpreted in a fashion that has such harmful effects. To the contrary, the interpretation which both benefits the affected interests and promotes the Act's goals is one which reads the Act to permit collection of rent from the fisherman."

Other important legal issues are extensively discussed by Anonymous (1976), KNIGHT and LAMBERT (1975), MUNDT (1978) and KOCH (1978). These include 1) the delegation doctrine, 2) substantive due process, 3) procedural due process, 4) equal protection, 5) the "taking" and compensation issues, and 6) property rights. The delegation doctorine claim would assert that the FCMA's delegation of authority to establish limited access system does not comply with the constitutional doctrine which require that legislation have adequate standards to be constitutional. The FCMA suffers from no constitutional infirmty in this regard. Substantive due process claim pertains to whether there is legislative competence to restrain the right of fishermen to engage in a particular fishery. The constitutional doctrine of substantive due process is not a significant obstacle to limited entry. Procedural due process claims would allege that liberty (the right to fish) and/or property (the catch or fishing gear) were being taken without satisfying due process standards. The equal protection clause challenge would assert that the method by which access to the fishery is allocated unreasonably discriminates between the persons willing to participate. The taking claim would assert that the regulatory scheme resulted in a taking of property for public use without compensation.

Limited entry may be implemented through the use of licenses, stock certificates, or user fees. Two legal considerations underlie implementation of each of these alternatives. These are 1) creation of a new form of property in the right to fish and the attributes of the property; and 2) allocation and distribution of the newly created property. The issue of whether permits or private property associated with a limited entry scheme could constitutionally be made nontransferable should be settled as constitutional.

Conservation issues. CICIN-SAIN (1978) has brought an issue that the question of conservation effectiveness is unclear, for, in most cases, limited entry needs to be complemented by other management measures. Similar issues have been dealt with in Australia (MEANY, 1975), Canada (FRASER, 1977 and SINCLAIR, 1978), California (KEEN, 1978), Michigan (BISHOP, 1975 and TALHELM, 1978), and New England (McCONNELL and NORTON, 1978).

Economic issues. TALHELM describes an extreme Michigan experience on limited entry which is characterized by contracting commercial fisheries, increasing importance of sport fishery, altering ecosystem by men's activities, a contrast between equity and efficiency and uncertainty about the future of commercial fishing. Employment in the commercial fisheries in Michigan has declined from over 6000 at the turn of the century to three or four hundred today. The number of licensed sport fishermen on the other hand, has doubled from under 700,000 in the 1930's to around 1.3 million today. The economic impact of the Great Lake's sport fishery on Michigan's economy is $300 million per year, and that of the commercial fishery is around $20 million. The costs of commercial fisheries management, administration and law enforcement exceed license revenues by about 15 to 1, and the excess is paid by sport fishermen, an apparent inequality. Ideally the commercial fishery should pay for itself, and perhaps even pay rent to the public (TALHELM, 1978).

On the other hand, CAMPBELL claims that the increased value of individual vessels remaining in the fleet are not justified in relation to the increased return that can be achieved because of the fewer number of fishing vessels. Substantial increase of entry permit price due to transferable entry permits has resulted in higher transaction costs to new entrants and windfalls to sellers (BISHOP, 1973; CAMPBELL, 1973; McCONNELL and NORTON, 1978; and ADASIAK, 1978). An exclusive "rich men's club" has been created in Alaska (ADASIAK, 1978) and Canada (NEWTON, 1978). Although limited entry in Canada created a source of economic rent from the resources, this rent inevitably accrued to those canneries and individuals who obtained the right of resource exploitation. This created a general demand from those excluded from the industry. These pressures inevitably led to the demise of the licensing programme (FRASER, 1977).

Overcapitalization problems have not been prevented by limited entry in both Australia (MEANY, 1975) and Canada (NEWTON, 1978). Limited entry has not provided a solution to long-term control of fishing effort (NEWTON, 1978). Further, McHUGH (1978) argues that limited entry is not viable for most single-species fisheries, because fluctuations in abundance interfere. Flexibility to shift from one resource to another is necessary for economic stability. McCONNELL and NORTON (1978) suggest inability of limited entry itself

to deal with problems of discards, incidental catches, fishing mortality other than landed catches and development of underutilized species fisheries. In addition to adverse effects on the distribution of income, BISHOP argues that limited entry costs burden excluded fishermen and do not solve the poverty problem in fisheries (1973 and 1975). Further, limited entry will not help to produce food at the lowest cost for the people of America (TOLLEFSON et al., 1971). It would not encourage economic rent generated to be channeled into investment that would improve the resource (KEEN, 1978).

Social issues. Social issues stem from four important aspects. There must be a definition of who will be "in", who will be "out", and with what consequences (ORBACH, 1978). Limited entry changes fishermen's life style (TOLLEFSON et al., 1971). Third, as long as the benefits from government spending are greater than the costs of relatively favorable schemes, reasonable policy would be required for corrective action regardless of the size of the industry. But especially in a case where the industry is excessively burdened by external diseconomies caused by the common property nature of the resource (WILSON and OLSON, 1975). Finally, the economic welfare of the primary producer is only one element in a web of interests that ends with the consumers or taxpayers (McHUGH, 1978). Examples are Indian/Non-Indian conflicts (TALHELM, 1978 and BELL, 1978) and equitable license allocation in fisheries; community disruption and creation of an elite; an argument that the U. S. owes the industry something and should assist the industry (DYKSTRA, 1975); and arguments that fishermen must pay for the privilege, that the laissez-faire approach could be the optimum economic approach for all interests combined (McHUGH, 1978), and that only single owner type management system under national control can remove the adverse imperatives of the commons and create incentives for investment in fisheries resources (KEEN, 1978). More importantly, transferability of entry permits or stock certificates would result in drastic structural change in fisheries in the long run (the present fishermen would not be fishermen tomorrow).

Political issues. There exist three main streams in political issues. One pertains to political freedom claiming that limited entry seems to be a reversal of the free enterprise system (TOLLEFSON et al., 1971 and CICIN-SAIN, 1978). It is important to understand that limited entry definitely affects political freedom of fishermen: political freedom might increase for qualified fishermen in the short run while it decreases for disqualified fishermen. Another promlem stems from historical rights of the establishment. Political opposition to limited entry is at its maximum in fully developed or overfished fisheries (McHUGH, 1978). Futher, KEEN (1978) argues that the long run effect would be to make management more difficult because valuable property rights create conservation on the part of

the holders and inflexibility will be created for resource managers. The last consideration is increasing political power of sport fisheries. Sport fisheries may offer a significant threat to the success of comprehensive limited entry scheme (McHUGH, 1978 and TALHELM, 1978).

Administrative issues. Issues pertaining to administrative aspects are communication problems, costs including time, and development of bureaucracy. Limited entry is a delicate issue. Some would benefit while others would be hurt. Unlike the development of natural regulation such as territoriality, limited entry schemes have been proposed by people in academic fields to improve economic efficiency in fisheries, and although appreciated by fisheries managers because of possible management cost reduction and administrative convenience, not developed by fishermen. Lack of self-evaluation of fishermen in the proposed limited entry schemes is critical for the future development of the strategies. Although an indiscriminate application of the limited entry schemes to all fisheries is unlikely, fishermen are afraid of the "domino effect" (i.e., introduction of limited entry into other fisheries) and the development of bureaucracy.

The present socio-economic data base in fisheries is too poor to establish a sound fisheries management scheme. Therefore, SMITH suggests a licensing system for all fisheries to collect necessary information for the future change (1978). However, reliablity of the data provided by fishermen is at present still a question. Alaskan limited entry program has experienced increasing unexpected costs due to allocation criteria litigation, the litigation work load and program monitoring (ADASIAK, 1978).

In summary, both open access and limited entry have numerous problems when we use these schemes independently as fisheries management tools. These tools must be carefully studied and wisely applied with other methods.

3. Nature of the Economic Confrontation

The economic confrontation of limited entry with the free enterprise system in fisheries consists of three dimentions: 1) the free enterprise system in fisheries, 2) compatibility, and 3) economic efficiency.

1) The free enterprise system in fisheries

A free enterprise economy is characterized by a large measure of individual freedom over a wide range of economic choices. Within a broad framework of legal and social sanctions, consumers are free to choose among a variety of commodity offerings; enter-

prisers and potential enterprisers, singly and in groups, are free to enter into or exit from the businesses of their choice; and resource owners are free to place their resources in employment wherever employment can be found. In the market places of the economy, exchanges will occur voluntarily whenever and wherever they will be of mutual benefit to the parties concerned. Both profits and losses will occur as enterprisers correctly anticipate consumers' desires or fail to read correctly the signs of the economic zodiac. The price system plays a key role in guiding and organizing economic activity (LEFTWICH, 1955).

In fisheries, there are two extreme views on this subject due to different perceptions concerned with common property resources. One is a traditional view: no one owns the common property fisheries resources (the fishing ground or fish stock) so that any individual who owns resources such as capital, equipment and labor is free to enter into fisheries, harvest fish and sell them, or to leave the fisheries. The fish caught belong to him because he took the risk for them. Although some government intervention is unavoidable, it should be minimal and not restrict entry because free access reserves the American tradition of freedom and independence and make the fishing industry the last frontier of the free enterprise system. Even in this extreme view it admits some government intervention in fisheries due to the common property fisheries resources.

The other view is a contemporary one: the owner of the common property fisheries resources is defined as the people of the United States (FCMA, 1976)*. In a sense that owners of the resources are free to enter into production of commodities or to sell the services of their resources to others who engage in the production of commodity, even a federal government enterprise would be compatible with the free enterprise system when the government acts as a trustee. The acceptance of foreign fee fishing under the FCMA is a clear example. In this sense, the free enterprise system in

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* The owner of the resources (Sec. 102. Exclusive Fishery Management Authority)

The United States shall exercise exclusive fishery management authority, in the manner provided for in this act (FCMA), over the following: 1) All fish within the fisheries concervation zone; 2) All anadromous species throughout the migratory range of each species beyond the fishery conservation zone, except that such mangement authority shall not extend to such species during the time they are found within any foreign nation's territorial sea or fishery conservation zone (or the equivalent), to the extent that such sea or zone is recognized by the United States; 3) All Continental Shelf fishery resources beyond the fishery conservation zone.

fisheries is quite different from other profit-motivated free enterprise systems based on the use of private property resources. The free enterprise system in fisheries must take account of social welfare, in addition to profits. With decreased fear of depletion of the fisheries resources and higher contribution to social welfare, less government intervention would be needed. The same principle is applied for state and local levels. Therefore, management alternatives under the free enterprise system range from the laissez-faire to government enterprise in fisheries.

2) Compatiblility of limited entry with the free enterprise system in fisheries

This is a political question pertaining to whether limited entry represents an effort to restrict freedom of entry into an occupation noted for its tradition of independence.

By definition, limited entry denies access to the resource to individuals in order to preserve the economic health of the industry. From the static point view, limited entry is certainly a reversal of the free enterprise system in fisheries. However, limited entry is not necessarily a reversal of the free enterprise system in fisheries from the dynamic point of view. The dynamic view considers growth aspects of the concept. The concept of the free enterprise system in fisheries is not necessarily a fixed organization, but rather a process. Changes are normal in this everchanging world. In fact, the environment surrounding fisheries in the United States has changed drastically since 1950. Among these changes most important in this regard is the evolutionally change in the concept of the fishing grounds and fish stocks.

For a long time, the fishing grounds and fish stocks were regarded as free in the same way that air is free to breathe. As more fishermen, vessels and gear are employed in fisheries, the concept of the fishing grounds and fish stocks as scarce resources has developed. Recognition of the stocks as scarce resources or overfishing forced the creation of some restrictions, formally or informally. Some of these restrictions are apparently variations of limited entry. For example, during the 17th century, the alewife catch in Cape Cod towns was regulated by a warden who set fishing days and allowed only town residents to fish (SMITH and PETERSON, 1977). Lobster fishermen in Maine have informally developed their territoriality. In the 1940's, Maryland adopted the management plan which maintained the number of fishermen and gear operation in Maryland waters at the early 1940's level untill increased yield indicated that additional fishing would not be injurious to the fish and the fishermen (TILLER, 1945).

During the last two decades, there has been increased awareness

among the public and academicians in the problems of such resources as common property resources. Although some restrictions were imposed in fisheries in various parts of the United States, serious limited entry programs were not enacted until 1968. Michigan and Wisconsin instituted limited entry in 1968 (BISHOP, JONSON and SAMPLES, 1978; and TALHELM, 1978). Alaska began the gigantic limited entry program in 1973 and 29 fisheries are under entry limitation at present (ADASIAK, 1978). Legislation passed in 1973 limited entry into the commercial herring fisheries of Washington State (TRUMBLE, 1977). A moratorium on salmon vessel licenses and a federally financed buy-back progrom to take vessels out of the Washington State salmon fisheries were initiated in 1974 (BELL, 1978). In California, limited entry regulations were enacted in 1974 to protect the herring fishery and the herring roe fishery (COLE, 1977) and program was begun for the abalone fishery in 1976 (CICIN-SAIN, MOORE and WYNER, 1977). In Massachusetts a variation on limited entry, a license moratorium, in the lobster fishery has been in effect since 1978. These examples clearly show that limited entry is compatible with the free enterprise system in fisheries in some parts of the United States.

The passage of Public Law 94-265, The Fisheries Conservation and Management Act of 1976 (FCMA), is critical in the history of fisheries in the United States. The FCMA not only defined the people of the United States as the owners of these resources within the fisheries conservation zone, but also intends to regulate entry of foreign vessels* and permits establishment of a system for limited access to the domestic fisheries in order to achieve optimum yield**.

* FCMA Sec. 201. Foreign Fishing

(a) In General. After February 28, 1977, no foreign fishing is authorized within the fisheries conservation zone, or for anadromous species or continental shelf fisheries resources beyond the fisheries conservation zone, unless such foreign fishing... 1) is authorized under subsection (b: Existing International Agreement) or (c: Governing International Fishery Agreements); 2) is not prohibited by subsection (f: Reciprocity); and 3) is conducted under, and in accordance with, a valid and applicable permit issued pursuant to Section 204 (Permits for Foreign Fishing).

** FCMA Sec. 303. Contents of Fishery Management Plans

(b) Discretionary Provisions. ...Any fisheries management plan...may establish a system for limiting access to the fishery in order to achieve optimum yield if, in developing such system, the Council and the Secretary take into account... A) present participation in the fishery; B) historical fishing practices in, and dependence on, the fishery; C) the economics of the fishery; D) the capability of fishing vessels used in the fishery to engage in other fisheries; E) the cultural and social framework relevant to the fishery, and F) any other relevant considerations.

Thus, foreign fishermen are no longer free to enter into fisheries within the U. S. fishery conservation zone or for anadromous species or continental shelf fisheries resouces beyond the fishery conservation zone. In order to enter into these fisheries, the foreign fishermen must acknowledge the exclusive fisheries management authority of the United States. They are required a valid entry permit as well as assessed fees, according to Sec. 201 in the FCMA. This might be regarded as a kind of limited entry and the first legal acceptance of limited entry by the American public.

Further, the limited entry provision to the domestic fisheries in the FCMA has many problems in relation to recapturing of economic rent (CHRISTY, 1977), but this is another clear example of the legal acceptance of limited entry by the American public. Thus, limited entry is not necessarily incompatible with the free enterprise system in fisheries.

3) Economic efficiency

The existence of externalities places a definite limit on the scope of free competitive enterprise. An external economy (diseconomy) is said to exist when marginal social cost is less than (is greater than) marginal social benefits (FERGUSON, 1969). There are three sources of external economies and diseconomies: 1) ownership externalities, 2) technological externality and 3) public good externality.

In fisheries excluding aquaculture, the important example of external economies is the lack of cultivation process: both fishermen and consumers do not have to pay preharvest costs to produce fish stocks because nature takes care of it. Production costs in fisheries, therefore, generally mean harvesting costs and no attention is given to preharvest costs which are great cost components of other productive industries such as agriculture.

On the other hand, there are many external diseconomies in fisheries. An example of ownership externalities is the discard problem. Fish caught customarily belong to the fishermen. Thus, the fisherman behaves as the owner of those fish and make a decision whether or not the catch should be kept. This decision is usually based on market demand or his preference for the catch. As a result, for every pound of shrimp taken in the Gulf, a shrimp boat is likely to haul in five to ten pounds of other kinds of fish which may be thrown away (SCHMECK, 1974). Another example is water pollution. The private costs of waste disposal or oil spills are the costs incurred in building drainage tankers and the like; and the marginal private cost to which price is equated is virtually zero. However, the social cost which directry affects fisheries is definitely positive when waste disposal by many sources and oil spills cause water

pollution, resulting in fish kills, ecological change and devaluation of products. Thus, marginal social cost exceeds the marginal private cost: an apparent external diseconomy.

Examples of the technological externalities are many. By-catch waste results when gear is not selective enough to permit fishermen only to catch the right ones (McCONNELL and NORTON, 1978). RICKER (1976) reports that fish mortality (other than landed catch) caused by pelagic salmon gillnetting is estimated to be equal to the catch. Technological externalities are also due to interactions between catches among different fishermen and in different time (TURVEY, 1964), inablity to restrict fishing efficiency which leads to the resource depletion (GULLAND, 1974) and inability to prevent overemployment and overcapitalization (BELL, 1972).

Public good externalities are regarded as common property resources problems in fisheries. Due to the large dependence on common property resources, legal restrictions are unavoidable and increased costs of production for fishermen and administrative costs for the society. Further, discards of incidental catches often result from these legal restrictions and agreements (SCHMECK, 1976). Resource depletion and overcapitalization due to congestion of fishing vessels are other examples. Common property rights are also associated with low labor productivity due to disinvestment, congestion, overexploitation and government restrictions as previously described. Further, lack of incentive to improve the resource situation by the individual fisherman blocks the expansion of production possibility frontier which could provide external economy unique to fisheries.

These external diseconomies in fisheries will continue under the present system and will not be solved by open access or limited entry by itself. In a sence, fisheries management is a matter of application of various management tools to remove these external diseconomies, not a matter of whether open access or limited entry. Under open access, fisheries could certainly increase economic efficiency and the industrial health and stability, if fishermen are screened by the laissez-faire or the formal closures combined with quotas or a progressive tax system are accepted. The fear of accepting these measures makes the present form of fisheries management difficult and expensive. On the other hand, limited entry is neither a fixed concept nor a matter of judgement, rather a flexible concept. Although it reduces the pressure on the stock in the short run (less than 5 years) conservation effectiveness of limited entry in the long run is unclear. Thus, limited entry needs to be complemented by other management measures. Effectiveness of limited entry depends on how it is applied and is in part measured by how effectively these external diseconomies are removed.

Section 3. Alternative Forms of Limited Entry

The problem that the New England Fishery Management Council faces in regard to the groundfish resource is that it contains a few highly valued species, i.e., cod, haddock, and yellowtail flounder, the populations of which are either declining or show unbalanced age structures, and several other species whose populations are robust, but currently of lower commercial value. At the same time, there has been an increase in the overall number of commercial vessels and the degree of dependency on vessels previouly in the fleet on a few highly valued species for a significant portion of their earnings. The present policy for groundfish has been proved to be imcompatible with a policy of preventing formal closueres and of living within established OY's or quarterly allocations. Therefore, either closures had to be accepted or OY's had to be increased (VIDAEUS and MUELLER, 1978). These problems could be regarded as the general problems of the present American fishing industry, also characterized by overcapitalization and lack of incentives to develop underutilized species.

Limited entry might solve some short run problems by itself. However, it is far from a complete solution to complex and conflicting fisheries problems. Its vitality and usefulness is best when combined with other relevant tools. Therefore, nine selected limited entry schemes in addition to three controls (no government intervention, continuation of the present system, and a system of disincentives/incentives) are described in this section and further analyzed in a later section.

1. Control A: No Government Intervention

Under this system no fisheries management tool for regulatory purposes is used by any governmental authority. This alternative does not affect the nature of private enterprises such as single proprietorship, partnership, corporation, joint-venture and cooperatives. However, communal ownership, public trust and government enterprise in fisheries would be excluded.

2. Control B: Continuation of the Present System

Under this system fisheries are kept open. A combination of annual or quarterly commercial and recreational catch quotas, explicit allocations of primary species to individual vessel groups based on gear type and vessel size, fish size restrictions, closed seasons, mesh size restrictions and landing restriction would be applied according to the situation. Quarterly divisions of the TAC's would ensure some distribution of harvests over the year. Annual and Quarterly allocations by user-groups may continue to be

determined with reference to the historical aggregate catch performance of the groups and impose maximum limits on catches of cod, haddock, and yellowtail flounder on a per vessel trip, per vessel day, or per vessel week basis.

3. Control C: A system of disincentives/incentives (A modified version of Dykstra, 1975)

Under this alternative a system of positive and negative incentives to encourage fishing of less utilized species and discourage fishing of overutilized species is suggested. The dealer would pay the vessel the market price agreed as usual. The vessel would owe the Council (or the agency designated by the Council) an assessment on some species, and the Council would owe the fishermen on others. For example, on haddock, the vessel owe the Council, or its agent, 50% of market price; on cod, the vessel would owe the Council or its agent 30% of market price; on whiting, the Council or its agency would owe the vessel 10% of market price; on squid, the Council or its agency would owe the vessel 15% of market price. These percentages could be changed to afford great flexibility in directing efforts on or away from one or another species. This four point system could be introduced with a limited number of vessels which would participate voluntarily and in parallel with the current management scheme. It would then be expanded or eliminated without violent disruption of the fishing industry. This system would be combined with landing port zoning, no discard, and the simple licensing system with minimum government intervention. Minimum Government intervention means application of health and safety standards, restriction of obvious excess and current research effort to determine the total allowable catches (TAC's).

4. Moratorium on Entry Coupled with the Simple Licensing (A modified version of SMITH, 1978)

Under this system a temporary moratorium on entry into primary species fisheries would be imposed and all vessels or fishermen in New England would be licensed. Fishermen would be requird to purchase a non-transferable annual license for their boats. The license fees paid should be low enough so that they do not prevent any serious fishermen from participating in the commercial fisheries, but high enough to represent a serious purchase. While a flat rate would be appropriate for fishermen, a progressive rate would be suitable for vessels. The main purposes for licensing are to provide the Council with a framework for data collection and a rational basis for making decisions, to cover a part of enforcement costs, and to serve as a mechanism for up-grading fishermen's abilities and maintaining communication. Minimum government intervention would be imposed.

5. A Progressive Tax System

Under this system a progressive tax on landings of problem species at port would be imposed together with the simple licensing system and minimum government intervention, quotas, fish size restrictions, closed areas and landing port zoning. The gradual introduction of this system would be achieved by tax-rate adjustment and restricted use for threatened species. Funds could be used for under utilized species fisheries development purposes.

6. A System of Stock Certificates (VIDAEUS and MUELLER, 1978)

Under this system each existing vessel in the fleet would be allocated a share of the overall annual TAC's of cod, haddock, and yellowtail flounder. These shares would be established on a percentage basis so that the value of the quotas would vary as the size of the total TAC's vary from year to year. The basis for the initial distribution could reflect historic participation. By defining those who at any point in time are permitted to share in the resource, the system is a form of access control. The quotas would be considered transferable and thus could be considered as marketable certificates. An individual fishermen would therefore not be prohibited from entering or fishing. However, if the individual wished to enter the fishery, he would have to purchase his shares from existing participants. A limit on the number of shares that any single individual or corporation would be allowed to hold could be applied in order to prevent an undesirable concentration of too many shares in too few hands. The management authority could retain the right to levy a tax on the sale of the certificates. There would be no discards of fish allowed and there would be no limit placed on the vessel's harvest of other species. If a vessel caught quantities of cod, haddock, and yellowtail flounder in excess of the shares held by that vessel, a tax would be levied on these excess catches. These taxes could in effect take the form of price adjustment such as a system of disincentives/incentives. Funds could be used for fisheries development purposes. Initially such certificates would be issued for only cod, haddock, and yellowtail flounder. The number of species that such a system could be applied to will grow over time as current "underdeveloped fisheries" become fully developed.

7. The Alaskan Limited Entry System (Anonymous, 1973)

Under this system a commercial fisheries entry commision would be established. The commission would be charged with the following responsibilities and duties: 1) establish priorities based on which fisheries are in most urgent need of application of the limited entry provisions; 2) establish administrative fishing areas for regulating and controlling entry; 3) establish for all

types of gear the maximum number of entry permits for each area and then an optimum number of entry permits for each area; 4) designate species for which separate permits will be issued; 5) establish qualifications for entry permits; 6) administer the buy-back program; 7) provide for transfer and reissuance of entry permits; and 8) administer the collection of annual fees.

No person will be allowed to operate gear in a New England commercial fishery without a valid interim use or entry permit. A permit is not required of a crewman as long as the holder of the permit for that particular gear is present, and actively engaged in the operation of the gear all the time. A person may hold more than one interim-use or entry permit only to fish more than one type of gear; fish in more than one administrative area, and harvest particular species for which separate permits are used.

Eligibility for permits would be based on two equally weighted criteria: 1) an applicant's degree of economic dependence on the fishery and 2) the extent of an applicant's past participation in the fishery. Terms and conditions for entry permits are as follows: 1) each entry permit authorizes the holder to operate a unit of gear within a specified administrative area; 2) the holder of an entry permit will have the permit in his possession while operating the gear for which it was issued; 3) each entry permit is issued for a term of one year and must be renewed annually. Failure to renew an entry permit constitutes changes in use rights which may be revoked or modified by the legislature without compensation; and 5) an entry permit will survive the death of the holder. All entry permits are transferable, but those transfers must be administered through and approved by the commission. The commision will establish and administer a buy-back fund for over-crowded fishery for the purpose of reducing the number of entry permits to the optimum number over no longer than a ten-year period at a rate to be established by the commission. Each buy-back fund will be financed through an annual assessment on all fishermen in the fishery for which the fund was established. This assessment will not be more than seven percent of the gross value of the total annual catch attributed to a holder's entry permit.

8. SINCLAIR's Recommendations: Combination of the Economic and Administrative Virtues of a Licensing Program, a Royalty System and the "Grandfather System" (1978)

Under this system the simple licensing system with minimum government intervention would be imposed. The number of participants in the New England commercial fisheries could be reduced by adopting a variation of the "Grandfather System (non-transferable and lifetime license)" and by introducing a per pound tax on landings. This could be accomplished by freezing the total number of vessel licenses, and

withdrawing all licenses not currently active or being used by those possessing them. As the number of fishing units diminishes and the average income of the fishermen rises, a per pound tax on landings could be slowly introduced. Once the number of fishing units has declined to some artificially determined (not necessarily precise) number of fishing units, the royalty system could be put into place without posing any economic hardship on individual fishermen. In fact, if done properly, the royalty could be introduced in a manner that allows fishermen to realize a slow but moderate increase in their earnings over the transition period.

Once the number of fishing units is reduced to a level consistant with the harvest capacity of existing stocks, and the tax on landings has reached a level where it captures a substantial portion of the existing resource rent, then there may not be a need to maintain the freeze on licenses. The tax on landings would serve as a mechanism for preventing overexploitation and overcapitalization. No restrictions on changes in vessel capacity or their disposition will be necessary, and there will be a normal market for boats and gear. This system will have to be continually monitored to ensure that the tax on landings is sufficiently high so that it does not encourage overinvestment and overexploitation of the resource and low enough so that it does not discourage too many fishing units from participating in the fishery. However, there should be enough money generated from the royalty to pay for this added surveillance and enough information available from the licensing system to facilitate this type of monitoring. As the excess capacity in particular fisheries declines, additional efficiencies could be realized by removing gear, catch quota, and fishing period restrictions so that the productivity of effort is substantially increased.

9. Single Proprietorship Combined with Public Trust

Under this system a temporary moratorium on entry into primary species fisheries would be imposed, and the simple licensing system with munimum government intervention would be applied to all New England fisheries. A priority of single proprietorship for primary species fisheries would be set and other forms of enterprise would be subsidized to shift fishermen from primary species fisheries to underutilized species fisheries and/or distant water fisheries. Joint ventures which promote underutilized species fisheries would be encouraged. Discards would be discouraged. Further, a public trust would be authorized to develop underutilized species fisheries and engage in a buy-back program of large fisheries vessels (over 125 tons) and develop underutilized species fisheries using these vessels. This enterprise would also purchase underutilized species from other fishing vessels at sea, transport, process, market and develop new consumer goods. Domestic as well as foreign markets for these species would be promoted. Within 5 years the large corporations

would be withdrawn from primary species fisheries; if this is not sufficient, cooperatives or partnerships would be withdrawn from the primary species fisheries during the next five-year period. Funds for this program would be financed through 1) fees from foreign fee fishing, 2) an annual assessment on all fishermen in primary species fisheries, and 3) fisheries development bonds purchased by the public.

Section 4. Compatibility with Freedom Criteria

A few attempts have been made for comprehensive evaluation of fisheries management alternatives emphasizing limited entry. In this section an evaluation method, the use of freedom criteria, and expected impacts of the selected fisheries management alternatives are analyzed and evaluated.

1. Freedom Criteria

The impacts of any fisheries management scheme could be evaluated by the use of criteria which consist of physical, political, economic and social freedoms. Physical freedom means that an individual fisherman or a fishing industry is free to enter into or leave any fishery. Political freedom means that an individual fisherman or a fishing industry is free to do what he wants to do. Economic freedom allows an individual fisherman or a fishing industry to be free to enjoy economic health and stability. And social freedom means that an individual fisherman and/or a fishing industry is free to enjoy social health and stability. At the same time, an individual in the United States is free to share in or benefit from national resources. These four freedoms are basic incentives which determine human behavior and effectively reflect institutional, resource, environmental and technological impacts. These freedoms conflict not only within and among different categories of analysis, but also over the short run and the long run. That is, an increase in one's political freedom may decrease other freedoms at present and/or in the future. Further, an increase in one's particular freedom may decrease other's same or different freedoms at present and/or in the future. However, a decrease in an individual's particular freedom may occur when balance of these four freedoms for health and stability is desired. For example, once salmon were efficiently caught in the river by using primitive water wheels near processing plants, and catches were carried to the plants directly, while people enjoyed the taste of salmon at a reasonable price (all four freedoms seemed to prevail harmoniously). As time has passed, fishermen interested in ocean fisheries forced processors to remove those water wheels. All four freedoms of the fishermen seemed to

increase while those for the processors were threatened. Power plays by competing fishing and processing groups occurred so that all four freedoms of everybody had been damaged. Harvesting costs increased as the fishermen's physical freedom increased, and so on. The sophistication and mechanization of salmon vessels have ever-increased (although the physical freedom of fishermen has increased, economic freedom diminished). Mortality other than landed catch caused by pelagic gillnetting is estimated to be still equal to the catch. Catch per unit has declined (economic freedom of fishermen has diminished while social freedom is curtailed), and consumption of fuel and energy has increased progressively. A salmon has become a luxury food, and the salmon industry is flourishing: the economic freedom of fishermen prevails while social freedom of consumers and taxpayers has been curtailed.

At present, millions of dollars have been invested into limiting entry in salmon fisheries and ocean ranching programs. However, taxpayers and consumers have not been rewarded and the most efficient way of fishing has long been denied by fishermen. Thus, the present salmon fishing is far from the equilibrium point of all four freedoms and very unstable in contrast to the prevailing optimism among salmon fishermen on the West Coast.

2. Expected Impacts: Compatibility with Freedom Criteria

Using freedom criteria, expected impacts of the selected fisheries management alternatives are analyzed here. The analysis is made for three different time periods: the very short run (less than a year), the short run (2-5 years), and the long run (10-20 years).

Alternative 1: No government control. Under this system, fisheries management cost is not incurred. All four (physical, political, economic and social) freedoms may prevail in the very short run. However, over a few years competition will increase. Under overcapitalization conditions of the New England groundfish fisheries, natural selection processes may develop and all four freedoms may be curtailed. If this process excludes inefficient fishermen from the fisheries, creates incentives to develop underutilized species fisheries and increases stability of the industry, all four freedoms would increase in the long run. An increase in stability of the industry would satisfy all four freedoms of fishermen. Further, social freedom of the American public would increase because of low fisheries management costs, and increased supply of cheaper fish due to increasing economic efficiency. The pitfalls of this alternative are the loss of the four freedoms of small and weak fishermen and lack of any assurance for the future of fisheries. Excluded fishermen may not find appropriate jobs. Monopoly or territoriality may develop. If severe competition among the relatively efficient

fishermen were prolonged due to increasing demand for high valued species, the resource could be exploited to the point of irreversibility so that all four freedoms would be completely destroyed.

Alternative 2: Continuation of the present system. Under this system all four freedoms would maintain at the present level over the next few years. Although social disruption of the fishing industry would not be drastic, competition among fishermen would increase. Overcapitalization, lack of incentives to develop underutilized species and political pressures to increase optimum yields (OY's) would continue. Accordingly, administrative costs and the price of fish for consumers due to the fear of shortage of high-valued species would increase while economic efficiency of fishermen would diminish. Thus, physical, economic and social freedoms would be curtailed. In the long run all four freedoms would be substantially lessened unless the industry develops an underutilized species fishery or a distant water fishery. There has been an increase of 43% in the number of otter trawl vessels between 1970 and 1977 and an increase of about 50% in the numbers of vessels licensed to harvest groundfish between 1977 and 1978 (VIDAEUS and MUELLER, 1978). This might mean that the number of fishing vessels would continue to increase in the short run and these additional vessels would continue to fish for the next 20 to 30 years. SMITH and PETERSON (1977) reported that the average of years built of offshore fishing vessels in New England in 1976 was between 1945 and 1960 and approximate average ages of offshore full time fishermen were between 40 and 55. This would mean that most boats built before 1970 were very old and near to retirement, but most offshore full time fishermen were not old enough to retire except for Boston and Stonington, Connecticut (over 50). They would continue to show interest in fishing for the next 10 to 15 years. Thus, they would tend to build new vessels rather than leaving the fisheries. Accordingly, administration becomes more difficult and expensive.

Alternative 3: A system of disincentives/incentives. Under this sysyem, the loss in vessel earnings associated with "tie-ups" would be avoided. This policy would encourage minimization of discards and development of underutilized species fisheries. However, earnings from high-valued species would be lessened. Thus, an increase in gross vessel earnings would be moderate. Further, substantial management costs would be incurred for monitoring and predicting industial catch rates and administering the program. This would also affect redistribution of income beween fishermen's groups within the region. For example, the present discard rate by Gulf of Maine fisheries is much less than by Georges Bank or mid-Atlantic fisheries (VIDAEUS and MUELLER, 1978). Accordingly, this policy would be in favor of mid-Atlantic fisheries while less favorable for Gulf of Maine fisheries. During an experimentation period, physical, political, and economic freedoms of volunteer fishermen would increase while social

freedom of tax payers would decrease and the consumers may benefit from the development of underutilized species. However, when this policy expands, the same trend would continue for physical and social freedoms in the short run while political and economic freedoms would increase for some fishermen and decrease for others. As underutilized species fisheries develops promptly, this program would be phased out and administrative costs would be substantially reduced in the long run. Thus, all four freedoms would prevail in the long run. Pitfalls of this system are an increase in political tensions between Gulf of Maine fisheries and Georges Bank or mid-Atlantic fisheries and a development of black markets.

Alternative 4. Moratorium on entry coupled with simple licensing. This system is the first step of a rather complete fisheries management scheme and not complete by itself. Under this system, substantial management costs would be incurred. Although physical and social freedoms of the present fishermen would not be discouraged, these fishermen would be subject to fee payment and reporting. Thus, their political and economic freedoms would decrease in the very short run. Further, the four freedoms of potential entrants would be lost during the first year of the program. All these negative impacts would diminish in the short run because of development of routine work. Furthermore, excess encroachment of any freedom would be prevented by minimum government intervention. Basic information for better management would be provided. In addition, the pressure on resource exploitation from congestion of fishermen, vessels and gears would be reduced only in the long run because under overcapitalization conditions, effects of moratorium on entry on resource exploitation would be slow. Until a substantial number of fishermen, vessels and gears retire from the primary species fisheries, little change would be noted. Thus, all four freedoms would increase in the long run due mainly to increases in managerial flexibility of management authority and economic efficiency in fisheries. Pitfalls behind this alternative are false reports, lack of effective control of both technological efficiency and overcapitalization based on existing vessels and development of political pressure from young fishermen who desire to build new vessels for primary species fisheries instead of using old vessels.

Alternative 5. A progressive tax system. This policy intends to apply the economic theory of taxation to prevent resource depletion most efficiently. Under this system, substantial management costs would be incurred, but offset by tax income. Although physical freedom is not affected, political and economic freedoms would be curtailed, especially among large or efficient vessel or gear owners, in the very short run due to the existing overcapitalization problems and diminishing net income. Unless some form of compensation is provided, political pressure against this policy would be inevitable and persist in the short run. Accordingly, the price of fish would

substantially increase within 5 years. Thus, social freedom would be lessened. All other negative impacts in the very short run would diminish in the short run due to development of routine work. The strict application of this policy would effectively prevent resource depletion and develop underutilized species fisheries. Further, fisheries management authorities would have more flexibility to enhance fisheries resources. Thus, all four freedoms would prevail in the long run. If pitfalls exist, there would be development of black markets, bureaucracy and tax loop holes.

Alternative 6: A system of stock certificates. Under this system, all four freedoms for disqualified fishermen and potential entrants would be lost in the first year or two of the program while there would be no abrupt changes in the traditional pattern of fishing or in shares of existing major vessel groups. All four freedoms for qualified fishermen and processors would increase due to the reduction in fluctuations in landings, freedom of choice and decision making within the limit of each man's individual catch quatas. "Closures" would be self-imposed by individual fishermen and inducement of diversification to underutilized fisheries might come from increasing fishermen's management flexibility. All four freedoms of included fishermen would increase in the long run due to less competition, high fish prices, and development of underutilized species. However, social freedom of the American public would be uncertain except for a gradual increase in domestic fish supply. Although no one is directly prohibited from entering the primary species fisheries, the requirement for a stock certificates results in indirect control of such an action. Transaction costs, the price of each certificate, may result in windfalls to included fishermen. Pressure for additional entry would increase as the profits from the primary species fisheries increase. The ownership of the resource may accrue to an elite, resulting in drastic structural change in fisheries in the long run unless restrictions are placed on the number of shares that may be owned.

Alternative 7: The Alaskan limited entry system. Under this system, all four freedoms for disqualified fishermen and potential entrants would cease and substantial administrative costs would be incurred while positive impacts on qualified fishermen would be negligible in the first year because the industry is already overcapitalized. However, all four freedoms of included fishermen would gradually increase in the short run due to less competition and increases in fish prices, but social freedom of the American public would be uncertain. Although the buy-back program would reduce the number of entry permits to the optimum number within ten years, depletion of the primary species resource would be expected due to lack of effective control of technological efficiency and no incentives to develop underutilized species fisheries. As the resource declines, the price of fish for consumers would increase while profits for

included fishermen would rise and transaction costs of entry permit would increase due to entry permit transferability while windfalls to included fishermen would rise. As profits from the fisheries increase, pressures for additional entry would increase. In the long run, however, the fisheries would reach an equilibrium. At that time, the fisheries might be controlled by exclusive "rich men's clubs" unless specifically prohibited. Thus, all four freedoms of included fishermen would increase, but social freedom of the American public would still be uncertain due to the development of monopoly in fisheries.

Alternative 8: SINCLAIR's recommendations. Under this system, there would be no abrupt changes in the traditional pattern of fishing or in shares of vessel groups. However, all four freedoms of potential entrants would cease although those freedoms of included fishermen would not change much in the very short run because of the initial overcapitalization condition. In the short run, all four freedoms of included fishermen would gradually increase due to less competition, but contribution to social freedom of the American public through tax would be negligible. As economic freedom of included fishermen increases substantially, social freedom of the American public would increase by capturing economic rents. All four freedoms would slowly improve in the long run. If pitfalls exist, they would be attributable to the difference in retirement ages between vessels and captains and/or vessel owners. In New England many offshore fishing vessels are wooden, were built before 1950 and are near to retirement. However, captains and/or owners of vessels are relatively young business men who are interested in construction of more efficient new fishing vessels. Thus, "Grandfather system" may encounter a strong political pressure from these captains and/or owners of vessels. Success might depend on how to shift their interest to underutilized species fisheries. Construction of new vessels is an opportunity to efficiently develop underutilized species fisheries such as squid fishery which could easily be free from the incidental catch problem.

Alternative 9. Single proprietorship combined with public trust. Resource impacts of the vessel classes on cod and haddock is shown in Table 2. Except for the cod quata in the Gulf of Maine, resource impacts of the vessel classes over 61 tons are very large. Only 372 out of 1757 licenses (21%) were allocated 75.5% of cod and 84.4% of haddock in total quatas in fall,1978. Under this system, all four freedoms of large scale fisheries would be curtailed in the very short run while these freedoms of single proprietorship would increase. Assuming no single proprietorship of the vessel class over 125 tons, removal of this class from cod and haddock fisheries would decrease the fishing pressure 44.5% for cod and 49.8% for haddock. Assuming a successful shift of this vessel class to underutilized species fisheries, fishing pressure on high valued species

Table 2. Quarterly quotas by vessel class: Fall 1978

Type of vessel	0-60t		61-125t		Over 125t		Fixed gear		Total
No. of licences	635		236		136		865		1757
	t	%	t	%	t	%	t	%	t
Cod									
Gulf of Maine	581	40.9	342	24.1	180	12.7	317	22.3	1420
Georges Bank & South	501	8.9	1777	31.5	2958	52.4	404	7.2	5640
Total	1082	15.3	2119	30.0	3138	44.5	721	10.2	7060
Haddock									
Gulf of Maine	183	25.1	261	35.9	178	24.5	106	14.5	728
Georges Bank & South	86	4.5	650	34.2	1133	59.6	33	1.7	1902
Total	269	10.2	911	34.6	1311	49.8	139	5.3	2630
Yellowtail Flounder									
East of 69°									810
West of 69°									960
Total									1770

Source: New England Fisheries Management Council, memo from Spencer APOLLONIO to Groundfish Committee: Messrs. JONES, DRAKE, OLSEN, GORDON, LYMEN, DYDSTRA, NORRIS, October 18, 1978. and VIDAEUS L. and J. MUELLER, "Management of the Commercial Groundfish Fishery off the U.S. Northeast Coast, A discussion paper", 1978. p. 23.

would substantially be reduced even if some incidental catches (say less than 10%) would be inevitable. Although fate of excluded large scale fisheries would be quite transitory, all four freedoms of other sectors would increase in the short run due to less competition for included fishermen and more and cheap fish supply for consumers. Political pressure from excluded fishermen would be inevitable, but the total number of these fishermen is relatively small and their interest would be profits rather than politics. Thus, subsidies or other compensations are appropriate, they would be vital to develop underutilized species fisheries. Further, the public trust actively involves a buy-back program of large fisheries vessels (over 125 tons), develop underutilized species fisheries and plays a buffer function in the industry. The American public would have an opportunity to contribute to the development of underutilized species fisheries with limited liability and increase all four freedoms through overall fisheries development and more equitable distribution of sea wealth. In the long run, all four freedoms would prevail. If pitfalls exist, these would be the development of bureaucracy and corruption in the public trust. Some underutilized species at present could soon be overfished under this system. Thus, single proprietorship should always be encouraged for all species in the fisheries conservation zone.

Section 5. Summary and Conclusions

Fisheries management is a complex and delicate problem. Controversial limited entry approaches to fisheries management are examined in this study. Unfortunately, limited entry issues at present tend to assume that limited entry can solve all the present fisheries problems. Limited entry, however, is only a tool and has all the problems of open access except that the number of fishermen, vessels or gear is fixed. Either limited entry or open access must accompany other management tools for comprehensive management.

Major issues pertaining to these access controls concern conservation of the resource, economic efficiency, reduction of external diseconomies, inequality, and improvement of data base and institutional arrangements. Further, the claim that limited entry appears to be a reversal of the free enterprise system makes it unacceptable to the fishermen. However, the ways in which the concepts of both limited entry and the free enterprise system have been changing means that this claim is not necessarily true.

Due to the common property nature of fisheries and the impacts of external diseconomies, the free enterprise system in fisheries is quite different from other profit-motivated free enterprise systems that are based on the use of private property resources. As early as the 1940's Maryland introduced a limited entry program in order to conserve fisheries resources. A variety of controlled access or limited entry programs are now in effect in Alaska, Michigan, California, Massachusetts, Washington and Wisconsin. The passage of the FCMA in 1976 is unique in the history of the United States fisheries not only because it defined the owner of the fisheries resources as the people of the United States, but also because it regulates the entry of foreign vessels and permits the establishment of a system for limited entry to the domestic fisheries. This act shows an evolutionary change toward the legal acceptance of limited entry by the American public. Thus, limited entry is no longer incompatible with the free enterprise system in fisheries.

Freedom criteria based on physical, political, economic and social freedoms are applied to nine fisheries management alternatives emphasizing limited entry. These are: 1) no government intervention, 2) continuation of the present system, 3) a system of disincentives/incentives, 4) moratorium on entry, 5) a progressive tax system, 6) a system of stock certificates, 7) the Alaskan limited entry system, 8) Sinclair's recommendations, and 9) single proprietorship combined with public trust (Table 3).

Degrees of compatibility between different forms of fisheries management systems are positive from the standpoint of economic and conservation well-being; social freedom under these systems is

Table 3. Expected impacts of the selected fisheries management alternatives based on freedom criteria

Expected impacts / Alternatives	Very short run				Short run				Long run				Compatibility**
	Freedoms				Freedoms				Freedoms				
	Physical	Political	Economic	Social	Physical	Political	Economic	Social	Physical	Political	Economic	Social	
No govt. intervention	+	+	+	+	-	-	-	-	+	+	+	+	B
The present system	0	0	0	0	-	0	-	-	-	-	-	-	C
Disincentives/incentives	+	?	?	-	+	0	?	0	+	+	+	+	A
Moratorium	0	-	-	-	0	0	0	0	+*	+*	+*	+*	A*
Progressive tax	0	-	-	-	0	-	0	-	+	+	+	+	A
Stock certificates	?	?	?	?	+	+	+	?	+	+	+	?	B
Alaskan limited entry	?	?	?	?	+	+	+	?	+	+	+	?	B
SINCLAIR's recommendations	0	0	0	-	+	+	+	0	+	+	+	+	A
Single proprietorship	?	?	?	?	+	+	+	?	+	+	+	+	A

Note: +, 0, -, and ? mean positive impact, neutral or diminishing impact, negative impact, and indeterminate impct, respectively.
* Only when the system is combined with an effective control of both technological efficiency and overcapitalization and a mechanism to shift fishermen from primary species fisheries to underutilized fisheries. ** A: highly compatible; B: compatible; C: incompatible.

uncertain and disequilibrium among the four freedoms would persist. The continuation of the present system would be incompatible with freedom criteria due to increasing administrative costs and fish prices, and to the diminishing economic efficiency of fishermen.

In conclusion, fisheries management is a matter of application of management tools, not an issue of the alternatives of open access or limited entry. Both open access and limited entry have pros and cons and need not be a fixed concepts. Both government enterprise and limited entry are compatible with the free enterprise system in fisheries. The effectiveness of limited entry depends on how it is applied and can in part be measured by the rate of the removal of external diseconomies. It is not necessary to be conservative about structural change in fisheries in a dynamic world if the change provides appropriate compensation and definite long run balanced benefits. The potential of fisheries in New England and elsewhere depends largely on the above considerations. Further,

research, discussion, and experiences related to both the micro- and macro-dynamics in fisheries management are essential.

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