

THE INSHORE-OFFSHORE CONFLICT IN THE NEWFOUNDLAND FISHERY

by

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## ABSTRACT

This thesis examines the Government of Newfoundland's decision to emphasize the inshore fishery at the expense of the offshore in the future development of the industry. The inshore fishery is labour-intensive and is composed of approximately 30,000 licensed fishermen who operate on a seasonal basis from Newfoundland's coastal communities. More than 10,000 privately-owned vessels - with maximum range of 50 miles - are deployed in this sector and account for 65% of total landed tonnage. These vessels do not exceed 65 feet in length and over 90% are under 38 feet long. In comparison, the offshore fleet is capital-intensive and is executed from less than a dozen ports by 80 corporately-owned trawlers that range from 120 - 210 feet in length. The 1,100 men employed in this sector fish year-round as far as 200 miles out to sea and take the remaining 35% of total landed tonnage.

Apart from one major exception, each sector takes stocks that are not exploited by the other. A major portion of the cod resource, however, follows extensive migration patterns and is harvested by both sectors. This seriously complicates the Newfoundland fishery because cod is the single most important stock and accounts for approximately 40% of the dockside value of the total Newfoundland catch. The cod resource is in fact composed of a number of separate stocks but about 60% of the total cod catch comes from one stock complex. This complex is known as the 'northern cod' and only this cod follows extensive

migration patterns. Thus the inshore-offshore fishery conflict is confined solely to northern cod.

The inshore and offshore sectors are not on an equal footing regarding northern cod because the inshore sector depends upon the seasonal shoreward migration of the cod that escape offshore exploitation. The viability of the inshore cod fishery is therefore contingent upon the restriction of offshore harvesting to levels that allow adequate volumes of cod to migrate inshore. This issue has been a central problem in the Newfoundland fishery for some time but it has become critical since the extension of fisheries jurisdiction to 200 miles in 1977.

The extension of fisheries jurisdiction is expected to result in a 250% increase in total landings by Canadian fishermen from 1977 to 1985. In Newfoundland, landings are predicted to increase from 400,000 metric tonnes to 1,000,000 metric tonnes by 1985. Northern cod is anticipated to form the bulk of this with landings expected to rise from 80,000 metric tonnes to 365,000 metric tonnes during this period. The Government of Newfoundland is currently implementing strategies to deal with these increases but, before doing so, it first had to determine where the emphasis for the allocation of the expected increases of northern cod was to be placed. It decided that, since inshore fishing contributes more to the stabilization of rural settlement patterns and lifestyles, priority ought to be placed with this sector.

To analyze whether this was justified, the fisheries management literature was reviewed in order to identify appropriate criteria for evaluation. The literature illustrates that the three fundamental concerns are with utilizing the resource on a sustained basis, maximizing economic efficiency and satisfying the social aspirations of the people. On this basis, the criteria listed below were considered.

#### Resource-Related Criteria:

(1) Ability to harvest cod. It is important to know if each sector is capable of harvesting the major portion of the total allowable catch of northern cod. If one sector is not, placing priority with it would be an inefficient approach to managing the resource.

(2) Ability to ensure sustained harvesting. Fisheries management is concerned with sustained harvesting. If one sector displays a capability for stock depletion much greater than the other, it may not be the most attractive for the long term management of the resource. Thus, a second criterion is the physical ability of each sector to harvest cod without over-exploiting the stock.

#### Economic Criteria:

(3) Maximization of economic rent. The management literature outlines that a fundamental management concern is to maximize economic rent. A third evaluation criterion, therefore, is which sector harvests fish most cost-effectively for a given volume of catch.

(4) Maximization of economic efficiency. Maximizing rent for a fishery is only an accepted measure of economic efficiency during periods of full employment. Otherwise, immobility of labour, low opportunity costs and the combination of fishing with supplementary activities may mean that efficiency is fulfilled by over-employment in a fishery. Therefore, a fourth evaluation criterion is which sector contributes most to economic efficiency through the creation of employment and

compatibility with supplementary economic activities.

(5) Plant utilization. The processors have pointed to the fact that one of their most important concerns is increased plant utilization. A fifth evaluation criterion, consequently, is an examination of the impact that each fishery sector has on this.

#### Social Criterion:

(6) Satisfaction of social concerns. An integral aspect of fisheries management is satisfaction of social aspirations. In the Newfoundland fishery, these include provision of employment opportunities and preservation of existing settlement patterns. A final criterion is how the two sectors compare regarding this.

Examination of the available data illustrates that both the inshore and the offshore sectors have the ability to harvest the major portion of the northern cod. Inshore fishing, however, employs a less rapacious technology than offshore fishing and harvests only the migratory part of the resource. Thus, it runs a lower risk of over-harvesting. At the same time, data provided by Schrank et al (1980) indicate that the inshore fishery generates greater economic rents than the offshore, i.e. it is the most cost-effective approach to harvesting. Furthermore, because it is labour- rather than capital-intensive, inshore fishing creates more jobs and, because it is seasonal, also allows for a greater range of supplementary activities. Thus, it contributes more to "economic efficiency". The two sectors also differ respecting plant utilization. Offshore fishing provides year-round operability for a handful of plants whereas inshore fishing supplies over 150 plants but on a seasonal basis only. Since both sectors display an ability to harvest the major

portion of cod, neither has any advantages as far as increasing total plant utilization is concerned. Offshore fishing centralizes plant activity, however, and the inshore fishery may have benefits here by contributing more to efficiency criteria in creating a greater number of part-time jobs which can be fitted in with other occupations. Finally, the inshore sector is more supportive of existing settlement patterns than the offshore fishery because it provides employment in all outports and, since it allows for traditional supplementary activities more so than the offshore sector, is also more compatible with rural lifestyles.

In summary, the inshore sector outperforms the offshore regarding the generation of rent and the maximization of economic efficiency. It is also less likely to over-harvest the resource and more fully satisfies the social aspirations of the Newfoundland people. There are no distinct differences between the two sectors in their ability to harvest cod or their contributions to total plant utilization. The inshore fishery therefore surpasses or is at least comparable to the offshore sector in every criterion. On the strength of this, it is the conclusion of this thesis that the Government of Newfoundland has made an appropriate decision in placing emphasis on the inshore fishery.

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Finally, I wish to extend special thanks to Dr. William Rees of the School of Community and Regional Planning and Mr. Tony Dorcey of Westwater Research Centre for assistance rendered.

## I: INTRODUCTION

The objective of this thesis is to examine and evaluate the Government of Newfoundland's decision to emphasize the inshore fishery at the expense of the offshore in the future development of the industry. The inshore fishery is labour-intensive and is composed of approximately 30,000 licensed fishermen who operate on a seasonal basis out of Newfoundland's coastal communities (Government of Newfoundland, 1980). More than 10,000 privately-owned vessels - with maximum range of 50 miles - are deployed in this sector and account for roughly 65% of total landed tonnage (Government of Newfoundland, 1978a). Over 90% of the vessels in the inshore fleet are under 38 feet in length and the largest inshore vessels do not exceed 65 feet (Government of Newfoundland, 1978a). In comparison, the offshore fleet is capital-intensive and is executed from less than a dozen ports by 80 corporately-owned vessels that range from 120 to 210 feet in length (Government of Newfoundland, 1978a). The 1,100 men employed in this sector fish year-round as far as 200 miles out to sea and take the remaining 35% of total landed tonnage (Government of Newfoundland, 1978a).

The Newfoundland fishery resource consists of a multitude of stocks. Included among these are: groundfish, i.e. cod, haddock, redfish, flounder, plaice and hake; pelagic herring and mackerel; anadromous salmon; sea mammals, i.e. seals; and crustaceans including crab, lobster, scallop and shrimp. With the exception of the groundfish, all of these stocks inhabit the

inshore waters and are exploited solely by the inshore sector. These stocks account for approximately 35% of the landed value of the total Newfoundland catch (Government of Newfoundland, 1978c). Only the groundfish inhabit the more distant waters and, consequently, they form the basis for the offshore fishery. Yet, a major part of the cod resource follows seasonal shoreward migration patterns and is harvested inshore as well. Thus, both sectors compete for cod but each also takes additional stocks that are essentially inaccessible to the other.

The competition for cod complicates the Newfoundland fishery because cod is the single most important stock and accounts for approximately 40% of the dockside value of the total Newfoundland catch (Munro, 1980). The cod resource is in fact composed of a number of separate stocks but about 60% of the total cod catch (or 25% of the value of the total Newfoundland catch) comes from one stock complex. This complex is known as the 'northern cod'<sup>1</sup> and only this cod follows extensive seasonal inshore migration patterns. Hence, the inshore-offshore cod competition is confined to northern cod. Yet, the two sectors are not on an equal footing in this matter because the inshore cod fishery is dependent on the seasonal shoreward migration of the cod that escape offshore exploitation. Thus, the viability of the inshore cod fishery is

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<sup>1</sup>The northern cod stock complex is found in area 2J3KL of Figure 1, page 31. The other cod stocks are located in areas 2GH, 3M, 3NO, 3P and 4RS.

contingent upon the restriction of offshore harvesting to levels that allow adequate volumes of cod to migrate inshore. This inshore-offshore conflict has been a problem in the Newfoundland fishing industry for some time but it has become a critical issue since the imposition of extended fisheries jurisdiction to 200 miles in 1977.

The extension of fisheries jurisdiction by Canada means that fishing by foreign nations within this area will be phased out. This, in combination with stock rehabilitation programmes, is expected to result in a 250% increase in total Canadian landings by 1985 (Government of Canada, 1977a). In the Province of Newfoundland, landings are anticipated to rise from 400,000 metric tonnes (1977) to over 1,000,000 metric tonnes during this same period (Government of Newfoundland, 1978a). The Government of Newfoundland (1978a) has projected that the landed value of this catch, in constant 1977 dollars, will increase from \$85 million to \$194 million by 1985 and that its export value will increase from \$250 million to \$600 million.

The Provincial Government is currently implementing strategies to accommodate these increases in both landings and revenues. Before embarking on this however, it had to decide which fishery sector would be given priority in the allocation of northern cod. Northern cod is expected to form the bulk of increased landings in Newfoundland with yields predicted to rise from 80,000 metric tonnes (1977) to 365,000 metric tonnes (1985) (Munro, 1980). The debate that developed over the allocation of

this expected increase was therefore intensified by the fact that whatever decision was reached would strongly influence the long term future of the fishing industry.

The key supporters of increased offshore allocations are the offshore processing firms which include 12 of the 189 processing plants in Newfoundland. These twelve plants are fully integrated, i.e. they operate the 80 offshore vessels and, because they also process inshore fish, account for 50% of total processed output (Economic Council of Canada, 1980). Their motive for advocating offshore development is strictly economic - additional offshore capacity would create a greater, more dependable supply of fish which would contribute to greater plant efficiency, higher productivity and more profit. The main proponents of an increased inshore fishery are the seasonal inshore fishermen. They view any increase offshore as removing fish from them and consequently feel that future development in the fishery should give priority to increasing both landings and incomes in the inshore sector.

Even accounting for the fact that a great many licensed inshore fishermen do not actually fish for a full season (Munro, 1980), it is apparent that the offshore fishery is more effective than the inshore in terms of landings per man. It is also more conducive to year-round plant utilization. The offshore sector, however, would create fewer jobs than the inshore if expansion were to occur. In addition, the extra employment would be concentrated in a few ports and would do

little to alleviate the unemployment problems of the remaining fishing communities where the bulk of Newfoundland's population resides. For these reasons, the Provincial Government decided to resolve the inshore-offshore conflict by placing priority with the development of the inshore sector (Government of Newfoundland, 1978a). It has not, however, undertaken any indepth analyses to evaluate this decision. Rather, since the preservation of the inshore fishery has become a kitchen topic in Newfoundland during the past few years, the gut feeling one gets is that it was based on political expediency.

In a strict economic sense this may not seem a wise resource management decision. The seasonality inherent in the inshore fishery contributes to plant under-utilization and greater overhead costs per unit of output. The greater number of inshore fishermen also implies that, in comparison to the offshore sector, the economic rent is being distributed less efficiently. Yet, the Newfoundland Government has decided that spreading the benefits over a larger number of people to ensure their continued wellbeing takes priority. As such, it is a classic example of social considerations successfully challenging what may, in isolation, appear nothing more than strictly an economic problem. This study attempts to determine whether this decision is justified.

It should be reiterated at the outset that the issue of concern here is the allocation of the increased supply of northern cod that is expected to accrue from the extension of



fisheries jurisdiction. As has been noted, northern cod is the only major fishery accessible to both sectors and is, therefore, the only area of major conflict between them.

## II: METHODS

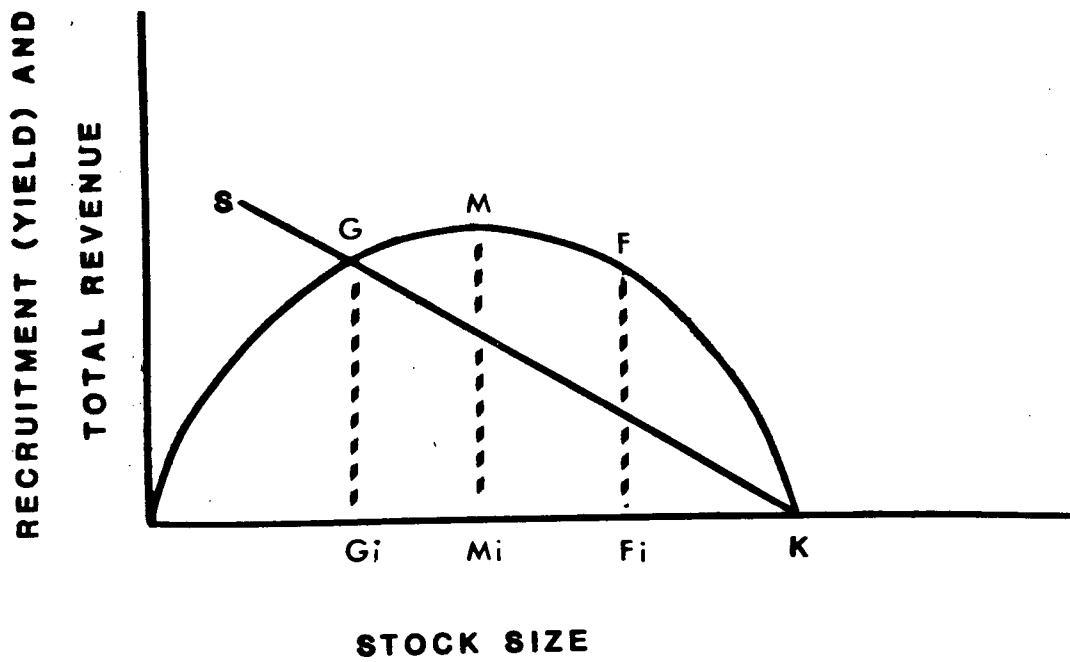
### Fisheries management theory

A review of the fisheries management literature provides insight into both the fisheries management approaches that have been used in the past as well as the considerations that are currently incorporated in fisheries management decision-making. From this, I extract management standards applicable to the Newfoundland fishery and, consequently, the criteria for evaluating whether the decision to favour the inshore sector is justified.

Prior to the 1950's, the recommended management regime for fisheries resources emphasized maximizing the sustainable biophysical yield that a fish stock was capable of providing (Koers, 1973 and Munro, 1980). This approach was challenged, however, when economists began to take interest in the management of fisheries resources. Economic analysis of fisheries resources came to prominence in the early 1950's with the pioneering work of H. Scott Gordon. Gordon was interested in the effects that the common property or open-access nature of a fishery had upon the overall economic performance of that resource. His analysis indicated that since fishing grounds are not private property, there is no proprietor to limit the employment of labour when economic rent on the ground is maximized (Gordon, 1954).

The analytic work developed by Gordon was pursued by several of his colleagues - including Anthony Scott, Francis T. Christy and James Crutchfield - and became the foundation of fisheries economics. It is represented in the model in Figure 1. The horizontal and vertical axes represent stock size or density, and yield and total revenue (volume of catch times price per pound) respectively for a single stock fishery. It is assumed that only one resource user exploits the stock and takes exactly the recruitment. Recruitment is the theoretical number of fish added per season to the fishery by a stock of a given size.

The arc in Figure 1 therefore represents the theoretical net recruitment to the biomass for all possible stock sizes. At low density, recruitment is obviously low because of limited stocks. For a while, recruitment increases with stock as the stock expands. However, as the stock expands, so in theory does density dependent natural mortality. Consequently, recruitment reaches a maximum at intermediate stock size but then drops until it reaches zero at maximum stock density. Recruitment to the stock also represents sustainable yields (maximized at  $M$ ). Line S depicts the relative costs of landing a unit of fish at different stock densities. It is assumed that the greater the density of the stock, the easier it is to harvest a unit of fish. At high densities, therefore, the catch per unit of effort is high and costs per unit landed are low. As density falls, however, so to does catch per unit of effort. Consequently, the cost per unit landed increases as density decreases.



**FIGURE 1: A RENT MAXIMIZATION MODEL  
FOR A SINGLE STOCK FISHERY**

In Figure 1 economic rent is maximized at F. Fishing at the maximum sustainable yield produces less than the maximum economic rent because of the increased unit harvesting costs associated with decreased stock density (Christy and Scott, 1965). A single resource user exploiting the stock, consequently, would limit fishing effort when stocks fall to  $F_i$ . In an open-access fishery, however, any economic rent attracts new entrants because rent is the surplus over total fishing costs which include both the costs to land the fish and the individual's opportunity cost (Christy and Scott, 1965). The existence of rent is an incentive, therefore, and fishermen will continue to enter an open-access fishery until all rent vanishes, i.e. total revenues equal total costs (Gordon, 1954; Scott, 1957; Christy and Scott, 1965; and Cauvin, 1979). In Figure 1 this occurs at G and is referred to as the point of bionomic equilibrium.

The tendency of open-access fisheries to approach bionomic equilibrium led economists to criticize existing fisheries management as contributing to a misallocation of resources (Scott, 1957). The early consensus of economists was that a fishery could only make a maximum contribution to the economic welfare of society by maximizing net economic yield or rent (Crutchfield, 1965). Otherwise, more fishermen than necessary are employed using more of society's resources than required. This not only means that excessive capital is used but that society also has to do without the extra goods and services that

could be produced if the unnecessary fishermen were employed elsewhere in the economy (Christy and Scott, 1965). Excessive labour inputs also mean that average incomes are much lower than they would be under conditions maximizing economic rent. In short, economists argued that the purpose of fisheries management "should be to promote the highest efficiency in the use of vessels and fishermen" (Bell, 1977, p. 9). In other words, maximization of economic rent was regarded as the best criterion of economic efficiency and hence the rational goal of fisheries management. Indeed, Christy and Scott (1965) equate maximum economic efficiency with rent maximization. Crutchfield (1979, p. 743) indicated that in order to attain economic efficiency, the fisheries would have to undergo rationalization, i.e. "the reallocation of resources under open-access to a controlled system designed to maximize the net value of production". Both definitions imply a reduction in the amount of effort from that which suppresses stocks to  $G_i$  towards that required to produce  $F_i$ . Pontecorvo (1977, p. 67) supported this by pointing out that "efficient utilization of (fisheries) resources requires that a transfer of capital and labour out of the fishing industry" should be encouraged to levels which "would not decrease the value of output" from the fishing industry. Crutchfield (1962, p. 384) also indicated that in a "more fundamental sense, it must be emphasized that maximum employment for a given output is a nonsensical objective". Finally, Pearse (1979, p. 9) implied a similar reduction of fishing effort by stating that "the most conspicuous source of production inefficiency is employment of excessive and redundant

labour and capital to take the catch in a potentially profitable fishery".

### Limitations in the Theory

At the heart of the traditional economic argument is the belief that fisheries management decisions should reflect this concern for minimizing the amount of "wasted" effort. For a number of reasons, however, this has not often been the case. Christy and Scott (1965, p. 223) state that in advocating a reduction of fishermen, for instance, economists assume "(a) that the gain to the industry would be great enough to compensate those who lost and that such compensation would actually be paid or (b) that compensation would not be necessary because society would swiftly and painlessly transfer those who lost into equally attractive jobs elsewhere". In many instances, however, one or both of these assumptions are invalid. Scott (1957), for example, suggests that the misallocation of resources that results from having too many fishermen is not necessarily a negative thing from society's point of view because the "sufferers" are the fishermen. He indicated that a change in tenure might only benefit those fishermen left in the harvesting sector because they would receive higher wages. Compensation to the displaced fishermen, however, would have to be made by society at large (Scott, 1957). Scott (1957) stated that this would have to include some other source of income which the fishing industry, by reason of the very need for reduction of size in the first place, would be unable to

provide. The assumption that the gain to the industry from a reduction of fishermen would actually be used to compensate those that were displaced is therefore rather tenuous.

More serious still are the limitations of the assumption that society could "swiftly and painlessly" transfer displaced fishermen to other jobs. Crutchfield (1972, p. 78) pointed out that the "economic, social and political isolation of fishermen makes them particularly immobile" and that it would be difficult to place them in alternative employment. Lokken (1959, p. 80) indicated that "fishermen can't move or be moved that easily, and their needs and views must be considered in framing a regulatory programme". In addition, Scott (1957, p. 437) stated that fishing labour is immobile because it is "geographically and industrially unadaptable". Finally, Cauvin (1979, p. 829) noted that fishermen have "few employment opportunities that are consistent with their skills and experiences".

Apart from the flaws with the assumptions regarding the reduction of fishing labour, other constraints have limited the widespread use of maximum economic rent as the major fisheries management objective. One of these is an expansion of the point raised earlier when Scott (1957) noted that society might have to provide the displaced fishermen with alternative sources of income. Essentially, Scott raised the issue that the externalities caused by increasing efficiency in a fishery may outweigh the benefits so gained. Christy and Scott (1965, p. 11), for example, suggested that "theoretically, at least, it is



possible to question whether or not society would be better off by restricting entry. The .... possibility of raised prices to the consumer because of oligopoly and .... high movement costs (to move displaced workers) plus lack of outside employment may mean that other goods and services produced (by displaced workers) are more than offset by the costs of displacement". Crutchfield (1972, p.78) stated that "it may even be that efficiency criteria are satisfied if excessive labour inputs to the fishery are less costly than alternative ways of providing (them with) minimum acceptable living standards". Both Crutchfield (1972) and Mackenzie (1979) have elaborated upon this by stating that, because of labour immobility and the nature of the skills, the opportunity cost for fishing labour - if not zero - is very low. Providing displaced fishermen with jobs elsewhere in the economy where the opportunity costs are much higher, therefore, means that, in the long run, this labour will demand a higher pay level. Once again, society may be better off keeping this labour in the fishery and paying it a smaller wage, especially if the economy is not at or near full employment. Rogers (1979, p. 787) also viewed the immobility of fishing labour as a serious constraint and suggested that "if labourers are, in fact, not moveable or retrainable or combinable with other mobile factors of production, then economic efficiency may dictate the maintenance of the less competitive fishermen at the expense of the more successful".

Crutchfield (1979, p. 747) indicated that an additional economic limitation to the maximum rent objective is that "many

fisheries are not suitable candidates for limited entry programmes because the cost of data acquisition and the management framework necessary to utilize it efficiently would exceed any benefits that might accrue". He also added that "most analyses have tended to assume that "economic efficiency would be improved if the fishery were to shift more and more to professional, full-time fishermen .... (but) .... in isolated communities a working schedule that combines the seasonal harvesting of fish with complimentary agriculture would be more efficient" (Crutchfield, 1979, p. 748).

Another constraint limiting the use of the maximum economic rent criterion as the major fisheries management tool is social and/or political in nature. Essentially, those to be displaced from a fishery do not view the situation in the same light as do the economists and, consequently, resist any move they perceive as jeopardizing their livelihood. Tussing (1979, p. 480), commenting on limited entry in the Alaskan salmon fishery, for instance, noted that:

"the concern with allocation efficiency is a professional idiosyncrasy of economists; the ordinary citizen assumes immobility and takes the possibility of structural unemployment very seriously. He therefore regards 'job creation' as having more merit than cost reduction. If a physical harvest which is constant over time can indeed provide opportunity incomes for ever greater numbers of fishermen, perhaps the existing organization of the resource is a truly wonderful innovation".

Needler (1979, p. 723) voiced a similar opinion when he noted that:

"The doctrinaire economist, viewing a fishery, might

be inclined to count wages (including returns to fishermen) as a cost and to concentrate on maximizing the "economic rent" and preventing its dissipation; the fishing community cares little about the overall profit as long as it is enough to keep the whole show going. The economist is prone to regard labour (including fishermen) as mobile and to say that labour should seek some other occupation if its return is below the national average; most fishermen are reluctant to leave either their occupation or their locale and, in recent years, get no encouragement from the fate of many who have left the small community for the large".

James (1959) stated that people will use political pressure to influence decisions affecting their jobs and indicated that a management scheme to increase rent in the fishing industry of the State of Maryland by reducing the number of participants was thwarted in such a manner. Other instances where "social considerations", i.e. the jobs and wellbeing of people, have affected fisheries management decisions are prevalent in the literature. Lokken (1959), for instance, pointed out that the Pacific halibut fishery was not managed for maximization of economic rent out of consideration for the repercussions to the fishermen involved. Both Adasiak (1979) and Rogers (1979) noted that management plans to increase rents in the Alaskan salmon fishery by limiting entry was influenced by social considerations. Entry into the fishery was restricted but not to the extent that undue hardship fell upon small communities where fishing formed a small but important source of income (Adasiak, 1979). Similarly, Mitchell (1979) suggested that social considerations played an important role in determining the shape of the management regime for the B.C. salmon fishery. Licensing was introduced to control entry but was not structured so that

existing salmon fishermen would be forced out of the industry.

A final constraint is the fact that the deterministic biological model on which rent maximization is founded is a theoretical over-simplification of density dependent population control for fish stocks. Stock recruitment, in fact, is subject to extreme and wide fluctuations because of environmental variations in water temperature, salinity and available nutrient supplies and their marked impact on pre-recruitment mortality (Grant, 1934; Pinhorn, 1976; and Silvert, 1977). Sandeman (1977), for example, has indicated that in 1958 and 1959 recruitment to the Atlantic herring stock was more than 100 times greater than normal while recruitment to the redfish stock had been observed to be negligible for as much as eight years in row. The unreliability of the biological models is increased furthermore by the fact that they do not consider inter-species relationships. The uncertainty surrounding the biology of fish stock recruitment is aptly described by Sandeman (1977, p. 103) as follows:

".... the deterministic models used not only provide no information about the relative errors in the estimates, but also in general completely ignore the important interspecific relationships that exist in the ecosystem. The models, therefore, are considered by some to be completely inadequate".

In short, application of the maximum economic rent criterion has, for a number of reasons, been limited. These include uncertainty about the underlying economic assumptions, the economic benefits that would result and the biological model upon which rent maximization is based. Social resistance and

public choice are also factors. In addition, several authors have argued that maximum economic efficiency may in fact be obtained through the maintenance of "excessive" employment in the fishery.

These limitations place constraints on the rent maximization objective but do not, however, negate the important role that economic considerations play in fisheries management; they merely qualify that role. Crutchfield (1977, p. 18), for instance, has recently written that the primary goal of fisheries management is "some composite of human well-being" which is "not measured solely by net economic benefits in the narrow monetary sense since consideration must be given to income distribution, employment opportunities and other social aspects". Yet, he also added that "economic maximization represents a basic starting point; if for no other reason than that peripheral social objectives can be met more readily if the fishery is on a sound economic footing" (Crutchfield, 1977, p. 18). Similarly, Rothschild (1971, p. 5) has stated that "while the economic goals are undoubtedly the goals that our fishing system should follow .... the best allocation is that which makes the greatest contribution to the quality of life of the individuals that own, harvest and process the resource". Finally, the Government of Canada (1977b, p. 1) recently announced that the "principle objective of Canadian fisheries policy is to derive the best overall benefits for Canadians in general and fishermen in particular" but stated that both economic and social objectives are involved.

Thus, fisheries management has changed dramatically since economists first challenged the maximization of biophysical yields as the recommended management regime. From an early concern with maximizing economic rents, fisheries management has added several dimensions and now gives consideration to a host of additional economic and social objectives.

### Decision Framework

Regarding the Newfoundland fishery, the issue under consideration is which harvesting sector ought to be given priority in the future exploitation of northern cod. The literature previously reviewed outlines that the major management concerns are with utilization of the resource on a sustained basis, economic efficiency and satisfaction of social concerns. An appropriate set of criteria to evaluate management strategies for the Newfoundland fishery is suggested below.

### Resource-related criteria

(1) Ability to harvest the cod stocks: Since the two sectors are essentially competing for the migratory cod, it is fundamental that their capability to harvest this resource be considered a criterion for evaluation. This provides indicators for determining whether placing priority with either sector would result in the full utilization of the total allowable catch of cod. If one sector cannot fully utilize the resource,

it can be concluded that placing priority with it would be an inefficient way to manage the resource.

(2) Ability to ensure continued, long term harvesting: The fishery of Newfoundland is viewed as a sustainable resource which can yield long term benefits to both the Province and society as a whole. A fundamental management concern, therefore, is that the stocks do not become over-exploited. If, for instance, one sector displays an apparent capability to deplete the stocks much more so than the other, then it may not be the most attractive for the long term management of the resource. Thus, a second evaluation criterion is the physical capability of each sector to harvest cod without over-exploiting the stock.

#### Economic criteria

(3) Maximization of Economic Rent: The fisheries literature outlines that a key objective of fisheries management is to generate the highest economic rent. In a strict economic sense then, it follows that a third evaluation criterion is which sector lands fish most cost-effectively.

(4) Maximization of Economic Efficiency: The literature also suggests, however, that maximization of economic rent is only an accepted tenet during periods of full employment. Otherwise, immobility of labour, low opportunity costs and combination of fishing with other economic activities may mean that economic efficiency is fulfilled by maintaining over-

employment in a fishery. Thus, a fourth evaluation criterion is which sector contributes most to economic efficiency vis a vis generation of employment as well as compatibility with supplementary activities and rural lifestyles. In the event that "economic efficiency" as defined is better satisfied than maximization of rent, the latter criterion will be considered subordinate to the former. The rent maximization criterion is included, however, because there may be important relationships between the two that would otherwise go unnoticed.

(5) Plant Utilization: The offshore processors have pointed to the fact that one of the most important attributes of offshore fishing is that it contributes to increased plant utilization. It is therefore appropriate that a fifth evaluation criterion be the impact that each harvesting sector has on plant utilization. By virtue of the fourth evaluation criterion, however, the most attractive sector may be that which generates the greatest number of jobs in processing plants and is most compatible with supplementary economic activities; not necessarily that which promotes greatest economic efficiency of plant use.

#### Social criteria

(6) Satisfaction of Social Concerns: The literature has revealed that an integral aspect of fisheries management is consideration of the social aspirations of the people that depend on the fishery for their livelihood. It has been



illustrated that in numerous instances economic objectives have been set aside out of concern for the social goals and objectives of the people. Indeed, the basic purpose of fisheries management is to make the greatest contribution to the "quality of life" (Rothschild, 1971, p. 4) and this undoubtedly entails social issues. It is therefore fitting that a sixth criterion be an evaluation of the ability of both sectors to fulfill the social aspirations of the Newfoundland people.

### The Problem of Evaluation

The foregoing discussion of fisheries management and particularly the economic concerns focussed on factors and values that, despite theoretical problems, are relatively easy to measure and evaluate. Fisheries management in Newfoundland, however, involves a range of less tangible values that do not lend themselves so readily to quantitative analysis. We have touched upon this in our consideration of sociopolitical factors in fisheries management, but the point requires further consideration in the present context.

Many quantitative evaluation techniques, such as cost-benefit analysis, have attempted to incorporate intangible values by quantifying the qualitative through the use of shadow prices. Recent literature in environmental economics, however, has illustrated that this is not satisfactory. Ehrenfeld (1978), for instance, has underscored this by describing the difficulties that are met when attempts are made to protect

environmental values from commercial development. He pointed out that modern industrial societies are dominated by the "cult of reason" and an essentially humanistic perspective that results in an entirely utilitarian approach to nature. Ehrenfeld (1978, p. 177) noted that this man-centred view of the world demands a "logical and practical reason for saving each and every part of the world we wish to preserve". As a result, "those parts of the natural world that are not known to be useful to us are considered worthless until some previously unsuspected value is discovered" (Ehrenfeld, 1978, p. 177).

Leopold (1966, p. 266) noted that one response to this has been that "when one of these non-economic values is threatened and if we happen to love it, we invent subterfuges to give it economic importance", i.e. we contrive an economic value for it. Conservationists have attempted to preserve marshlands from commercial development, for instance, by placing a dollar value on their natural properties of purifying waste water. As Ehrenfeld (1978) and Rees (1979) have illustrated, however, the fatal flaw with this is that once conservationists have accepted pure economic values as the sole criterion for resource allocation, they have nothing to fall back upon at the bargaining table. They may attempt to ascribe economic value to some essentially intangible resource in an effort to protect it from alternate development. However, when the value of some more widely recognized commercial use of a resource exceeds the "contrived" value, they are bound by the adopted economic rationale to accept the sacrifice of what in fact a non-

economic value. This lead Rees (1979, p. 9) to conclude that "quantitative evaluation techniques such as benefit-cost analysis are inherently biased and simply inappropriate tools for making decisions about the values we were really trying so desperately to rationalize".

Similarly, economic evaluation techniques are unsuitable tools for making decisions regarding purely social values. Consider, for instance, a retired schooner captain who, despite his age and a sufficient retirement income, still dabbles in the fishery. Assume he fishes only for salmon and lobster from a small, open boat. In the winter he sews salmon nets and constructs lobster pots and in the spring he prepares his boat for the water. During the summer he fishes - perhaps with the help of a grandson - and in the fall he stores his gear and his vessel away for the winter. Also assume that he earns only \$1,000 a year fishing but is not really concerned with turning a profit. Rather, his interest is to be near the water at the occupation to which he has devoted his life. To continue fishing for him is to prove his continued worthiness as a man, to display his undefeated mastery of the sea and perhaps to be able to pass along some of his expertise to his grandson. To value the utility that that fishermen receives from fishing at the \$1,000 he earns from it or to tell him that, for economic reasons, he is no longer allowed to continue fishing is simply inhumane. There may in fact be no economic measure that would accurately reflect the value that he receives from fishing or would persuade him to give it up. Any attempt to place an

economic value on the social utility he derives from fishing, therefore, may be inappropriate.

The inability of economic analytic techniques to deal effectively with non-monetary values has led to the development of "social impact assessment". Shields (1975) notes that "social impacts" involve adaptations on the part of social systems to "external" agents of change. Olsen and Merwin (1978, p. 44) add that "social impacts refer to all changes in the structure and functioning of patterned social ordering that occur in conjunction with an environmental, technological or social innovation or alteration". Finsterbusch (1978a) states that, in broad terms, social impact assessment therefore attempts to determine the full range of costs and benefits of alternative courses of action.

Many researchers see social impact assessment as attempting to measure the "quality of life". (See: Finsterbusch, 1978b; Olsen and Merwin, 1978; and Liu, 1978). The notion of a technique that spans both quantitative and qualitative elements and enables decision makers to determine which development alternative would contribute most to the "quality of life" is indeed an attractive one. It is, however, fraught with difficulty because any definition of "quality of life" is based on a value judgement and there is no standard on what should be included as measures or indicators of it. Olsen and Merwin (1978), for example, used 55 indicators to determine "quality of life" while Liu (1978) used 123. As Olsen and Merwin (1978, p.

43) have noted:

"Social impact assessment is severely hampered by the lack of a standard methodology. Thus far, virtually all social impact assessments have been made on an ad hoc basis, with no attempt to ground the work on any kind of theoretical foundation or to employ a methodology that could be replicated by others .... As a result, we do not at the present time have a sound empirical base from which to derive social impact assessments."

This viewpoint is also supported by Finsterbusch (1978a), Liu (1978), Sassone (1978) and Shields (1975).

Given the theoretical and methodological weaknesses of social impact assessment, the problem of comparing diffuse quantitative and qualitative criteria may seem unsolvable. Finsterbusch and Wolf (1978), however, have therefore suggested that the social impacts of alternative policies might best be analyzed using the criteria put forth by those most directly affected. In other words, the values of the people can be used to make the decision between incommensurable variables. Indeed, in a democratic society, this is how one would expect decisions to be made. Downs (1967) has written that even though politicians may only be interested in a citizen's vote, they must cater to that citizen's welfare in order to get his vote. Brown (1981, p. 17) has indicated that, in making decisions regarding their welfare, "individuals have preferences which determine their decisions and they will act in such a way as to provide themselves the greatest net benefits as weighed by these preferences". The values of the people determine their preferences which, in turn, should direct the behaviour of politicians.

This approach, however, is not satisfactory for evaluating a fishery. Consideration of the "social concerns" or "values" of the people is identified in the fisheries literature as being a management objective. To use it as the deciding factor in evaluating fishery options would therefore bias the results and would undermine the value of carrying out other analyses. To avoid this problem, this thesis will reach a decision between the two sectors of the Newfoundland fishery only if one sector has all the benefits. Otherwise, it will be concluded that neither sector has any advantages over the other and that priority in the future allocation of cod could justifiably have been placed with either.

Before analysis of the criteria outlined herein is initiated, however, it is important to have a firm understanding of the complexity of the issue at hand. A brief description of the changes that have taken place in the Newfoundland fishery from the days of the salt cod fishery to the extension of fisheries jurisdiction is therefore provided. It is only with a historical perspective that a full appreciation for the intricacies of the Newfoundland fishery can be attained.

### III: HISTORICAL EVOLUTION OF THE INSHORE-OFFSHORE CONFLICT

#### Early Background

The Province of Newfoundland was initially settled for the pursuit of the salt cod fishery. Fish formed the backbone of the economy and as late as the early 1900's represented 85% of total exports (Munro, 1980). Settlement patterns reflected this dependence on the sea: 1,300 fishing communities - the "outports" - dotted the Island's 6,000 miles of coastline while the interior remained virtually uninhabited until the establishment of the Grand Falls paper mill in 1904 (Canning and Inglis, 1977).

The salt cod fishery was a seasonal occupation that depended upon the seasonal shoreward migration of a major stock complex. It was carried on close to shore and employed a "passive" technology - baited hooks, jiggers, etc. - that only took the fish that happened upon it. The catch was then gutted, split (i.e. the backbone was removed), cured with salt and dried in the sun. Normally the entire family was involved in processing the catch. In the fall, when the season was complete, the dried fish was sold to the local merchant who arranged for its export.

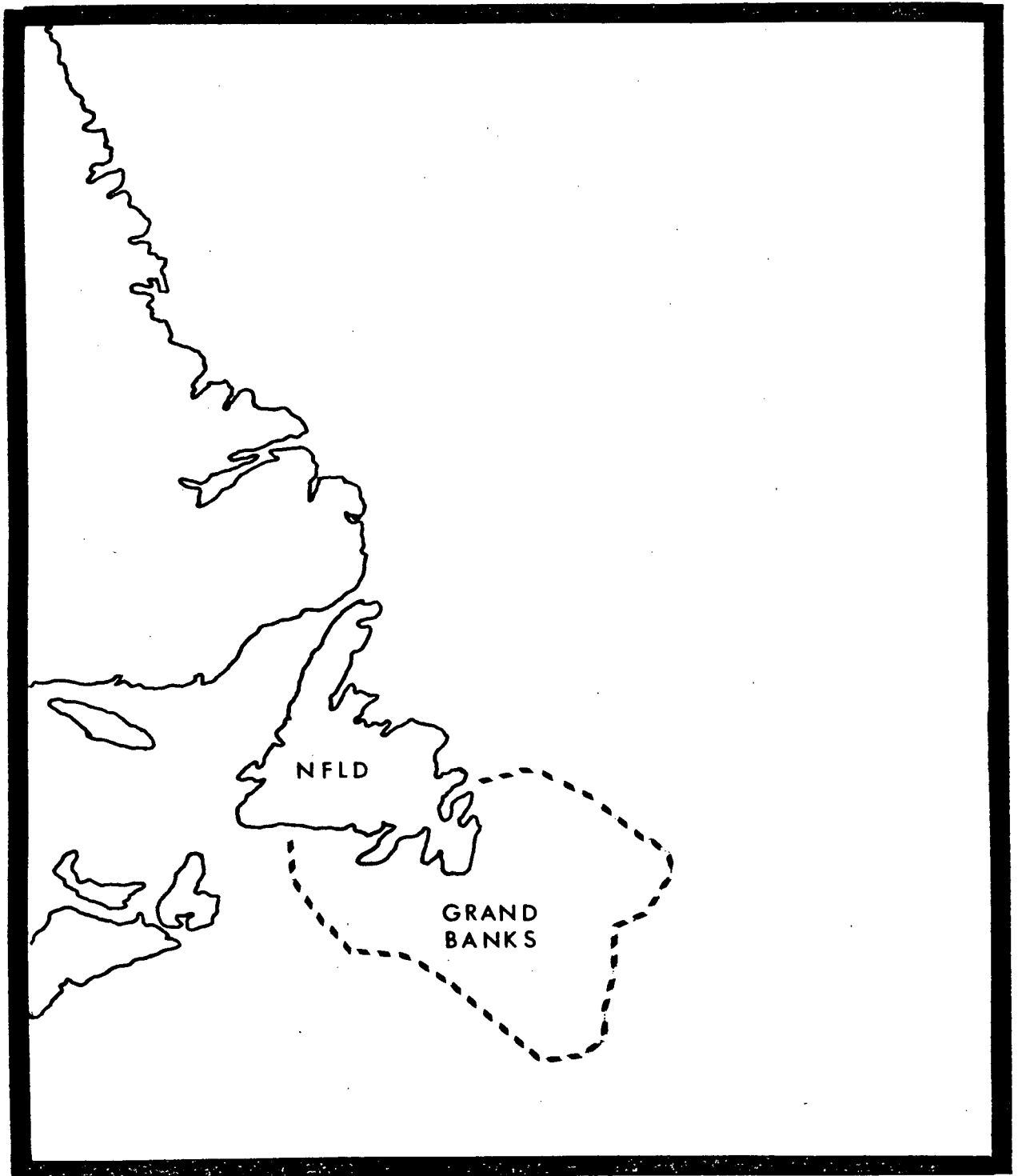
The peak of the traditional salt cod fishery was usually a six to eight week period from June to August during which the bulk of landings was made. Although fishing and related

activities - mending nets, repairing vessels, etc. - lasted much longer, the average fisherman was left with a considerable amount of time on hand. Salt cod, however, never commanded very high prices and fishing income was normally insufficient to provide for an acceptable livelihood. The "off-season", consequently, was utilized in producing income in kind through hunting, trapping, tending gardens and cutting wood for both building supplies and fuel. Through this combination of activities, an acceptable level of material comfort was realized (Matthews, circa 1970).

The Newfoundland inshore cod fishery continued almost unimpeded from approximately the 1750's to the 1920's. Alexander (1977) notes that the encroachment of European influence began at this point with the introduction of Spanish and Portuguese fleets to the Grand Banks (see map, next page). These Europeans competed with the large Canadian, American and Newfoundland fleets which were also well developed by this time. The "bankers" - as these vessels were known - exploited the offshore fishing grounds and deployed their crewmen in small dories to fish for cod and haddock through the traditional methods of handlines and jiggers. The bankers remained on the fishing grounds throughout the summer, salted the catch heavily to compensate for the absence of sun-curing, and returned to port only with a full load or when fall gales became prevalent.

This early bank fishery also depended on passive gear and the strain it had on the fishery resource was relatively light.





**FIGURE 2: THE GRAND BANKS**

In the early 1920's, however, the first trawlers were also introduced to the Northwest Atlantic fishery to provide for the fresh fish industry that had started during this period in Atlantic Canada (Government of Canada, 1928). These vessels represented a revolutionary concept in fishing since, through the use of otter trawls, "active" fishing gear was used for the first time. This type of gear - dragged along the ocean bottom - could, in effect, pursue fish and scoop vast quantities out of the water. This technique seemed so effective that the traditional fishing interests lobbied against it (Government of Canada, 1928). It was felt that the trawlers would deplete fish stocks because they destroyed fish spawn, damaged the fishing grounds and captured large quantities of immature and unmarketable fish (Government of Canada, 1928). The opposition was so intense that the Canadian Government prohibited them from fishing inside territorial limits.

Territorial limits, unfortunately, only extended three miles and the trawlers were free to fish outside this zone. For reasons relating to poor refrigeration technology and consumer prejudices against the quality of fresh fish products, however, the development of a trawler fleet in the Northwest Atlantic did not rise dramatically until after World War II (Alexander, 1977). For a period of approximately twenty years, therefore, the inshore fishermen, the bankers and the offshore trawlers co-existed.

In the wake of World War II, however, two radical changes

occurred which greatly altered the face of the Northwest Atlantic fishery and the way of life of the Newfoundland outports. The first of these was the massive build-up of European trawler fleets on the continental shelf off Canada. The second was the decline of the salt fish industry.

Alexander (1977) has devoted considerable energy to analyzing the decline of the salt fish industry in Newfoundland. Among other things, he stated that the post-war economic problems that many nations faced put Newfoundland's exports in a very poor position, i.e. "because of the insignificant size of her domestic market, she was an unattractive trading partner for any of the importing countries and, hence, the first to be sacrificed in any trade or payment crisis" (Alexander, 1977, p. 163). He also argued that union with Canada should have solved this problem but, unfortunately, did not. The two most important reasons were the Federal Government's condemnation of the salt fish industry as a "hopeless relic of the past" and its belief, which was sparked by the fish stick boom of the 1950's, that the future of the fishing industry lay with a corporately organized trade in frozen fish products to the United States. Consequently, the Federal Government did not support the salt fish industry. Instead, emphasis was placed with the development of a frozen fish industry geared to the United States market (Alexander, 1977). Without assistance, the salt fish industry was unable to prevail against the marketing problems of the post-war era and it all but vanished (Alexander, 1977). The bank fishery completely expired and the total production of salt fish

plummeted from a peak of 336,000 metric tonnes in 1919 (Macdonald, 1977) to 13,000 metric tonnes by 1968 (Alexander, 1977). In the meantime, the fresh fish industry continued to expand. A small volume of salt fish is still produced in Newfoundland but the vast majority of fishermen have shifted to the production of fresh fish for the frozen food industry.

The development of a fresh fish industry in Newfoundland prompted the need for processing plants. In 1953, Newfoundland had 14 frozen fish plants but by 1956 this number had swelled to 50 (Alexander, 1977). These plants were most cost-effective when operating on a year-round basis because continuous operation translated into lower overhead costs per unit of output. The seasonal migration patterns of the major fish stocks as well as harsh winter fishing conditions prevented the inshore sector from providing for this. As a result, the major plants began to acquire offshore trawlers capable of fishing the entire year. By 1956, these plants were operating 34 deepsea vessels (Alexander, 1977).

#### The Intensification of Offshore Fishing and the 200 Mile Limit

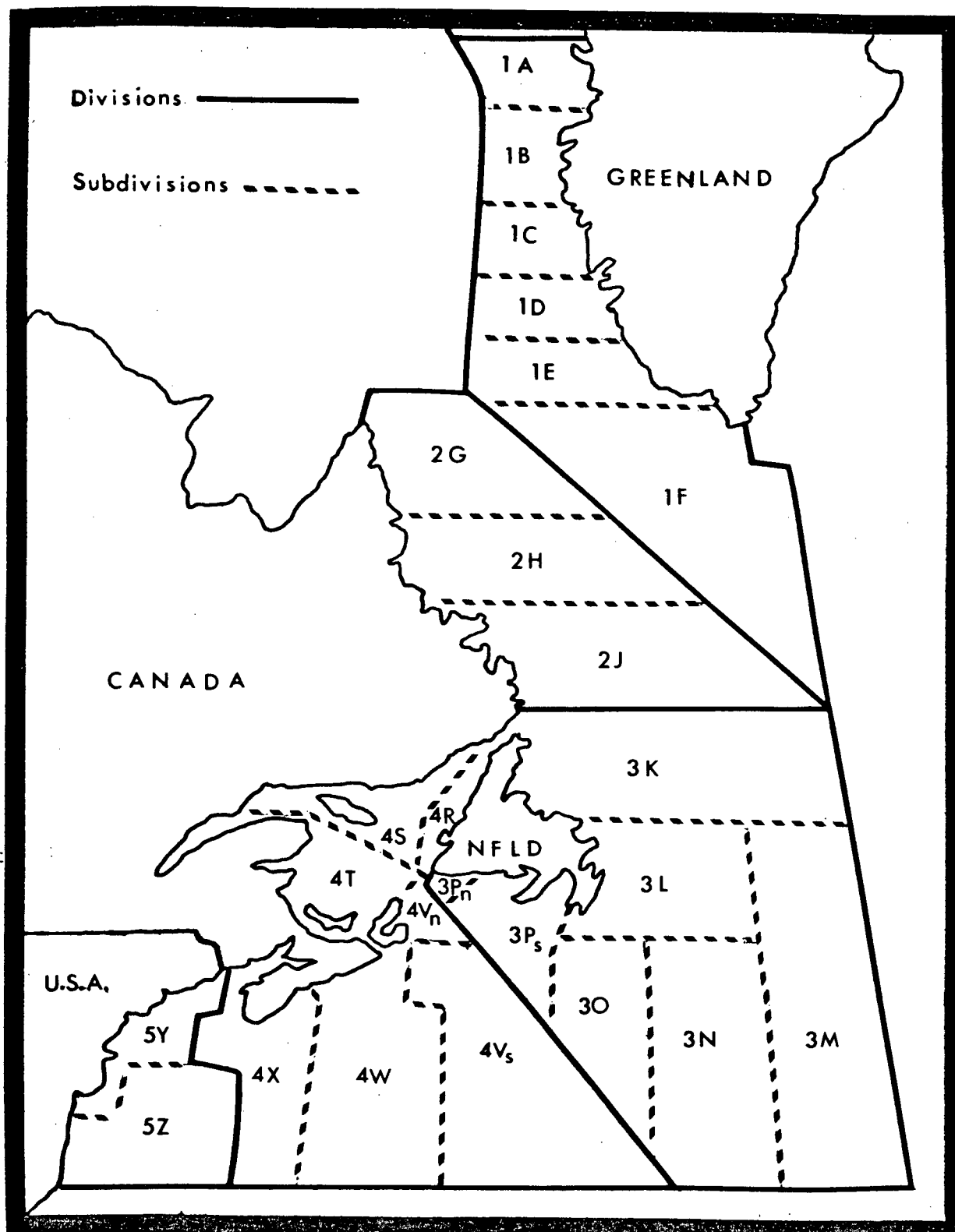
The development of offshore fishing by Newfoundland, however, was insignificant in comparison with the growth of offshore fishing in the Northwest Atlantic by foreign nations. By 1949, competition for fish in these waters had increased to such a scale that the International Commission for the Northwest Atlantic Fishery (ICNAF) was formed to regulate it (Koers,

1973). ICNAF was composed of fifteen member nations<sup>1</sup> and its mandate was to manage the resources of the area so that stocks would be kept at levels necessary to sustain maximum yields (Koers, 1973). To ensure its success, ICNAF's incorporation charter gave it power to impose restrictions on all member nations.

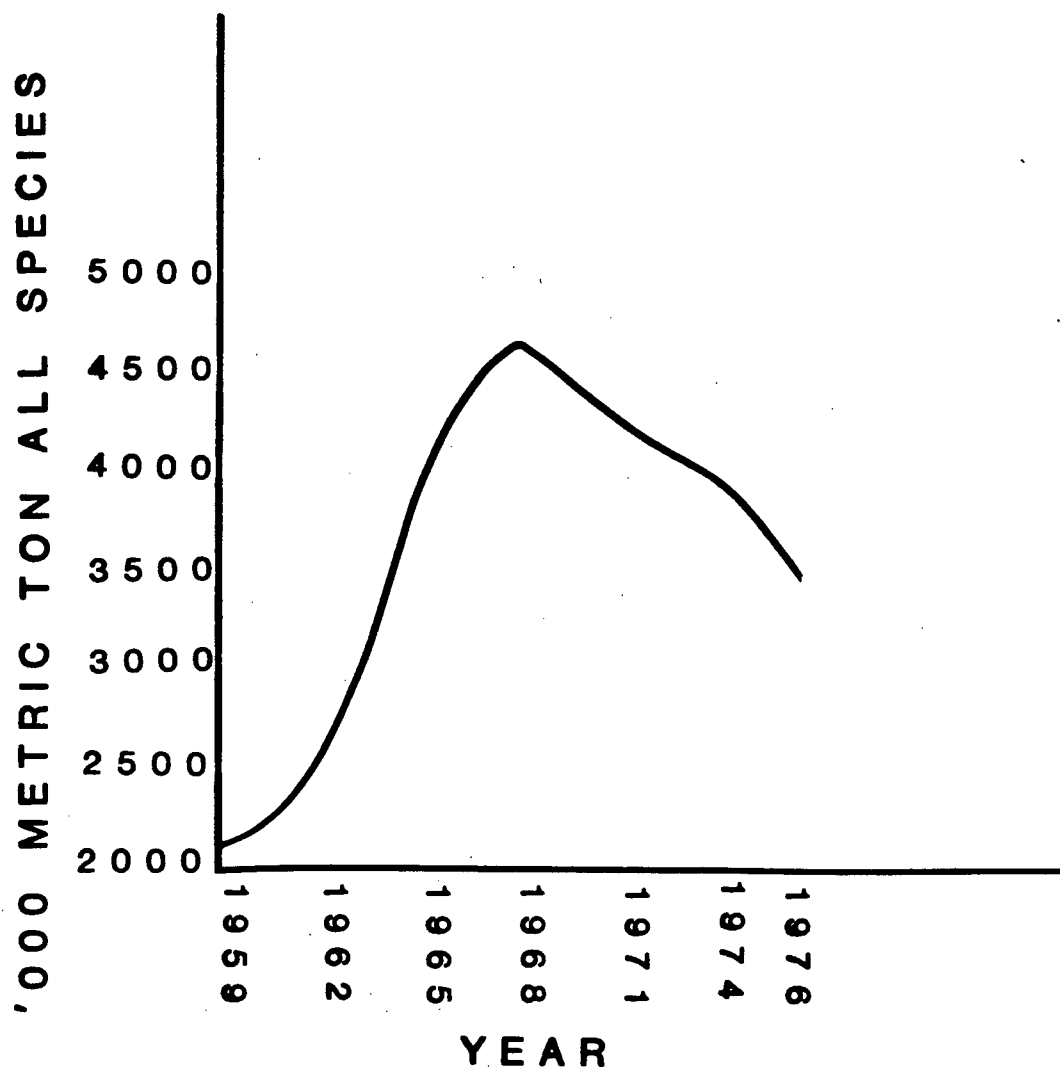
Despite this "police" power, unfortunately, ICNAF did not live up to its mandate. Figure 4, for instance, reveals that the total catch of all species in the Northwest Atlantic rose from 2.144 million metric tonnes in 1959 to a record high of 4.646 million metric tonnes in 1968 - an increase of 217%. Figure 4, however, also shows that since 1968 landings have fallen and by 1976 were reduced to 3.461 million metric tonnes - a decrease of 26%. Moreover, Figures 5 - 7 show that landings have only been maintained at high levels through the exploitation of new species. Mackerel landings (Figure 5) from 1962 to 1973 increased by a factor of fifty-two and similar sharp increases are shown for capelin (Figure 6) and squid (Figure 7). Furthermore, Figures 8 and 9 indicate that stocks that were once very abundant and important in terms of total landings have become diminished over time. Cod landings (Figure 8) reached a

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<sup>1</sup>The member nations of ICNAF included Canada, Denmark, the Federal Republic of Germany, Iceland, Italy, Japan, Norway, Poland, Portugal, Spain, Romania, the United Kingdom, the United States of America and the Union of Soviet Socialist Republics. Figure 3 depicts the ICNAF convention area.

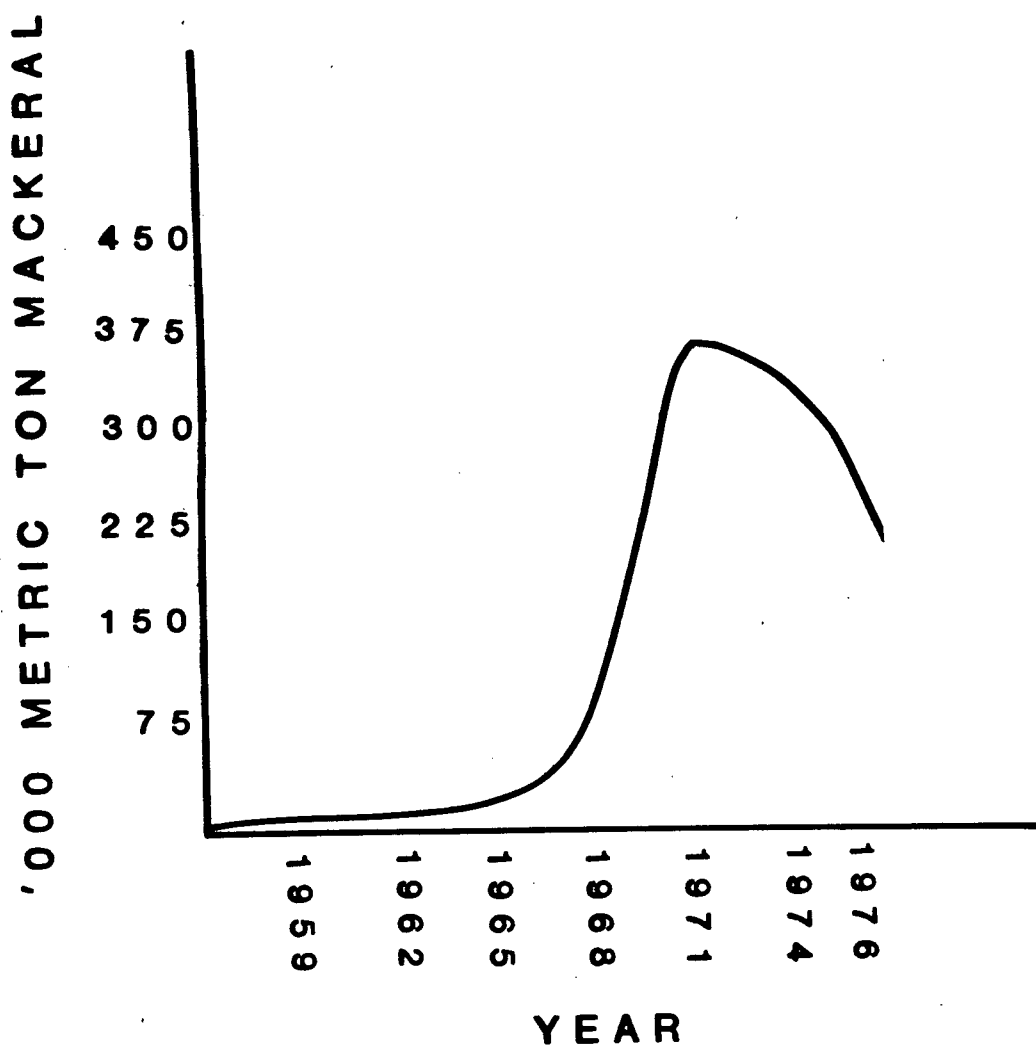


**FIGURE 3: THE ICNAF CONVENTION AREA**



**FIGURE 4: TOTAL CATCH ALL SPECIES,  
NORTHWEST ATLANTIC**

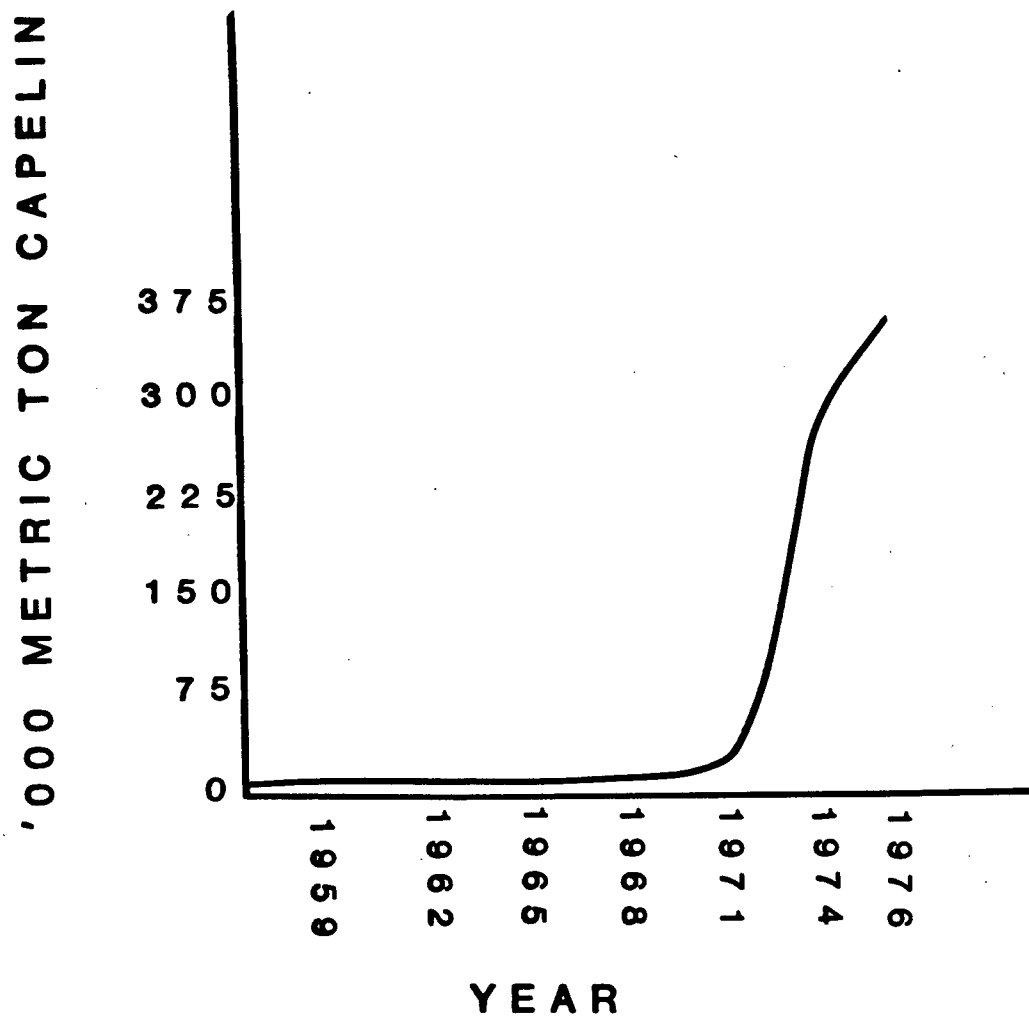
**SOURCE: ICNAF (1977)**



**FIGURE 5: TOTAL CATCH MACKERAL,  
NORTHWEST ATLANTIC**

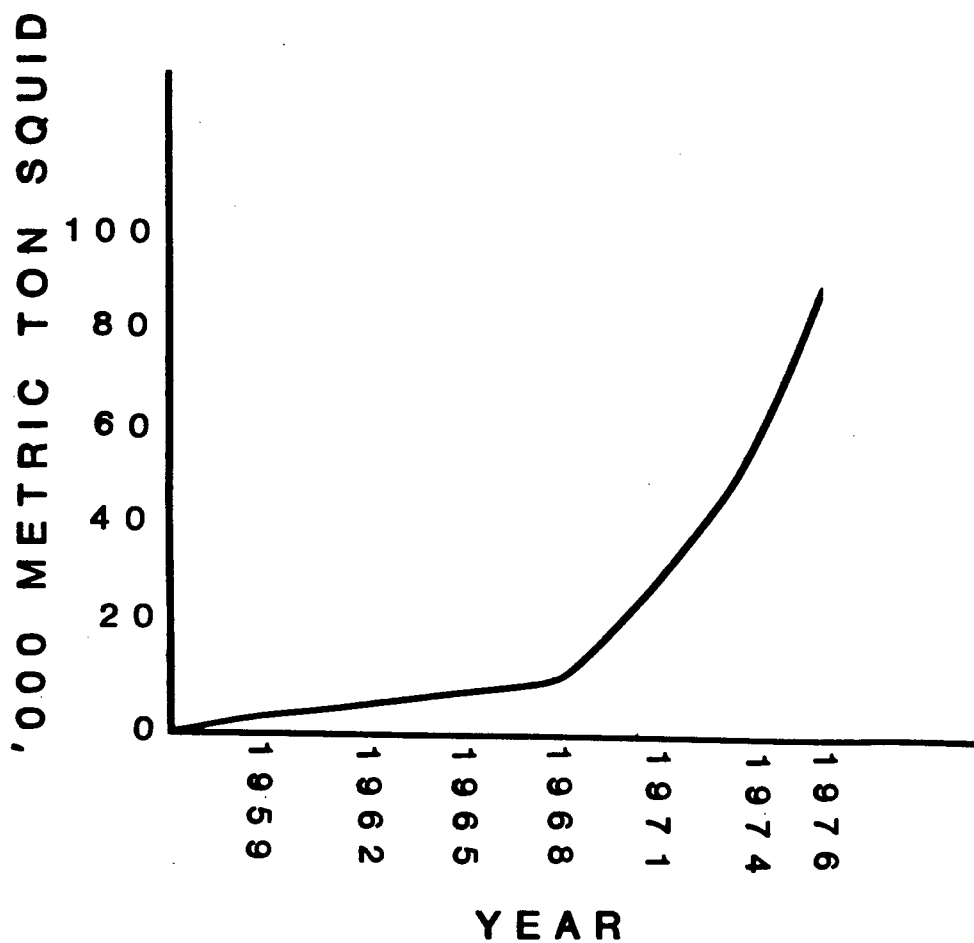
**SOURCE: ICNAF (1977)**





**FIGURE 6: TOTAL CATCH CAPELIN,  
NORTHWEST ATLANTIC**

**SOURCE: ICNAF (1977)**



**FIGURE 7: TOTAL CATCH SQUID,  
NORTHWEST ATLANTIC**

**SOURCE: ICNAF (1977)**

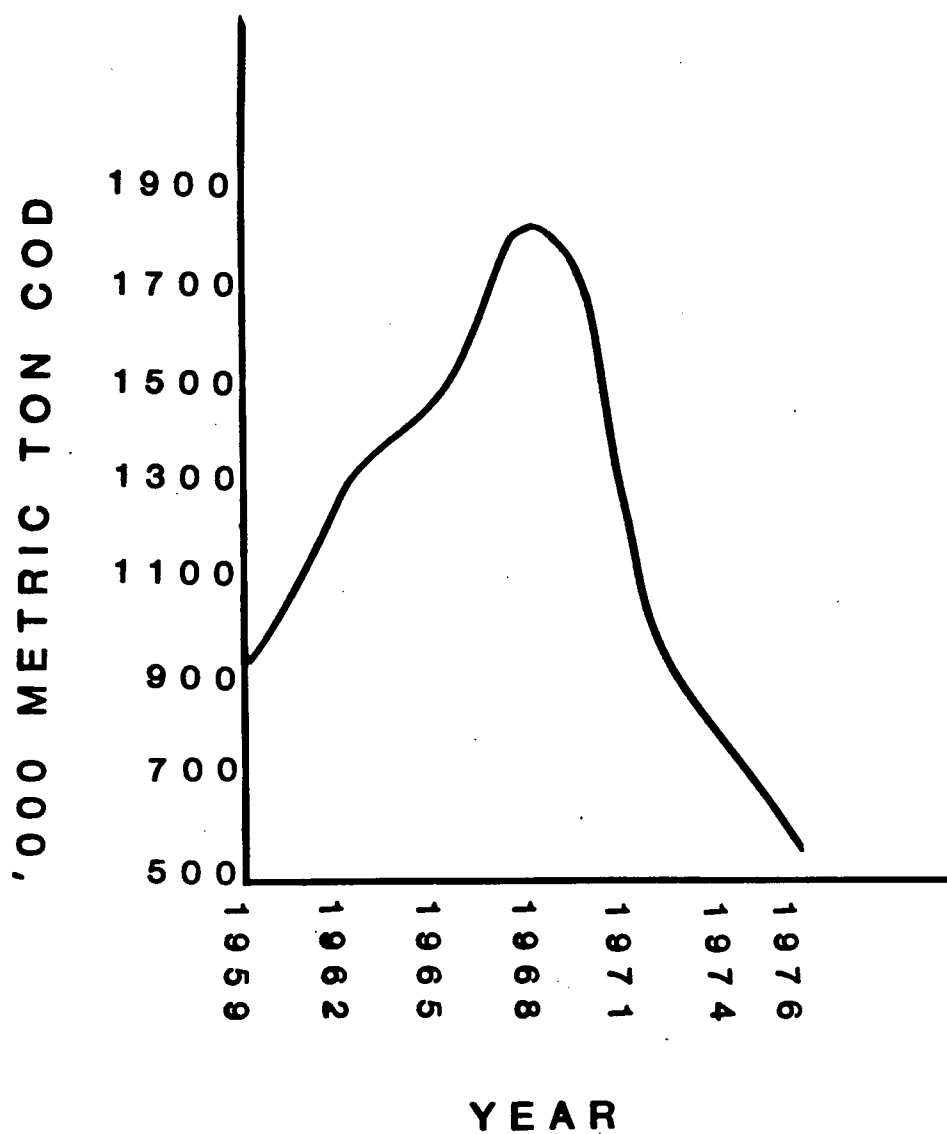
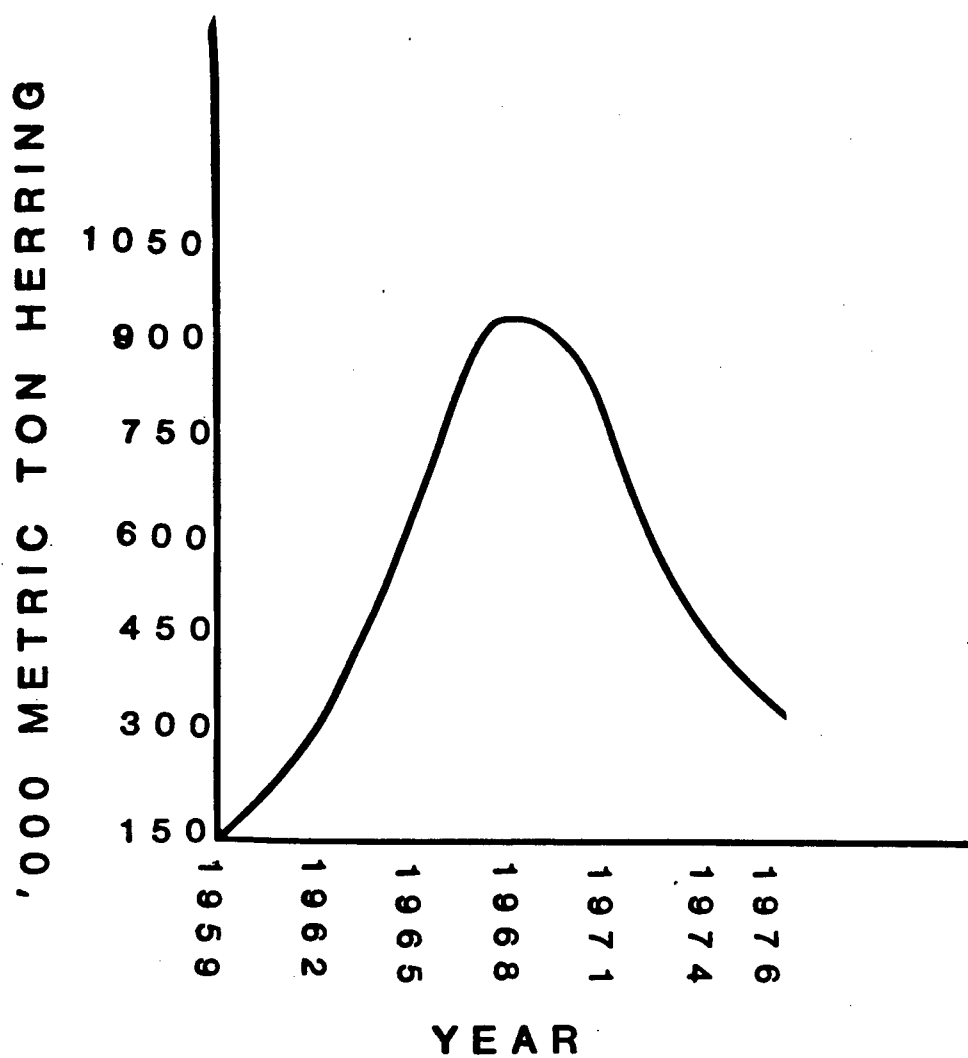


FIGURE 8: TOTAL CATCH COD,  
NORTHWEST ATLANTIC

SOURCE: ICNAF (1977)



**FIGURE 9: TOTAL CATCH HERRING,  
NORTHWEST ATLANTIC**

**SOURCE: ICNAF (1977)**

high of 1.876 million metric tonnes in 1968 but fell by 1976 to just .525 million metric tonnes - a reduction of 73%. Herring catches (Figure 9) totalled .967 million metric tonnes in 1969 but by 1976 had been reduced to .322 million metric tonnes - a reduction of over 66%. Other species, including haddock and redfish, show similar trends.

High landings of some stocks in certain years may be attributable to biological factors such as water temperatures and salinity which affect year-class survival and growth rates. The continued decrease in landings of a particular stock, however, can only be attributed, in this case, to over-fishing. The statistics suggest that a number of stocks have been over-fished to the point of serious stock depletion. Johnstone (1972) asserts that this has been the case; particularly with cod, haddock and herring. An overall reduction in fish size, as reported by the Atlantic Development Board (1969) over a decade ago, lends support to this as well. The most convincing evidence of this, however, is the fact that over-exploitation has led to the closing of specific fisheries on several major fishing grounds; the most recent example being the halt of cod fishing on the Grand Banks in 1980. In this light, it becomes apparent that the increased landings of many species is not due to biological bonanzas as much as it is to the ambitions of fishermen to keep total catch levels high through the replacement of depleted stocks with stocks that have not been fully exploited.

Clearly, ICNAF's power to impose restrictions on its members was no guarantee that stocks would be managed at maximum sustainable yields. Further evidence of ICNAF's inability to manage the Northwest Atlantic fishery effectively is provided by examining the consequences of its quota system. Until 1972, quotas were made not on a national basis but on the basis of each stock. Copes (1972) noted that each fishing nation tried to out-fish its rivals and, under this broad quota system, there was a wild scramble at the beginning of each year by each fishing nation to take as much of the overall quotas as possible. Partly as a result of this, the fleet became over-capitalized. The gross tonnage of the fleet fishing the Northwest Atlantic increased from 507,970 metric tonnes in 1959 to 1,505,852 metric tonnes in 1971 (ICNAF, 1972). During this same period, however, catch per unit of effort - as measured by the ratio of total landings to gross tonnage - fell from 4.2 to 2.9; a decrease of 31%.

Consequently, ICNAF's performance in the Northwest Atlantic fishery not only failed to prevent the depletion of the resource but to safeguard the industry from becoming economically inefficient as well. This trend, unfortunately, worsened throughout the 1970's and Canada came to view ICNAF's management efforts as completely inadequate (Economic Council of Canada, 1980). By the mid-1970's, the Atlantic Canada fishery had collapsed and total landings had fallen by such an extent that the Federal Government had to inject massive subsidies to keep the entire industry afloat (Alexander, 1977). With both the

resource and the industry apparently on the road to oblivion, Canada reacted by unilaterally extending its fisheries jurisdiction to 200 nautical miles on January 1, 1977 (Government of Canada, 1978a).

#### Effects of Intensified Offshore Fishing on Newfoundland

The effects of over-fishing by the offshore vessels were not confined solely to reduced catches offshore. The decimation of the stocks also greatly reduced the seasonal migrations of fish upon which the inshore fishery of Newfoundland depended. Silvert (1977) pointed out that the inshore fishery had been characterized by a chronic shortage of fish since the early 1960's as a result of the impact of trawler fishing on fish stock size. In 1969, the Atlantic Development Board stated that the inshore fishery was showing the effects of the increasing offshore fishery and was, in effect, losing to the trawlers in a competition for scarce resources. McCracken (1975, p. 2) noted that not only was it "easy to see that the portion of the stock migrating inshore is seriously depleted" but that the average age and size of the fish had been reduced as well. Anderson (1974, p. 27) indicated that "offshore vessels virtually intercepted fish that might have been taken by the seasonal inshore sector".

Throughout most of the 1960's and the 1970's the inshore fishery was in a very anemic condition. The Atlantic Development Board (1969, p. 33) referred to it as an "instrument of poverty"

and Copes (1972, p. 1) condemned it as Newfoundland's "chief economic liability". Both the Atlantic Development Board (1969, p. 33) and Federal Minister of Fisheries Jack Davis (Johnstone, 1972, p. 84) said that much of the fault for this lay in the fact that the inshore fishery was composed of "too many men with too much gear" fishing a limited resource.

As long as extensive trawler fishing in the Northwest Atlantic continued to decimate the stocks, it was apparent that the performance of the Newfoundland inshore fishery was unlikely to improve. Without extending fisheries jurisdiction there was little Canada could do to change the situation either; especially if the ICNAF nations refused voluntary quota reductions. The problems associated with the low resource supplies available to Newfoundland's inshore fishery therefore seemed incurable. Consequently, if low incomes and the poor economic showing of the inshore sector were to be overcome, the only other alternative was to reduce the number of fishermen. It was largely from this point of view that Copes (1972) advocated the need to rationalize the inshore sector which, essentially, meant liquidating many of the inshore fishermen. The resettlement of smaller outports to larger centres was one way in which this was achieved. The Provincial Government embarked on this scheme partly to consolidate people and make the provision of services - schools, roads, electrification, etc. - more cost-effective (Economic Council of Canada, 1980). Copes (1971), however, added that a fundamental aspect of the programme was to move people from inshore fishing communities to



towns geared towards offshore production which were capable of competing with foreign fleets.

Under the resettlement scheme, incidentally, approximately 300 communities and 28,000 people were relocated. Initially, the majority of a community's residents had to vote in favour of resettlement before the actual relocation took place. In 1975, however, the programme was halted by intense public protest because it was felt that the Government was forcing people to move against their will (Economic Council of Canada, 1980).

#### Current Socio-Economic Conditions

Despite the resettlement programme and the poor fishery harvests, the inshore fishermen and fishing communities continued to survive. By present count, there are over 30,000 inshore fishermen in the province scattered throughout 700 outports. Inshore fishing is still seasonal but many fishermen and others dependent on fisheries-related employment augment fishery earnings with other wage income or through traditional self-subsistence occupations. In addition, most Newfoundland communities now have the basic public services that resettlement was designed to reduce the costs of providing. It is unlikely, therefore, that resettlement will be important as a means of diminishing these expenses.

The Newfoundland fishery, unfortunately, is not the only segment of the provincial economy that has experienced

difficulty. Since confederation, the Provincial Government has entered into a variety of development projects that have had far from satisfactory results. Newfoundland, for instance, has the highest per capita production of minerals of any Canadian province but the Government earns more in tobacco tax than it does in mining royalties (Economic Council of Canada, 1980). In the 1950's, the Newfoundland Government invested heavily in factories to produce rubber, chocolate, leather, gloves and batteries but, within a few years of their inception, all had folded (Economic Council of Canada, 1980). Over an eight year period, the Government invested approximately \$400 million in a kraft linerboard mill which was later sold to Abitibi-Price for \$41 million (Economic Council of Canada, 1980). In addition, the ERCO phosphorous plant in Long Harbour, Placentia Bay is annually given a power subsidy valued at more than the company pays out in wages (Canning and Inglis, 1977). Finally, the Newfoundland Government recently estimated that, due to a poorly negotiated, long term contract with Hydro Quebec, it has forsaken approximately \$400 million a year on the Churchill Falls hydro development (Economic Council of Canada, 1980).

The economic indicators reveal that Newfoundland has paid dearly for these policy blunders. The per capita income and the participation rate in the labour force, for instance, are only 68% and 83% respectively of the Canadian average (Economic Council of Canada, 1980). In addition, official unemployment rates for the province - currently at 16% - have traditionally

been twice<sup>1</sup> the national average while sales tax - at 11% - is the highest in Canada. Moreover, Newfoundland's per capita public debt - \$3,200 - is the highest of all the provinces. The cost of living is significantly above average as well (Economic Council of Canada, 1980).

The economic conditions of the Province, however, are not uniformly distributed. In 1976, for instance, the Department of Regional Economic Expansion identified the entire Avalon Peninsula as the urban-industrial core and indicated that conditions within this area are comparable to other growth regions in Canada (Government of Canada, 1976). Certain other areas - the airport town of Gander, the two pulp mill towns and the mining towns of Labrador - also have prosperous economies. These regions, collectively, contain approximately 45% of the Province's population. The bulk of Newfoundland's economic problems, consequently, lies with the remaining proportion of the population that resides in the outport communities. Many of these regions - the South Coast, Baie d'Espoir and the Northeast Coast - often experience unemployment rates in excess of 40% and, in extreme cases, as much as 60% (Newfoundland Federation of Labour, 1978).

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<sup>1</sup>The People's Commission on Unemployment has argued that a more accurate unemployment figure making allowance for the discouraged workers that have left the labour force would approach 35%. See: Now That We've Burnt Our Boats: Newfoundland Federation of Labour; St. John's, 1978.

In light of this unbalanced economic situation, the fishery is of paramount importance. Munro (1980) has indicated that the fishery provides a significant portion of the economic base of these regions and accounts for 13% of total employment in the Province as a whole.<sup>1</sup> The introduction of the 200 mile limit, however, has intensified its importance. The Government of Newfoundland (1978a) foresees it being the major growth component of the economy during the 1980's. It is confident that the Province is "in a position to benefit extensively from the rational exploitation of renewable stocks available to the fisheries sector" (Government of Newfoundland, 1980, p. 78). It is worthwhile at this point to examine the biological and resource-related criteria concerning these "renewable stocks available to the fisheries sector" and to determine how the inshore and offshore sectors compare. This shows that not only are there differences between the two sectors but, equally as important, that there is considerable speculation inherent in the Government's assessment of what the resource potential actually is.

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<sup>1</sup>To place this in perspective, it should be noted that the much-vaunted forest industry of British Columbia accounts for only 12% of total employment in that province.

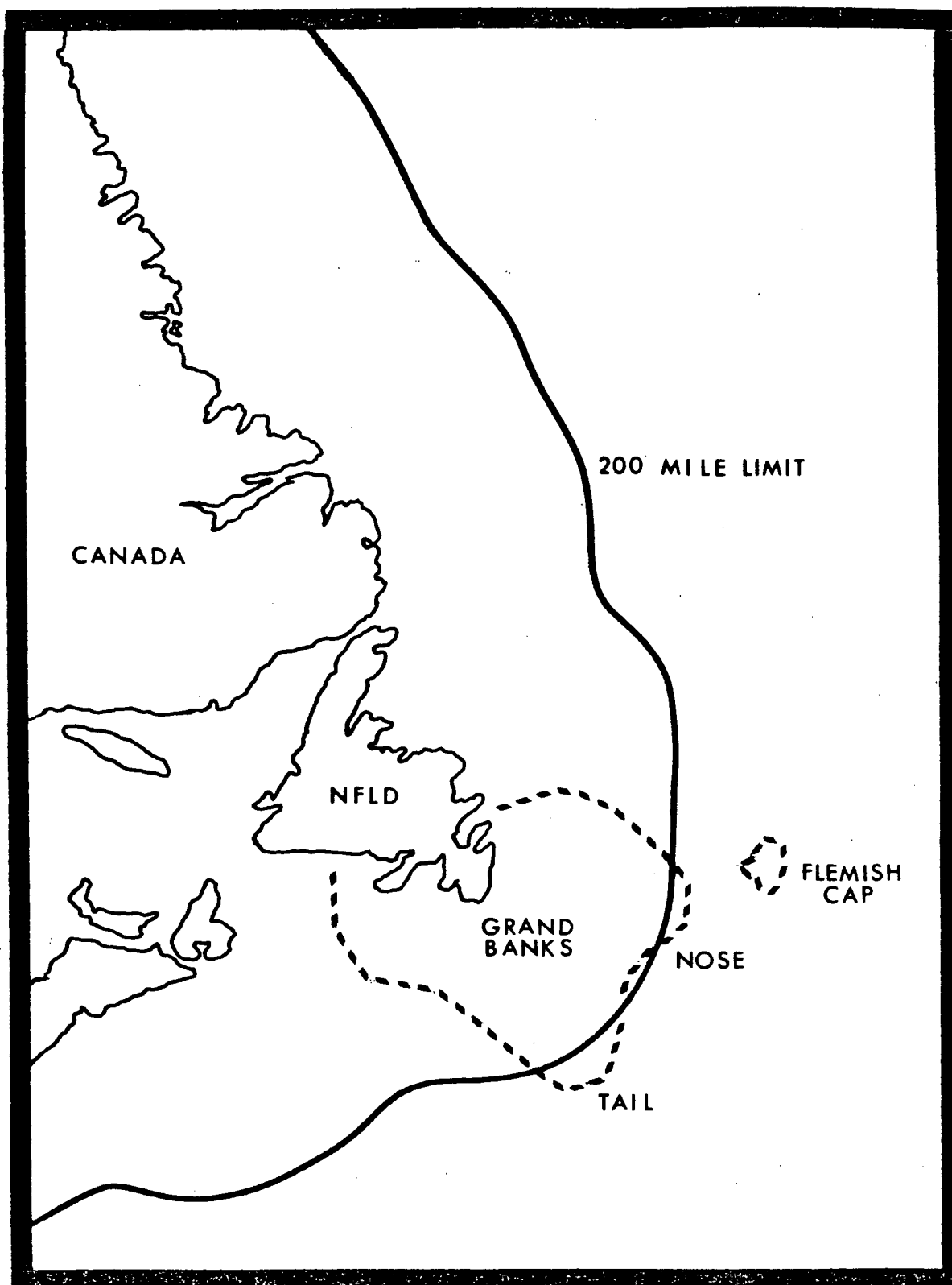
#### IV: EVALUATION OF RESOURCE-RELATED CRITERIA

##### Overview

The basis for fisheries expansion in Newfoundland is the phasing out of fishing by foreign nations within the 200 mile limit and the rehabilitation of the stocks through conservation programmes. The extension of fisheries jurisdiction has provided Canada the opportunity to initiate both these measures but holds no guarantee that the stocks will respond as projected. There are important reasons for this and elaboration is warranted.

One of the most important reasons is that fish stock growth projections, as has already been noted, are at best only crude measures of how the stocks are expected to behave over time. The Government of Canada (1977a) has underscored this by stating that many of its resource projections are based on very weak data. It has indicated that for many stocks - squid, herring, lobster, mackerel, scallop, capelin and others - fundamental biological data is lacking. Consequently, the Government of Canada (1977a, p. 1) has emphasized that its "predictions of stock status in the 1980's are to a large extent best guesses".

This problem is compounded by the fact that the extension of fisheries jurisdiction did not provide Canada control over the entire eastern continental shelf. Three important groundfish spawning areas - the Flemish Cap and the "nose" and the "tail" of the Grand Banks (see map, next page) - fall outside its



**FIGURE 10: FISHING AREAS BEYOND  
THE 200 MILE LIMIT**

jurisdiction. Although an international management committee has been established to administer these areas, at least one country, i.e. Spain, has proceeded with indiscriminate exploitation of them. This not only complicates the management problems Canada faces with the fishery but casts additional uncertainty on its resource projections.

The northern cod stock complex, fortunately, lies entirely inside the 200 mile limit. Interference from foreign nations is therefore not a problem but there is conflict over this resource within Canada. Newfoundland views northern cod solely as a provincial resource because of its historical dependence upon it as well as the fact that, under the terms of confederation in 1949, it retained full control over all its natural resources. It is therefore claiming complete access to the northern cod. Nova Scotian fishing interests, however, want to exploit these grounds with freezer trawlers to provide raw material for their plants. Thus, a virtual "cod war" has broken out with both Provinces claiming a "right" to the resource and no resolution in sight.

This issue may or may not be settled in favour of Newfoundland. Until it is resolved, however, any assumption by Newfoundland that it will obtain full access to the northern cod is open to considerable uncertainty. This, in combination with the uncertainties of resource estimation previously discussed, implies that there is considerable speculation inherent in the management framework regarding the Newfoundland fishery. These

place serious constraints on the planning process for the management of the fishery and, unless the Government of Newfoundland is unconcerned about making decisions it may later regret, demand that the Province remain flexible in implementing development strategies. Having noted that this problem exists, however, does not preclude analysis of each sector regarding the two resource criteria that have been outlined.

#### Ability to Harvest Cod

The relative ability of each sector to harvest the total allowable catch of cod has been listed as the first criterion for evaluation. In pursuing this analysis, it is assumed that, for the time being, the uncertainties inherent in the projection of the cod resource is not a problem. In other words, the total allowable catch of northern cod is established at 365,000 metric tonnes - the maximum projected for the planning period to 1985.

Evaluation of this criterion is difficult nonetheless, because the migration patterns of the northern cod are poorly understood. It is not accurately known what percentage of the stock biomass migrates shoreward and, consequently, the catch capacity of the inshore sector is troublesome to assess. Munro (1980) has noted that it will take several years for knowledge of the migration patterns to improve. In the meantime, Munro (1980) has indicated that the Newfoundland Government is assuming the highest historical catch - 336,000 metric tonnes in 1919 - to be the maximum that could be taken by the inshore



sector. With the 1985 allowable catch of northern cod estimated at 365,000 metric tonnes, the implication is that the inshore sector would fall just short of landing this amount. Yet, the 1919 catch was harvested with comparatively primitive gear and was also cured by the fishermen. In fact, it was only 14 years before this that diesel engines became common in the inshore fishery (Atlantic Development Board, 1969). This figure, therefore, may not reflect the maximum that could have been caught had modern technology been used and the fishermen not been burdened with curing the catch. Thus, it is not unlikely that the inshore sector is capable of landing more than 336,000 metric tonnes of cod and may in fact be able to take the entire allowable catch of cod estimated for 1985.

In comparison, the offshore sector is not dependent on cod migrations but can exploit the cod stocks year-round on the distant, offshore grounds. The past performance of offshore fishing by the ICNAF nations (Figure 8) indicates that an offshore trawler fleet would have no difficulty whatsoever in taking the entire allowable catch of cod. Without more solid evidence to prove that the inshore sector can take substantially more than the 336,000 metric tonnes landed in 1919, the implication is that a Newfoundland offshore fleet capable of out-fishing the inshore sector could be developed. This would suggest that it is more able to utilize the cod resource than the inshore sector.

This, however, is a non-issue in the sense that the concern

is not whether one sector should be allocated the entire cod resource. The issue is whether the harvesting capability of either sector is insufficient for it to be given priority for the future allocation of cod. Since the evidence indicates that both sectors are capable of landing almost all of the anticipated increase, the conclusion is that, in terms of catching capability, priority for landing cod could justifiably be placed with either sector.

#### Ability to Ensure Continued, Long Term Harvesting

Ensuring that the fishery does not become depleted from over-harvesting has been identified as a second evaluation criterion. The inshore and offshore sectors differ considerably in this respect.

Essentially, inshore fishing only harvests the fishery resource that migrates shoreward. It does not fish the entire stock biomass and, in addition, is characterized by lengthy periods during which no fishing takes place. Furthermore, it utilizes passive technology that takes only the fish that happens upon this type of gear. Thus, it is not a rapacious fishery and is unlikely to deplete the resource. In comparison, offshore fishing exploits the entire biomass - not just the portion that is migratory - on a year-round basis. It also employs an active technology which effectually scoops vast quantities of fish out of the water. It provides little opportunity for stock regeneration and employs a more rapacious

technology than inshore fishing. Consequently, it has a much greater physical potential for stock depletion and is less attractive for the long term management of the resource as defined.

## Synopsis

This section has illustrated that, on the basis of the above criteria, there are differences between the inshore and the offshore sectors of the Newfoundland fishing industry. Both sectors are capable of harvesting cod at levels sufficient to justify priority in the allocation of future supply increases but the offshore sector has a greater physical capability for over-fishing the resource. An examination of the economic criteria reveals that the two sectors rate differently respecting these as well.

## V: EVALUATION OF ECONOMIC CRITERIA

### Overview

Economic analyses of the inshore and offshore sectors of the Newfoundland fishing industry are difficult to undertake because of limitations, inconsistencies and ambiguities with the available data. This is particularly the case with the inshore fishery.

The seasonal nature of the inshore fishery makes it extremely troublesome to assess accurately the amount of effort - measured in man-years - required in this sector to land a given volume of fish. This problem is intensified by the fact that the inshore fishery is more seasonal in some parts of the province than it is in others because of the vagaries of weather, ice conditions and fish stock flows. Furthermore, because of differences in vessel sizes, there are intra-regional as well as inter-regional differences in the length of the inshore fishing season. The largest inshore vessels - the decked, 65 foot longliners - can fish in weather conditions, for instance, unsuited to the smallest vessels. Yet, the longliners on the northeast coast of the province are ice-bound for significant periods when similar and even smaller vessels in the southern regions are fishing. On top of this, the inshore fishery - in contrast to the offshore fishery - exploits other stocks besides groundfish. As has been noted, these include: pelagic herring and mackerel; anadromous salmon; crustaceans

including lobster, shrimp, scallop and crab; and sea mammals, i.e. seals. These are all seasonal fisheries which occur at different times of the year and fluctuate in length due to weather, market conditions and resource supplies. Inshore fishermen pursue these fisheries in a variety of combinations and the result is that, unless a complete inventory is taken, it is difficult to determine the dynamics of the inshore fishery. As an illustration, of the 13,700 men engaged in the inshore fishery in 1973, 3,000 fished for less than three weeks, 350 fished for over 42 weeks and the rest fished between 3 to 42 weeks with the majority fishing between 10 to 28 weeks (Munro, 1980). Apart from providing a rough breakdown, this information tells very little about total employment in the inshore fishery and would have to be much more detailed before being of any use in an economic analysis of inshore harvesting efficiency.

In addition to the wide fluctuations in the length of employment generated in the inshore fishery, there are also large variations from year to year regarding the actual number of inshore fishermen. Copes (1972) indicated that this is a function of the lack of alternative job opportunities in Newfoundland, i.e. the inshore fishery swelled when jobs elsewhere became scarce. More realistically, Munro (1980) has suggested that inshore fishermen are income maximizers and that participation in the inshore fishery is more dependent on the ability of fishery earnings to compete with alternate sources of income. In either event, it is generally accepted that, in the Newfoundland inshore fishery, there are a great many more

licensed inshore fishermen than there are actually fishing on a yearly basis. The Government of Newfoundland (1978b), for instance, indicated that although 20,250 fishing licenses were issued in 1977, only 17,500 men actually fished. In a different publication printed the same year, however, the Government of Newfoundland (1978a) stated that 20,862 fishermen were employed in the inshore fishery in 1977. This inconsistency, if nothing else, aggravates the difficulties encountered in attempting to undertake economic analyses of the inshore fishery

In comparison, the offshore fishery is much easier to indentify and describe. It is exploited by only 80 deepsea trawlers which fish on a year-round basis and require a total crew on the order of 1,100 - 1,200 men (Munro, 1980). It is, therefore, quite easy to determine both the exact amount of effort required in and the net revenues produced by this small number of vessels.

The offshore fishery, however, does present problems to economic analyses comparing the inshore and offshore sectors. This relates to the effect of offshore fishing on the inshore cod migrations and has been given ample coverage earlier as a central issue. It is of particular significance because in the presence of offshore harvesting of the migratory stocks, any economic analysis of the inshore fishery will not accurately reflect the maximum - in terms of both landings and revenues - that this sector is capable of producing. Historical data on the fishery prior to offshore development offer no solution to this

problem either because, as has been illustrated, relatively primitive technology was used then and the fishermen also had to cure the catch.

Obviously, any attempt at undertaking economic analyses of the inshore and offshore harvesting sectors of the Newfoundland fishery will be fraught with difficulty, confusion and inconsistency. In evaluating the economic criteria that have been outlined, therefore, this constraint must be borne in mind.

#### Maximization of Economic Rent

The cost-effectiveness of each harvesting sector, i.e. its ability to maximize rent, has been identified as a third evaluation criterion. There is, unfortunately, a notable lack of literature on this subject and only two indepth analyses have appeared in recent years. Both equated that sector which generated the highest profit margins as that which maximized economic rent.

The first study, by the Government of Newfoundland (1978a), was extremely narrow in scope and compared economic data of only one offshore trawler with representative data for the 700 decked inshore longliners. The vast majority of both the inshore vessels as well as the offshore trawlers were not incorporated in the study. This limitation is intensified by the fact that the offshore vessel referred to in the study was a 171 foot trawler which, according to Schrank et al (1980), does not exist

as a component of the Newfoundland offshore fleet. Most Newfoundland trawlers are smaller but since at least one is larger (Schrank et al, 1980), it is not unlikely that this vessel could become part of the Newfoundland offshore fleet.

The results of the study are worthy of consideration but first a description of methods used is warranted. This is subject to criticism because it incorporated an unrealistic opportunity cost of labour which is expanded upon later in this section.

Essentially, the Government study used extensive cost and revenue data provided by ICNAF and the Provincial Department of Fisheries for 1977 to determine the "normalized social economic surplus" of each vessel type. This is the ratio of total revenue minus total costs to total revenue. Total costs included all operating and maintenance costs as well as capital costs amortized over the life expectancy of the vessel. Labour was valued at an arbitrary opportunity cost of \$12,000 per input, i.e. the average yearly industrial-composite earnings in Newfoundland. Total revenues were the average landed value of the catch of these vessels. The normalized social economic surplus cannot not mathematically exceed the value of 1<sup>1</sup> and,

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<sup>1</sup>Assuming that total costs equal zero, then:

$$\frac{\text{total revenues} - \text{total costs}}{\text{total revenues}} = 1.$$



therefore, the most cost-effective vessel is that having the highest surplus.

The results of the study indicate that for both vessels the normalized surplus was negative, i.e. total costs were greater than total revenues. Although the inshore vessels scored a higher surplus than the offshore vessels (-.47 compared to -.65), it is apparent that both classes of vessels are highly inefficient. The incidence of these negative surpluses warrants explanation which is provided after the second study is presented.

This study, prepared in 1980 by Schrank et al for the Economic Council of Canada, pursued the issue of rent maximization in much greater detail. The authors began by calculating the relative productivity, i.e. the average differences in fish catching power, for thirty-three vessel and gear combinations which represent the entire spectrum of groundfish harvesting techniques used in both the inshore and offshore sectors. This was accomplished through a multi-variate regression analysis of data from 4,000 fishing trips from 1973 to 1978 provided by ICNAF and the Federal Department of Fisheries and Oceans. These data also enabled the authors to estimate the average catch per day fishing over the sample period for each vessel-gear combination. They then determined the normalized social economic surplus of all vessel types for 1978 and undertook two other analyses based upon the relative productivities and estimated catch per day. These involved

simulations in which hypothetical catch by gear and vessel type were assumed in order to observe how these changes affected cost-effectiveness.

This study, unfortunately, is flawed; not the least problem the obscure discussion of format and methodology used. Other more serious problems include the fact that the relative productivities for each vessel-gear combination were based upon data for years that were particularly poor for the fishery. The inshore fishery, however, suffered more during this period than did the offshore because of its dependence on fish that escape offshore exploitation. It is therefore likely that the relative productivity data for the inshore fishery is biased downward.

A second flaw lies with the opportunity cost of labour that was used. The authors evaluated labour at the average weekly earnings of the 1978 industrial composite of the Newfoundland economy (\$241). This figure was adjusted downward, however, because the authors assumed that, since the unemployment rate in Newfoundland is 16.4%, the average Newfoundland fisherman should expect to be unemployed that much time. As a result, the opportunity cost of labour in the Newfoundland fishery was established at \$10,781.

Given the economic situation in Newfoundland, however, this figure seems unrealistic. Consider that the actual average income of the inshore fishery was approximately \$2,000 in 1977 (Government of Newfoundland, 1978a). Inshore fishing does allow

for other job activities but with the unemployment rate of many outports ranging from 30% to 60%, it is extremely unlikely that other employment is available. The ability to produce income in kind contributes to outport earnings but it is doubtful that it makes a significant contribution. Dyke (1968) has suggested that, on average, one third of a fisherman's earnings come from income in kind but this would increase 1977 incomes to just \$3,000. The only other source of income available to fishermen in the off-season is unemployment insurance but it is doubtful that this makes up for the implied gap in the opportunity cost figure.

The problem with using an inaccurate opportunity cost of labour is that it was applied to every fishermen and was considered, as has already been noted, as part of the harvesting cost of each sector. If the real opportunity cost, for example, were zero, it would mean that an artificial burden of \$10,781 per fishermen was being added to the calculations. At the time of the study, however, there were over seventeen times as many inshore fishermen as there were offshore and this means that, in computing the normalized social economic surpluses, the inshore sector was burdened much more than the offshore by any error in the estimate.

These two flaws bias the study by Schrank et al (1980) against the inshore sector and it is obvious that its findings cannot be accepted as indisputable. Reproduced in Table I (next page), they nevertheless confirm the findings of the government

TABLE I

Normalized Social Economic Surpluses of  
Inshore and Offshore Fishing Vessels

<u>Vessel Type</u>	<u>Normalized Social Economic Surplus</u>
Tonnage Class I (Inshore) - open vessels of less than 39 feet and 10 gross tonnes	-1.54
Tonnage Class II (Inshore) - decked vessels between 39 and 45 feet and under 25 gross tonnes	-1.50
Tonnage Class III (Inshore) - decked vessels between 46 to 55 feet and 25 to 49.9 gross tonnes	-3.28
Tonnage Class IV (Inshore) - decked vessels between 56 to 65 feet and 50 to 149.9 gross tonnes	-1.34
Tonnage Class V (Offshore) - trawlers under 145 feet and between 150 to 499.9 gross tonnes	-1.40
Tonnage Class VI (Offshore) - trawlers over 145 feet and over 500 gross tonnes	-1.50

study by indicating that in every instance the surplus is negative. More importantly, however, they also reveal that in almost every case the surpluses were within a few points of one another. The sole exception is the Tonnage Class III vessels which have a negative surplus over twice that of any other. Schrank et al (1980, p. 30) have suggested that the reason is that these vessels tend to be "overloaded with electronic gear which requires extensive maintenance and drives operating costs up" but added that costs might be lowered if this "auxillary gear were more carefully chosen and the skippers given special training" in its use.

On the basis of their findings, Schrank et al (1980, p. 29) were led to conclude that "large vessels are not in general more economical than small vessels". They noted the reason was that the capital and operation costs "associated with trawlers balance the extra labour inputs required in the inshore fishery when all labour is valued at its expected industrial wage" (emphasis mine). If, as has been suggested here, the opportunity costs were much too high, then the inshore fishery should rate far better than the offshore. The authors have underscored this by illustrating that the surpluses were sensitive to substantial changes in the assumed opportunity cost of labour. They emphasized this through an analysis of the 1978 performance of the most labour-intensive vessel-gear combination. Assuming a zero opportunity cost gave a surplus of .71 but an opportunity cost of \$10,781 resulted in a normalized surplus of -2.31. As a result, Schrank et al (1980, p. 28) stated that "with strong

implications such as these resulting from a change in the assumption of the opportunity cost of labour, it is obviously only with great care that this figure should be manipulated".

The labour costs used in the study, therefore, may be largely responsible for the magnitude of the negative surpluses in the inshore sector. Schrank et al (1980), however, have indicated that labour costs are not the cause of the negative surpluses. They have noted that the incidence of negative surpluses inshore is attributable to government subsidies. Subsidies are provided for gear replacement, vessel construction and a host of other items but were not included in the study. Schrank et al (1980) explain that, since entry in the fishery is not restricted, it is expected that rents will be completely dissipated. Therefore, "if the Government pays subsidies to a zero-rent fishery, then fishermen will enter the industry until rents (including subsidies) are again dissipated" (Schrank et al, 1980, p. 68). Consequently, rents net of subsidies have to be negative.

Subsidies from both the government as well as the parent company can also be used to explain negative surpluses in offshore vessels (Schrank et al, 1980). Whereas labour costs biased the performance of the inshore sector, however, Schrank et al (1980) have indicated that operating and capital costs biased the performance of the offshore sector. The most important operating cost is fuel. The authors have shown that fuel costs become a greater component of total overall operating

costs as vessel size increases. The value of fuel consumed by the Tonnage Class II vessels was just under 10% of the landed value of the average catch of these vessels (Schränk et al, 1980). For the Tonnage Class VI offshore vessels - representing 80% of the fleet - fuel costs were over 30% of the landed value of the average catch. These figures, incidentally, are corroborated by the Government of Newfoundland, (1978b).

As a side issue, it should be noted that fuel used in the fishing industry is exempt from provincial tax and, at \$.55 per gallon (Schränk et al, 1980), costs less than one-third the price that consumers in Newfoundland pay at the pump. Fuel used in the fishery is therefore subsidized but this was not taken account of in the study. The implication is that if the offshore vessels had to pay tax on fuel consumed, fuel costs would equal or exceed the present dockside value of their entire catch. In comparison, Tonnage Class II inshore vessels would have to pay less than 30% of the value of their average catch for fuel. These data would have had extreme influences on the normalized surpluses had they been included. Moreover, given the expected future increases in the price of fuel, it is apparent that high energy costs are going to trouble the offshore fishery much more than the inshore. This is not only a function of the fact that the trawlers fish the more distant grounds but also because they rely on active rather than passive fishing gear.

Fuel costs, although important, are not the major cause of inefficiency in the offshore vessels. The single most important

reason for negative surpluses in these vessels are the capital costs. Schrank et al (1980) have pointed out that as vessel size increases, so to does the percentage of the average landed value of the catch required to amortize the capital costs over vessel life-expectancy. In Tonnage Class I vessels, less than 20% of the value of the catch is needed to amortize annual debt charges (Economic Council of Canada, 1980 and Schrank et al, 1980). In Tonnage Class VI vessels, however, annual capital debt charges exceed the entire value of the catch. Not even the Tonnage Class III vessels - previously described as being over-capitalized with excessive auxillary equipment and having the lowest normalized surplus - expend more than the trawlers on annual debt financing; 91% compared to 101% (Schrank et al, 1980).

In summary, Schrank et al (1980) suggest that neither the inshore nor the offshore fishery has a clear economic advantage as far as harvesting is concerned. In each case, the normalized social economic surpluses are negative. Labour costs and subsidies are the main reasons for this in the inshore fishery while excessive fuel and capital costs contribute more heavily to negative surpluses in the offshore vessels. Yet, their evaluation is flawed not only because it incorporated an inflated opportunity cost of labour which lowered the normalized surpluses for the inshore vessels but because it ignored the fuel tax subsidy which raised the normalized surpluses of the offshore sector. Had these two facts been considered in the analyses, they would have altered the data for the two fisheries in favour of the offshore. Thus, instead of being unable to



differentiate between the economic performance of either sector, Schrank et al (1980) should have had an indisputable basis for stating that the inshore fishery more nearly maximizes economic rent.

#### Maximization of Economic Efficiency

Many authors have indicated that rent maximization may not be the most economically efficient approach to managing a fishery; especially if the economy is not at or near full employment. (See: Christy and Scott, 1965; Crutchfield, 1972; and Mackenzie, 1979.) The immobility of fishermen, low opportunity costs for fishing labour and the possibility of combining seasonal fishing with other activities have been cited to support that economic efficiency may be satisfied through the maintenance of over-employment in the fishery. In Newfoundland this could well be the case.

Consider, for instance, that the inshore fishery is just one component of outport lifestyles. Many Newfoundlanders still combine fishing with other activities including hunting, forestry-related work and, to a limited extent, agriculture. Although the total monetary value of these activities may be small, they nevertheless constitute an important component of the outport economy. In addition, living in an outport compared to urban areas is less expensive. Not only is the lifestyle less sophisticated but the tax burden is much lighter as well. Property tax and other urban/municipal taxes, for instance,

simply do not exist in the majority of outports. As a consequence of all these factors, Skolnik and Wadel (1969) have suggested that the average Newfoundland outport family required just 65% of the cash income of an urban (St. John's) household to attain an acceptable material standard of living. Ferris and Plourde (1980) have supported this by stating that non-market income from the inshore fishery alone represents perhaps as much as 25% of total inshore fishing income.<sup>1</sup> Consequently, the fifth evaluation criterion is which sector contributes most to economic efficiency vis a vis the generation of employment as well as compatibility with supplementary economic activities and rural lifestyles.

The two sectors reveal distinct differences regarding this. The seasonal, labour-intensive inshore fishery not only generates a large volume of employment but also fits in well with the range of supplementary economic activities available in Newfoundland. In comparison, the capital-intensive, year-round offshore fishery not only provides less employment to take a

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<sup>1</sup>This is attributable to the fact that inshore fishing families consume substantial amounts of fish; much of it being the high value varieties such as salmon and lobster. Inshore fishermen usually fish on a daily basis and have the opportunity to bring fish home every day. Offshore fishermen usually fish ten day trips and not only cannot bring fish home as often but, because they fish only groundfish, have less of a variety to choose from.

given catch but also prohibits the undertaking of supplementary activities. It is therefore less economically efficient than the inshore fishery as defined by this criterion.

#### Plant Utilization

A fifth evaluation criterion is the impact that each harvesting sector has on plant utilization. The total Newfoundland plant capacity is currently under-utilized because of a shortage of raw material and the processing sector is anxious to mitigate this. There are distinct differences in the performance of the inshore and offshore sectors in this matter. The inshore fishery provides for seasonal plant operation and thus contributes to higher overhead costs per unit of output. To illustrate the magnitude of this, Munro (1980) has indicated that all of the 177 non-integrated plants are shut down from three to five months of the year. In comparison, offshore fishing is year-round. The integrated plants also operate year-round and are not hampered by the problems associated with seasonality.

On this basis, it may seem that a fishery emphasizing offshore harvesting would be able to solve the problem of plant under-utilization. This, however, is a fallacy because the fishery resource is insufficient to allow for the full utilization of total plant capacity. The Government of Newfoundland (1977) has indicated that plant capacity is utilized only 35% on the basis of an eight-hour shift per

working day. Consequently, even assuming that the 250% increase in total landings by 1985 is realized, the under-utilization problem will still exist. Thus, offshore fishing increases plant utilization only in the sense that it exploits the stocks that are inaccessible to the inshore sector. As far as northern cod is concerned, it increases the utilization of the integrated plants by catching fish that might have been taken inshore and processed elsewhere. It therefore increases the utilization of the integrated firms only by effectually lowering it in the other plants.

Obviously, offshore fishing - by providing for full utilization - promotes the profitability of the twelve integrated firms. It is dubious, however, that maximizing the profitability of a small number of processors is the most attractive way to manage the resource. Consider, for instance, that the twelve integrated plants account for approximately 50% of total processed output. Theoretically, twenty-four such plants could process the entire Newfoundland catch. Yet, this would not only mean that the remaining plants would be forced to shut down but that several thousand part-time jobs would be replaced by a few hundred full-time positions. Given Newfoundland's general economic conditions, it is unlikely that the displaced workers would be able to find employment elsewhere. As with harvesting, economic efficiency may be satisfied through the maintenance of over-employment, i.e. a greater number of jobs in the processing sector; especially if processing plant incomes can be supplemented by other

activities. In other words, the economic benefits of seasonal processing of fish may outweigh those of year-round processing. In this event, the inshore fishery clearly has an advantage over the offshore sector. It creates a greater physical number of processing jobs - even if they are only part-time - and allows for the undertaking of supplementary activities.

In summary, as far as cod is concerned, offshore fishing increases the plant utilization of some firms by lowering it elsewhere. Thus, it has no advantage over the inshore sector as far as total plant utilization is concerned. Inshore fishing provides raw material for the majority of plants but enables them to operate on a seasonal basis only. Yet, it does create more jobs and may therefore contribute more to economic efficiency.

#### Employment Considerations

It is worthwhile to note as a side issue that two fundamental employment issues warrant more consideration than they have normally been given in the management of the Newfoundland fishery. These relate to the possibility of having either an over-abundance or a shortage of labour in the fishing industry.

The likelihood of alternative employment developing in the province to the extent that it may cause labour shortages in the fishery seems doubtful - especially in light of the fact that

there are approximately 70,000 unemployed currently in Newfoundland (Newfoundland Federation of Labour, 1978). Yet, a demand for workers having skills similar to fishermen could do exactly this and offshore oil development offers that possibility.

The Government of Newfoundland (1980) has recently stated that, although no commercial oil field has yet been proven, the province faces the "possibility that the development phase (of a major oil field) may commence prior to 1984". Between 1,000 - 1,500 jobs would be directly created by one development and many of these would be either on the rigs or on the vessels servicing them (Government of Newfoundland, 1980). The high incomes paid by the oil companies would certainly exceed the "opportunity cost" figures previously cited and could persuade men to exchange fishing boats for oil rigs and service vessels. The indirect injections into the economy through royalties, taxes, etc., would also create jobs that may cause men to pull their boats ashore. The experience of other oil boom economies - the Shetland Islands and Scotland in particular - is that this can easily happen. Consequently, there may be reason to give consideration to the potential impacts of a major oil development on the fishery.

The most visible impacts of offshore oil development would be with the offshore fishery because of the small number of men involved. Whereas the displacement of several hundred fishermen from the inshore sector would go unnoticed, it would literally

cripple the offshore sector. It is extremely important, therefore, that deliberate consideration be given to the potential effects that offshore oil development may have on this sector. Otherwise, fishery management plans may go unrealized because of labour shortages.

On the contrary, consideration should also be given to the possibility that too much labour might enter the fishery. The problems associated with over-entry in an open-access fishery have already been given ample coverage and need not be reiterated. This is less likely to occur with the offshore sector because entry requires extreme capital investment. The rapid rise in the number of inshore fishermen from 13,700 in 1973 (Munro, 1980) to 30,000 in 1980 (Government of Newfoundland, 1980), unfortunately, suggests that this could well be a problem with the inshore fishery.

At the present time, the government has limited entry in the Newfoundland fishery by placing a freeze on licensing. Limiting entry into the fishery, however, is no guarantee that rents will not be totally dissipated. Attempts at regulating the B.C. salmon fishery, for example, have illustrated that limiting entry is not an effective solution of itself. Pearse and Wilen (1979, p. 764) noted that the limited entry "programme (in B.C.) has, nevertheless, failed in its purpose of preventing further expansion of redundant capital in the fleet". Fraser (1979, p. 760) added that "the (B.C.) limitation programme has failed to reduce the cost of fishing in any absolute sense. The reduction

in fleet size has simply called forth significant increases in the capital intensity of the remaining vessels". Meany (1979, p. 789), in commenting on the restricted entry programme for the Australian lobster fishery, also stated that "excessive reinvestment in boats and equipment" has limited the success of the programme.

The reason for this is that limiting entry in a fishery does not solve the problems associated with the common property nature of the resource. All it does is create a common property resource with fewer participants. The existing fishermen still try to out compete each other by employing extra gear and more-advanced technology. Since each fisherman is competing with every other, all tend to do the same and the result is that rent is dissipated.

The Economic Council of Canada (1980) has suggested that one way to solve this problem is to incorporate a "stinted" quota system. This is a method under which each fisherman is allowed only limited landing rights, i.e. "he is permitted to land and sell no more than a specified number of pounds of fish of a certain species, caught in a certain zone of the ocean in a certain season of the year" (Economic Council of Canada, 1980, p. 123). Stinted quotas have also been advocated by Pearse (1979) as a possible solution to the problem of rent dissipation in fisheries. The Government of Newfoundland may find that stinted quotas could have a great deal of merit in the management of the inshore fishery. Even if excessive entry into



the inshore sector does not become a problem, it should investigate both the benefits and detriments of applying this technique to the management of the Newfoundland fishing industry.

### Synopsis

The inshore and offshore sectors differ substantially regarding the three economic criteria. Inshore fishing not only more nearly maximizes economic rent but it also contributes more to economic efficiency vis a vis the creation of employment and compatibility with supplementary activities. In addition, although neither sector displays any advantages as far as total plant utilization is concerned, the inshore sector disperses plant employment throughout the entire province and may contribute more to economic efficiency as defined herein.

## VI: EVALUATION OF SOCIAL CRITERION

Consideration of social concerns is the sixth and final evaluation criterion regarding the Newfoundland fishery. The literature reveals that the lack of employment opportunities is the most pressing social issue in Newfoundland. The Economic Council of Canada has highlighted this in its study Newfoundland From Dependency to Self-Reliance. It has noted that Newfoundland "remains a Canadian metaphor for isolation, poverty, and dependency" (Economic Council of Canada, 1980, p. xi) and has indicated that the major symptom of this is the Province's severe unemployment problem. The most detailed account of Newfoundland's unemployment problem, however, is provided by the People's Commission on Unemployment. Formed by the Newfoundland Federation of Labour in 1978, the People's Commission was charged the specific task of analyzing the economic, social and psychological effects of unemployment on individuals, families and communities throughout the Province. In six months, it travelled over 4,000 miles, heard over 45 hours of formal briefs and testimony and assembled more than 1,000 pages of material (Newfoundland Federation of Labour, 1978). Based upon these data, the People's Commission commented on the fishery as follows:

"The fishery offers the possibility of an industry where the economy can serve society; where Newfoundland rural and family life can be maintained; where existing patterns of settlement and social life can be integrated with a rewarding and secure base of employment for many.

While the fishery offers hopes for jobs and rewarding employment, the type of development which is pursued within this industry is pivotal to the kind of

future we will all share. Will we have a fishing industry which enhances the quality, character and structure of our rural communities or will this industry be organized around the principles of centralization and industrialization that have plagued the province for decades?" (Newfoundland Federation of Labour, 1978, pp. 103 - 104).

According to the Commission, therefore, the major social concern regarding the fishery is the provision of employment opportunities to ensure the preservation of existing settlement patterns and the continuation of rural lifestyles. This attachment to the outports in particular is very strongly instilled in the Newfoundland people. Much of the documented evidence of this is provided in community ethnologies published by the Institute of Social and Economic Research at Memorial University of Newfoundland. These studies cover communities throughout the Island and offer useful insights into community attachments as well as rural lifestyles. (See, for instance: Faris, 1966; Firestone, 1967 and Chiarmonte, 1970.) Migration data recently published by the Economic Council of Canada (1980) lends support to this as well. It noted that a significant portion of Newfoundlanders that leave the province return at some later date. In addition, it stated that since the early 1970's, in-migration has been growing at a faster rate than out-migration. Migration flows, of course, are difficult to evaluate. Newfoundlanders, for example, may not be returning because they want to but because they cannot find employment. In actuality, both reasons - as well as others not mentioned - are probably valid. The relevant point here is that many do return simply because they have strong personal attachments.

Perhaps the best evidence of these community ties, however, is the political opposition to the resettlement programme that developed during its last years. Matthews (1976) in his study of three communities facing the threat of resettlement gives an excellent example of this. Matthews (1976, p. 3) has written "All three communities are small, with populations ranging from 200 to 700 people .... Even though they are exposed to the pulls of urban living, they appear to have maintained a viable rural life. More importantly they have resisted all efforts to encourage them to resettle". He noted that two of the communities expressed their indignation at the Government's intention to resettle them by sending the following telegram to the minister responsible for the programme:

"It is hard to believe that our government could have so little regard for human beings and reach such a deplorable decision. This decision by our government to strip us of our birthright and our freedom of choice is only the same as the Russians did in Czechoslovakia in 1968. Since 98 per cent of the people of our communities are opposed to the centralization programme we are proud to announce that we are here to stay" (Matthews, 1976, p. 25).

The Newfoundland and Labrador Rural Development Council (1975) indicated that the resettlement threat sparked communities throughout the entire Island to form "regional development associations" to initiate action to confront the programme and is further evidence of the Newfoundland people's opposition to community centralization. Finally, the Economic Council of Canada (1980, p. 14) underscored the entire issue by noting that the resettlement programme has left a "bitterness that future planners will overlook at their peril".

Using the provision of employment to ensure the continuity of existing settlement patterns and rural lifestyles as the social criterion for evaluating a major structural shift in the Newfoundland fishing industry indicates that there are clear and fundamental distinctions between the inshore and the offshore sectors. Essentially, the capital-intensive offshore sector reduces the amount of labour required to land a given volume of fish. Moreover, the jobs it provides are full-time and are therefore not compatible with the maintenance of the traditional rural lifestyles. In comparison, the inshore sector creates a great deal of employment and fits in well with traditional outport life. If a decision in the Newfoundland fishery were to be based solely on social considerations, it would have no other choice but to place priority with the inshore sector.

## VII: CONCLUSIONS AND DISCUSSION

In this thesis I have identified six criterion to evaluate whether the Government of Newfoundland is justified in deciding to place priority with the inshore sector in the future development of the fishing industry. These criteria include:

- ability to harvest cod;
- ability to ensure sustained harvesting;
- maximization of economic rent;
- maximization of economic efficiency;
- impacts on plant utilization; and
- satisfaction of social concerns.

It was illustrated that both the inshore and the offshore sectors have the ability to harvest the major portion of the anticipated increase in the allowable catch of northern cod. Therefore, no distinction between the two can be made in this respect but, because the inshore sector employs passive technology and harvests only the migratory portion of the stocks, it runs a lighter risk for resource depletion. At the same time, the inshore sector generates higher economic rents, i.e. assuming the normalized surpluses are adjusted for inflated opportunity costs and fuel tax exemptions. Furthermore, by creating more jobs and fitting in well with existing supplementary activities, the inshore fishery contributes more to economic efficiency in terms of providing for the economic wellbeing of the greatest number of people. The two sectors also differ widely with respect to plant utilization. Neither sector

contributes more to total plant utilization as far as northern cod is concerned but the inshore fishery tends to disperse processing activity throughout the province while offshore fishing concentrates it in a small number of ports. The inshore fishery may have benefits here, therefore, by creating more processing jobs and contributing more to the overall economic wellbeing of more people. Finally, the inshore fishery clearly outrates the offshore in its ability to fulfill the social aspirations of the Newfoundland people. Not only is it more supportive of existing settlement patterns but it is also more compatible with outport lifestyles.

In summation, the inshore fishery outperforms or at least matches the offshore sector in every evaluation. Therefore, it is the conclusion of this thesis that the Government of Newfoundland appears, on the strength of the evidence presented herein, to have made the proper decision in placing priority with the inshore sector in the future development of the fishing industry. It is apparent that such a move will capture the maximum social and economic benefits and, consequently, will ensure the best utilization of the resource.

Before closing, however, one last issue must be addressed. Many have pointed to the historical inability of the inshore fishery to provide outport people anything except meager standards of living as convincing evidence that it will never amount to more than an "instrument of poverty". Indeed, it has often been suggested that perhaps the most humane act is to

hasten the demise of the inshore fishery, eliminate the remaining outport communities and move the people en masse to more prosperous regions elsewhere in Canada. In response to this, it has to be conceded that the inshore fishery alone is unable to solve all of Newfoundland's economic ailments. In fact, the Government of Newfoundland (1978a) has recognized this and has indicated that the inshore sector cannot be expected to provide acceptable standards of living for any more than the 30,000 inshore fishermen already licensed. Yet, this should not be taken as admission that these fishermen have to be impoverished. One has only to look at other countries to appreciate that prosperous economies can be built upon a fishery. Iceland and Norway in particular are two examples where this has been done. The harvesting and processing of fish in combination with shipbuilding and fisheries research and development make significant contributions to the economic wellbeing of these nations. Instead of writing their coastal communities off as economic liabilities, they have turned them into national assets. There is no reason why Newfoundland cannot achieve the same.



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