Labor Developments in the Fishing Industry

Special Editor
Jean-Louis Chaumel

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Contents

Abstract

CHAUMEL, J.-L. [ED.] 1984. Labor developments in the fishing industry. Can. Spec. Publ. Fish. Aquat. Sci. 72: 90 p.

For the first time in North America, this international symposium has brought together experts, university researchers, and partners in the fishing industry to report on working conditions for fishermen and processing plant workers and, in addition, on various aspects relating to technological changes and productivity which are proving decisive to the survival of this socioeconomic activity.

With respect to fishing vessels, the papers presented within the framework of this symposium deal not only with the causes of occupational accidents aboard trawlers and types of diseases to which fishermen are subject, but with the integration of considerations relating to working conditions with the process of vessel design.

With respect to processing plants, the experts have identified specific occupational health problems (crab fumes) and analyzed job responsibilities, particularly for women, in processing operations. This aspect is often related to the systems of remuneration and productivity improvement which are in effect in these plants. The relevance of various approaches to the organization of work in these plants is thus discussed in a number of papers.

Finally, the conditions governing the survival of coastal communities in response to the evolution of the socioeconomic context are also discussed by symposium participants from Iceland, Denmark, France, Mexico, and Canada's Atlantic and Pacific provinces.

Foreword[1]

In an increasingly internationalized and competitive economy and a context of rising educational levels, LABOR questions assume new dimensions. This is equally true in the fishing industry, which, although it has been shaken by a profound structural crisis, seems to hold hope of a promising future for the coastal population of Canada and other countries as well. This evolution, however, has a number of very specific features for an economic activity that is often closer to agriculture than to industry, yet represents the principal resource of regions directly threatened by high unemployment.

To ensure the survival and development of what has long been considered a minor socioeconomic sector, fishermen, industrialists, workers, governments, and researchers must work together to develop effective and acceptable solutions to the new challenges facing the fishing industry. How can we increase the wages of workers in this sector and guarantee them decent working conditions, and at the same time improve the quality of the product and plan for the modernization of what are in many cases outdated processing facilities?

The answers to these questions are not simple. Those familiar with the industry know that government decrees alone cannot guarantee the development of a context based on years of tradition in an activity that is anchored in the very soul of these coastal populations, some of which are isolated from other socioeconomic environments. Can the skills of our fishermen be protected and yet developed within the new context of competition which is now emerging?

Specifically, to permit this apparently essential evolution, the efforts of the various parties must not be directed at reproducing the isolation model so frequently characteristic of the fishing industry. Modern methods of communication must also be used to enable this sector to take advantage of other skills, experience, and technologies. In this connection, this symposium has been called as part of an effort to initiate a movement for collaboration of these efforts, the aim being an adaptation of the industry to the new demands to which it is exposed, so that the men and women of these coastal communities can continue to derive ever greater benefits from our maritime resources.

The proceedings of this symposium have been published with the assistance of the Université du Québec à Rimouski and Dr J. Watson of the Scientific Information and Publications Branch of the Department of Fisheries and Oceans. I wish to express my particular thanks to Mr R. S. Lefebvre, of the same Department, for his continuing and invaluable contribution to this work, as well as Odile Tremblay and Langis Lafrance who assisted in the preparation of this publication.

[1]Translation of the French.

Opening Address[1]

Guy Massicotte

Rector, Université du Québec à Rimouski (UQAR), 300 avenue des Ursulines, Rimouski, Que. G5L 3A1

It is a pleasure for me to greet all the participants in this symposium on Labor Developments in the Fishing Industry. First of all, I want to welcome you to Rimouski, a city of education and science and one turned increasingly towards its waterfront, in an increasing awareness of its importance to the future development of our societies. I also want to welcome you to the Université du Québec à Rimouski, which, despite its general orientation, is tending more and more to direct its activities towards the marine environment and its resources. Finally, I want to welcome you to this symposium, which typifies the spirit behind our University, in its effort to bring together concerns relating to labor within the specific context of the fishing industries and the viewpoints of scientists and those directly involved in the industry.

The Université du Québec à Rimouski has been in existence now for 14 years. It offers the essential university discipline and, at the same time, is channeling its development towards the ocean sciences and the application of scientific knowledge to the marine environment and to the activities associated with the development and exploitation of marine resources. Within these areas and fields of activity, it has developed some expertise and thus aspires to a certain leadership within the national and international scientific community.

UQAR's activities in the area of ocean studies range from the very basic to the very applied. In oceanography, we have a department of some 20 professors and researchers, and offer both master's and doctoral degrees. We also have a postdoctoral program. In the field of maritime resource management, we have a research group, known as GERMA (Groupe d'études en ressources maritimes), and will soon be offering a master's program. In addition to these activities specifically oriented towards ocean studies, other activities of a more general nature are tending to specialize in ocean-related problems. This is true, for example, of an agrifood research group, CRESALA (Centre de recherche en sciences appliquées à l'alimentation), which is devoting more and more attention to seafood products, and of CIRAST (Centre d'intervention et de recherche sur l'amélioration des situations de travail), which has also acquired some expertise on the fishing and seafood processing industries. In addition, the University has collaborated in the development of a Centre de recherche en ressources maritimes, a structure designed to coordinate the industry's scientific and technological resources for the promotion of R & D appropriate to the needs of society.

You will have noted that UQAR is interested not only in the natural environment, but also in the social and human environment, not only in pure knowledge, but also in the problems of application and management, promotion and development. As a University, of course, we are concerned with scientific and educational excellence. But this does not prevent us from attaching a great deal of importance to the relevance of these activities to the problems experienced in society: on the contrary. Here again, we do not regard this concern with the concrete problems of our immediate environment as contradictory to our intention to assume a certain leadership within the national and international scientific community. In fact, as a University established in a maritime environment, and one which has chosen as its primary line of development the study of the phenomena and problems associated with this field, we feel that we have original expertise which we hope to enrich through contacts with those who have undertaken similar experiments, and to share with others.

Finally, UQAR's faculty members, like many others around the world today, are attempting to go beyond the traditional disciplines and apply the resources of the scientific method to various fields of human activity, in an effort to extend both our knowledge of them and their value to man. Maritime studies and the analysis of labor situations are two of these new fields of activity with which the University is concerned through its interest in social progress. The fact that these two fields are combined in a single scientific and educational concern, in a symposium bringing together experts and practitioners with a variety of outlooks, says a great deal about the mission which the University in general and UQAR in particular is called upon to perform in society.

As is customary at the opening of any symposium, I would now like to express the hope that each participant will achieve his objectives and that this participation will stimulate his interest and expand his horizons.

Thank you.

[1]Translation of the French.

Impact of Changes in the Nova Scotia Fishery on Occupational Health and Safety of Trawlermen

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BINKLEY, M. 1984. Impact of changes in the Nova Scotia fishery on occupational health and safety of trawlermen, p. 2–4. *In* J.-L. Chaumel [ed.] Labor developments in the fishing industry. Can. Spec. Publ. Fish. Aquat. Sci. 72.

The first part of this symposium on the analysis of working conditions starts with Marian Binkley's presentation. She clearly outlines the various factors which contribute to work injuries at the operation and the environment levels, as well as in the social working context.

Introduction

Changes in the east coast groundfishery have had profound ramifications on all sectors of the Industry. With the release of the Kirby task force on the Atlantic fishery, and its subsequent reorganization, the industry is reeling under the effects of these changes. Whether critics or supporters of the reorganization, the debate centers upon the economic benefits and/or costs of the changes taking place. However, neither group looks at the effects on the health and safety of the men and women who work in factories and on the boats. This paper will attempt to analyze the effects of changes on the occupational health and safety of one small sector of the industry — the trawler fishery of Nova Scotia.

Studies on the occupational health and safety of fishermen focus on three major areas:

1) the physiological demands of the actual job on board the vessel;
2) the working environment on the vessel; and
3) the psychological strain of being at sea.

Recently, a fourth issue has been added — survival of the men when a vessel goes down. Little work has been done in assessing the effects of social and economic changes on the working conditions of the men aboard the trawlers. The classical model divorces the vessel and the men from the ports and communities from which they come. This isolation is a fallacy. Changes in social and eonomic factors within the industry and communities invariably affect working conditions.

Occupational Health of Trawlermen

Physiological studies have investigated work stress among various types of fishermen by assessing circulatory stress and work load by the monitoring of heart beat (Astrand et al. 1973; Rodahl et al. 1974; Rodahl and Vokac 1977a, b). Rodahl and Vokac (1977a) investigated work stress of six Norwegian trawlermen on two medium-size vessels. The subjects were monitored continuously over a 24-h period. The work day was divided into four 6-h shifts with 6-h on and 6-h off. Off shifts were usually spent eating, resting, and sleeping. Activities during the work shift consisted of handling trawl, bleeding, washing and storing fish, cleaning the deck, and resting. Rodahl and Vokac (1977a) found the physiological response of the men remarkably similar. Handling the trawl resulted in the highest recorded heart beats (140–160 beats/min). This activity, however, was intermittent, thus dissipating the high circulatory strain. Bleeding and washing and storing fish resulted in a continuous level of low circulatory stress, punctuated by periods of high stress while hoisting and storing fish. The rhythmic nature of the work and the distribution of high and low circulatory stress activities helped regulate the work load (1977a, p. 638).

Rodahl and Vokac's study (1977a) gives the impression that work on a trawler is regular and systematic. However, it stands in contrast to the earlier British studies such as Shilling's (1966) which emphasized the physiological strain and lack of sleep experienced by the crews. This dichotomy may be explained by a combination of factors. First, the Norwegian trawlers are highly mechanized compared to other trawler fleets, including our own. Second, and probably more important, is that catches vary in size. The six on and six off shift system is the economic ideal. It is adequate enough to process a poor to moderate catch but if the catch is good, or the equipment breaks down, the crew must work through their off shift. The resultant physiological stress and overtiredness may cause cardiovascular distress or contribute to careless actions which may lead to accidents.

Working on a trawler is a dangerous occupation. Moore (1969a) states that the British trawler fishery has high morbidity and an annual mortality rate of 5.7 per 1000 trawlermen. Shilling (1971) argues that British trawlermen have a mortality rate two times higher than the rate for miners and 20 times higher than that in the manufacturing industries. There is no strong evidence that these rates have declined. Collacott (1977) argues that although safety standards for equipment have risen, morbidity is in fact increasing. Accurate morbidity statistics are difficult to calculate. Trawlermen are loathe to report accidents and illnesses. Some are never treated. Others are treated by their family doctor rather than the company's physician. Lack of treatment of minor injuries in certain circumstances may lead to chronic disability. For example, a minor back strain left untreated may lead to a chronic back problem and ultimately to partial or total disability.

Causes of mortality and morbidity can be divided into two groups — accidents and illnesses. The most common causes of accidents on board are:

1) falls on deck against deck gear, storm doors, hatches, gangways and from bunks;
2) entanglement in a winch or fishing gear;
3) burns and scalds in the galley; and

4) cuts and lacerations while gutting fish.

Injuries sustained in these accidents include lacerations, contusions, sprains and strains, scalds and burns, and eye injuries. However, more serious injuries such as fractures of limbs, ribs, and vertebrae are common, as are loss of fingers and limbs. The most frequent causes of accidental death are drownings, falls, and crushings by winch or fishing gear (Moore 1969a, b; Shilling 1966, 1971; Collacott 1977). Most of these accidents occur during heavy seas, particularly during the winter.

Reported illnesses include cardiovascular disease, pneumonia, and other respiratory tract infections, skin allergies and infections, and psychiatric illnesses. Cardiovascular disease is the most common cause of natural death cited (Moore 1969a). This is not surprising given the high circulatory stress that some men experience. Psychological stress on board ship can be traced to many sources — boredom, financial worries, confinement, and worries about family and friends on shore to name a few. Rix et al. (1982) argue that in Scotland, alcohol dependency is higher among fishermen than among the general population. Collacott (1977) reports a similar finding concerning British fishermen. However, few captains would tolerate drinking among their crew at sea. Thus, most drinking takes place on shore. Other manifestations of psychological stress include suicides (Shilling 1971), neuroses, psychoses (Collacott 1977) and gastrointestinal problems (Moore 1969a).

The Nova Scotia Trawler Fleet

According to the Kirby Task Force (1982) the east coast trawler fleet consists of less than 150 vessels. Nevertheless they account for approximately 45% of the catch. Most of the fleet is owned by the large producers: National Sea Products, Fishery Products, H.B. Nickerson and Sons, The Lake Group, and Connors Brothers. Smaller firms may own one or two vessels which supply a single plant. All vessels are 150 ft or longer and are either stern or side trawlers. Side trawlers are gradually being phased out and replaced by safer and more efficient stern trawlers. At present there are no factory or freezer trawlers in the fleet. Thus all processing beyond bleeding, splitting, gutting, and cleaning takes place on shore. The average crew size per vessel is approximately 15 men who are divided into two shifts. Most trips take 10–15 d at sea, with a replacement crew ready to board as soon as the vessel is unloaded and refurbished. Although the trawler fleet can work all year around, their "season" is being limited to the late autumn, winter, and early spring months. During the rest of the season, the same grounds may be fished by the inshore fleet.

The trawler fishery is a fishery in trouble. Although the fishery accounts for approximately 45% of the groundfish catch, their proportional share is dwindling. In 1973, they took 57% of the catch in contrast to 43% of the catch in 1981 (Kirby 1982, p. 35). However, Kirby (1982, p. 35) argues that when red fish (ocean perch) catches are excluded, the percentage of the catch is about the same. Why has the catch in red fish dropped? The simple answer is the weakness in the market for this fish. In fact, the weakness in the fish market has had a profound effect on the trawler fishery in general. In 1981–82, because of falling fish prices, some Nova Scotia trawler companies temporarily shut down their plants and tied up their fleets (Kirby 1982, p. 21). In August 1983, National Sea closed their Louisbourg plant and tied up their trawlers, at the same time slowing down production at their Lunenburg plant. With the government-backed merger of National Sea Products and H. B. Nickerson and Sons, all but two vessels from the Riverport area have been moved to Newfoundland.

Effects of Reorganization on the Trawler Fishery

The major reorganization of the Atlantic fishery is an attempt to make the fishery economically more viable. Efficiency calls for a continual supply of good quality fish for a few year-round plants. Since the inshore fishery is more economical than the trawler fleet, it makes economic sense to tie up the trawlers during the late spring through early autumn and work them during the off season. Moreover, the relocation of some of the fleet from Nova Scotia to Newfoundland to be closer to the lucrative winter Labrador fishery makes sound economic sense. But what kind of effect does this policy have on the men aboard the trawlers?

As previously mentioned, working the seas is a hazardous occupation, particularly during the winter months. Accident rates increase because of the higher incidence of heavy seas and storms (Shilling 1971). The probability of a vessel going down also increases, yet the trawlers must go out to supply the plants on shore. Last January through March, the issue of winter sailings in bad weather came to a head. A number of trawler captains from Riverport and Louisbourg refused to set sail in bad weather. Their warnings went unheeded. They were suspended and their commands were offered to other men. The vessels went out. Unfortunately their fears were realized. The following obituary appeared in the H. B. Nickerson and Sons Newsletter:

> Louisbourg, N.S. — Gerald St. Croix, aged 26, deckhand on the Canso Condor, died suddenly on February 13, 1983, of injuries sustained following an accidental fall from his bunk during heavy seas.

With the push to reorganize the fishery more of these cases will occur.

Why are trawlermen willing to take these risks? With the trawler season being limited to the late fall through early spring and with the fleet being cut back, it is increasingly difficult to find and maintain employment. Because of the short season every day counts, not only in terms of wages but also in future unemployment benefits. However, if men refuse to work because of weather conditions, there are many men available to fill each vacancy, and alternative employment opportunities are limited or nonexistent.

The uncertainty and the short length of employment have other effects. More and more men who sustain injuries fail to report them. Working under this additional stress, not only is the present injury aggravated but the probability of suffering a second injury is great. With poor weather conditions, the probability is even higher. Moreover, an injured worker tends to have more accidents, putting other workers at risk as well.

Furthermore, financial worries and fear of lost employment lead to psychological stress. Workers under such stress become more careless than their peers. They tend to be involved in more accidents. Dependency on alcohol and other drugs may develop or increase under this added strain. More and more frequently the role of stress manager falls to the members of the trawlerman's family, particularly the wife. Indirectly, the wife's psychological well-being comes into question. Moreover, frustration generated from the workplace may be chaneled into antisocial behavior such as wife and child beating, incest, and brawling.

Conclusions

What can be done to break this cycle? The reorganization of the fishery will continue, but its negative effects on the health and safety of the men and women who work in the industry must be limited. A number of changes must be introduced into the trawler fleet. It is impossible to eliminate all of the hazards in this fishery but they can be limited. Safer and more mechanized equipment must be installed on the trawlers. This equipment is also more economical in the long run. Side trawlers with their dangerous winch and trawl assemblies must be replaced by the safer stern trawlers. Safety equipment, such as hand rails and survival suits must be mandatory on all vessels. However, these measures will not be effective unless a safety program is also implemented which attempts to break down the fatalistic attitude of the trawlermen. Since many serious injuries sustained can be traced to individuals who have been involved in earlier accidents, measures must be devised to treat these individuals without them losing their wages.

As the reorganization of the Atlantic fishery continues a number of new programs will be implemented. Most will be proposed for economic reasons. Some of these will have profound effects on many aspects of the fishery and on the men and women who work in its many sectors. However, these measures must be scrutinized carefully for their unintended consequences, especially those related to the health and safety of the workers.

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Methods of Intervention with Respect to Working Conditions on Inshore Trawlers from the Design Stage[1]

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CHAUMEL, J.-L. 1984. Methods of intervention with respect to working conditions on inshore trawlers from the design stage, p. 5–7. *In* J.-L. Chaumel [ed.] Labor developments in the fishing industry. Can. Spec. Publ. Fish. Aquat. Sci. 72.

In a dynamic view of the problem of working conditions, the author maintains that this concern must be evident from the very moment of the technical design of industrial equipment. In the specific case of fishing vessels, this is a new approach but also probably a more delicate one. Jean-Louis Chaumel describes his experience with the CIRAST team in connection with inshore trawlers and outlines the very specific characteristics of this type of approach.

Improvement of Working Conditions in the Fishing Industry

THE CONTEXT

While workers in the fishing industry represent only a very small proportion of Quebec's labor force and their occupational accidents may thus seem of minor importance, it is, however, apparent that the trades that they exercise are particularly dangerous. Studies on the risks encountered by fishermen and workers in processing plants are almost nonexistent. The data that would enable us to assess the importance of occupational accidents are also lacking and are all the more difficult to obtain in that work habits make the collection of information on this subject very uncertain.

The Gaspé Community Health Department and the CSN union, in preliminary studies, have stressed the need for intervention to improve the working conditions that prevail in this industrial sector. However, the demands of productivity to which the fishing industry is now subject must be based, in the current social context, on less dangerous or alienating working conditions.

While regional interests agree that it is essential to begin work at once along these lines, their approach, in the absence of sufficiently precise quantitative data, must take paths other than those traditionally used by researchers. Until reliable data are available, we have no choice but to proceed with analyses based closely on the actual experience of the industry, analyses which nonetheless represent some progress in the knowledge that the various parties (industrialists, fishermen, and workers) have of their working context and its evolution.

PROSPECTS FOR APPLIED RESEARCH

While threats to health and safety in the fishing industry are apparently comparable to those observed in the so-called "high-risk" activities, our studies in a fish processing plant (salted/dried fish), within the context of a joint effort by administrators and workers, and various analyses of work stations and plant productivity have gradually led us to visualize research and intervention in this field in a very specific light.

In a context in which most processing plants operate only 5 to 7 months a year, and at a time when the entire fishing industry is going through a difficult crisis, administrators' investment capacities are extremely limited. It may, of course, be argued that the improvement of working conditions is frequently more a question of mentality than of money, and it is possible to demonstrate the profitability of investments in this field; but with little government support (in this context in the fishing industry), the outlook for progress remains extremely dim. Moreover, processing facilities in Quebec, like the fishing fleet itself, are very old. The fisheries must therefore begin to modernize their tools of production if they are to survive in a context of international competition or, more immediately, to meet government requirements with respect to fish quality. To assist in this essential evolution, the various governments are prepared to provide financial assistance to private companies and cooperatives.

Efforts to improve working situations must be dealt with cautiously in this type of context. While it is essential that steps be taken as quickly as possible to protect workers against the risks involved in their activities, it is equally important to ensure that such risks do not recur in the new working structure now developing for them. Moreover, it is particularly difficult to reorganize work stations when they are technologically rigid and built around mechanized equipment. In other words, it appears that research and intervention efforts might be truly productive if they encouraged decisionmakers, investors, administrators, and engineers to take this aspect of working conditions into account in the design of the new plants and new equipment that will necessarily transform the fishing industry within the next few years.

METHOD OF RESEARCH AND INTERVENTION DURING THE PHASE OF DESIGN AND INTRODUCTION OF NEW EQUIPMENT

An approach based on intervention at the level of technological decisionmaking and design of the new working environment is related to the biotechnology of design. It demands,

[1]Translation of the French.

however, an intimate knowledge of traditional procedures, workers' skills and the socioeconomic context within which the new production or processing tool is to be used. Even in the case of apparently new technologies, it seems essential that the workers who have the experience and skills which researchers, designers, and even engineers often lack be associated with the thinking behind the tool's design.

The Case of Fishing Vessels

Development of a Prototype Inshore Fishing Vessel

Applied research is of some interest in a case like this because it can respond to certain precise needs:

- It is much easier for the engineers, architects or technicians working on the design of a new vessel to make technical changes to the hull or superstructures when they are still in the prototype–development phase. The prototype is then normally used as a model for mass production of fiberglass hulls (as in the case of this small boat) and thereafter any structural modification becomes technically and financially difficult.
- Unless shipyard administrators are aware of the importance of the working conditions of future users and their impact on the vessel's productivity, and unless they are given technical assistance with this aspect, they are unlikely to devote much thought to such conditions.
- Research and development costs, particularly for a small and medium-sized enterprise, are often exorbitant. This type of enterprise rarely has either the human or the financial means to consider the various elements which affect working conditions aboard the vessel.

Fishermen often have very little opportunity to learn about the actual operation of a new working tool (in this case, the vessel), and they are often quite willing to try new fishing methods and, in particular, a new fishing vessel.

In view of these factors, our approach was based on the close involvement of experienced fishermen, whom we asked to test the prototype vessel by actually using it. All the difficulties they experienced in various types of maneuvers or in certain working positions were then identified either directly by them or by the observer on board, who conducted interviews, made his own observations, and took photographs.

This approach enabled us to identify the existence of a number of risks to the safety of the crew, and propose modifications. Biotechnological analysis shows that one work station and a number of operating methods should be modified to eliminate certain causes of fatigue and pain or risks of falls, and to improve the efficiency of the new vessel.

The main difficulty in this type of evaluation lies in the emotional response (feelings) of the fishermen towards the concept of a vessel other than the type that they are accustomed to using. In fact, the choice of a vessel and its technical characteristics is based, in most cases, not on rational criteria but on fishing traditions and the type of experience to which the inshore fisherman has been exposed. The researcher must therefore make a special effort to identify, despite the considerable objectivity of the fishermen testing the new vessels, those elements of information that are of particular importance in terms of the work of the men aboard.

The Case of a Stern Trawler

Applied research on the improvement of working conditions begins, here again, with the design of the vessel, but in a different context. We are dealing, in this case, with a new type of trawler, but one which is much larger (55 ft) and is entering mass production. The actual design of the vessel, then, cannot readily be modified, but a number of changes are possible with respect to equipment and working methods.

The conviction that a research study could be relevant in this case was soon shared by the various parties concerned:

- The crew members, who, on this type of vessel or on others, wanted their often difficult shipboard working conditions improved, and realized that construction was a vital phase in this respect.
- The masters, who were interested in obtaining information and comments on the organization of work on board, but realized in particular that such research could be of real assistance to them and were proud of the interest shown in their vessels.
- The shipyard had some information on the operation of the first vessels it had delivered (4 at the time), but it was fragmentary. The naval architect, technicians, and engineers not only hoped to obtain detailed information on the operation at sea of the trawler they had built and on any difficulties encountered, but were prepared to improve the vessel if some assistance were made available.

A number of sailings in different types of weather enabled a trained observer to view the living conditions of the crew, to examine each work station on board, and to identify the major risks. Here again, it was primarily the observations of the fishermen and the critical incidents observed which constituted the essential elements of the data collected. It is unusual for measurements (of noise, for example) to be taken on the earliest sailings. They were used only to the extent that the fishermen and the observer agreed on the relevance of more specific and objective assessments of the working environment.

We performed these studies on a single vessel of the series begun by the shipyard. They have enabled us, however, to present the shipyard, the crew members, and the master with a report summarizing the various observations, illustrated by a number of photographs.

This document, which was studied by the shipyard's technicians and by the naval architect, has permitted a number of immediate modifications (reinforcement of certain mooring devices), but its principal impact will be in the longer term. It has clearly made the shipyard more aware of the working conditions aspect, and active efforts are now being made to find better technical arrangements for reducing certain nuisances as far as possible (for example, by improving the ventilation system in the engine room and soundproofing the crew's quarters).

In addition, the master of the vessel has become more aware of certain risks and of the need to prevent possible accidents, either by more detailed instructions regarding certain maneuvers, or by more regular and stricter inspection of certain materials (in particular, the cables).

Finally, it should be noted that our last sailings in rough water indicated excessive weight at the stern of the vessel, which became particularly evident when the trawl was emptied into a receiving compartment. Risks were substantially higher at that time in terms of the vessel's stability. This information, which

has been passed on to the shipyard, will enable it to consider a solution to this problem, probably through a lightening of the trawl-raising superstructures at the stern, or better ballasting of the vessel.

Concrete Prospects for Improvement of Shipboard Working Conditions

Our comments here deal more with the question of the relevance of this type of approach than with an evaluation of the state of working conditions aboard fishing vessels. On this latter aspect, in fact, more observations are required if we are to develop any clear idea of the situation in Quebec. Other papers presented at this symposium reveal, however, something of the scope of the problems in this connection (at least in regions other than Quebec).

Essentially, behavior with respect to vessel design does not appear to have changed greatly, and occupational accident prevention or shipboard living conditions for crew members appear to be of very minor concern to those involved in the shipbuilding process. As usual, it is the characteristics of the machinery and the space available that dictate the organization of the work stations and rest areas.

The second major observation arising from the two cases described above is that a number of parties contribute to the design of the vessel but then leave the question of working conditions to their other partners. It is a game of musical chairs between the shipyard, the client (usually the master), and the naval architect, with each one claiming that it is not his responsibility to intervene but it is for someone else to do so.

These observations may encourage a fatalistic attitude, particularly since in many instances costs are inevitably associated with any improvement in shipboard working conditions. We can assume, however, that this situation will change, for the following reasons:

- Voyages are tending to become longer, and this means that more attention will have to be devoted to the comfort of the workers aboard.
- The productivity expected of the crews is also tending to increase. However, this trend cannot continue unless some effort is made to ensure the safe and efficient organization of work stations and proper rest for members of the crew.

It is essential, then, that the various parties involved in the design of the fishing fleet be made aware of the impact of their decisions: masters, naval architects, shipyard administrators. However, it is also important that governments share this new awareness, since they frequently finance a major proportion of these investments and would thus be entirely justified in establishing certain requirements with respect to shipboard living conditions.

In short, the approach which we have used in these two cases of fishing vessels illustrates:

- that it is in fact at the vessel design stage that there is the greatest chance of influencing working conditions, since without this effort to eliminate risks and nuisances at the source, the characteristics of the maritime environment appear to make the implementation of any subsequent improvement in working conditions particularly difficult.
- that any effort along these lines requires coordination among those who participate, to various degrees, in the technical choices associated with the design and construction of the vessel.

It is precisely at this level of coordination that the expertise of university researchers, who, it must be admitted, are not always entirely familiar with fishermen's skills, can be particularly useful and relevant. Within the fishing industry, which still operates on a largely artisanal basis, these researchers, who, although they are outsiders, are aware of the needs of the industry, can certainly offer some contribution, not only by making their techniques and scientific skills available to the industry, but also through their familiarity with participatory approaches.

Respiratory Problem Associated with the Processing of Shellfish in Eastern Canada[1]

France-Laurent Forest, Roland Auger, and Jean-Marc Tardif

Département de santé communautaire, Centre hospitalier de Gaspé, Gaspé, Que. G0C 1V0

FOREST, F.-L., R. AUGER, AND J.-M. TARDIF. 1984. Respiratory problem associated with the processing of shellfish in eastern Canada, p. 8–9. *In* J.-L. Chaumel [ed.] Labor developments in the fishing industry. Can. Spec. Publ. Fish. Aquat. Sci. 72.

The health problems encountered by certain workers in shellfish processing plants in the Gaspé have led physicians in that region to initiate a preliminary and extremely interesting analysis to determine the origin of this industrial disease. Here France Forest modestly summarizes a complex approach involving the cooperation of a number of health specialists.

Introduction

Since the introduction of Quebec's recent legislation on occupational health and safety in 1980, the Gaspé occupational health team has been concerned with fishing and the processing of seafood products. While it is not a priority sector, this activity represents a local priority because of the number of people involved and the economic impact of this activity in our region.

The study was just underway when physicians working in the Magdalen Islands informed us of an unusual respiratory problem in the crab processing plants. Following the usual preliminary observations, a team was set up to meet this demand. The principal members of this team are:

- —André Cartier, respirologist, Hôpital Sacré-Coeur de Montréal
- —Mrs Marie-Alix D'Halewyn, of the Montreal Public Health Laboratory
- —Messrs Huy, Guillot, and Weber of the Centre de toxicologie du Québec
- —the occupational health team of the Département de santé communautaire de Gaspé, consisting of the three (3) undersigned and Mr Daniel Smolla
- —a number of individuals from the Centre de santé de l'archipel des Îles-de-la-Madeleine.

The present paper describes the approach taken by this multidisciplinary team and the results obtained to date.

Preliminary Observations

- according to physicians in the Magdalen Islands, the workers concerned show symptoms strongly suggestive of asthma
- inspection of a typical plant (slides)
- hypothesis as to the "steam-fumes" carrier
- review of literature.

These preliminary activities have led to the development of a number of working objectives:

1) to describe clearly the nature of the syndrome
2) to determine the prevalence of the problem and its distribution among the workers
3) to identify the causal agent in order to permit its very specific elimination at the source.

CLINICAL PORTRAIT

- —preseason questionnaire
  - — personal respiratory history
  - — urticaria and atopy
  - — symptoms
- —laboratory
  - — blood test
  - — skin tests (prick test)
  - — spirometry
  - — bronchial irritability
  - — monitoring
- —diagnostic criteria
- —a positive diagnosis of occupational asthma was confirmed in 46 of the 302 workers seen, a rate of 15.2%. No satisfactory test for early identification was found.
- —types of asthma observed:
  - — semidelayed (7–8 h)
  - — immediate (10–30 min)
  - — mixed
- —distribution of the problem:
  - 351 workers — 37 new
  - — 15 not contacted
  - — 299 valid subjects
    - — 46 occupational asthma
    - — 253 negative
- —statistically significant correlations:
  - — sex
  - — smoking
  - — obesity
  - — crab skin tests.

After isolating the theoretically possible effect of these risk factors (smoking, overweight), we found the residual prevalence of occupational asthma to be very high, at approximately 10%.

- —causal agent (hypotheses)
  - — MIUF } ruled out
  - — pathogenic parasites } ruled out
  - — steam-fumes
    - allergenic protein aerosol
    - sensitizing gas (amines, other)
  - — brief review of studies by:
    - Quebec Public Health Laboratories
    - Centre de toxicologie du Québec

[1]Translation of the French.

— existence and confirmation of the problem in other crab processing plants in Quebec and New Brunswick.
— other shellfish processing plants
  — lobster
  — shrimp
— other aggressors (survey) present in the plants concerned.

Conclusion

This study has enabled us to demonstrate the existence of the problem of occupational asthma in workers in crab processing plants. It has also enabled the workers affected to receive recognition and even financial compensation for the problem.

We hope that the team of researchers involved will be able, in the relatively near future, to identify the agent of aggression. Meanwhile, we feel that the recommendations issued to workers, employers, and inspectors can help to reduce and eliminate the problem to some extent. These recommendations have to do with elimination at the source and can be summarized as follows:

- Isolate steam-producing work areas:
  — cooking
  — canning.
- Ensure the presence of mechanical ventilation in unrefrigerated and sanitary areas, with five (5) changes of air an hour.
- Equip the cooking area with a hood to remove steam and vapors.
- Ensure that crab preparation operations are performed in such a way that the internal temperature of the product does not exceed 4°C.
- Provide an information program for all workers concerning the risks associated with exposure to the steam/fumes carrier.
- Provide workers with masks capable of trapping the suspected substances.
- Establish an environmental monitoring program and facilities for medico-environmental monitoring.
- Proceed with further research.

Safety and Working Conditions in Ocean Fishing Through a Study of Occupational Accidents[1]

Patrick Dorval

Laboratoire de Recherche "Sécurité et Conditions de travail à la pêche maritime," Institut universitaire de technologie de Lorient, 10, rue Jean Zay, 56100 Lorient, France

DORVAL, P. 1984. Safety and working conditions in ocean fishing through a study of occupational accidents, p. 10–22. *In* J.-L. Chaumel [ed.] Labor developments in the fishing industry. Can. Spec. Publ. Fish. Aquat. Sci. 72.

The team from the Institut universitaire de technologie de Lorient headed by Patrick Dorval is currently France's leading group of experts on working conditions in the fishing industry. It has produced a number of major studies, particularly on occupational accidents aboard fishing vessels. Mr. Dorval's paper reflects the scope of these studies and offers a useful portrait of the risks that fishermen encounter at sea, whether in the European context or even, quite probably, in that on North America.

It should be pointed out that the study presented here is the result of a collective effort performed within the context of the Laboratoire de recherche en sécurité et conditions de travail à la pêche maritime of the Institut universitaire de technologie de Lorient (Université de Bretagne occidentale).

The study was conducted by M. Andro, P. Dorval, G. Le Bouar, and C. Le Pluart, a seaman's physician and an associate in the studies performed in this laboratory.

A Systemic Approach to Safety in Ocean Fishing

INTRODUCTION

The literature on occupational accidents is copious and disparate: statistics, laboratory research, clinical studies, reports on efforts at prevention, etc. This abundance and disparity make any effort to analyze the accident something of a problem: it is difficult to determine which approaches or concepts will enable us to acquire a satisfactory understanding of the accident phenomenon. The major problem in any such study lies in the fact that it falls between a number of disciplines: basic sciences, engineering sciences, human, legal and administrative sciences, etc. Where there should be synthesis, we frequently find a cut-up view, located within a preestablished framework depending on whether the researcher is a specialist in occupational medicine, an engineer, a psychologist, etc. The result, all too often, is a limited, and thus limiting, concept, in terms of prevention, of the accident phenomenon. This is why far too many studies on occupational accidents consider only one variable, and sometimes two or three, totally ignoring other dimensions of the phenomenon and excluding any idea of interdependence among the different variables.

THE CONCEPTUAL FRAMEWORK

Consequently, if the study of occupational accidents is to lead to an effective policy of prevention, it will be necessary to visualize a systemic approach based:

- first, on the definition of a frame of reference which will permit study of the system in all its complexity, and
- second, on a definition of the occupational accident for use in analysis.

The frame of reference with which we are generally concerned is the enterprise, viewed as a system, a combination of interacting material, logical and human elements, organized to perform a given mission. This system is complex, open, and living.

The occupational accident will then be interpreted as a dysfunction in a system, with the context in which this dysfunction occurs defining the worker's activity, formed of four components: the individual, the job, the equipment, and the environment.

Briefly, we can say that the organization of the work defines a standard method of operation, that any deviation from the norm constitutes a dysfunction, and that the ultimate stage of the dysfunction existing within the system from long before is the accident.

METHODS

These are based on two approaches: a priori analysis and a posteriori analysis.

A priori Analysis:

The aim here is to analyze working situations through the four components of the activity. Exhaustive examination of the relationships between each pair of these four components makes it possible to establish a table of the potential factors of binary accidents.

The next step is identification and description of the modes of dysfunction or nonadaptation. A study of various chains or

[1]Translation of the French.

combinations of these dysfunctions, either among themselves or in combination with other events, makes it possible to identify a series of undesired final events.

These methods are based heavily on preliminary analysis of the risks and analysis of the modes of failure, techniques developed within the framework of material systems which can be usefully applied to our topic.

A posteriori Analysis:

This approach covers clinical analysis and epidemiological analysis of occupational accidents.

Clinical analysis: The objective in this case is to study the causes of accidents and the factors influencing accidentability through the use of the tree of causes method in the case of accidents which have given rise to investigations of sufficient depth to permit such treatment. The analyst begins from the undesired events which have actually occurred and attempts to work back to the possible causes. In other words, the tree is a representation of the chain of causes leading directly or indirectly to the accident.

Epidemiological analysis: This approach, which is based on the use of a standard form, provides general information on accidents, describes their distribution within the enterprise and among the workers, and attempts to relate them to other phenomena in an effort to identify possible cause-and-effect relationships. This makes it possible:

— to describe the distribution of accidents at a given time, to evaluate the importance of the phenomenon, and to provide data for the planning and identification of priorities in prevention operations,
— to identify the risk factors and contribute to the etiology of occupational accidents, and
— to follow the evolution of accidentability in the enterprise.

Conclusion

The systemic approach requires the implementation of all these methods, which are not exclusive but, rather, complementary (for example, epidemiological analysis makes it possible to determine the type of accident for which clinical analysis will be very important in the progress of prevention).

It is only through complete analysis of the safety of a system, including both a priori and a posteriori analyses, that we can identify all the information that will make it possible to offer proposals for the prevention of occupational accidents and the improvement of working and living conditions.

This systemic approach to safety problems in ocean fishing is shown in Fig. 1, summarizing the approach that we have taken

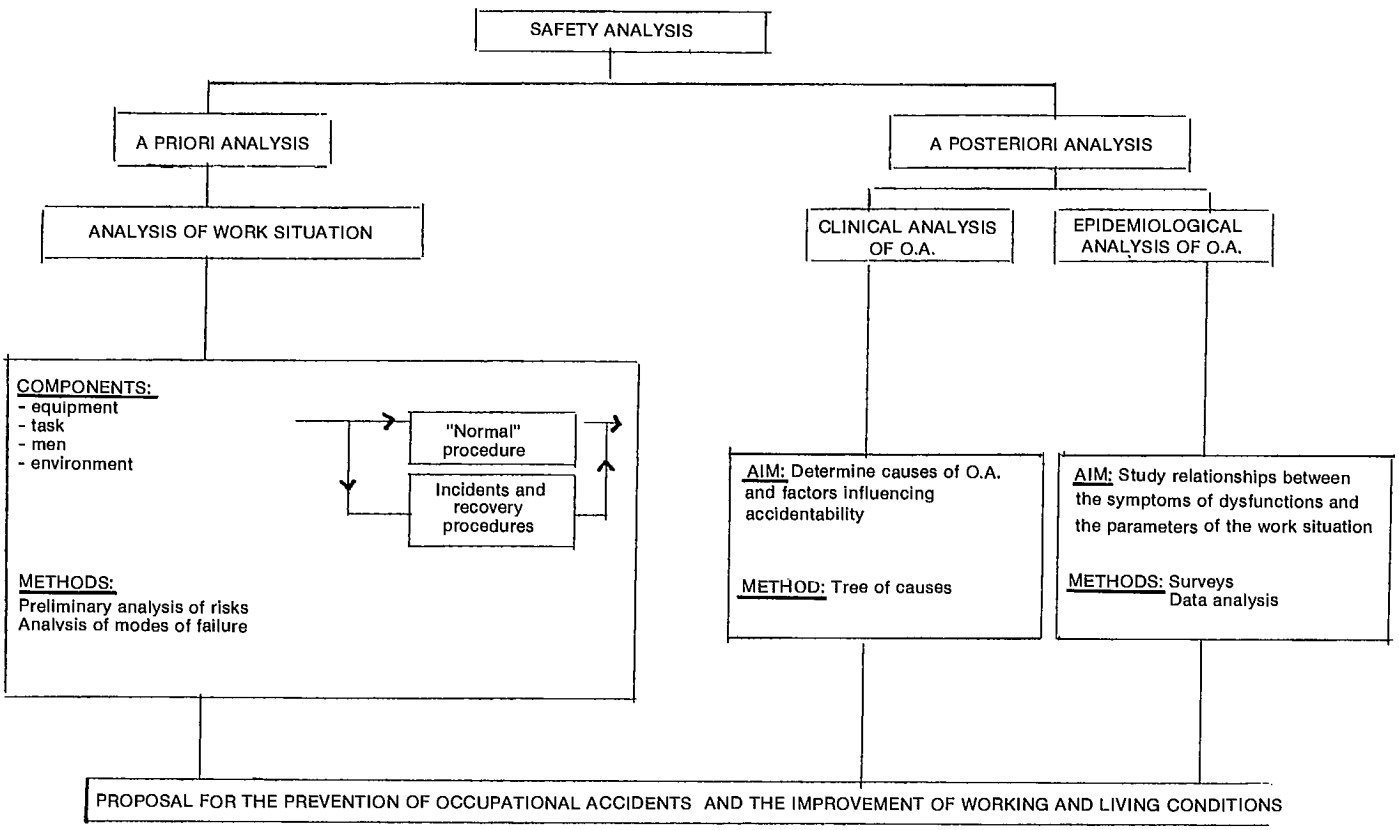

FIG. 1. Systematic approach to problems of safety in ocean fishing.

in our research and that we shall illustrate by means of several examples.

Analysis of Data on Occupational Accidents in the Countries of the EEC from 1977 to 1980

Some Characteristics of Ocean Fishing and the Problems They Pose for Epidemiological Analysis of Occupational Accidents

Fishing, a High-Risk but Largely Unstudied Activity

The first point to strike the researcher dealing with problems of occupational safety in ocean fishing is the fact that so little research has been done to date in the area of the prevention of occupational accidents. Of course, the approximately 150 000 individuals currently employed in the ocean fishing industry represent a small proportion of the workers of the European Economic Community as a whole; still, the conditions in which they work are infinitely worse than in almost any other profession and, as a result of this situation, occupational accidents in this industry are of major importance. In France, for example, in 1981, 1 seaman in 8 was the victim of one accident a year, as compared to 1 in 14 within the general social security system. In addition, some data suggest that occupational accidents in ocean fishing are more serious than those in the system as a whole: the death rate for occupational accidents is 2%, as compared to 0.1% for the system as a whole, or 0.3% in building and public works, which are considered high-risk industries.

Fishing, an Activity with Specific Rhythms of Life and Work

One of the major characteristics of this activity is the complete rupture from the working situations found on land;

- the rhythms of work, typical of a hunting economy, are in fact entirely different, as shown in Fig. 2, which relates to two "typical" days on an industrial trawler doing 13-day trips,
- interactions between the working environment and the living environment are entirely different because of the relative isolation of the crew for periods of varying length.

In our systemic approach, we use, as our frame of reference in this case, the subsystem represented by the fishing vessel. This system can be classified on a preliminary basis as a closed system, in contrast to a workshop or a shipyard, for example, which can be considered open systems.

Fishing, an Extremely Heterogeneous Activity

Heterogeneous in terms of the organization of the profession: heavy industrial equipment, artisanal equipment; methods of remuneration for seamen-fishermen which can vary enormously.

Heterogeneous in terms of fleet structure: freezer vessels of 80 m or more, which spend several months at sea, industrial fresh fishing vessels of approximately 50 m, which go out for 2 weeks at a time, inshore fishing vessels of 12–16 m, which spend a few days at a time at sea, etc.

Heterogeneous in terms of trades practiced and geographical areas visited: the French tuna seiner fleet which fishes tropical waters, large German and French trawlers, which fish the coasts of Canada and Greenland, small pole trawlers, which fish for sole and shrimps in the North Sea, line-fishing tuna vessels in the Bay of Biscay, etc.

This diversity, which is accentuated when we consider the fleets of the various countries of the Community, would make any epidemiological approach to occupational accidents meaningless, especially one attempting to deal with the problem primarily from the standpoint of comparisons among the various types of fishing.

It is the systemic approach which gives us, once again, the proper framework for our analysis.

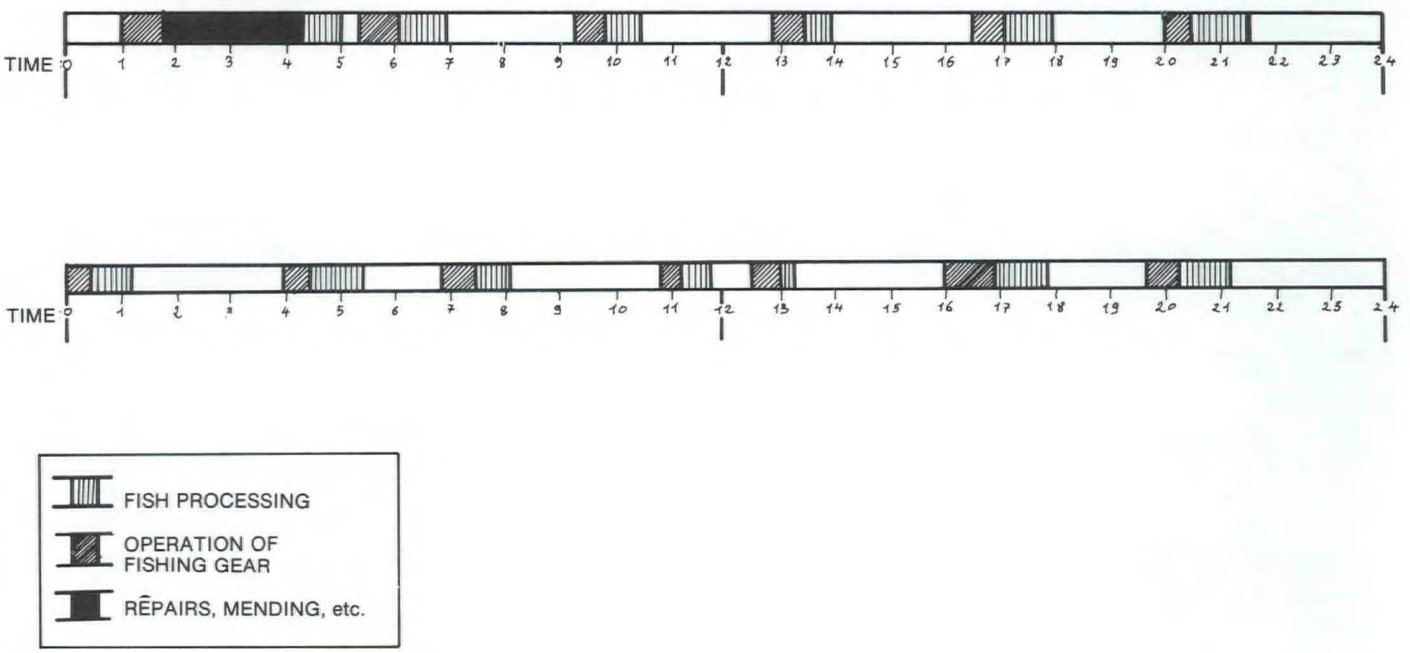

Fig. 2. Rhythms of work for two "typical" days on an industrial trawler.

In fact, whatever the type of fishing or the country considered, the activity of the crew of any fishing vessel is organized around three major tasks:

Operation of the fishing gear:
This includes:
— preparation of the fishing gear
— shooting
— sweeping
— operation of the winches and hauling equipment.

Fish processing:
This includes:
— gutting
— handling
— storage.

Finally, what we might call "other tasks":
These include:
— watch duties
— vessel maintenance and operation (engines)
— domestic tasks
and all activities associated with life on board in general.

It is the study of these three major tasks which will constitute the guideline for our analysis.

The Material and its Handling

The basic material consists of all the data on occupational accidents in ocean fishing from 1977 to 1980, in the nine countries of the Community, stored on IBM magnetic tape. These data have been compiled from reports (see the model in Fig. 3) filled out on a voluntary basis, and forwarded to Brussels by the various maritime countries of the EEC. The data used thus do not represent statistical information but merely an analysis of the circumstances of a number of occupational accidents.

Following preliminary data processing, we were faced with the problem of the application of the results obtained in terms accessible and comprehensible to the nonepidemiologist, permitting comparisons between the situations in different countries without sacrificing the scientific validity of the study.

We have therefore used:

a) a technique of graphic representation based on the weighted matrix concept, and

b) a mathematical method of data analysis: factor analysis of correlations.

COMMISSION OF THE EUROPEAN COMMUNITIES
Directorate-General Employment and Social Affairs V/2215/83-IRL

JOINT COMMITTEE ON SOCIAL PROBLEMS IN SEA FISHING

1983 IRELAND

RESEARCH ON THE CIRCUMSTANCES OF INDUSTRIAL ACCIDENTS IN SEA FISHING – 1983

ACCIDENT REPORT FORM: *to be completed for each accident at sea fishing for the period of 1/1/1983 to 31/12/1983*

A/C/D/E/R: *to be completed* – B/F to Q: *put a tick in the relevant box.*

Ⓐ NAME OF THE VESSEL
Registered No .....

Ⓑ TYPE OF VESSEL
[1] SIDE TRAWLER [2] STERN TRAWLER [3] SEINE NET [4] LONG LINER [5] PAIR [6] BEAM TRAWL [0] OTHER

Ⓒ IDENTITY OF INJURED PERSON
Surname: Christian name: Year of birth: Rating:

Ⓓ DATE OF ACCIDENT ...../...../..... Day Month Year

Ⓔ LOCAL TIME OF ACCIDENT ...../..... Hour Minutes

Ⓕ [1] Day light [2] Semi-darkness [3] Darkness

Reserved EEC: 0 5 8 3 (1 2 3 4)

No. report form (5 6 7 8)

Ⓖ USUAL DURATION OF TRIPS
[1] 0 to 2 day
[2] 2 to 9 days
[3] 9 to 22 days
[4] more than 22 days

Ⓗ POSITION OF THE VESSEL AT THE TIME OF THE ACCIDENT
[1] Alongside / at anchor
[2] On passage
[3] Fishing

Ⓘ TIME AT WORK OF INJURED PERSON AT TIME OF ACCIDENT (*)
[1] At work continuously for under 2 hrs
[2] At work continuously between 2 and 4 hrs
[3] At work continuously between 4 and 7 hrs
[4] At work continuously over 7 hrs
(*) *Rest period of less than 4 hours is not a Break*

Ⓙ METEOROLOGICAL CONDITIONS
Wind force (*): 0–3 [1] | 4–6 [2] | 7–9 [3] | +9 [4] (24)
Sea state: 0–3 [1] | 4–6 [2] | 7–9 [3] (25)
☐ Fog / blackfrost (26)
☐ Snow / ice (27)
(*) *Beaufort.* (*) *Code sea state*

Ⓚ PLACE OF ACCIDENT

1	Wheelback (forward)
2	Foredeck (general)
3	Working deck (stern trawl)
4	Dallews (stern trawl)
5	Fore gallows (side trawl)
6	After gallows (side trawl)
7	Boat deck
8	Bridge
9	Main winch
10	Ausiliary winches
11	Towing block
12	Gutting pounds
13	Processing room
14	Fishroom (wet fish)
15	Fishroom (frozen fish)
16	Liver boilers
17	Het hold
18	Machinery spaces / workshop
19	Galley / mess deck / pantry
20	Accomodation
21	Gangways
22	Ladders
23	Other:

Ⓛ OCCUPATION OF INJURED PERSON AT THE TIME OF ACCIDENT

1	Ashore / proceeding to / from vessel
2	Boarding leaving vessel
3	Watchkeeping duties (bridge)
4	Watchkeeping duties (machin. space)
5	Preparing / stowing fishing-gear
6	Shooting gear
7	Hauling gear
8	Handling deck machinery (winches etc.)
9	Gutting fish
10	Handling / stowage: wet fish
11	Freezing / stowage: froozen fish
12	Handling deck lifting gear
13	Workshop duties
14	Mooring the vessel
15	Galley / mess deck / pantry duties
16	Off duty
17	Other:

Ⓑ 9
Ⓓ 10 11 12 13 14 15
Ⓔ 16 17 18 19
Ⓕ 20
Ⓖ 21
Ⓗ 22
Ⓘ 23
Ⓙ 24 25 26 27
Ⓚ 28 29
Ⓛ 30 31

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Ⓜ AGE OF INJURED PERSON		Reserved EEC
1	Under 18 years	
2	18 to 25 years	
3	25 to 30 years	
4	30 to 35 years	
5	35 to 40 years	32
6	40 to 45 years	
7	45 to 50 years	
8	50 to 55 years	
9	55 years and over	

Ⓝ CAUSES OF ACCIDENT		
1	Fall aboard: by slips	33
2	Fall aboard: taking seas on deck	34
3	Fall aboard: other:	35
4	Taken overboard	36
5	Fire / explosion	37
6	Toxic poisoning (refrigerants etc.)	38
7	Steam / boiling water	39
8	Electric shock	40
9	Deck machinery (winches etc.) *	41
10	Trawl gear equipment *	42
11	Lifting gear wires *	43
12	Mooring equipment *	44
13	Engine room machinery *	45
14	Fish knives / use of hand tools	46
15	Fish processing machinery	47
16	Fish handling	48
17	Others:	49

Ⓞ NATURE OF INJURY		
1	Bruising / blow	50
2	Wound / cut	51
3	Stab / prick	52
4	Sprain / strain	53
5	Fracture	54
6	Crushing	55
7	Amputation / cut off	56
8	Burns / scalds	57
9	Frostbite	58
10	Asphyxiation / drowning	59
11	Concussion	60
12	Hypothermia	61
13	Other:	62

* Trapped, caught, struck.

Ⓟ INJURED PART		Reserved EEC
1	Head / neck (exc. eyes)	63
2	Eyes	64
3	Chest	65
4	Back	66
5	Abdomen	67
6	Buttocks	68
7	Shoulder / arm	69
8	Elbow	70
9	Forearm	71
10	Wrist	72
11	Hand	73
12	Fingers (exc. thumb)	74
13	Thumb	75
14	Hip / thighs	76
15	Knee	77
16	Leg	78
17	Ankle	79
18	Foot / toes	80
19	Internal	81
20	Multiple injuries	82

Ⓠ TREATMENT OR CONSEQUENCES		
1	First aid	83
2	Radio medical advice	84
3	Medical treatment at sea	85
4	Medical consultation ashore	86
5	Diversion (with or without disembarkation)	87
6	Man incapacitated (over 24 hrs)	88
7	Death: immediate or after ..... hrs	89
8	Man disappeared at sea (drowning)	90

Ⓡ BRIEF DISCRIPTION OF ACCIDENT

FIG. 3. Information sheet.

TABLE 1. Results of occupational accident reports, all years combined.

Vessel Position	Belgium			Denmark			Germany			France			Italy			United Kingdom		
	D	R	F	D	R	F	D	R	F	D	R	F	D	R	F	D	R	F
1—Side trawling	59	32	175	42	32	88	10	18	66	445	112	955	4	0	4	46	131	396
2—Stern trawling	1	1	6	0	0	0	13	107	358	185	87	455	186	109	234	71	98	308
3—Seiner	0	0	0	10	8	15	0	1	3	49	7	56	12	5	6	1	7	19
4—Line	0	0	0	0	0	0	0	0	1	66	18	167	1	2	2	0	1	0
5—Large trawler	19	6	42	0	0	0	6	0	10	38	1	90	22	10	12	2	0	2
6—Pole	157	49	233	2	0	1	15	6	15	13	3	8	0	0	0	0	0	0
0—Other	0	1	2	0	0	0	18	15	48	315	52	265	8	4	14	—	—	—
Unknown	0	0	0	0	2	5	6	6	11	9	1	3	1	0	2	0	0	1
Total (1)[a]	236	89	458	54	42	109	68	153	512	1120	281	1999	234	130	274	124	238	730
Total (2)[b]		783			205			733			3400			638			1092	
Total (3)[c]		784			205			741			3437			642			1109	

[a]Table (1) = dock (D), en route (R), fishing (F).
[b]Table (2) = D + R + F.
[c]Table (3) = total report by country.

General Information on the Data from the Study

General Table

In Table 1, we have compiled the accident reports, by country, type of vessel, and vessel position, all years combined.

This table suggests the following observations:

- First of all, the Netherlands and Ireland submitted no reports during the period under consideration and have therefore been excluded from the study,
- The number of data available for Denmark does not permit complete analysis, as was performed for the other countries,
- This table showns that, for all countries, most of the data collected relate to the various forms of trawling.
- In this table, we have also distinguished between accidents occurring at the dock (D), en route (R) and during fishing (F). For all countries, there is a preponderance of accidents occurring during fishing. We should note, however, the importance of accidents occurring at the dock in a number of countries (France, Belgium, Denmark, Italy).

Study of the Distribution of Fishing Accidents by Tasks and Immediate Causes

In this section, we shall attempt to study the relationships between shipboard tasks, as defined previously (page 12), the immediate causes of the accidents, ant the sites of the injuries.

Study of the Distribution of Accidents by Shipboard Activities

As examples, we have shown the graphs obtained for France and Great Britain (Fig. 4, 5).

- Whatever the country considered, there is an evident preponderance of tasks involving the operation of fishing gear in the origin of the accidents. This preponderance is very clear for Italy (68%), Denmark (62%),

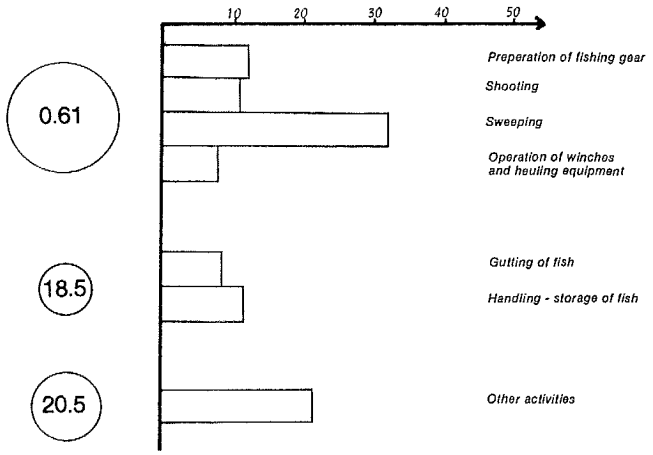

FIG. 4. France: percentage of accidents by activities.

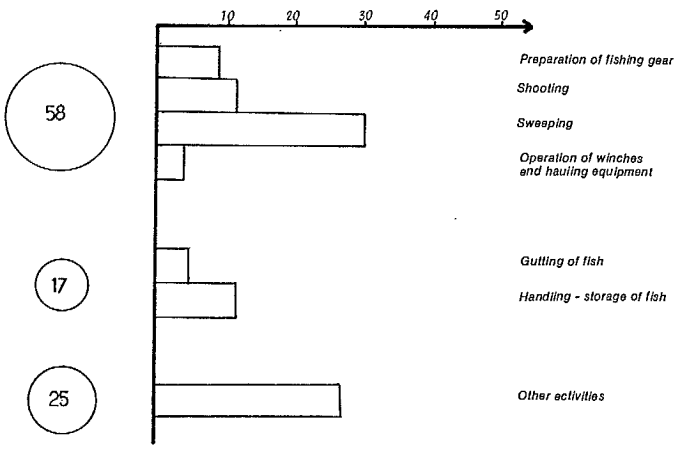

FIG. 5. United Kingdom: percentage of accidents by activities.

France (61%), and Great Britain (58%); it is slightly less so for Germany and Belgium (47%).

- Finally, fish processing ranks last in the origins of fishing accidents, with percentages ranging from 18.5% (France) to 8.5% (Italy).

If we return now to the examination of the tasks associated with the operation of the fishing gear, it is interesting to note the importance of the sweeping phase in the orgin of the accidents for France, Great Britain, Italy, and Denmark. This phase is, in fact, responsible for approximately 50% of all accidents occurring in the course of these tasks in these countries.

Study of the Distribution of Accidents by Activities and Immediate Causes

We prefer, with reference to our approach to the accident phenomenon, to use here the term "immediate cause," which corresponds to the various causes of accidents listed under N in the EEC report. These immediate causes have been classified in four groups:

- falls aboard ship (N/1, N/2, N/3)
- fishing gear, winches, and cables (N/9, N/10, N/11, N/12)
- fish and fish processing tools (N/14, N/15, N/16)
- other causes (N/5, N/6, N/7, N/8, N/13 and N/17).

As will be noted, we do not include here falls overboard (N/4), which will be examined in detail elsewhere.

Our purpose here is to identify the possible correlations between activities and immediate causes. The data processing performed uses a technique involving the construction of a weighted matrix. The results obtained for France are shown in Fig. 6. In this figure, the last column on the right gives the percentages of accidents as related to immediate causes. The figure shows that it is the fishing gear, winches, and cables that constitute the major immediate cause of occupational accidents. The results for the various countries are extremely homogeneous, ranging from 35% (Italy) to 41% (Great Britain).

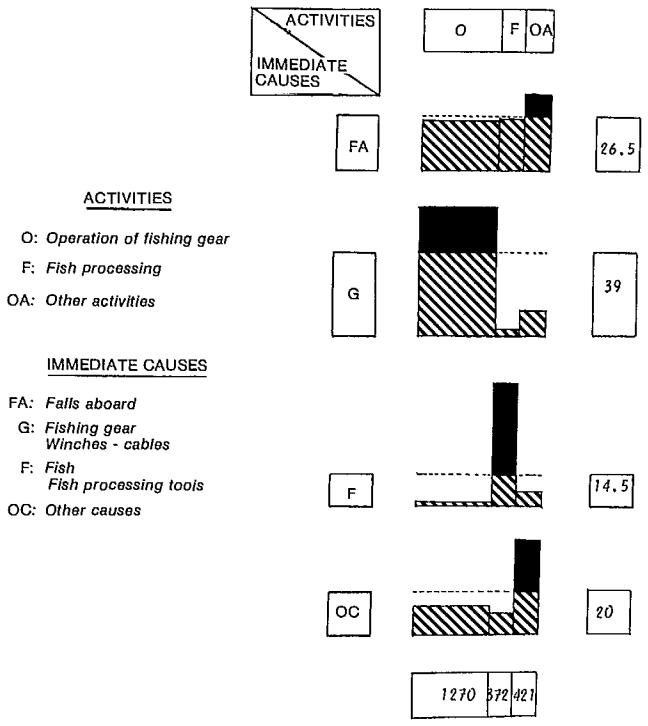

FIG. 6. France: vessels fishing. Distribution of accidents by activities and immediate causes.

Next in declining order of importance are:

- falls aboard ship, with percentages ranging from 26.5% (France) to 37% (Italy).
- "other causes," with percentages ranging from 16.5% (Germany) to 23% (Italy).
- fish processing, with percentages ranging from 16% (Germany) to 9% (Belgium).

The results for Italy are very clear here, with a percentage of 5%.

The figure also shows, for all countries, an identical influence of activities on immediate causes. In terms of statistical probability, we note, for all countries, a larger number of accidents having as their immediate cause, first, fishing gear during operation of the fishing gear, and, second, fish and fish processing tools during fish processing, results that may seem obvious at first glance.

The figure also shows that accidents having falls as their immediate cause are distributed in accordance with statistical probability, thus indicating that the activity does not appear to have any preponderant effect on accidentability as related to falls aboard ship (Fig. 7, 8 relating to Germany and Italy, for example).

Study of the Distribution of Accidents by Activities and Sites of Injuries

We have grouped the various sites of the injuries in the traditional seven zones:

- the head (P/1),
- the eyes (P/2),
- the chest, abdomen, back, and buttocks (P/3 to P/6), grouped under the heading *trunk*,
- the shoulders and arms (P/7), grouped under the heading *arms*,
- the wrists, hands, and fingers (P/10 to P/13), grouped under the heading *hand*,
- the hips, thighs, knees, and legs (P/14 to P/16), grouped under the heading *legs*,
- the ankles, feet and toes (P/17 to P/18), grouped under the heading *feet*.

The results presented here, again in weighted matrix form, relate to France (Fig. 9).

The preponderance of accidents to the hands is evident for all countries. In fact, this type of accident represents percentages ranging from 30% for Great Britian to 40% for France, where the result is clearly higher than that observed in building and public works (25.9%), the most comparable industry because it covers the same type of general activity and places the same emphasis on handling operations.

- next in order of importance is the trunk, except for Germany, where this site of injury ranks only fourth;
- the next clear figures relate to the sites least affected by occupational accidents:
  first of all, there are the eyes, which are in last position for all countries, and then the head, which is in second last position for France (5.5%), Germany and Belgium (8%), and Great Britain (9%). Italy stands out here, with 12.9% for the head, or third position, directly after the hands and trunk.

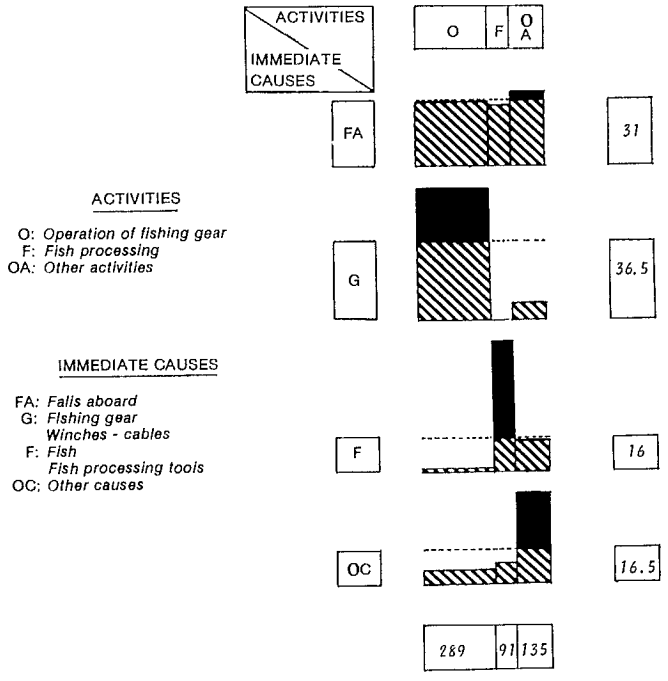

FIG. 7. Germany: vessels fishing. Distribution of accidents by activities and immediate causes.

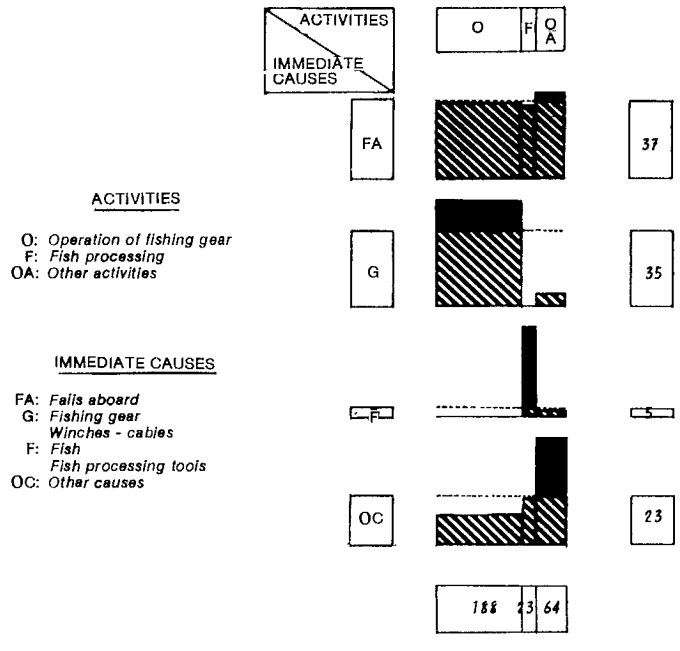

FIG. 8. Italy: vessels fishing. Distribution of accidents by activities and immediate causes.

As regards fish processing, we note that Italy, Germany, and France have far more accidents to the hand as a result of this type of activity than can be explained by statistical probability. This result is much lower for Great Britain, and in contrast to that observed in the case of Belgium, where the distribution observed is very close to proportional representation. It is important to note, also, the prevalence of activities relating to operation of the fishing gear in the origin of accidents to the hands for France, Italy, Belgium, and Great Britain (the importance is represented by the area of the corresponding box).

Study of the Distribution of Accidents by Immediate Causes and Sites of Injuries

The results discussed here, for France are presented in Fig. 10. As in Fig. 9, the right-hand column gives the percentages of accidents for the various injury sites. The predominant fact here is the close similarity between the figures for all countries: since, generally speaking, each country has approximately twice as many accidents to the hand as to the trunk, statistical probability indicates that, for each immediate cause, there will be twice as many accidents to the hand.

Figure 10 shows that this is not the case. For example, for all countries, there are far more accidents resulting from falls aboard ship and affecting the trunk than anticipated. Furthermore, although the figures are much lower, the same observation applies to other sites, which vary depending on the country.

These figures also clearly indicate, for all countries, the importance of accidents to the hand during fish processing.

CONCLUSION

In conclusion, the analysis developed here would appear to provide data which enable us:

- to achieve an objective view of the risks of accidents presented by ocean fishing, and
- to rank these various risks in terms of their importance.

This study thus demonstrates a number of facts, regardless of the country concerned:

- the predominance of gear operation tasks in terms of accident origin: these account for 68% of all accidents for Italy, 62% for Denmark, 61% for France, 58% for Great Britain and 47% for Germany and Belgium. It is also interesting to note the importance of the sweeping phase within these tasks of operating the fishing gear: 50% of all accidents, for a number of countries (France, Great Britain, Italy, Denmark). It is also during these operations that we find the most falls overboard (75% of all accidents reported), essentially during the sweeping and shooting phases,
- the predominance of fishing gear, winches, and cables as the immediate cause of occupational accidents. The homogeneity of the results observed in this connection is rather remarkable, with the percentage for the various countries studied grouped in the 35–41% range. It is essentially during the operation of the fishing gear that this equipment is associated with the origin of the accidents observed,
- the almost total lack of influence of the activity on accidentability as related to falls,
- the predominance of accidents to the hands, which represent 30–40% of the accidents observed.

Some Data on the Working Environment

We have chosen to report here a number of partial results relating to sailings effected at different times of the year (May 1981, January 1982, February 1983, June 1983) aboard four stern trawlers, built between 1972 and 1976, ranging from 54 to 59 m

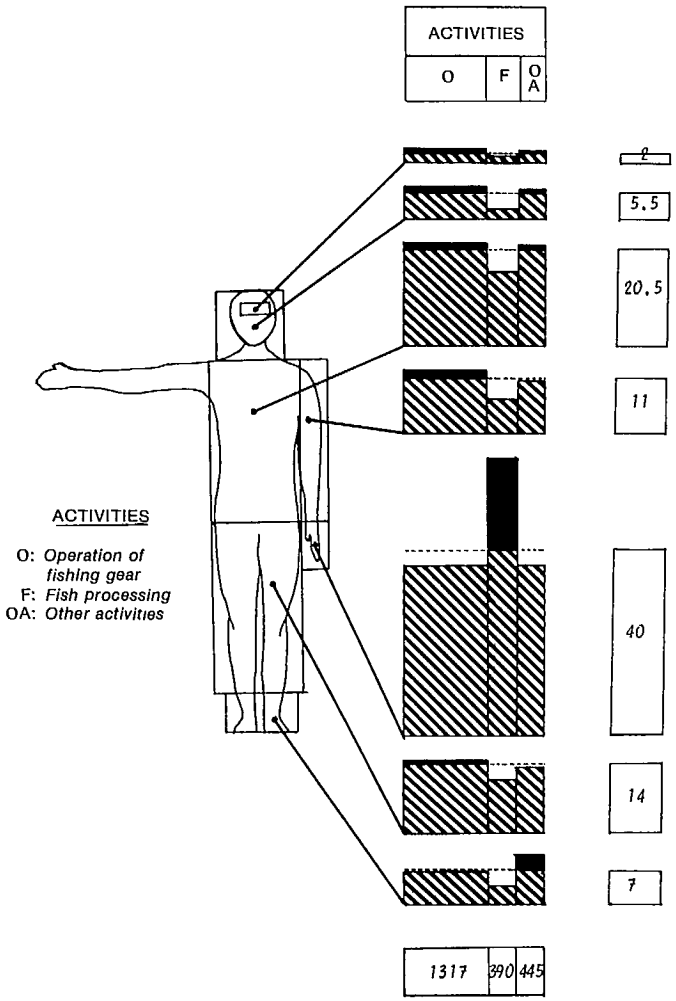

FIG. 9. France: vessels fishing. Distribution of accidents by activities and sites of injuries.

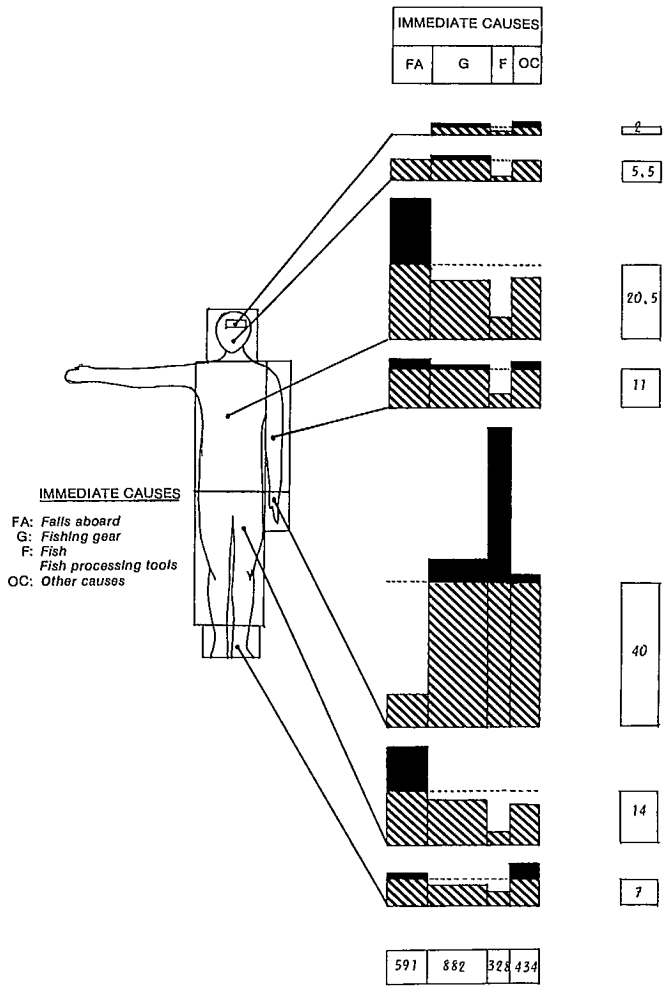

FIG. 10. France: vessels fishing. Distribution of accidents by immediate causes and sites of injuries.

in length, manned by crews of 16 and doing 14-day sailings west and north of the British Isles between 52° and 62° north latitude (Fig. 11).

NOISE PROBLEMS

As an example, we present here some results obtained during a sailing effected in May 1981, aboard the *Capitaine Cartier*, a 59-m vessel built at Ostend in 1972 (Béliard-Murdoch shipyards).

Of the 14 days at sea, four were spent traveling to and from the fishing grounds. The time devoted to each task on this trip is shown in Table 2.

TABLE 2. Time devoted to each task on this sailing.

Preparation, maintenance, and repair of fishing gear (M)	Operation of fishing gear (O)	Fish processing (F)
42[a]	45 h	45 h 15 min

[a]Over half of which performed en route.

Here we report the results for two "typical" days which seem to us representative of the rhythms of activity aboard ship:

- a day of fishing without incident, entirely devoted to (O) and (F) tasks,
- a day of fishing involving an incident, devoted to (M), (O), and (F) tasks.

The results for these two typical days are shown in Fig. 2. They do not include time spent by the seamen on bridge watch.

Figures 12 and 13 represent an example of the noise sheets that we have developed. They relate to the main deck [(M), (O), and (F) tasks] and the tween deck (living quarters) and have been established for the vessel during fishing and sweeping of the fishing gear, respectively.

On the basis of the measurements effected,[2] we have prepared Table 3, which permits calculation of the equivalent 24-h continuous level, obtained from the equation:

$$\text{Loq (24)} = 10 \log \left[\frac{1}{1440} \Sigma t_i \cdot 10^{0,1 L_i} \right]$$

[2]Precision integrating sonometer, Bruül and Kjaer type 2218 equipped with B.K. microphone, type 4165 (½), B.K. filters type 1613.

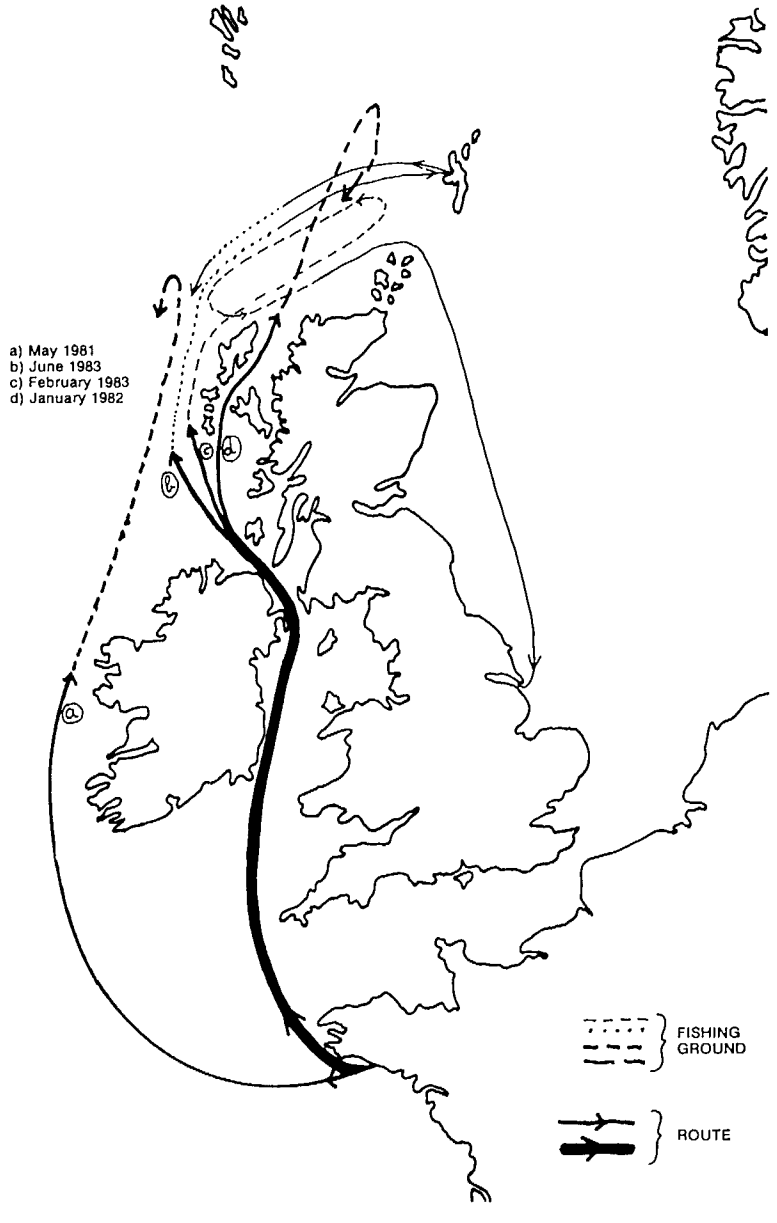

FIG. 11. Sailings at different times of the year.

TABLE 3. Activity, location, phase of operations.

		Seaman's equipment movement		Operation of fishing gear		Fish processing		Repairs to fishing gear	Domestic life		
		Corridors		Main deck (aft section)		Main deck (fish processing room)		Main deck (aft section)	Tween deck		
									Corridors	Mess	Cabin
		Swccping Shooting	Fishing	Sweeping Shooting	Hydraulic group en route	Shooting	Fishing	Fishing Hydraulic group en route	Fishing		
Day with incident (1)	Time	30 min	30 min	30 min	3 h	45 min	3 h 15	2 h 35	1 h	3 h	8 h 55
	dB_A level	95	85	85	85	88	83	81	85	78	80
Day with incident (2)	Time	30 min	30 min	30 min	3 h 15	45 min	3 h 35	0	1 h	3 h	10 h 55
	dB_A level	95	85	85	85	88	83	81	85	78	80

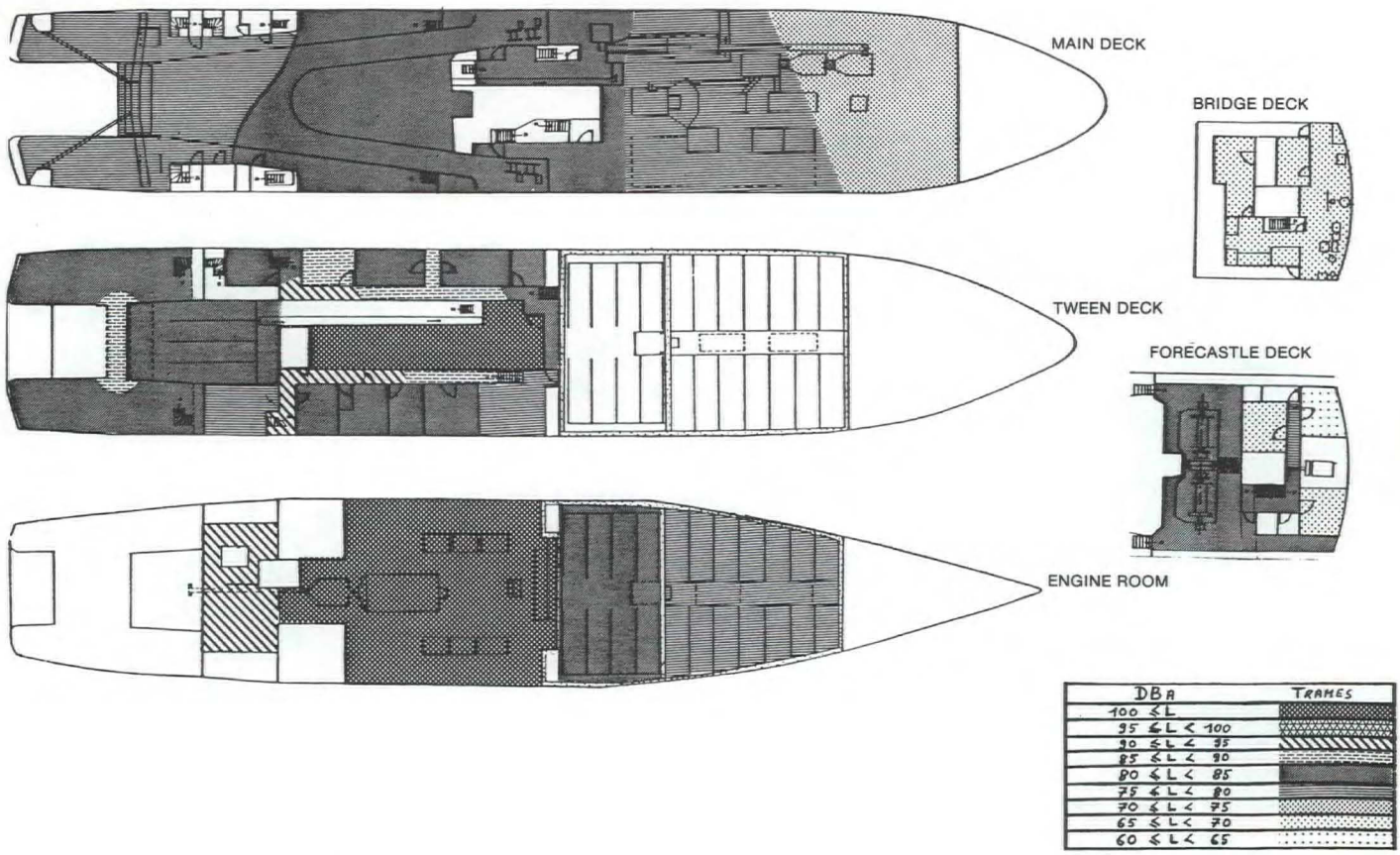

FIG. 12. Sailings at different times of the year (May 1981, January 1982, February 1983, June 1983).

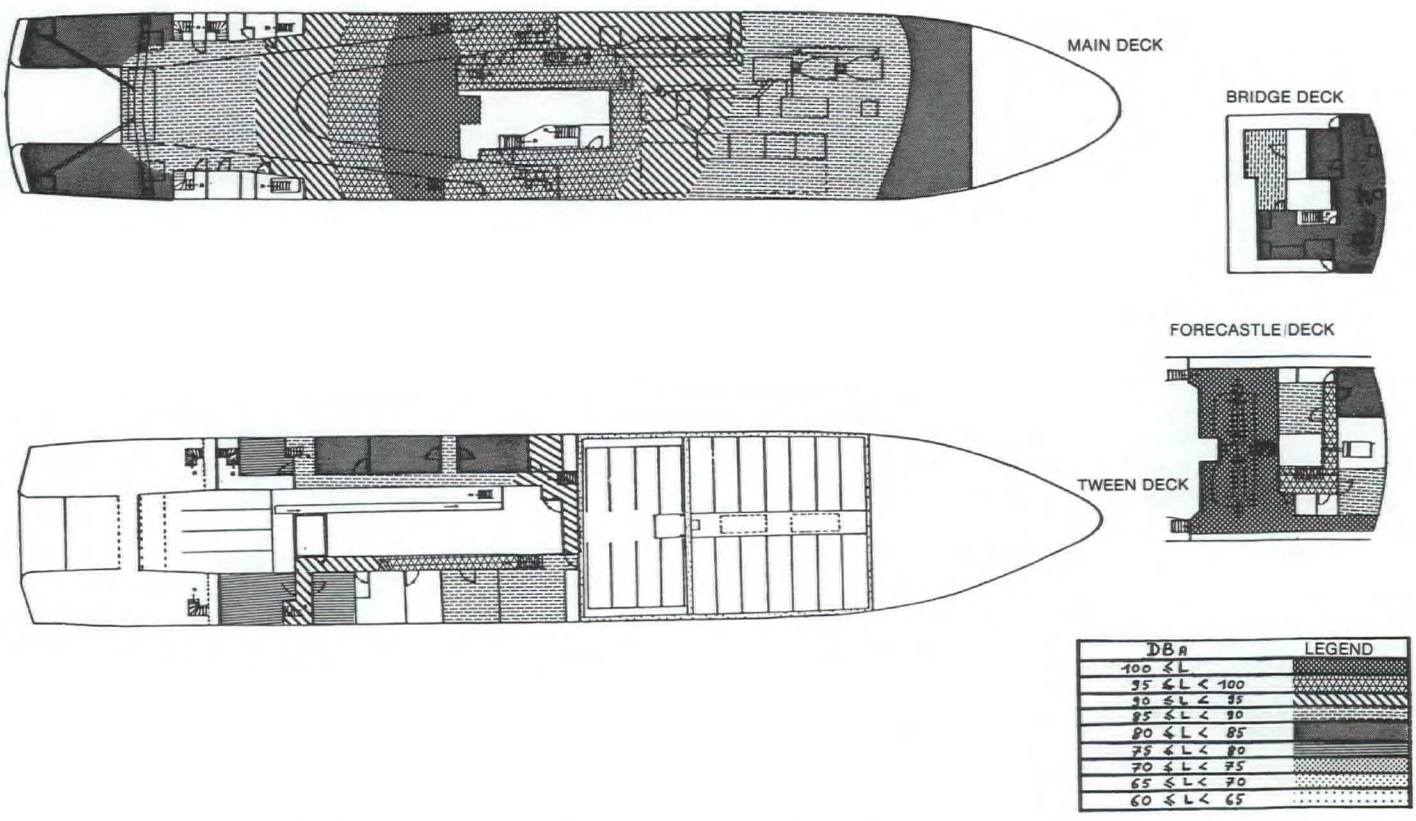

FIG. 13. Sailings at different times of the year (May 1981, January 1982, February 1983, June 1983).

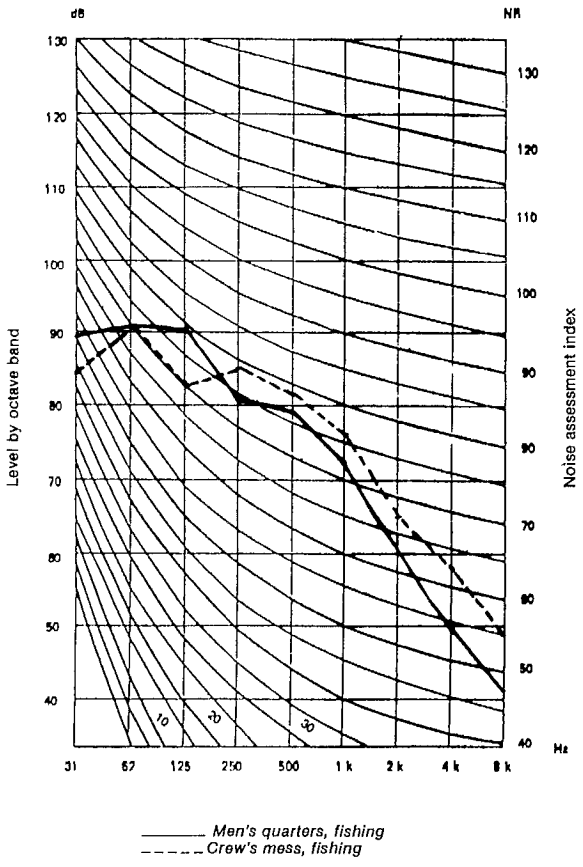

FIG. 14. Analysis by octave band.

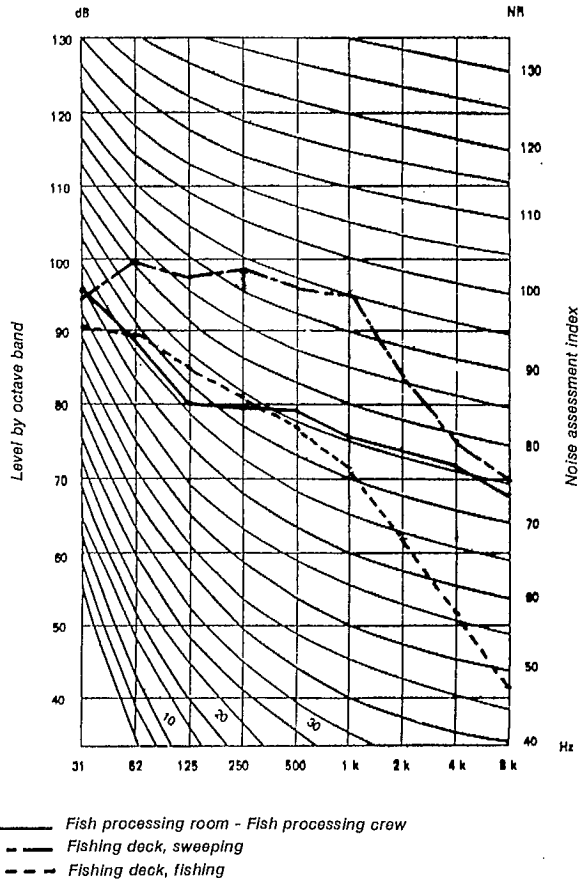

FIG. 15. Analysis by octave band.

where t_i represents the time over 24 h, expressed in minutes, during which the seaman is exposed to noise level L_i.

For days (1) and (2), then, we obtain levels of 83.7 dB_A and 83.8 dB_A.

These results are complemented by analyses by octave band (Fig. 14, 15).

Aboard this vessel, the seaman is exposed to very high noise levels (> 90 dB_A) only for short periods corresponding to his movements in the corridors during the shooting and sweeping phases. The noise level during work fluctuates with the location and phase of operation of the fishing gear. In the living quarters, however, the seaman is constantly exposed to a relatively stable level of 80 dB_A.

Table 4 compares these results with the allowable limits recommended by the IMCO (Inter-Governmental Maritime Consultative Organization), which, while they do not apply to fishing vessels, may be considered a desirable objective.

TABLE 4. Comparison of results to IMCO recommended allowable limits.

		Cabin		Mess	
	Log (24) dB_A	dB_A	NR	dB_A	NR
IMCO resolution	80	60	55	65	60
Shipboard measurements	84	80	80	78	78

At work, the most dangerous noise level is generated by the main winch. Prevention in this case will involve better soundproofing of the vessel.

In the living quarters, acceptable levels require a reduction of approximately dB_A. Octave band analyses show that, in order to achieve ratings of NR55 in the cabins and NR60 in the mess, sound levels must be reduced across the entire sound spectrum. This objective can be achieved only by dealing with the noise problem in conjunction with actual vessel design, in terms of the location of living quarters, choice of equipment, and soundproofing methods to be used.

LIGHTING

This is a delicate problem which cannot be dealt within the framework of this paper.

We shall content ourselves with reporting here on the results observed on the work deck (at the stern). The measurements were taken at night, at sea, by means of a luxmeter, equipped with incidence-correcting filters.

We noted that the lighting level varies a great deal from one vessel to another and, within the same vessel, from one point to another on deck.

The values obtained by calculating the average lighting level on deck for each vessel are shown in Table 5:

TABLE 5. Values obtained by calculating the average lighting level on deck for each vessel.

Vessel	*Cartier (a)*	*Drake (d)*	*Ludovic Jego (c)*	*Côte St.-Jacques (b)*
Average lighting (L in lux)	17	40	40	32

These results suggest the following observations:

- The average lighting level is definitely too low: an objective of 100 Lux appears reasonable,
- There are definite "black holes" at certain points on the vessels, with lighting levels of less than 10 Lux, levels normally explained by lighting system failures and lack of maintenance,
- the lighting of sensitive work stations must receive priority attention. This is true, for example, of the stations at the trawl covers, where we measured lighting levels of less than 20 Lux. It is also true of work zones presenting specific dangers, such as the approach to the rear ramp or the arm winch zone,
- the lighting level of the sea off the stern of the vessel could not be measured: following discussion with the seamen and officers, however, we concluded that the lighting was inadequate for this type of vessel.

Clinical Analysis of Occupational Accidents in Ocean Fishing

Epidemiological study of the occupational accidents has enabled us to demonstrate:

- the importance of tasks involving the operation of the fishing gear, and particularly the sweeping phase (for example, in the case of the France).
- the importance of the fishing gear and its handling in the origin of accidents occurring during these tasks.

Observation of operations on a number of sailings aboard industrial stern trawlers has led us to focus our attention on work at the covers and to examine this situation in terms of integrated safety measures.

Our approach, then, consisted of analyzing a number of accidents that occurred in this area and determining the causes, in order to define the preventive measures to be implemented. We present here the clinical analysis of an accident that occurred at the cover of an industrial trawler meeting the characteristics defined above.

Analysis of Work at the Cover

This analysis has been developed from a number of slides detailing the various phases of work at the cover.

Analysis of the Accident

Description of the Incident

It was January. The vessel was fishing at 60° north latitude off the coast of Scotland. At about 7 a.m., the vessel set out its trawl. The covers were still in position and were not experiencing traction from the trawl.

Seaman X mounted the rear port step to ensure that the rope connecting the extension to the cover (the extension connector) was not fouled. He had just changed this rope. He had placed one of his hands on the cover to keep his balance. The vessel rolled, the cover moved, removing his support, and the seaman fell into the water.

Tree of Causes

This is shown in Fig. 16 and is described below.

Comments Suggested by the Tree of Causes

- The accident occurred during the process of checking a related task which, while exceptional, was entirely normal. The extension connector was showing clear signs of wear and had therefore been replaced, and seaman X was checking it as the trawl was being set out. The accident illustrates the need for detailed analysis of work at the cover, relating to the main task, of course, but also to all auxiliary or exceptional tasks. This analysis can be effected only with the participation of all those concerned: master, boatswain, and, of course, seamen, who alone can fully describe the actual work involved and verify the description of the activity,
- To effect this task of checking, the seaman was standing on the step. Proper design of a work station requires that the work of checking, which is always necessary, be taken into consideration, implying here an arrangement of the tackle and a concept of the visual field adapted to the task,
- when the vessel rolled, the cover shifted against the stern. This problem with the locking system of the covers on these vessels had been mentioned to us on a number of occasions by seamen on various sailings.

While the application of an effective solution to prevent the risk of cover movements poses no major technical problems, it is important to consider the following two factors:

— the solution must not involve a displacement of the risk and must be properly integrated with the subsystem constituted by the cover work station,
— the solution must be flexible enough to apply to the various types of covers which are or could be used on these vessels.

Observations Made at This Work Station During Sailings Aboard Four Industrial Stern Trawlers

Through analysis of a series of slides relating to work at the cover, we have found a number of anomalies aboard these vessels.

On the basis of these slides, we would place particular emphasis on:

- dimensional characteristics,
- equipment associated with work stations of this nature.

Conclusion

In this paper, we have attempted to emphasize the importance of the systemic approach in dealing with problems of safety and living conditions in ocean fishing. The results obtained, only a very small proportion of which are discussed here, illustrate the value of this approach.

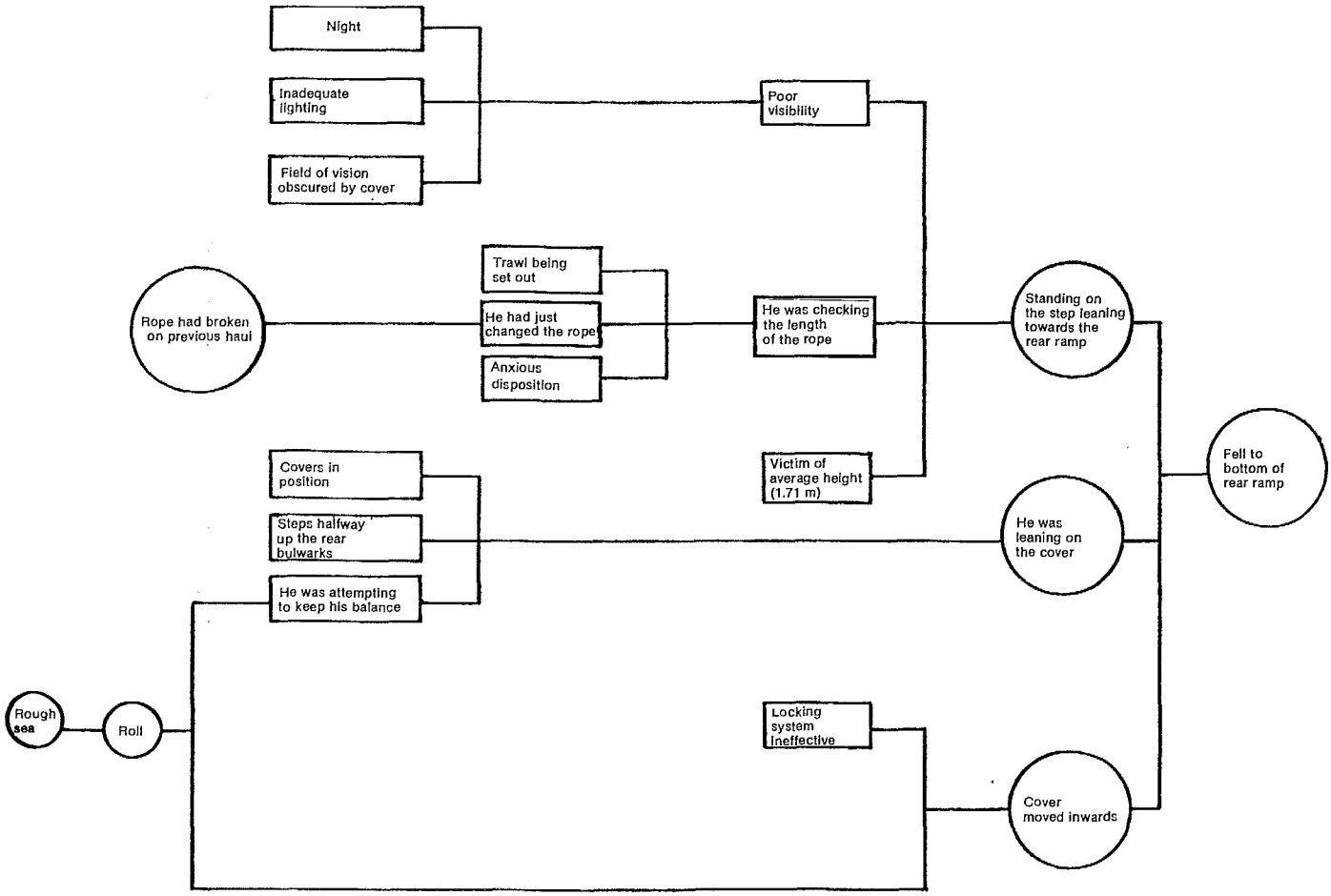

FIG. 16. Tree of causes.

We feel that it is equally important to emphasize the multidisciplinary nature which such research must reflect and the need to include the principal parties concerned: seamen-fishermen, shipowners, marine administration, etc. But this is another subject and one which would require a great deal of time to debate.

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Restraint in Workers' Situation as Determined by Organization of the Labor Process in the Fishing Industry in Iceland

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GUNNLAUGSDÓTTIR, S. S. 1984. Restraint in workers' situation as determined by organization of the labor process in the fishing industry in Iceland, p. 23–25, *In* J.-L. Chaumel [ed.] Labor developments in the fishing industry. Can. Spec. Publ. Fish. Aquat. Sci. 72.

When talking about fisheries, we often refer to Iceland and Denmark. Sara Gunnlaugsdóttir and E.B. Baldursson have studied more closely the work done in processing plants. Their presentation showed a great knowledge of the specific problems encountered by processing plant workers. The condition of women in those plants and, more generally, the analysis set out by those two researchers led all the people present at the symposium to a serious reflection.

Summary

A project was carried out in the Icelandic fishing industry using questionnaires. More than half of the men and more than two-thirds of the women chose alternatives that described their work as monotonous, with uniform movements, and as having little influence on the work process. It is shown by an index that jobs that employ women only score higher on restraint than do jobs that employ both men and women. Furthermore, there is a significant relationship between the restraint index and working positions (sitting/standing), lifting heavy things, working with bowed head, and working with concentration, whereas interruptions lead to less restraint. Finally, a great difference in degree of restraint is shown between different forms of payment for both men and women. Women working individually under productivity incentive salary systems have 50% higher restraint than those with hourly (or fixed) wages or those doing group-work under productivity incentive salary systems. For men, the restraint is 50% higher for group-work than for fixed-wage work and 75% higher for individual-work under incentive salary systems than for fixed-wage work. This shows the close connection between the forms of payment and the degree of monotony, uniformity, and influence.

On Material and Population

Our information on working conditions and the labor process in the fishing industry in Iceland comes from answers to questionnaires from a random sample of 773 persons (576 women and 197 men) that were working in the fishing industry from January to March 1982. This is during the high season, so that no students were working. The random sample was taken from a list provided by the pension funds of workers in the fishing industry. Questionnaires were mailed to home addresses in the autumn of 1982 and 10 days later were placed in a box at the factories, or were retrieved at home if people were not at work. About 97% of the questionnaires were returned, and about 95% were filled in.

A validity check has been made by comparing our data on working hours per week and working period per year with official statistical data. The check was positive. Furthermore, the average age distribution of people working constantly in the fishing industry as found out from official statistical data was very similar to the distribution of our population.

A sister project has been carried out in the Danish fishing industry. Both parts of the project were initiated and sponsored by the Commission on Equal Rights under the Nordic Minister Council. Furthermore, the Icelandic part of the project has received financial support from the Social Ministry of Iceland.

On Object and Method

There are different ways of assessing work load. We see work as an organized labor process and work load as primarily a result of that organization. The organization of the labor process aims at the optimization of the production process. This is a question of productivity of labor, partly as a result of the level of technology. By increasing productivity, we have seen differentiation in the production process that is based on measurements to simplify and tighten up the process; i.e. to reduce the content of each unit and maximize the pace (speed). How the organization of labor process changes concretely as a result of productivity demands, depends on the nature of production and its place on the world market. In other words there are different tendencies at work in the automobile industry and in the fishing industry. Whereas skilled workers and highly automatic processes characterize the metal industry as a whole, the fishing industry in northern Europe is characterized by unskilled female workers working manually under productivity incentive salary systems.

We define work load as the connection between the organization of the labor process and certain physical and mental consequences for the worker. Therefore we will more or less have to assess work load on the basis of subjective reports from the workers in question. In our questionnaire we have a general question about variety at work, a question about variation of movements during work and a question about the workers' influence on the organization of the work process. These questions are meant to construct criteria for the organization of work, or restraint. As to how the more concrete physical load can be connected with the organization of the labor process, we have asked whether people are standing, sitting, or moving while working, whether they have to concentrate hard, whether they lift heavy objects, and whether they work with bowed heads.

We have constructed a model for the purpose of creating an instrument to assess restraint in different kinds of work, under different salary systems, and comparing the sexes.

What the Concept Contains

Discussing different aspects of the organization of labor process, we are primarily concerned with uniform movements, monotonous work, and workers' influence on the work. In all three cases there is a marked difference between men and women.

TABLE 1. Uniformity, variety, and influence for both sexes.

	Uniform Movements		
	Yes	No	
Men	55%	45%	$n = 184$
Women	78%	22%	$n = 561$
P 0.000			

	Variety at Work				
	Great variety	Some variety	Rather monotonous	Very monotonous	
Men	11%	31%	44%	14%	$n = 188$
Women	6%	18%	48%	28%	$n = 564$
P 0.000					

	Influence on the Organization of Work				
	Great	Considerable	Not much	Negligible	
Men	11%	23%	25%	41%	$n = 184$
Women	3%	12%	17%	68%	$n = 523$
P 0.000					

There are certain similarities between the sexes which reflect the characteristics of work in the fishing industry. Conditions are clearly worse for the women than for the men in all three cases. More than half of the men and more than two-thirds of the women chose alternatives that described the work as monotonous, with uniform movements, and having little influence.

Looking at what the concepts contain, the relationship between the organization of labor process as it appears in variety of movements and variety at work, shows a clear connection.

TABLE 2. Uniformity as a function of variety (both sexes).

Variety at work		Uniform Movements		
		Yes	No	
Great or considerable	Men	21%	79%	$n = 75$
	Women	38%	62%	$n = 129$
Some monotony	Men	72%	28%	$n = 82$
	Women	86%	14%	$n = 271$
Great monotony	Men	100%	0%	$n = 26$
	Women	98%	2%	$n = 155$

Men: P 0.000; women: P 0.000

The majority of those who have variety also have freedom of movements. Almost all workers with monotonous work have uniform movements. We may say that monotony means to perform uniform movements, whereas this is not the case the other way around.

Variety at work is a more general question than uniformity of movements. As for the question about influence on work, we assume that it is the most general question of the organizational concepts.

The relationship between the workers possibility of influencing the work process and its organization as it appears in variety of movements is not significant. This means that we can not postulate a connection between the experienced amount of influence and work movements performed. There is a significant relationship between women's experience of variation at work, i.e. monotonous work, and their possibilities of controlling the situation, as will be seen from the following table. (The category "varied" contains the two categories from the questionnaire "very varied" and "varied".)

TABLE 3. Variety as a function of influence (women).

Influence	Variety at Work			
	Varied	Some monotony	Very monotonous	
Great or considerable	40%	48%	12%	$n = 81$
Not much	28%	54%	18%	$n = 90$
Negligible	19%	48%	33%	$n = 346$
P 0.000				

The amount of influence is combined with the monotony experienced, in such a way that less influence corresponds to more monotony.

We see that the organization concepts have different content. Workers who experience influence on the organization of their work, have to some extent monotonous work and those who have variety at work, have to some extent uniform movements.

The Restraint Index

A connection between the organizational concepts and the concrete work people say they are performing, i.e. the concrete mode of working, can be demonstrated by constructing an index for the alternatives in the questions, central to the organizational question (the question on uniform movements, the question on monotony in work situation, and the question on influence on the organization of work). The "worst" alternative will be

assigned the weight 2, the "second worst" the weight 1, and the others 0 (except for the question on uniform movements, where the affirmative answer gets the weight 2, and the negative and no answers 0).

TABLE 4. Restraint index in percentages for both sexes.

	Restraint Index							
	0	1	2	3	4	5	6	
Women	5%	5%	13%	14%	16%	27%	20%	$n = 576$
Men	15%	15%	15%	20%	14%	14%	7%	$n = 197$

P 0.000

Table 4 clearly shows the great difference between working conditions for men and women. The index (high figure: worse condition, less freedom), shows 3.9 (on the average) for women and 2.7 (on the average) for men. We can also see that 20% of the women have consistently chosen the worst alternatives, compared to 7% of the men. What is the reason for this? The fact that women have the jobs characterized by greater monotony, faster pace, and less possibility for structuring the work would be a plausible explanation.

In the following table we will look into the scores of the sexes within the different jobs.

TABLE 5. Restraint index for jobs (both sexes).

Job	Women	(count)	Men	(count)
Reception of raw material	4.3	(10)	2.7	(35)
Cutting and packaging	4.3	(259)	–	
Cutting only	4.6	(111)	–	
Packaging only	3.8	(39)	–	
Filleting by hand	4.1	(50)	3.2	(15)
Fillet-machine	3.2	(71)	3.6	(41)
Dry fish or saltfish	2.4	(89)	2.0	(70)
Other functions	2.9	(73)	2.8	(64)

The general feature of this table is the high degree of restraint for women shown as a high score on the organizational scale. The jobs that employ women only score highest on the scale. In jobs where both sexes are working, men and women do not have the same functions, as confirmed by their difference in degree of restraint. That is to say that a considerable part of the differences between the sexes is to be found in the job name. Another part of the difference can be found in the description of the work.

The job name gives important information on the work processes involved. The various job functions, however, are not homogeneous as regards the movements carried out in the process of work.

There are three different working positions, standing, sitting, and moving. As only 2% of the women say they don't usually stand at work, there is no significant relationship between the degree of standing and the index of restraint.

TABLE 6. The restraint index with regard to working position (both sexes).

	Women Working		Men Working	
	Sitting	Moving	Standing	Moving
Never	3.5	4.4	–	–
Seldom	3.4	3.7	–	–
Sometimes	4.3	3.8	2.1	2.9
Always	4.6	2.7	3.0	2.2
	P 0.001	P 0.000	P 0.031	P 0.011

Work that involves movement is clearly related to greater freedom. This is logical since there is a break in the movement patterns. Standing means more restraint for men; this tendency also holds for women. As for the sitting position, the middle categories score low, while the extreme categories score rather high. Three other factors will be considered, that is work done in a stooping position, lifting heavy things, and concentration. The answers are significantly different for women only.

TABLE 7. The restraint index with regard to lifting, bowing, and concentration (women).

	Lifting Heavy Things	With Bowed Head	With Concentration
Yes	3.6	3.7	4.3
No	4.3	4.1	3.1
	P 0.000	P 0.001	P 0.000

There is a clear tendency for less restraint in connection with lifting heavy things; this means a break in the work process. Obviously a stooping position also leads to less restraint, which probably refers to the fact that such a position can not be held for long periods. Concentration shows an opposite tendency, which means that concentration is connected with the organizational question of restraint in our data. This only holds true for the women; for men there is no such connection.

The Forms of Payment as a Conclusion of the Index

We may infer that 86% of the women and 69% of the men in our sample were working under productivity incentive salary systems. We have three categories of those systems, the category of individual bonus systems, the category of group- or "premia"- systems, and a category of time-payment. Tying the restraint index to the forms of payment, we have the assumed picture of individual bonus systems being characterized by less freedom, regardless of sex.

TABLE 8. The restraint index as a function of the forms of payment (both sexes).

	Women (count)	Men (count)
Time-work	3.1 (73)	2.1 (51)
Group-work	3.2 (128)	2.9 (94)
Individual work	4.5 (325)	3.5 (23)

Women: P 0.000
Men: P 0.003

Not only is the women's work more restrained in all cases, but the majority of men also work under the forms of payment that score less on the organizational index, as the majority of women work under individual salary systems. The table shows that higher degree of monotony of work and uniformity of movements, and less degree of influence on the work correspond systematically through the index, to a higher degree of individual dependence on the payment. Thus, women working individually as a form of payment, score almost 50% higher on the index than do other women. Men doing group-work or individual work as forms of payment, score 50% or 75% higher on the index than men that have fixed-wage work.

Work Stress in the Fishing Transformation Plants

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Performance pay is still a very common practice in processing plants. This analysis by Einar Baldvin Baldursson, within the Danish context, shows the influence of this system on the working conditions of the men and women employed in these plants and on the difficulties associated with their work.

Introduction

This paper describes some of the findings of our Icelandic/Danish research group about the conditions in the fishing industry based on Danish data. The model used produces similar results with respect to both the Icelandic and the Danish data. Although a number of important questions in relation to this model are not discussed in this paper, it gives a reasonable idea of the usefulness of this approach.

The Danish Fishing Industry

There are more women than men in the Danish fishing industry. In the last few years, however, simultaneous with decreasing employment, the percentage of men has grown to about 30%, a 100% increase over the last 10 yr.

One other major study on the work conditions in industries that employ more women was done by T. S. Kristensen (1976). This study showed that the working conditions in these branches are generally worse than in those branches that employ mainly male workers.

A comparison between our study and Kristensen's shows that, if anything, the conditions in the fishing industry are slightly worse than in those industries that Kristensen studied.

The Danish fishing industry has some problems that clearly cloud the picture of work conditions. There are on the one side problems of cold, draught, and wet surroundings, and on the other side, noise. Ninety percent of the workers do suffer from these problems which likely explains, in part, the high frequency of some illnesses, mainly infections and impaired hearing.

Our questionnaire listed 17 work conditions. On average, the workers said that six of these were characteristic of their work conditions. Apart from cold, draught, changes in temperature (from cold to hot), and noise, many workers mentioned wet and slippery floors. A surprising number also complained about chemical pollution. This is partly caused by pollution from ammoniac and partly by the introduction of new processes. Development in the Danish fishing industry means that new problems are added to the traditional ones.

The industry is also characterized by a heavy work load. For example, about 50% of the workers in the Danish fishing plants have to lift heavy equipment as part of their work. Furthermore, 63% have to work in a bent position, resulting in strain on the back.

About 47% of the workers have to work faster than they would like. This can also mean faster than they can cope with. About 48% characterize their work as utterly monotonous. Only 10% feel that they can in any way alter the way their work is done. This refers both to the tempo of work and the methods used.

The organizational aspects of the work situation are described via the restraint index (similar to the so-called Taylor-index, used in some recent surveys, T. S. Kristensen 1983).

The restraint index is composed of three elements:

1) the character of movements in work — varied vs. uniform
2) the experience of work — varied vs. monotonous
3) the experienced influence on the work process — much vs. no influence.

The answers give values from 0 to 2, where 2 represents the worst alternative (out of 4) for each question. The result is a scale going from 0 to 6, where 6 represents a work situation of uniform movements, utter monotony, and no influence.

Restraint Index	Men	Women
0	12%	3%
1	12%	4%
2	18%	11%
3	25%	12%
4	13%	22%
5	11%	23%
6	9%	25%
	100%	100%
	n = 165	329

P = 0.01%

We can see that the women's scores are higher on the index than the men's. The men's jobs are generally more varied; 48% of the women and 20% of the men belong to the two extreme categories.

Before talking about health problems we should mention that most workers average 20–30 h a week. This is because of the problems of the Danish fishing industry in getting enough raw materials. Because of this there is also less strain, because the workers have a chance to relax. Illness is less frequent

compared with a situation with full employment. Our findings about the health problems in the Danish fishing industry therefore by no means exaggerate the strain in this industry (insofar as they are the cause of these problems), but on the contrary belittle them.

Model of Illness

Our model for the development of illness is structured into three levels:

Level 1 — an immediate psychological and physiological reaction to the strains of work and work conditions

Level 2 — the development of concrete symptoms

Level 3 — the actual development of illness.

Analysis of Long-Term Consequences

In our study, it has been extremely difficult to analyze the extent of possible long-term effects (level 3). The reason is simple. Generally people do not work for more than 4–6 yr in the fishing plants. Employment has been on the decline in the fishing industry and people with 8 yr of seniority are ten times fewer than workers with only 1 yr of seniority (newly recruited).

The facts indicate that very few people are able or willing to be occupied for a long time in this kind of work. Given the unemployment in areas where there is fishing activity, it does not seem likely that all these people who are leaving the industry leave it willingly. The only alternative is unemployment or a low-paying part-time job. One of the consequences of this situation is that possible long-term effects will show up in other occupational areas. Another consequence, is that we can expect that the workers who remain are mainly those who are especially able to "survive" under these conditions. Because of these problems, our study has mainly concentrated on an analysis of reactions of the "immediate type" and the possible influence of the most important problems in the fishing industry.

General Findings about Health

We have found that more than 60% of the workers had been treated for some illness or another in the last 12 mo before they answered our questionnaire. More than one-third had been treated for more than one illness. The most frequent problem was muscular tension in the back and shoulders (21%). The second most frequent problem was pain or deformation in the back (16%).

In this context it is of special interest that 50% of the people that had been treated by a doctor were told that their illness was caused by their work, particularly in the case of muscular tensions and symptoms in the back.

Concept of Tools

As mentioned before we divided the development of illness into three levels. In this paper, however, our discussion is limited to the first level. This level includes those reactions which, over prolonged periods of time, can be assumed to cause certain symptoms, and later illness.

The concept of tools that we use at this level refers to specific types of reactions to clearly defined environmental factors. Their function is to estimate the relative effect of these conditions (whether it is the level of restraint, or the pace of work) within the overall framework of physiological and psychological reactions. The aim is to construct tools that correspond to those types of reactions that are mainly conditioned by a clearly defined set of environmental factors.

Two such reactions or concepts that we have used extensively in our analysis will be introduced here: the concept of physical exhaustion and the concept of work stress.

Physical Exhaustion

We will only discuss the concepts of exhaustion and work stress among the women that participated in our survey (as our analysis of this phenomenon so far has been focused on the women).

The concept of exhaustion is based on two questions: "Do you feel exhausted AFTER work?", and "Do you feel exhausted in the morning BEFORE work"? The concept is organized into two levels:

Level 1 includes those exhausted after work.

Level 2 includes those exhausted both after AND before work.

Exhaustion (women in the Danish fishing industry)	
Level 0 (not exhausted)	7%
1 (after work)	57%
2 (after and before)	36%
	100%

This tells something about the physical strain in the Danish fishing industry.

The most obvious explanation is the work load. We have found that the physical strain of handling heavy things contributes to exhaustion. The same goes for working in a bent position.

Purely cognitive strain — demands for concentration — does not contribute to exhaustion. This is possibly because cognitive strain is expressed in the form of stress and other forms of psychological reactions. Therefore our findings indicate that exhaustion is mostly a physiological reaction to physical strain.

The character of the work must be included in an estimate of the level of strain. A comparison between the restraint index and the frequency of level 2 of exhaustion does show a clear relationship.

Restraint Index	Frequency of Level 2 of Exhaustion
Level 0–3	25%
4–6	43%
$P = 0.01\%$	

Our model for describing the organization of work (the restraint index) does not include tempo of work. Tempo in the Danish fishing industry is mainly determined by the wage system. There are still a number of monotonous jobs in the industry where tempo is not a major problem. There is a connection between the tempo of work and the level of restraint. It is easier to increase the tempo of work in situations characterized by

uniform movements than in more varied jobs. The essential point is that a high level of restraint does not automatically correspond to an increasing tempo. However, the tempo of work in itself is a factor that influences the extent of physical exhaustion.

To examine the relative importance of the pace of work and the level of restraint, we split the women into three groups. Group 0 includes those women that felt that their work could not be characterized as monotonous and had no problem with the pace of work. Group 1 includes those who felt that their work could be characterized as monotonous but had no problems with the pace of work. Group 2 includes those who only mentioned the pace of work, and group 3 those who mentioned both. Monotony has been chosen as an indication of a high level of restraint.

Monotonous work and pace of work

Level	%	*n*
0 Neither monotony nor tempo	38	126
1 Only monotony	20	67
2 Only tempo	20	65
3 Both monotony and tempo	22	72
	100	329

Monotonous work and pace of work vs. exhaustion

Exhaustion Level	0	M 1	T 2	M + T 3	
0	48%	24%	24%	5%	100%
1	41%	21%	20%	18%	100%
2	26%	20%	22%	33%	100%

$P = 0.03\%$

As we can see there is neither an important difference between categories 1 and 2, nor a significant increase in the occurrence of exhaustion in category 3. Exhaustion does not discriminate between strain connected with the level of restraint and strain from pace of work. Exhaustion does function, mainly as an indication of the physical strain of work.

There is also a clear connection between exhaustion and work stress. Among those with level 0 in exhaustion only 10% complain of work stress. At level 1 this increases to 26% and to 59% at level 2 ($P = 0.001\%$). This relationship indicates clearly that the conditions causing each reaction often occur simultaneously. This does not mean, though, that these concepts are identical in cause or effect (the question of effect is not discussed in this paper).

Work Stress

The concept of work stress is a part of a broader stress concept. It includes those workers in our survey who indicated that they felt stressed at work and pointed out a concrete cause. These causes will be discussed later. Thirty-seven per cent of the women said that they had work stress.

One of the most important differences between work stress and exhaustion is that work stress is to a much lesser degree determined by the level of restraint than is exhaustion. The connection between the restraint scale and work stress is only valid for those women who scored 6 on our restraint index. Of those, 50% are work-stressed. Among the other groups there is no clear relationship between the restraint index and work stress. The difference between exhaustion and work stress becomes clear when we compare the relative effect of monotonous work (as a representative for the restraint index) and tempo for work stress.

Work characterized by:	% suffering from work stress
Neither monotony nor tempo	15%
Only monotony	22%
Only tempo	63%
Both monotony and tempo	71%

This table seems to indicate that tempo plays a very important role for the experience of work stress. This is partly expressed in the limited increase of the frequency of work stress in the category of combined monotony and tempo. Therefore, it seems that work stress is a much more specific category of strain than exhaustion. Exhaustion is a good criteria of the level of general physical strain. Work stress on the other hand is a more specific expression of reaction to concrete environmental problems. In our case many problems are connected with the effects of productivity increasing salary systems.

Productivity Increasing Salary Systems (PI)

The aim of PI is to increase the pace and productivity of work. In the Danish fishing industry this system is mainly based on individual productivity. Women working under PI complain much more about the pace of work than their colleagues paid by the hour.

	Pace of Work OK 1	Too quick 2	
Wage system			
Hourly wages	73%	27%	100%
PI	45%	55%	100%

$P = 0.001\%$

Although we can assume that the work load is heavier under PI than under the system of hourly wages, this does not show when we compare those two groups in respect to exhaustion.

	Level of Exhaustion 1	2	3	
Wage system				
Hourly wages	6%	59%	35%	100%
PI	10%	53%	37%	100%

$P = 0.08\%$

In this respect, there are minimal differences between these two groups. Part of the reason might be that women under PI are

motivated by the wage system itself to ignore symptoms of exhaustion. Also, the symptoms of exhaustion could be substituted or transformed by work stress.

	Frequency of Work Stress		
	No	Yes	
Wage system			
Hourly wages	77%	23%	100%
PI	52%	48%	100%

$P = 0.001\%$

In this way, PI, partly through the pace of work, contributes to work stress, i.e. PI means increasing tempo and tempo means higher frequency of work stress.

If we eliminate those who complain of the tempo of work and compare those on PI to their fellow workers whose wage is based on hourly wages, we can still see a significantly higher frequency of work stress among those who work under PI. Part of the reason seems to be that PI undermines the confidence of the individual worker in the ability of the group as a whole to act collectively. Many workers feel isolated and insecure. They feel to an even lesser degree than other workers that they can in any way have influence on their work and work situation.

The difference between the PI and hourly wages can also be highlighted in another way. As mentioned before, the participants in the survey could specify what they felt was the cause of their work stress. Among those working under PI, the most frequently mentioned causes were the *pace of work* and the *wage system itself*. Among others, the most frequently mentioned cause was the *level of restraint*.

Conclusions

The PI systems seem to contribute to work stress mainly through their effect of increasing the pace of work. These systems are in the Danish fishing industry, mainly based on individual productivity. One of the consequences is that the individual worker feels that in matters of wages and work conditions she cannot rely on the ability of the group to act uniformly.

We have been able to a certain degree to distinguish between exhaustion and work stress. Exhaustion seems to reflect the work load and the degree of restraint in the work situation. On the other hand, work stress reflects the degree of pressure experienced by the worker insofar as the wage is determined by the individual's productivity.

Health and Safety for Fishermen and Shoreworkers on the Pacific Coast of Canada

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Fisheries on the West Coast are a bit different than on the Atlantic Coast. However, the experience of these three union leaders regarding analyses and claims related to the fishermens' working conditions is particularly interesting for all those involved in fisheries. Moreover, the authors have contributed to the development of the common stand taken by the unions. Their position is set out in full at the end of the present document.

We would like to begin by thanking the organizers of this conference for letting the workers of B.C.'s fishing industry be represented here today.

One cannot talk about the benefits of industry, either to those directly involved or to society in general, without confronting directly the health and well-being of those who toil in the industry. We believe that any examination of the fishing industry in British Columbia will soon discover that a very high price indeed is extracted from workers during the production of fish. It is also easily demonstrated that federal and provincial governments have repeatedly turned a blind eye to the problems, leaving the workers to bear the brunt of inaction and irresponsibility. These are strong words, but we have a strong case.

- Between 1976 and 1981, 36 shoreworkers and fishermen were killed on the job.
- In the same period, 165 suffered permanent disabilities and 6000 injuries, serious enough to result in time lost on the job, occurred.
- Shoreworkers in B.C. suffer 50% more accidents than their counterparts in the United States.
- The average length of a fishermen's claim was 55 d, higher than any other occupation in British Columbia.
- The incidence of repetitive motion diseases is double the provincial average.
- No study has ever been undertaken to examine the occupational diseases related to fish plant and fishing work.
- It is one of the few industries where no government body takes responsibility for enforcing safety standards over a large section of it.
- For five years the UFAWU has demanded that the companies contribute a fraction of a cent per pound to a fund to establish a safety program, but the companies have refused.

The list of problems can go on forever it seems, but we wish only in this short period of time to make it abundantly clear that the fishing industry is a long way from the 20th century in many respects. And before we go briefly into each section, we want to say that our experience is that the situation will only improve when workers themselves, through their organizations, are successful in winning concessions from the companies.

Health and safety issues are seldom a question of common sense under the present industrial system and simply desiring a safe workplace will not result in the same effect. All too often safety and health issues are tied directly to the profit and loss statement of the company and a delayed expense is more for the benefit of the shareholders. Rather than advocate for workers in the industry, the government often appears to take on the role of mediator, ruling with great regularity on the side of the company because of the balance of power within the society in which we live. If the plight of fishing industry workers is to change, the road traveled will have to be not only scientific and technical, but political and popular.

The Workers' Compensation Board now covers fishermen, only because of the hundreds of fishermen and their wives who walked picket lines, lobbied government officials and brought to bear the will of the public on policymakers over many years.

Safety programs must be controlled by those who are directly affected by the operation of the industry. It will be the workers who drown, are maimed, and crippled by this industry and they must make the decisions which so directly affect their lives.

We are confident that over time we will be able to bring to bear the political and economic pressure necessary to clean up the fishing industry. On the other side of the coin is management, who for years has viewed as a sacred right management's right to control all aspects of production without interference from the workers. This right will have to be challenged daily if the necessary improvements are to be made. We

must not forget that the disastrous state of the industry today is the responsibility of the small group that has exercised control over it.

Fishing

Fishing in British Columbia has traditionally been a dangerous occupation. In the past few years, safety has been frought with problems that indicate that the subject is still in its infancy, with limited fishing times, bad weather, and the haphazard methods of hiring and training. In the industry, safety is still largely governed by the maxim, *caveat emptor*, the buyer (or worker) beware.

Fishermen have only been recognized by the Workers' Compensation Board since January 1975. Consequently, much of the regime that governs the fishermen is characterized by compensation for lost time accidents, with little or no investigation into the causes. While the board pays out the money, it has no jurisdiction over the safety of the industry. The loss of one fisherman in August 1983 remains uninvestigated at this time.

Part of the problem in the fishing section of the B.C. industry can be recognized as structural. Dominated by salmon fishing in the summer, fishermen in B.C. frequently come into the industry for a short period of time, then leave after 2 or 3 years. The long periods of time away from home make it difficult for some to cope, and with the exception of some fishing villages on the central coast, there are few social support systems for fishermen who live in one of the urban centers. Geography and isolation during fishing season cause problems in transferring injured workers from the grounds to medical facilities. As well, the breadth of the B.C. coastline makes servicing the fishing fleet and policing safety afloat a haphazard, personal choice that is frequently left to the individual fisherman.

Jurisdictional problems abound in the safety coverage of fishermen. The fishing fleet is presently regulated by the federal ministry of transport in safety matters, yet provincial bodies govern problems that arise from it (i.e. compensation).

Training in the industry is only a recent phenomenon in the fishing game. Last spring, a joint industry conference on safety was held in Vancouver which produced procedural recommendations for fishermen engaged in purse seining. Unfortunately, fishermen who worked the decks of the boats had little input, and some of the knots recommended for use were hazardous to workers. Hiring practices aboard fishing vessels may also be questioned. Frequently, a vessel owner passes over an experienced worker in favor of an inexperienced relative.

In spite of activities on the part of the UFAWU's Navigation and Safety Committee, legislation is slow in coming for the bare essentials of safety at sea. Emergency locator devices (EPIRB) are still optional equipment aboard fishing vessels, as are survival suits. The latter are left to individual crewman as part of his equipment should he wish or be able to purchase one.

Few fishermen know how to fight a fire aboard a boat. In fairness, however, there are courses offered at the Pacific Marine Institute in a program called the Fishing Master course, but again this is not a requirement for the job. First aid training is similarly considered a frill for fishermen. In spite of a high accident rate among "beachmen," for example, few crewmen have Industrial First Aid training.

The most dangerous job in the B.C. fishing fleet is that of a beachman aboard a salmon purse seiner. It requires a crewman to climb a beach with a line attached to the end of the net and to tie that line to a tree. This job is frequently carried out in periods of strong tide. The dangers of the job may be seen in the annual statistics of the Workers' Compensation Board: in 1982 alone, 11 lost time accidents were suffered by workers who were struck by beachlines. Out of a population of 500, this statistic alone bears out the danger of "working on the beach."

Much of the problem with the beachman job is one of education. A new crewman is sometimes given the job with only a brief explanation of how to tie a knot, and then is left on the beach with only 45 seconds to go from the shore to the tree and tie the knot before strain is taken. There is a superstition about beachmen only lasting 5 yr at most on their jobs; it is the "lucky" one who returns from a season of "tying-up" unscathed. It is partially for this reason, and the high amount of physical exertion required, that the job is dominated by young men.

Many fishermen operate vessels single-handed. Trollers and gillnetters leave B.C. ports by the thousands each spring, and there are the inevitable horror stories the following fall about men who were hurt on the job driving their boats with one hand on the wheel, the other wrapped around a bottle to kill the pain.

Some trollers hire deckhands as a safety measure. Here again, experience must be taken into consideration. One loss in 1979 in the Gulf Islands involved a skipper who drowned after falling overboard because the deckhand did not know how to disengage the automatic pilot. Another gillnetter lost some fingers after being thrown overboard and was in the water for 4 hours because his "deckie" did not know how to operate the clutch controls.

In spite of a long fishing history in British Columbia, safety for fishery workers still has a long way to go. Further down the line we must look at issues of occupational health, i.e. the long-term effects of outside exposure on people who work at sea. Skin cancer and eye lesions have been recognized for years in the medical community as being related to ultraviolet radiation from sunlight and both are recognized as being part of the fisherman's medical baggage. However, there has been no recognition of these issues by the WCB. Fishermen, already in crisis on economic fronts, work in a dangerous job in an unusual resource industry. What is most unusual is that in other B.C. resource industries such as forestry and mining, safety is given a high priority by the companies, whereas in fishing we are barely out of the dark ages.

Shoreworkers

While WCB regulations cover the shore section of the industry, many serious problems still face workers. At the root of many problems is the companies' attitude of paying lip service to WCB regulations and plant safety committee recommendations for action. "It's safety if we can afford it, not necessarily safety" said one plant safety committee chairman. For example, simple changes such as emergency lighting or a hand railing will only be constructed after continuous pressure from the plant safety committee.

Long hours in the industry also contributes to an increasing number of accidents. Workers can spend 14 hours a day for several consecutive weeks working on the line. This takes its toll both physically and mentally.

The production mentality exists at the expense of safe conditions for workers. A canning line continues to run at the

same pace despite the fact that a worker at the end of a double shift is certainly not as quick as he was when he started the day.

Work also comes in large amounts over short periods of time and then a shoreworker will be unemployed for long periods between seasons. This also leads to injuries on the job.

The WCB plays a role in enforcing the regulations, but this is not coordinated coastwide. In the north, regular inspections by people who know the fishing industry take place. In the south, there are no regular inspections. Work also can be mundane and methodical, allowing little time for any meaningful participation during the work day. There is no job rotation within the plant that would offer workers a change, both mental and physical.

For many diseases and injuries caused by repetitive motion, changing jobs is considered a basic precaution; however, this is never done on a regular basis. Repetitive motion diseases are never considered seriously in the plants by the company or the WCB. No studies have been done to provide a scientific basis for taking action despite the fact a walk through any plant will show that the problems are widespread.

Last year, a young man lost both his legs in an unsafe ice auger. Two weeks later, a young women in a different plant almost suffered the same fate in exactly the same way. The season before two workers lost their lives in the same way. However, neither government nor company action was taken following the accidents to ensure that it did not happen again. Only when the union launched a campaign did the problem get resolved and ice augers were brought up to provincial standards.

In some plants, safety committees barely function and in others no regular meetings are held. It is our experience that the corporations would prefer not to hold safety meetings and it is only when workers demand that they be held that they actually happen in many cases.

The key to solving the safety and health problems facing workers in the fishing industry is the workers themselves. There has to be more autonomy given to plant safety committees and members. They must have the clout to ensure that their recommendations are carried out promptly. The committee must have a say in changing the physical work area to ensure that improvements do take place. This would mean a program of job rotation, where the tedious mess of demeaning work would be somewhat relieved. This would mean that the safety committee in conjunction with shop stewards would have input and control over the production schedule to ensure that the tremendous stress on the workers is lessened, if not eliminated. This would also mean that safety would be a priority coastwide and the WCB would have authority to levy serious penalties on corporations who are not prepared to put safety up front.

The UFAWU has always demanded of the companies an industry funded safety program controlled by the workers themselves. The Fisheries Association has admitted that the cost would be miniscule in view of the current WCB assessments. Why the reluctance on this demand? The answer is obvious. The ensuing politics of this decision would enable the workers to control more managemental decisions, something the management is not prepared to give up without a fight. These proposals by our organizations would not eliminate industrial accidents in the fishing industry, but they would pioneer a new and progressive approach that would put the well-being of workers in the industry ahead of production and profit.

Productivity, Motivation, and Working Conditions in Fish Processing Plants in Quebec in Particular, and Atlantic Canada in General[1]

Pierre J. Vagneux

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VAGNEUX, P. J. 1984. Productivity, motivation, and working conditions in fish processing plants in Quebec in particular, and Atlantic Canada in general, p. 33–37. *In* J.-L. Chaumel [ed.] Labor developments in the fishing industry. Can. Spec. Publ. Fish. Aquat. Sci. 72.

Pierre J. Vagneux, who has a solid background in the management of fish processing plants, now works with Quebec's Direction des pêches maritimes and thus is equally familiar with the overall problems encountered by this industry. Here he deals with the delicate question of productivity as related to working conditions.

Introduction

This report is based on a 15-year association with the fish processing industry in Atlantic Canada, six as a management consultant concerned primarily with productivity and nine as a provincial official dealing in particular with fishery development and administration. Over the course of these 15 years, the author has observed two of the seven-year cycles apparently typical of the fishing industry, marked by the crises of 1967–68, 1974–75, and 1982–83.

In addition, these 15 years have seen major fluctuations in catches, which peaked around 1972–73, fell in 1975–76, and are now rising again as a result of the replenishment of stocks effected by the introduction of such measures as the annual fishing plans and the administration of the 200-mile economic zone.

While the search for a solution to the problem of industry viability centered in 1975 on an increase in the volumes processed, we have doubled or even tripled the quantitites today, yet the problem remains unsolved. Who would have thought, in 1975, that profits would have remained at the same level?

Conditions have certainly changed, but fundamentally the essential problems remain. In 1969, many experts had identified them; in 1983, they are still applicable.

- the disproportionate emphasis assigned by administrators to the raw material (quantitative aspect) to the detriment of the human resource,
- the chronic imbalance between catches, processing, and markets in terms of space and time, but also in terms of the range of products,
- the lack of attention to the quality of the raw material and finished products, which are lacking primarily in consistency.

These three problems condemn the industry to permanent nonprofitability. The solution, then, lies in changing direction and taking positive measures to:

a) ensure the primacy of the labor force over the raw material in the concerns of administrators,
b) promote and achieve a balance between markets and processing, but also between processing and catches, and
c) offer the consumer a guarantee (consistency) of optimum quality.

This solution is based, then, on an overall approach, the objective of which is the human resource, in terms of processing or production. We must recognize that the final product, its form, cost, and quality, depend solely on the decisions and efforts of human beings.

The Current Situation

The author reviews the situations currently prevailing in the processing industry.

Disproportionate Emphasis on Manpower over the Raw Material

In fact, if an administrator is asked what his most important resource is, or his most important input, you can be certain that he will say: "the fish." To his way of thinking, he is right, because without the fish, there can be no sales and no work; moreover, fish purchases represent 60–75% of his production costs.

Sometimes it is said that manpower is a key resource, although it represents only 15–20% of the production costs. In fact, some administrators have finally realized that the final product is the result of human labor. The way in which the work is done inevitably determines the price obtained, but also the cost of production, and hence profit levels.

Consequently, if we look at the human activity and the factors affecting it, we can see the enormous task facing administrators. Habits, attitudes, and perceptions must also be changed. In other words, it will take a major effort to ensure the primacy of the labor force over the raw material in the concerns of administrators. The following are some of the fields in which

[1]Translation of the French.

such efforts may be appropriate:

- *rejection of the concept of performance based on speed*

In many cases, we have achieved the aberration of paying the most to the person who wastes the most. In fact, speed is often encouraged to the detriment of quality and production. Example:

the gutter or filleter
175 lb of redfish at 31 %
or 125 lb of redfish at 34%
or 125 lb of redfish at 34%
or 100 lb at 37%

In this case, the question is not one of encouraging either Stakhanovism or extreme slowness; still, there is room for sustained and sustainable human rhythms compatible with quality workmanship of the highest level.

- *lack of regular inspections of machines requiring adjustment*

In most cases, these machines operate for long periods without inspection and with below-normal results. For example, there is the boning machine which is supposed to produce 90 lb of fillets from 100 lb of fillets of a given size, species, and consistency. Should we tolerate 85 or even 88, given the fact that this machine handles 2000 lb an hour? Obviously, with a yield of 88 lb, it wastes 40 lb or $48 an hour, and with a yield of 85 lb, it east up 100 lb or $120 an hour. In this case, simple and frequent checks of the machine's performance should be enough to keep it properly adjusted. A well-trained employee is fully justified.

- *lack of employee choice in job selection*

Administrators often forget that one employee is not identical to another, either in terms of motivation, requirements, or personal needs, or even, more particularly, in terms of ability. As a result, jobs are assigned on the basis of sex, and not on the basis of size or dexterity. It seems normal that a man should be a filleter and a woman a packer. Why should it not be the other way around? It is important to give more thought to this vital element of the proper matching of the employee to his job.

- *study of work stations and methods*

Few firms have established work stations and defined methods with a view to facilitating the work, ensuring a sustained level of performance, reducing fatigue, and minimizing accidents. Are efforts being made to save motion? Is there anyone in the firm responsible for the continual improvement of work stations and methods, with training in the techniques of work analysis?

- *lack of employee training and follow-up*

Even with an employee chosen on the basis of his ability, and with an appropriate work station and optimum working methods, someone must be responsible for introducing the employee to his new work, for handling follow-up, for assisting him, for correcting his errors, and for finally confirming him in his job or training him for another? The lack of follow-up and proper matching procedures are very costly to the firm and, as a result, to the labor force in general.

If it is possible to fillet redfish at a rate of 34 or 37%, if the average for the line is 32%, should those who do 28% be kept on, and should 32% be considered normal for the line? These questions must be asked, and answers must be found.

In all these cases, however, administrative methods come into question. The administrator plays a key role in the improvement of his firm's productivity. A system of control and production planning must be established, data analyzed, and action taken to correct existing problems. An overall policy with respect to work analysis, rhythms, and training and selection of employees is essential.

Imbalances Between Markets, Processing, and Catches

The Atlantic, and particularly the Gulf, fisheries are inevitably subject to an off-season extending from January to April and characterized by the presence of ice, climatic conditions dangerous to navigation and fishing, and a reduction in fish concentrations.

Each species, moreover, has a cycle of availability and migrations of varying importance. Mobility (fleet autonomy) dictates, to some extent, the regularity and abundance of supplies. An inshore fleet produces heavy landings over a generally short period, while a semi-deep-sea and deep-sea fleet offers more regular contributions over a longer period.

Fishing, then, normally occurs from April to December, and the processing plants follow the same cycle. Employees are hired in repsonse to the rate of supply, which is highest in late spring and early summer.

The markets generally require fish year round, particularly during cool weather, but increased demand is observed in the winter, during the cold period. Our markets, most of which are located in the northern hemisphere, impose this cycle of demand on us.

The administrator must therefore establish a balance with his supplies, and hence his fishermen, his employees, but also minimize/optimize his facilities (investments). Ideally, processing acts as a buffer or regulator between the fishing cycle and the consumption cycle and, for obvious reasons, regularity of employment is desirable, if not desired.

The imbalance, however, is all too evident. Huge investments lie idle in port over the weekends, with some boats spending 50 to 100 of the 230 days available tied up at the dock. Plants operate 5 days out of 7, with a single shift. Work weeks of 10–15 and 20 hours are common. There is room, then, for some reflection and better planning and balancing of the desires of all parties concerned, within a context of economic profitability.

Later we shall describe a number of possibilities based on compromises between these interests.

Lack of Product Consistency

The lack of consistency in the product and the reduced quality associated with processing and handling delays also cause firms enormous losses. These losses are not inevitable and could be avoided.

Quality begins, of course, on the boat. In fact, the fishing gear and shipboard handling and storage procedures play major roles. Fish that live between 2 and 6°C must not be warmed any more than necessary and should be kept alive or gutted at a very low temperature, between 0 and 4°C.

The fish should be processed as soon as possible after it is caught, but also as soon as it is unloaded. The fisherman may

respect his contract to deliver quality fish, but if there is no plant able to take his fish over the weekend or for several days, what is the advantage? Fishing schedules are frequently irrational. Fishermen come in on Friday, or even Thursday, to be sure of selling their fish, and thus unload before the weekend, and go out again Sunday evening. This ensures a more pleasant family life. However, the result is a shortage of supplies on Monday, Tuesday, and Wednesday, and a glut on Thursday, Friday, and Saturday morning.

Processing quality and costs thus fluctuate, with negative results for the firm's profit levels.

How can we satisfy the objectives of better quality, the only assurance of better prices and profits, of stability and growth for the firm and of job (and income) security for its employees?

Viewpoints of Those Concerned (Human Resource)

What, in fact, do each of the parties want?

The Fishing Boat Owner

Like any businessman, he wants to make a profit on his operation by making optimum use of his property. In the Gulf, the fishing season extends from mid-April to mid-December, depending on the size of the boat and the availability of fish during this period. The fisherman wants to maximize his income, that is, to catch as much fish as possible, with the fewest possible problems. He wants an outlet that is prepared to buy his fish at any time, not only to avoid delays in unloading, which frequently lead to deterioration in quality, but also to enable him to put out to sea again as quickly as possible.

The fishing boat owner has a moral obligation to make full use of his license. In fact, these licenses are issued only in limited numbers and offer access to a renewable common resource. His decision to return to his fishing must reflect this moral obligation. He also has a certain obligation to the plant, his outlet, and both must make compromises.

Crew Members

Crew members want a guarantee of good-paying jobs which will make them eligible for unemployment insurance benefits. They also want a weekly rest period, like the rest of society and their families. However, we have to remember the seasonal nature of fishing and its relatively short duration (maximum: 32 wk). At the present time, dockside rest/leisure periods are 2–3 days long, and are extended only by damage to the boat or the closing of the fishing season.

The Plant Manager

Like the fishing boat owner, he must make a profit to ensure the survival of his firm. He must guarantee his employees regular employment if he wants to keep them, but he must also offer an outlet for the fisherman.

The fluctuations in supply, widely varying schedules (with major implications in terms of costs, and employee incomes as well) and conditions governing overtime, weekend, and holiday pay have serious repercussions on profits, to the point that production on such days is often neither promoted nor encouraged. In addition, even when such production occurs, absenteeism is so high that the willingness to operate often leads to negative results.

Any effort to regularize employment must be considered desirable. We whould also note the difficulty of maintaining employment towards the end of the season, particularly if the employees have accumulated enough unemployment insurance credits and the firm cannot guarantee a minimum income.

Processing Plant Employees

This group is interested in jobs that are as stable as possible, in other words, predictability. Most of the employees want a way of becoming eligible for unemployment insurance benefits when there are no other jobs in the area.

The employees want decent incomes, honest working conditions, but, most of all, stability.

There is nothing stimulating about sitting at home waiting to be called back to work, or about working only 10–30 hours a week.

Finally, the quality of life and leisure time represents a conflict during the summer, since the summer period also corresponds to the period of maximum landings. Is it possible to reconcile the seasonal nature of fishing (nothing during the winter, a peak during the summer) with the workers' legitimate desire for leisure time and summer holidays?

Working conditions need improvement. In many cases, the basic health elements (in the Herzbergian sense) do not exist. How, than, can we speak of motivation and improved productivity? Rest areas, bathrooms, health facilities, parking, participation in company life, job security, working conditions, including noise, lighting and humidity-temperature levels, and, of course, cosmetic aspects inside and outside the plant: in all these respects, we are far removed from the conditions that reign in similar enterprises.

The State

In this context, the State, which is concerned with social and economic factors, observes the inadequacies in the system, its inefficiency and, of course, the costs borne by society.

The lack of regular jobs and their division among different individuals represent social costs. The marginal profitability of the industry, perpetuated by the braking effect of certain practices resulting in the underutilization of available facilities and equipment and the short fishing period, make it impossible to visualize any improvement in the industry, which must be based on profitability.

The State must therefore encourage and promote any approach or proposal likely to release the industry from its present impasse.

Towards a Solution

The ultimate objective is to make the fishing industry strong and viable. In Quebec, climatic conditions and the availability of fishing resources create a number of constraints. Despite these constraints, it is quite conceivable that better use could be made of these resources than has been evident to date. We can take a new, serious look at what we are doing individually, collectively and, of course, corporately, and take steps to ensure longer, more stable employment, which will ensure profitability, the assurance of well-being, better working conditions and, indeed, of employment conditions.

We must therefore attempt to achieve this profitability, this productivity, in the following ways:

1) by making better choices of products
   " " " choices of methods of production
   " " " choices of work schedules
   " " " choices of production
   " " " choices of markets
2) by reducing waste in all forms:
   — wasting of time
   — wasting of raw materials
   — wasting of energy
   — wasting of production capacities (underutilization)

It is essential, then, that we take a new look at the work contracts of those involved with the maritime environment, and that we do so within the framework of the problems facing this environment, with solutions from the environment.

Each of the four key parties must make a commitment to the others. The industrialist who attempts to provide continuous employment must be assured that manpower and fishermen will be available. The fisherman who is making the effort to fish must be sure of a constant outlet for his product, just as the employee needs stability of employment, with clearly established schedules. At the same time, changes in methods, new types of production, the modernization of equipment, and the introduction of microcomputers will require adjustments by the labor force and its cooperation as well.

What we see, then, is extensive interaction among the four parties concerned, and a need to review and revise the existing social contract. The survival of the industry and of the maritime regions which depend on it is tied to this thorough review.

Health Elements Required for Motivation of the Labor Force

Actual Working Conditions

In Quebec, the rationalization of the processing industry must be completed by December 31, 1984. After this date, any establishment failing to meet the minimum standards required by the law will remain closed until it does comply and obtain from the Department a permit satisfying the public interest. Application of the law should go a long way towards dealing with many of the points affecting working conditions and the atmosphere in these plants.

Related aspects — rest rooms, parking, cosmetic aspects — may be settled by a joint committee within the firm.

Employment Conditions

These include not only the duration and intensity of employment, but also work schedules.

Duration of Employment and Intensity of Employment

The employees prefer continued employment for a short period, rather than the distribution of employment over a longer period. It is important, then, for administrators to plan their production in such a way as to offer stable employment, using the fish brought in by the fishermen and also regularizing production by purchases from outside the region (as is done in New Brunswick) and storing preprocessed or partially processed products. This is one of the administrator's primary responsibilities.

Work Schedule

The current work schedule is generally 5 days, with the weekend free. If landings are larger, Saturday and overtime are used as buffers, and finally, if the need develops, another shift is set up.

The present system still represents a break in processing continuity (weekend), resulting not only in underutilization but also in deterioration of the product reaching the port (where it is stored on board the boat or at the plant). In addition, the situation results in underutilization of the fleet.

How, then, can the plant be used 7 days out of 7, and employees offered a better quality of life during the summer season?

We might suggest the idea of having morning and afternoon shifts, rather than day and night shifts, or of combining with three shifts operating on a morning — rest — afternoon rotation, according to some appropriate cycle, with the rest period either divided into blocks or shared. This is certainly a new idea for the fishing industry. However, this type of schedule already exists in many industries and services: police, the steel industry, hospitals, airlines, etc. This schedule offers a number of advantages, almost identical incomes, the opportunity to plan leisure time, and a substantial amount of free time, even during the working period.

At the same time, fishermen should seriously study models involving groupings of fishing operations, either as owners or management companies, which would permit the application of the concept of crew rotation (5 crews for 4 boats). Such rotation would ensure optimum use of the boats, more desirable rest cycles, and similar incomes. With this option, the rotating fleet must have good logistic support on land.

Actual Productivty

Administrators and employees must accept reality, and productivity must become an essential goal for capital and labor alike.

Productivity, however, must not be seen as an axe which will cut jobs. A productivity operation can maintain and even increase employment. In many cases, productivity means reducing waste through a series of precautions, which tend to demand more of the labor force. The emphasis on quality should also justify additional manpower.

Productivity must be attacked objectively by administrators and understood by the labor force. There are many possible approaches, including:

Production

1) examination of industrial methods and work study, analysis and criticism
2) establishment of a system of production control permitting production testing at strategic points
3) definition of standard working methods and standards
4) balancing of production lines and organization of work stations
5) program of personnel selection, training, and assignment based not only on aptitudes and job requirements, but also on the skills to be assimilated.

6) optimum utilization of landings for identified products
7) serious evaluation of the processing methods selected — fresh, fast frozen, extraction of meat, precooked products — taking into account value added in terms of the unit of supply
8) mixed methods of calculation of cost price — direct cost and allocation of general costs — to provide a more rational basis for decisions relating to production or nonproduction and to establish relevant units of volume
9) choice between incentive and hourly wages, as required.

Motivation

Motivation will come with the improvement of working conditions, employment conditions, and as the work itself becomes more pleasant.

Joint production committees, quality control groups, information on the "health" of the firm, introduction of job enrichment techniques, and development of a new social contract among the four partners: these factors constitute the ingredients for motivation, a source of improvement and achievement and, of course, innovation.

In conclusion, the four parties involved must establish a new social contract based on the realities of the maritime environment. The productivity of the firm is dependent on productivity and working conditions. Motivation will ensure the survival of the industry.

Audit of Seafood Handling Techniques Aboard Fishing Boats[1]

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Intervention with fishermen to facilitate the evolution of their working methods and the training available to them must meet real needs and fit the very specific context of this industry. Here Ghislain Masson describes the approach taken by a team from the Department in attempting to encourage masters and crews to adopt new forms of behavior in response to the problem of fish quality.

Introduction

Under Bill 36, the ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec was to begin, as of April 1, 1984, to classify seafood products landed in Quebec on the basis of freshness. The classification was to be performed on entry to the plants by a team of specially trained graders.

Although it is an important step, the classification of seafood products alone cannot ensure landings of quality products. A production or processing system consists of changing inputs (in the case of fishing operations, maps, information, ice, bait, fuel, food, properly equipped boats, etc.) into an output (quality fish on plant entry). See Fig. 1.

The other elements are:

1) equipment and machinery and its sequence of installation
2) methods and instructions
3) personnel.

The quality of the output (in this case, the quality of the raw material supplying the processing plant) depends on the interactions and interdependence of the four elements already mentioned, that is:

1) equipment and machinery and its arrangement
2) instruments of control
3) methods and instructions
4) personnel.

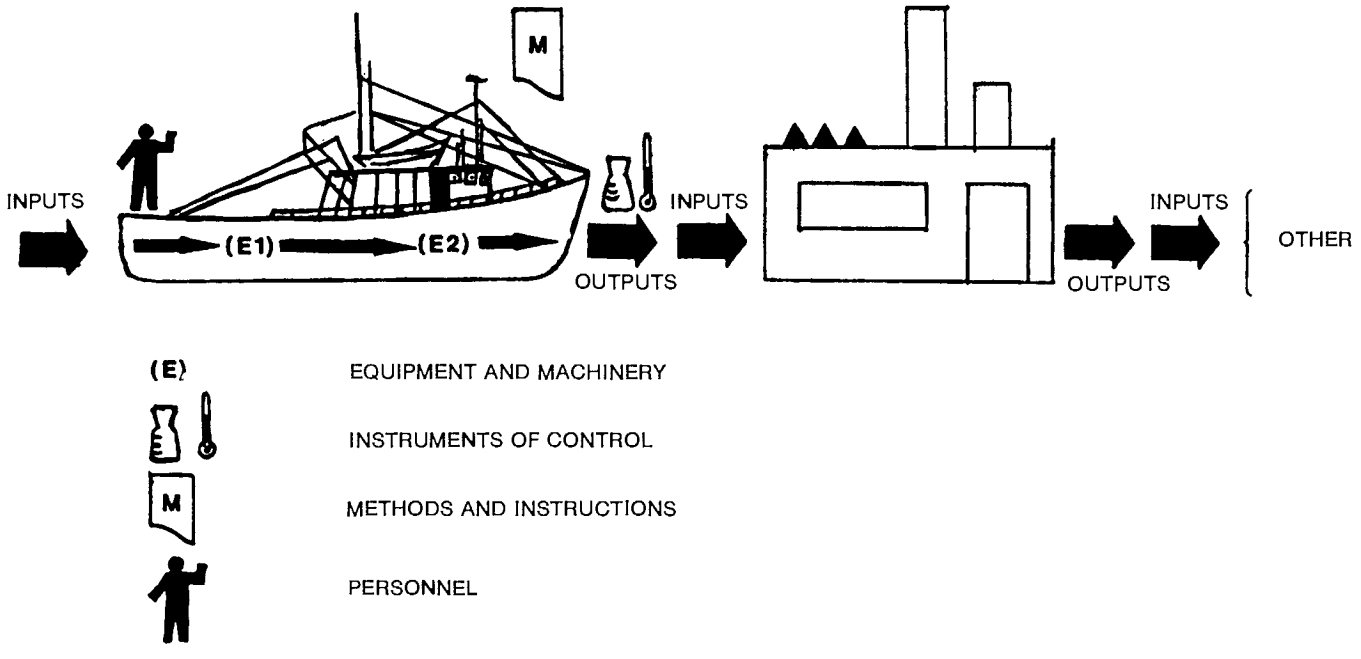

Fig. 1. Seafood production system and its elements.

[1]Translation of the French

The interaction and interdependence of the elements of fishing operations were presented to fishermen during an introductory information tour through Quebec's fishing areas in the spring of 1983.

This tour covered four elements (see Table 1):

a) subsidy programs
b) grading of fish on landing or on plant entry
c) presentation of adult training programs by the Centre spécialisé en pêches maritimes.

In addition to the information tour, the same team prepared an audit project to assess specific situations within given operations or units with a view to permitting the application of corrective measures. "An ounce of prevention is worth a pound of cure." Here we introduced a new concept, using what might be termed an "audit of good production practices" or quality audit, defined as a methodical examination of a situation in comparison to a model for the purpose of reducing any discrepancy in quality to zero or maintaining conformity with that model.

TABLE 1. Elements of the information tour.

Elements of the information tour		System counterpart
A	Subsidy programs	Equipment and machinery
B	Grading of fish on landing or on plant entry	Instrument of control
C	Presentation of films: "La qualité commence à bord" (Quality Begins on Board) "Le poisson se mange frais" (Fish Must be Fresh) and explanation of laws and regulations	Methods and instructions
D	Presentation of adult training programs by the Centre spécialisé en pêches maritimes	Personnel

Besides the audit, we prepared a form to determine the costs of these operations. It is impossible to talk about quality without establishing its cost.

However, in this presentation, we shall concentrate primarily on the audit aspect of our project.

I would also like to point out that the objective of the first year of the project was to develop an instrument and personnel capable of performing such audits on seafood production units.

Process of the Project or Preparation of the Audit

Before preaching the gospel to others, it is wise to begin at home, and for this reason, our first efforts were directed at informing the personnel involved in Project "Top Quality" about our project.

To do this, we held a "quality week" within our division, during which we reviewed the concept of quality and learned to define it as those characteristics of a product or service that will enable it to satisfy the user at a given price.

We were then able to add further detail to this definition in relation to:

quality of design: the development of the quality working documents required for preparation of the product

quality of production: preparation of a product meeting the firm's specifications and quality policy

quality of performance: verification that the product provides the service expected by the consumer.

In the course of this week-long program, we then presented a number of films, including "*La qualité, clé du succès*" (*Quality, the key to success*), documentaries on good seafood handling practices and on the cleaning of fishing boats and processing plants. In addition, we discussed the hows and whys of the laws and regulations governing the operation of the fishing industry.

Once the personnel were familiar with the hows and whys of quality, the real work began, with the preparation of a working plan.

The second stage, then, or the first stage of the working plan, consisted of the definition of a model of fishing operations, since the audit consists of an assessment of reality against a model. Because we did not have a complete model, we had to produce one, and, to do so, we analyzed the existing laws, regulations, and standards, and consulted technical and scientific documents, both national and international.

Working from these documents and from the experience of the group as a whole, we were able to prepare a draft outline of good handling practices appropriate to Quebec operations. Note that we call this document a draft: it cannot be considered definitive until it has been repeatedly assessed against reality.

Once this document on good handling practices had been prepared, an audit form was drawn up. This related to groundfish, crab, and shrimp operations. At the same time, a cost breakdown form was developed. Since this paper has to do with the audit, we shall concentrate primarily on the form that relates to this aspect.

The audit form was divided into four major sectors (Table 2), identified as follows:

Sector I: Preparations and catch
Sector II: Storage
Sector III: Landing and transportation
Sector IV: General sanitary aspects

For each sector, we defined: stages, elements, and subelements. For example, for sector I, preparations and catch, we identified 12 stages (Table 3):

1) loading the ice
2) loading the bait
3) setting out the gear
4) cleaning at sea
5) cooling the deck
6) bringing in the catch
7) killing the catch
8) emptying the crab traps
9) sorting
10) bleeding
11) gutting
12) washing the catch

In the majority of cases, the stages are divided into materials and methods. For example, we divided the entire operation into 31 stages consisting of over 200 subelements, divisions, or points of evaluation. It should be noted that these apply to all of Quebec's fisheries.

Once the materials — that is, the audit form and the cost breakdown form — were available, the entire working group received 2 weeks of further theoretical and practical training.

The first week dealt with theory: explanation of the financial aspects of operating a fishing boat, boat nomenclature, types of fishing, approaching the clientele, and very detailed explanations of shipboard handling procedures. The second week,

TABLE 2. Audit sectors.

I		II		III		IV		General average
01	Loading the ice	13	Placing in hold	15	Emptying the hold	30	Sanitary facilities	
02	Loading the bait	14	Storage	16	Cleaning the deck	31	Sanitary methods	
03	Setting out the gear	22	Holding (shrimps)	17	Grading			
04	Cleaning at sea	23	Cooking (shrimps)	18	Weighing			
05	Cooling the deck	24	Cooling (shrimps)	19	Transfer of containers			
06	Bringing in the catch	25	Freezing (shrimps)	20	Transportation to the plant			
07	Killing the catch	26	Placing in containers (crabs)	21	Cleaning in port			
08	Emptying the crab traps	27	Emptying containers (crabs)					
09	Sorting	29	Replacing in containers (crabs)					
10	Bleeding							
11	Gutting							
12	Washing the catch							

TABLE 3. Example of audit form for one sector. Sector 1: preparations and catch.

Stage	Elements	Sub-elements/divisions	No. Score	Observations
Ice			01	
	Materials		011	
		Approved ice	0111	
		Replacement	0112	
		Type	0113	
		Quantity	0114	
	Methods		012	
		Production	0121	
		Storage	0122	
		Transportation	0123	
		Loading	0124	
		Tools	0125	
Bait			02	
	Materials		021	
		Freshness	0211	
	Methods		022	
		Transportation	0221	
		Loading	0222	
		Storage	0223	
		Baiting	0224	
		Disposal of ice	0225	
Setting out the gear			03	
	Method		031	
		Duration	0311	

which dealt with practical aspects, included: a visit to the docks, landing facilities, boat cleaning techniques and, finally, a visit to the facility used by the graders and their working procedures (in operation on an experimental basis in 1983).

First Audit Tests

Once the team for Project "Top Quality" had been trained, members performed their first audit tests aboard fishing boats. At this point, we would like to discuss the difficulties involved in performing these audits within the seafood production system.

The Physical Environment

Seafood production operations take place aboard fishing boats and are thus very different from other types of production or processing systems, which normally occur on land in larger areas and according to more predictable schedules. The audit of an agrifood plant, for example, is necessarily less difficult.

In addition, fishing boats, at least the majority of those used in Quebec, have been designed to hold the crew required for the operation in the minimum amount of space. There is generally little or no room available for the auditor. This is not a problem with processing operations on land, since in most cases a technical team can always find room to set up and do its work. In selecting boats for our tests, one of our first concerns, then, was whether there was room for an additional passenger.

Schedules and Seasons

Operations occur on only approximately fixed or predictable schedules, and voyages may last for several days; as a result, it is difficult to plan audits. For our first tests, we wanted to avoid long periods at sea — 1 week, for example — so that we could do a larger number of audits and also control the cost of the project, since we felt that an audit concentrating on 1 or 2 days of fishing would be more useful than one dealing with a week-long voyage. Our second criterion for selection of the fishing boats was thus the anticipated length of the voyage.

Even after arrangements had been made, we were dependent on the weather, and schedules were frequently changed as a result.

In addition, the fishing period can affect the volume of the catch, as fishing conditions can. The audit should therefore be performed at different times of the year to permit a better view of the situation. This year, our work was concentrated primarily at the end of the season. We were unable to consider the beginning of the season, when catches are larger.

The Form and its Use

Performing the audit involves filling out a form on which the various elements of a processing or fishing procedure are listed. The model that we developed covered groundfish, shrimp, and crab fishing operations, classified on the basis of the types of fishing gear involved, particularly in regard to groundfish: inshore trawling, deep-sea trawling, etc. As a result, the form used included all the elements for the various kinds of fishing and so was too bulky (15 pages).

Since there are almost as many fishing systems as there are fishing boats, there were several elements of the form which did not apply, and consequently it was unnecessarily long.

The specific conditions of fishing operations — limited dimensions, very humid location, and unstable environment — made it difficult, if not impossible, to move around the boat with forms and pencils during operations. Since the auditor could not assess the various elements as they took place, he would form a general idea of the situation and fill out the form at a more convenient time and place. As a result, facilities had to be examined without the audit form to assist the auditor's memory.

Besides the audit form, the auditor had to fill one out dealing with the breakdown of costs, and this required a certain degree of availability on the part of the crew, which was difficult to obtain. One fact might be noted: the period of greatest availability occurred when the boat had a mechanical breakdown.

The Territory To Be Covered

In our working plan, we had expected to cover certain landing points throughout maritime Quebec, but, for various reasons, we had to restrict our activities to the immediate region of Gaspé. The major factors that kept us primarily in the Gaspé region were evaluation of the various tests (returning as a group) and the difficulty of planning the audits for various reasons.

The Auditor

The personnel assigned to these duties must have good sea legs for various sea conditions and various types of boats. This fact was brought home to us during our tests, when several of our most experienced people in terms of time at sea were personally endangered by heavy seas.

Because of the limited accommodation available on fishing boats, the single auditor on board had to fill out both the audit form and the cost breakdown form; auditors must therefore be generalists and understand the overall aspects of operations management.

The evaluation of the situation is, in most cases, subjective, and so there is a problem with respect to scoring and uniformity among the various situations and the various auditors. In an effort to clarify and correlate their scores, the auditors worked together to identify, for each element, the situation that should receive the maximum number of points, and evaluated the various situations encountered. With the possible exception of dockside facilities, it is difficult to calibrate the auditors' scores because they do not have simultaneous access to a given situation.

An early return to shore by the auditor could have cost us quite a bit of money, in some cases, since some fishing captains demanded compensation for their lost income and the additional expenses occasioned by the detour. We were therefore obliged, at least at first, to be extremely selective in choosing the types of fishing to be assessed. An early return as a result of illness, for example, would have seriously affected our budget.

Reactions to the Audit Technique

Technical Personnel

This type of activity was not immediately accepted: first, its utility had to be demonstrated, particularly since technical personnel are often still interested more in quality control (analytical techniques) than in quality management (all activities designed to produce a quality product at optimum cost).

However, once the idea was sold to them, it was easy to see the advantages of this instrument:

— ability to analyze a situation (a boat)
— ability to identify the performance of an operating unit
— measurement of the possible evolution of the sector
— better identification of problems.

Our division, like any other, is strongly oriented towards final goals. Since this action is aimed primarily at ensuring that Quebec's seafood products achieve certain levels of quality, it was clear that the audit and establishment of good handling practices (byproduct of our project) were means of ensuring the quality of Quebec's seafood products.

Fishermen

The reaction most commonly encountered among fishermen related to the profitability of landing quality products, since they believed that there would be a price differential in relation to quality; very few, however, recognized the possibility of reducing operating costs and improving quality at the same time.

Our activities with the fishermen were marked by a great deal of uncertainty and insecurity. As a result, product quality and related aspects were frequently considered secondary. However, once they understood the purpose of our intervention, two types of reaction or behavior became evident:

— those who had confidence in the audit instrument and saw it as a means of establishing good handling practices. This group included fishermen who had already recognized the importance of certain actions in landing quality products,
— there were also some who had limited confidence in our approach. These fishermen demonstrated a certain fear of being unable to observe good handling practices.

In addition, in many cases, they considered the auditor as a grading inspector, rather than someone who was trying to help them.

Trainers or Teachers

We were warmly received by the Centre spécialisé en pêches maritimes, which delegated two resource people to join the working group.

The exercise of preparing a guide to good handling practices enabled them to break the operation down into simpler elements and thus to channel their training along these lines.

The Future

The objective of this year's study is to develop the "audit of good handling practices" as a working tool and to determine the method of operation.

Once the instrument is developed and tested, we would like to establish an intervention group which could apply it to Quebec as a whole, in order to:

1) correct specific situations in response to particular problems, such as poor landing quality,
2) quantify the state of a situation for a group of operations,
3) follow the progress of Quebec's fleet in achieving conformity to a given model,
4) establish the relationship between an operation model and the quality of the seafood products landed,
5) and, finally, improve good handling practices in terms of both cost and quality of the products landed.

To achieve the goals of the audit of good handling practices, we must adapt the instruments (forms, theoretical model) to each situation; as a result, it is already planned that all the elements be developed for text processing and that the auditor, before performing the audit, prepare forms appropriate to the operation he wishes to assess. In addition, the format must be reduced and reproduced on suitable materials (format, paper, etc.); the experience of biologists should be useful in this respect.

Because of the specific situation of fishing operations, it is impossible for us to send an army of specialists, given the limited space available for them on fishing boats. In addition, since the area to be covered is relatively vast and we do not have the transportation facilities available in major centers, we must develop another approach.

We must therefore train generalists who are equally familiar with:

1) good handling practices
2) the establishment of costs of production or financial management of fishing operations
3) the administration of maintenance and safety elements
4) subsidy programs
5) laws and regulations
6) organization of the industry
7) fishing equipment, etc.

In short, we must train personnel with an overall approach to the situation of fishing operations, since we do not want to see a solution in one discipline become a problem in another. However, these generalists must be equipped by specialists like ourselves and supported by more highly developed areas of expertise.

With a more specific application, cost-benefit relations may enable us to develop better models of good shipboard handling practices.

Conclusion

The fishing industry, like the other sectors of agrifood production, must adapt to modern management techniques, and there is no reason that it cannot do so. We can draw confidence from the example of the evolution of the dairy industry.

Furthermore, if the fishing industry is to be profitable, it must produce a product that meets the needs of the user; good handling practices are a tool which will enable the operation to ensure that the means it implements lead to the achievement of its ultimate goal: the landing of a product that meets the needs of the user.

The audit is a means of diagnosing existing or potential problems, and the systematic approach, encompassing all the elements of the system, together with their interaction and their interdependence, is marvelously suited to the audit of good handling practices.

Comparison of Productivity in the Fishing Industries of Newfoundland, Iceland, and North Norway: Some Initial Observations

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COPES, P., AND O. FLAATEN. 1984. Comparison of productivity in the fishing industries of Newfoundland, Iceland, and North Norway: some initial observations, p. 43–59. *In* J.-L. Chaumel [ed.] Labor developments in the fishing industry. Can. Spec. Publ. Fish. Aquat. Sci. 72.

Having been actively involved in the analysis of the development of the fishing industry for several years, Parzival Copes is no doubt one of the most knowledgeable persons in the field in Canada. The analysis he presents, in cooperation with Professor O. Flaaten, gives us an overall view and enables us to better understand development opportunities in the Canadian fishing industry.

Introduction

This paper records some of the preliminary findings of a research project designed to compare and analyze fishing experience in three zones of the North Atlantic (Fig. 1) that have many features in common, but also exhibit important disparities. The project aims to assess the relative economic effectiveness of fishing operations in Newfoundland, Iceland, and North Norway and relate this to differences both in endowment and institutional performance. Factors to be considered include the resource base, conditions of resource access, location and environment, fishing technology and strategy, demographic characteristics, political organization, trade relations, and cultural practices. In the final analysis, the purpose of the project is to help identify the most effective fisheries policies and development strategies and assess how they may help to generate greater benefits for lagging sectors of the fishing industry in the areas under study.

In this paper the analysis will be confined to comparisons of major relevant features in the three zones concerned, drawing on readily available sources of information. The patterns that emerge from these general comparisons will be used to identify factors that offer plausible explanations for major differences of economic productivity in the fishing industries of the three zones. In future papers the authors hope to offer a more detailed analysis leading to more refined conclusions and implications for policy.

Political and Economic Status

The three fishing zones compared in this paper represent jurisdictions that have distinctly different political status: Newfoundland is a province within a federal state, Iceland is an independent country, and North Norway is a region comprising three counties of a unitary state.

Newfoundland, which jurisdictionally includes both the island of Newfoundland and the coast of Labrador, was once an independent dominion within the British Commonwealth. As the result of a severe economic crisis, it requested that Great Britain assume responsibility for government of the country. In response, in 1934, Britain placed Newfoundland under the authority of an appointed Commission of Government. After World War II, a referendum was held to determine anew Newfoundland's status; it joined Canada as a province in 1949.

Canada is a federal state in which the constitution has reserved sovereign jurisdiction over many areas to the provinces. However, jurisdiction over "Sea Coast and Inland Fisheries" is assigned specifically to the federal government. The provincial government, on the other hand, has jurisdiction over areas such as "Property and Civil Rights" and thereby retains several responsibilities relevant to the fishing industry, e.g. the licensing of fish processing plants.

In terms of economic conditions, Newfoundland has been considered Canada's most depressed province ever since it joined Confederation. Among Canada's 10 provinces, it has habitually had the lowest per capita personal income. In 1980, it stood at $6343 against a national average of $9913 (Copes 1983). Newfoundland depends heavily on transfer payments from the federal government to maintain its income level, low as it is. But with Newfoundland having only 2.4% of the national population (Table 1), the Canadian government finds the task of supporting income in the province relatively easy.

TABLE 1. Population data for Newfoundland, Iceland, and North Norway, 1971 and 1980

Item	Newfoundland[a]	Iceland[b]	North Norway[b]
Population total			
1 January 1971	519 000	204 600	454 100
1 January 1980	564 500	228 300	469 700
As a percentage of national population			
1 January 1971	2.4	100.0	11.7
1 January 1980	2.4	100.0	11.5

SOURCE: [a]Statistics Canada, *Quarterly Estimates of Population for Canada and Provinces*; [b]Flaaten (1983), p. 3.

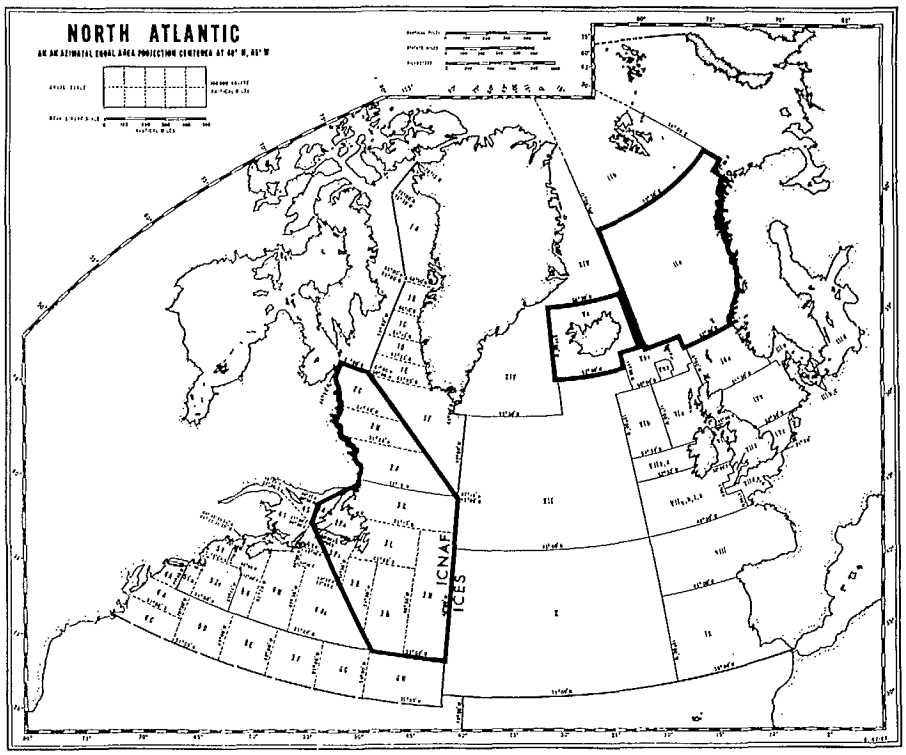

FIG. 1. Newfoundland, Iceland, and North Norway zones.

In terms of economic performance, Newfoundland falls even further behind the national average. Per capita output is little more than half of the average for Canada (Table 2), while the unemployment rate is about double the national rate (Table 3). In addition, there are many "discouraged workers" in Newfoundland who remain outside the labor force, which is apparent from the very low labor force participation rate (Table 3).

Iceland has had the status of a separate sovereign country following a constitutional accord with Denmark concluded in 1918. Remaining joint institutions with Denmark were abolished during World War II. The national government of Iceland has sole jurisdictional responsibility for the country's fisheries and must rely on its own financial resources in discharging that responsibility. Iceland had a population of only 228 300 in 1980, which was less than half the population of North Norway and only 40% of the Newfoundland population (Table 1). Despite its very small base, Iceland has performed at an impressively high economic level. OECD statistics show that the country has had a consistently favorable performance in per capita gross domestic product. Since 1960, the country has ranked annually between second and thirteenth among the industrially advanced countries of the world, and in the latest recorded year (1981) stood fourth.[1]

North Norway consists of the three northernmost counties of Norway, namely Nordland, Troms, and Finnmark. Together they constitute a distinct region that receives special development assistance from the national government in Oslo, because it is generally considered economically disadvantaged relative to the rest of the country. However, North Norway does not fall behind national economic standards nearly to the same extent as Newfoundland does in Canada (Tables 2, 3). As Norway is a unitary state, ultimate responsibility for the economy of North Norway rests fully with the national government.

TABLE 2. Per capita economic output for Newfoundland, Iceland, and North Norway, 1973, 1976, and 1980.

Item		Newfoundland	Iceland	North Norway
Per capita gross regional/domestic product at market prices				
in Canadian dollars	1973	2 966	5 168	3 867
	1976	4 568	6 749	5 964
	1980	6 443	14 603	13 016
as percentage of national	1973	51.9	100.0	78.5
	1976	53.9	100.0	77.0
	1980	51.6	100.0	79.3
Per capita net regional/domestic product at factor cost				
in Canadian dollars	1973	2 199	3 514	2 920
	1976	3 548	4 235	4 732
	1980	5 287	9 298	10 489
as percentage of national	1973	52.7	100.0	80.6
	1976	54.2	100.0	83.7
	1980	53.4	100.0	84.7

SOURCE: Flaaten (1983), p. 4.

[1]OECD, *National Accounts*, Main Aggregates, Vol. 1, Gross domestic product, per capita, in U.S. dollars — at current prices and exchange rates.

TABLE 3. Unemployment and labor force participation rates for Canada, Newfoundland, Iceland, Norway, and North Norway, 1975–80.

Item	Canada	Newfoundland	Iceland	Norway	North Norway
Unemployment rate	a	a	b	c	c
1975	6.9	14.0	0.5	2.3	3.2
1976	7.1	13.4	0.5	1.8	3.1
1977	8.1	15.6	0.3	1.5	2.0
1978	8.4	16.4	0.3	1.8	3.4
1979	7.5	15.4	0.4	2.0	3.0
1980	7.5	13.5	0.3	1.7	3.3
Labor force participation rate[1]	a	a		c	c
1975	61	49		62	60
1976	61	49		65	61
1977	62	51		65	61
1978	63	52		66	62
1979	63	53		66	62
1980	64	53		67	64
Standardized OECD labor force participation rate[2]	d		d	d	
1979	71.0		73.0	74.5	
1980	71.8		72.0	75.6	

NOTES: [1]For Canada and Newfoundland labor force as percentage of the population 15 years of age and over; for Norway and North Norway as percentage of the population 16–74 years of age; [2]Labor force as percentage of the population 15–64 years of age.

SOURCE: [a]Statistics Canada, *Historical Labour Force Statistics*; [b]Iceland (1982), p. 177; [c]Central Bureau of Statistics of Norway, *Labour Market Statistics*; [d]OECD, *Labour Force Statistics*.

Resource Dependency

In terms of their place in the world economy, Newfoundland, Iceland, and North Norway have several features in common. All three are part of the industrially advanced western world. However, within that world, they are all located in a position peripheral to the main industrial centers so that they have had to rely on natural resources production as the primary basis of economic activity.

All three are situated in a cooler part of the temperate climatic zone. Newfoundland lies the furthest south. Its capital, St. John's, is located at 47°35′N, well south of London and even Paris. Iceland's capital, Reykjavik lies at 64°10′N, and Tromsø, the largest and most central county capital of North Norway is positioned at 69°40′N, within the Arctic Circle. Despite its more southerly location, Newfoundland has a somewhat colder winter climate, resulting from the effects of the Labrador Current, which leaves only the south coast of the island ice-free. The warm Gulfstream, on the other hand, more than compensates for the northerly situation of Iceland and North Norway, leaving the coast of the former usually, and that of the latter always ice-free.

There are strong similarities in the resource bases of Newfoundland, Iceland, and North Norway, as well as some unique differences. The most striking commonality is the similar abundance of fish resources in the three areas. Indeed, they may be characterized as the three preeminent fisheries bases of the western, central, and eastern sectors of the North Atlantic, respectively.

Because of its basic relation to primary human needs, food production has played a fundamental role in the initial economic development of most areas in the world. Agriculture usually has been the dominant sector, with fisheries playing a more or less important supplementary role. Yet there have been regions that specialized in fisheries production for export already at an early stage of economic development. Newfoundland provides a prime example. For centuries after its "discovery" in the late 15th century, its rich fish stocks were the primary focus of economic activity and the only significant incentive for European settlement in the area (Alexander 1976). Agriculture was hampered by poor soil and an indifferent climate. It supplied but a limited share of the food needs of the local community, principally as a subsistence supplement to fisheries household supplies.

For the first permanent settlers of Iceland, who arrived late in the 9th century, fishing was an important pursuit, although agriculture soon became the primary economic activity. Historically, Iceland has been an exporter of fish products, but until recent times on a modest scale only. It was not until after World War I that Iceland's fishing industry embarked on a course of expansion that made it the all important export base for the country's modern economy. The industry's current importance is reflected in the fact that 77% of Iceland's merchandise exports over the period 1970–81 consisted of marine products (Anon. 1982, p. 177).

The North Norway experience is intermediate to that of Newfoundland and Iceland. Historically, agriculture has been an important basic economic pursuit in the area, unlike in Newfoundland. On the other hand, fish production for export has also been important for centuries, unlike in Iceland.

All three areas possess a significant hydroelectric potential and have developed much of it in recent times. All have also benefited from some mining activity. Iceland's forest resources are negligible and those of North Norway are very modest. Newfoundland's forests are significant in extent, if rather marginal in quality. Iceland has harnessed its unique thermal power resources, while Newfoundland awaits imminent development of large proven oil reserves off its coast. North Norway has offshore oil prospects that have yet to be fully assessed.

The Fish Stocks

In comparing fishery productivity in the three zones, the question of resource availability is an important first consideration. We need to know the extent and quality of the fish stocks available in each zone. These are not easily determined. A refined analysis would require extensive data on total biomass and stock densities from which yield/effort relationships for all commercially exploitable species in each zone could be calculated.

In the absence of sufficiently refined data, a rough comparison of commercial stock availability may be derived from historical catch statistics. For this purpose we have extracted relevant figures from the bulletins of the International Commission for the Northwest Atlantic Fisheries (ICNAF) and its successor the Northwest Atlantic Fisheries Organization (NAFO) for the Newfoundland zone. Figures from the bulletins of the International Council for the Exploration of the Sea (ICES) were used for the Iceland and North Norway zones.

We selected statistical divisions or areas that corresponded as closely as possible to the fishing space for which Newfoundland, Iceland, and North Norway, respectively, were the nearest landfall. The underlying assumption is that this demarcates the fishing zones in which the fleets of Newfoundland, Iceland, and North Norway have a natural advantage of proximity, which is now reinforced to a large degree by 200-mi fishing jurisdictions. As the bulk of the fish catch in the North Atlantic is taken from waters over the continental shelf and adjacent parts of the slope, we were particularly concerned that the statistical divisions and areas selected should come as close as possible to including precisely these features.

In the case of Newfoundland, we succeeded very well as ICNAF/NAFO statistical subareas 2 and 3 plus division 4R take in precisely the shelf and adjacent slope off Newfoundland, including the appertaining coast of Labrador (see Fig. 2). For Iceland, ICES area Va provides a rather good fit as it includes virtually all of the shelf around Iceland. It also gives a reasonable division of the (less important) slope areas between Iceland and the Faeroes and between Iceland and Greenland.

For North Norway, we have used ICES area IIa as the nearest statistical approximation readily available. At the southern end this area is too large to fit the boundaries of North Norway and in the northeast it is too small (see Fig. 3). There is also the question of whether it would be appropriate to consider ICES area IIb as part of the North Norway zone. This is the area around the arctic islands of Spitsbergen, which came under Norwegian sovereignty by international treaty in 1920, but which are not part of the North Norway counties. While the North Norway fleet has some advantage of proximity with respect to area IIb, the waters around Spitsbergen are open for fishing on an equal basis to all signatories of the 1920 treaty. Delimitation of an appropriate North Norway zone is further complicated by the extent to which northern and southern based Norwegian fleets fish throughout Norwegian waters with the support of nationally set quotas. Also notable is a significant extent of crossover fishing by Norwegian and Soviet fleets in each other's zones, by mutual quota arrangements. After considering all of the foregoing, we have stuck to using ICES area IIa, for the time being, as the least inappropriate statistical area for which data were readily available, to represent the resource base in North Norway waters. We hope to work out estimates for a more refined and better fit at a later date.

In searching for an indicator of the commercial fisheries potential for the three zones, we have considered that until recent years most of the fishing area in each of these zones was part of the high seas and therefore open to the fleets of all fishing nations. Moreover, as the waters of the North Altantic are within easy reach of the fleets of many of the most active fishing nations, it may be assumed that fishing in the three zones reflected, at its peak, a realistic full-scale effort to exploit the stocks, by competitive international standards. At the same time, it must be acknowledged that it is possible for short periods of time to catch fish at levels too high to be sustainable. In seeking a rough measure for a "sustainable high level catch" we have looked in each instance for the 10-yr period with the highest average catch, from which we have eliminated the catch in the highest three years in order to provide a discount for nonsustainable catch levels. Accordingly, as a crude single measure of the sustainable high level catch (SHLC), we have taken the average of the lowest seven years from the highest 10-yr period.

The SHLCs for the total catch of all species (not including seaweed and sea mammals) are shown in Table 4. The figures suggest that the resource base in respect of commercially exploitable stocks in the three zones of Newfoundland, Iceland, and North Norway is about of the same order of magnitude (see also Fig. 4). The Newfoundland SHLC, at 1 250 000 t per year, is 11% larger than the Iceland SHLC, with the North Norway SHLC falling about half way in between. As will be discussed below, the SHLC figures for Newfoundland and North Norway understate the capelin catch potential of these two areas considerably, so that their total SHLC lead over Iceland is also understated.

The composition of the SHLC, of course, is also quite important, with some species being of much greater value than others. In all three zones groundfish make up the larger part of the catch (Table 4; Fig. 5). Most groundfish fall within the same general price range and sell in similar markets, so that for rough analytical purposes the various groundfish species may be lumped together.

One useful distinction can be made, however. In all three zones cod is the most significant component of the groundfish catch (Table 4; Fig. 6) and in all three the landed price received for cod is above the average for groundfish by a margin of up to 10%. The larger the cod component, therefore, the more valuable the groundfish catch is likely to be.

Most of the nongroundfish catch in all three zones consists of lesser value pelagic fish, principally capelin and herring. A few decades ago, large herring catches dominated the pelagic fishery in both Iceland and North Norway. Herring stocks, however, are noted for great variations in year-class strength, marked by periodic stock collapses, resulting from both natural causes and fishing pressure. As a result of this stock instability, it is not possible to estimate a meaningful SHLC for herring. After a collapse of herring stocks in the Iceland and North Norway zones in the late 1960s, strong capelin fisheries (for meal and oil) were developed there (see Fig. 7).

TABLE 4. Estimated sustainable high level catches for the Newfoundland, Iceland, and North Norway fishing zones, showing the period over which level was achieved (catches in thousands of tonnes).

Item		Newfoundland	Iceland	North Norway
SHLC all species		1250	1125	1193
	period	1966–75	1971–80	1963–72
SHLC groundfish		1076	694	645
	period	1964–73	1962–71	1971–80
SHLC cod		805	384	281
	period	1963–72	1963–72	1969–78
SHLC capelin		96	411	136
	period	1971–80	1971–80	1971–80

SOURCE: Calculated from ICNAF/NAFO and ICES statistical bulletins.

In the case of North Norway, the capelin stocks straddle the boundaries of ICES areas I, IIa, and IIb, with the proportions of the catch taken from each of the areas varying considerably from year to year. Most of the capelin catch landed in North Norway and recorded in Table 5 as "local catch" in 1976 and 1980, was actually taken from areas I and IIb. The North Norway SHLC for capelin shown in Table 5, which is based on area IIa catch figures, evidently understates the actual catch potential substantially.

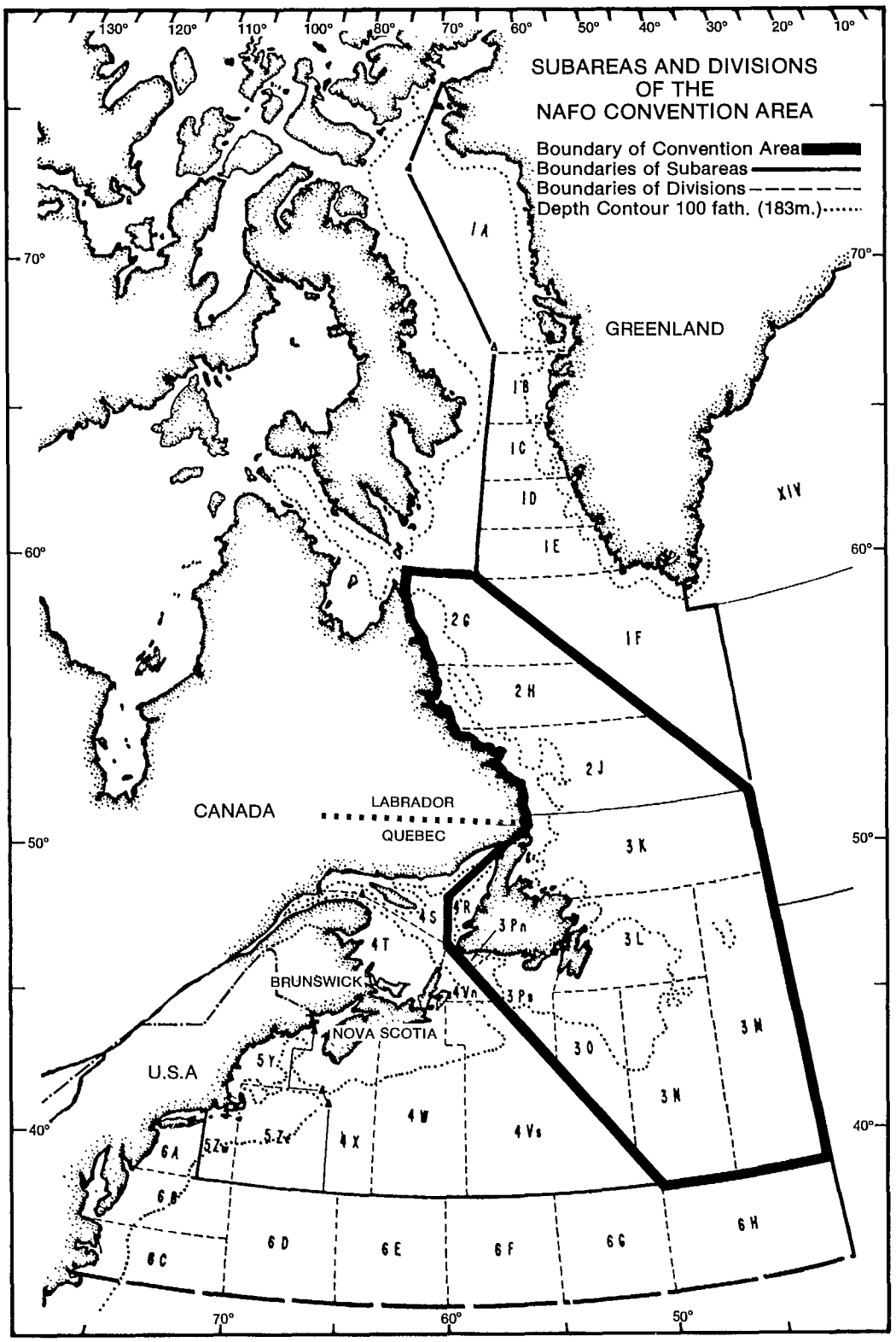

FIG. 2. Newfoundland zone.

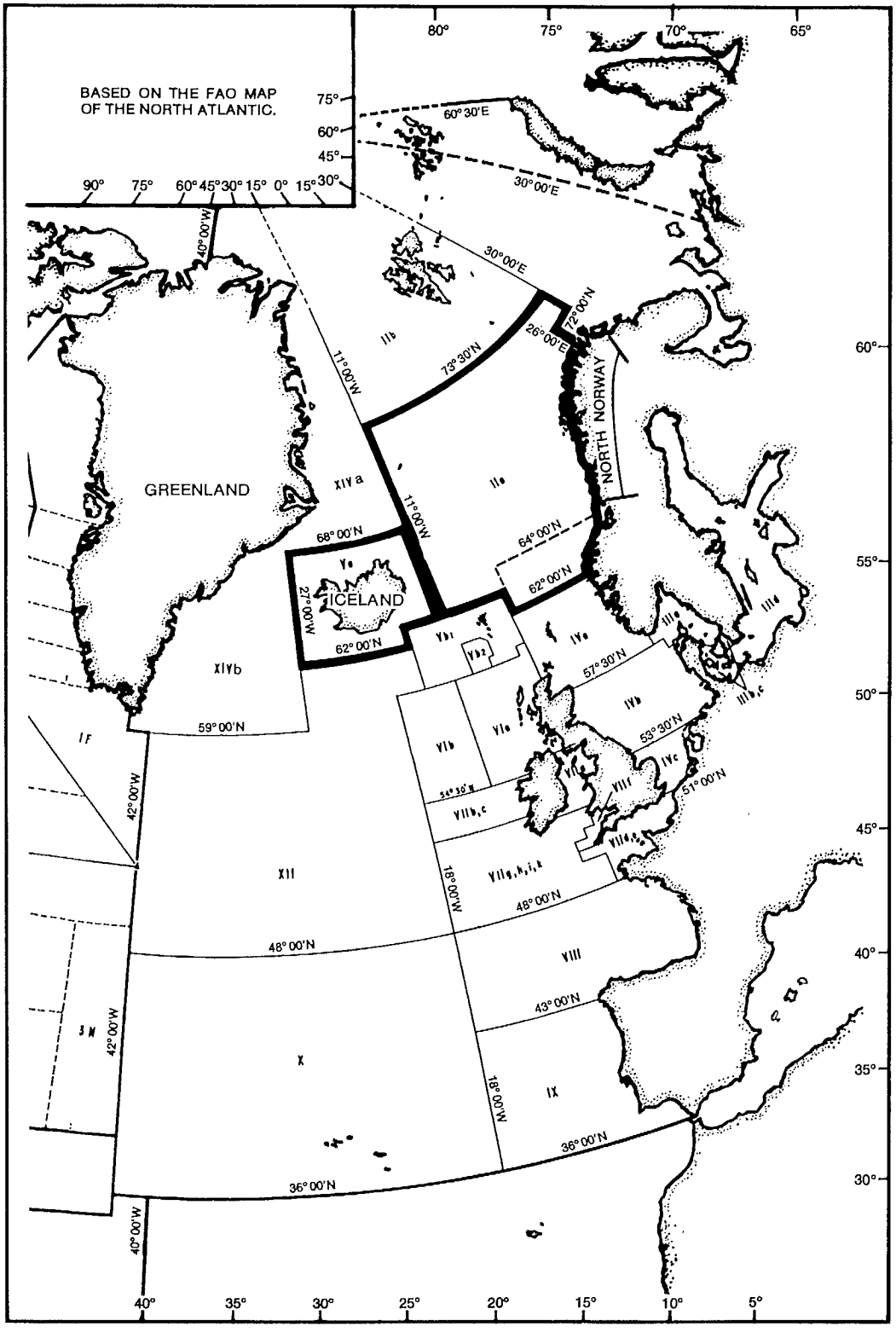

FIG. 3. Iceland and North Norway zones.

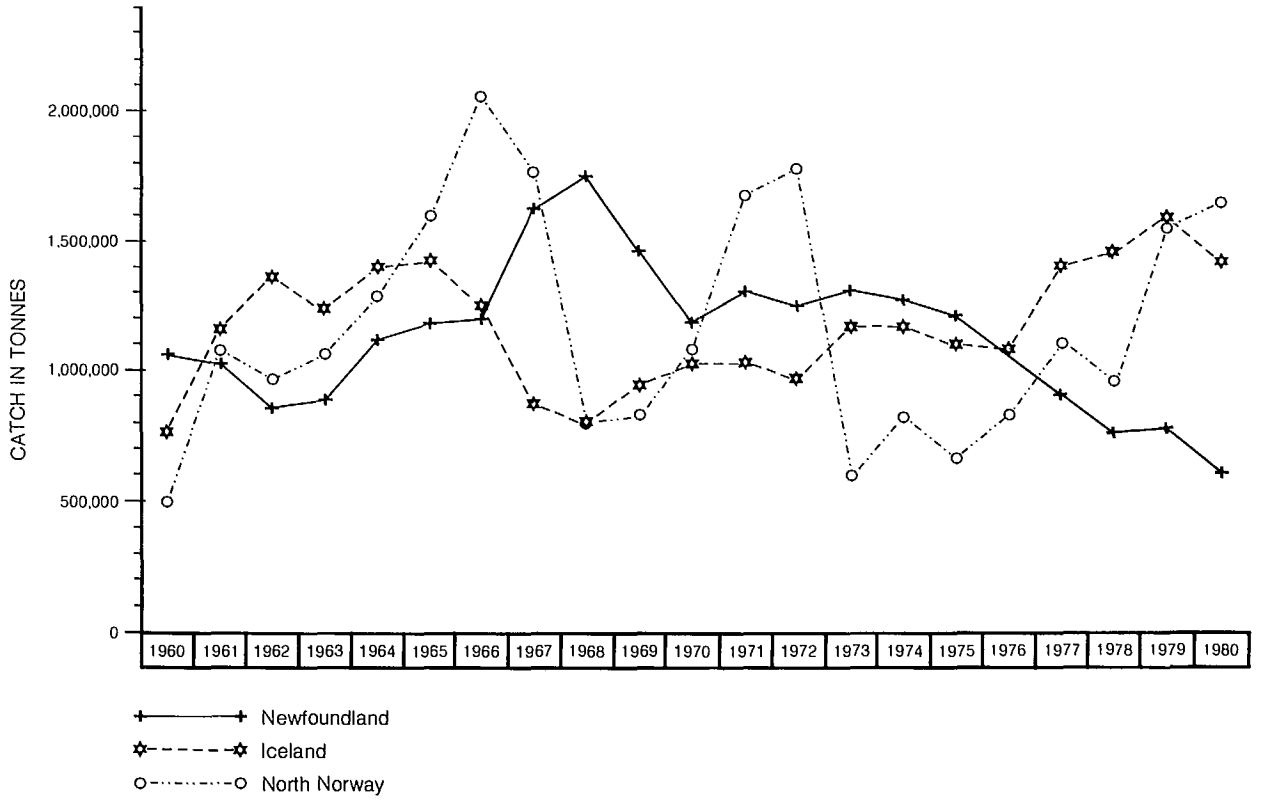

FIG. 4. Total fish catch in the three zones, 1960–80.

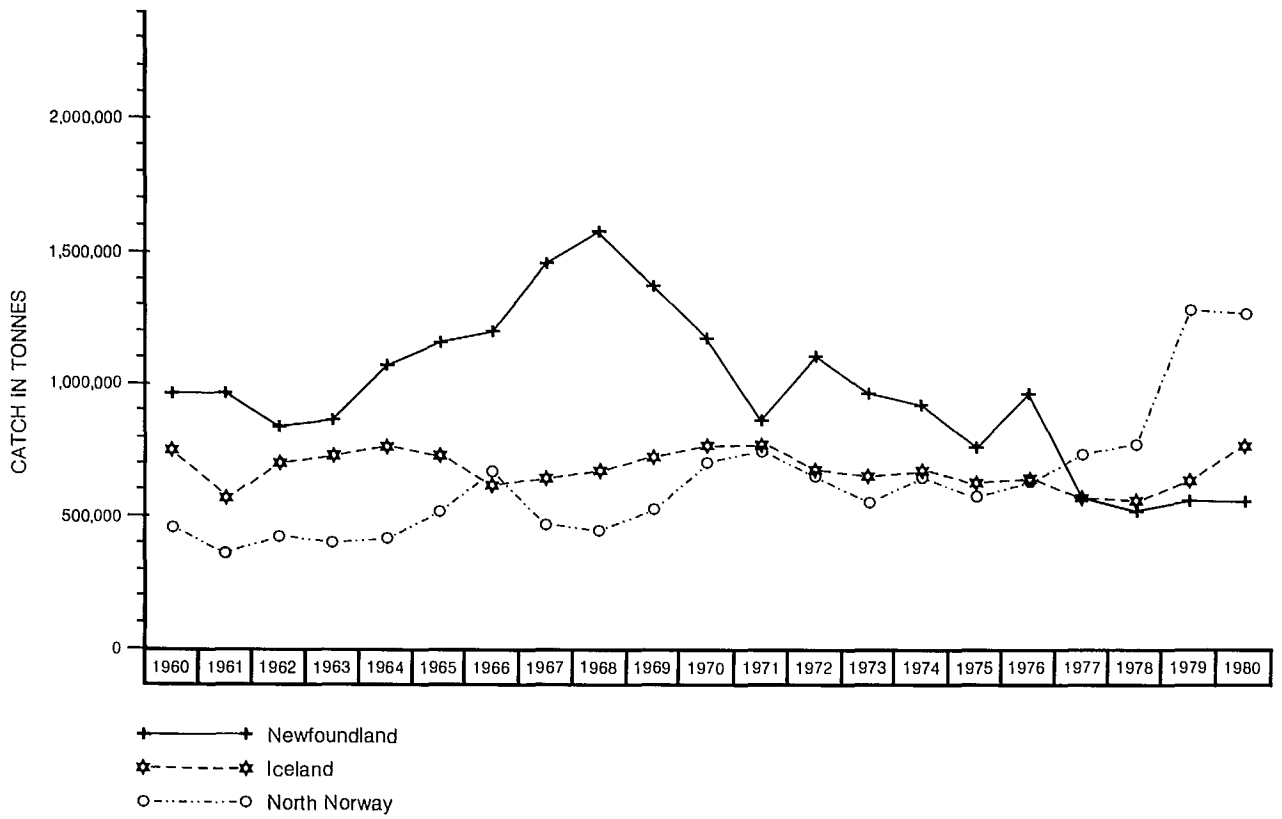

FIG. 5. Total catch of groundfish in the three zones, 1960–80.

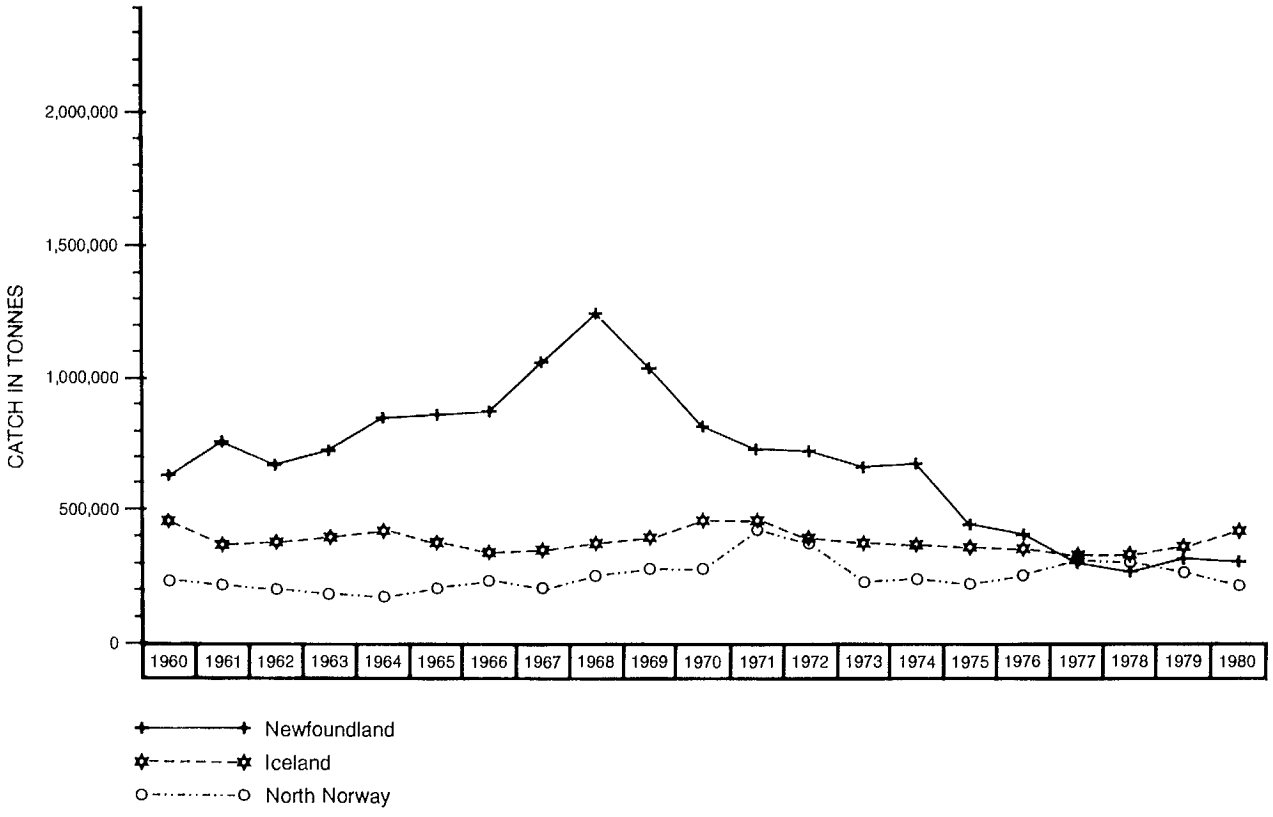

FIG. 6. Total catch of cod in the three zones, 1960–80.

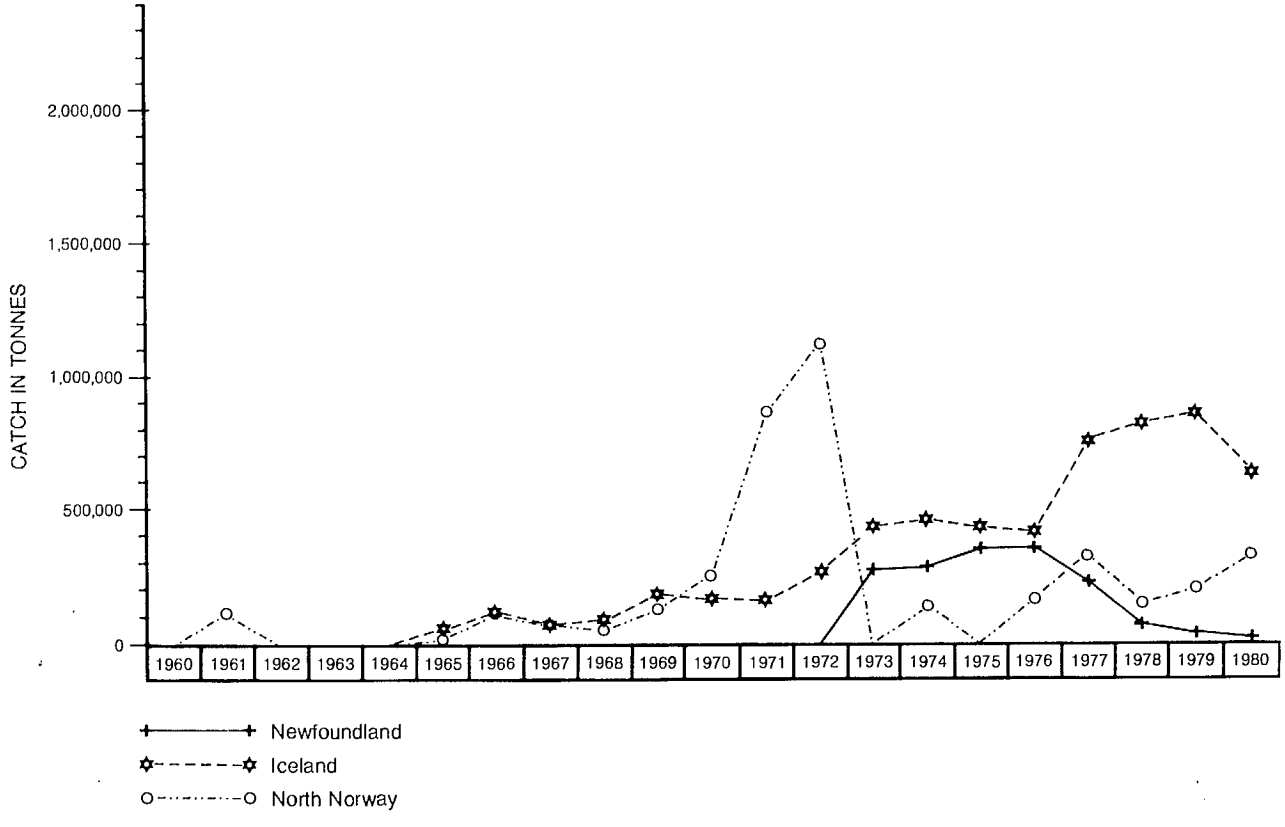

FIG. 7. Total catch of capelin in the three zones, 1960–80.

In Newfoundland, new stock discoveries led to an increased herring fishery in the early 1970s. While the stocks have again declined, herring until recently provided a catch of some significance in Newfoundland waters, if much less valuable than the groundfish catch. Very large capelin stocks are known to be present in Newfoundland waters (Pinhorn 1976). They were beginning to come under exploitation at a significant level by foreign fleets in the mid-1970s (see Fig. 7). However, foreign catch quotas were cut back severely by Canada when it extended its jurisdiction to 200 mi in 1977. Capelin are a significant source of food for more valuable groundfish. There is uncertainty and controversy regarding the surplus production of capelin that may safely and appropriately be allocated to the fishery. In any case, the Newfoundland fishing industry has not succeeded in establishing a commercially viable capelin fishery on a large enough scale to utilize available stocks.

The Newfoundland SHLC for capelin, calculated at 96 000 t in Table 5, is undoubtedly a gross understatement of the catch potential. Indeed, the Canadian government put the total allowable catch (TAC) for capelin in the Newfoundland area at 500 000 t in 1978 (Anon. 1978). However, it projected a decline of the TAC to 200 000 t in subsequent years because of the anticipated growth in the stocks of major predators such as cod, whales, and seals.

Apart from groundfish and the major pelagic species of herring and capelin, relatively modest catches of other species are taken in all three zones. Some of these are high value species, such as salmon and various crustaceans and molluscs. Most often the higher value species are taken relatively close to shore by the local fleets.

Returning to a review of Table 4, it can be surmised that the Newfoundland zone has an edge over the other two not only in the total size of the SHLC, but even more so in terms of its composition. Newfoundland has a much higher proportion of the more valuable cod. And within the pelagic group only Newfoundland recently has had a larger catch of the higher value herring than of lower value capelin (Flaaten 1983, p. 7). In Newfoundland, also, the higher value "other species" have made up a significantly larger part of total catch, both in quantity and value terms, than in the other two zones (Flaaten 1983, p. 7).

Domestic Landings

The SHLC figures provide a rough estimate of commercially feasible long run annual catches, based on the proven performance of the combined fleets of all nationalities that have fished in the zones concerned. Two important questions arise with respect to the home-based fleets of Newfoundland, Iceland, and North Norway in this matter. What share of the potential catch have they been able to take in competition with foreign fleets and how successful will they be in absorbing more of the potential total catch when they gain greater protection from the 200-mi limits established by their countries?

Some preliminary insights into these questions may be gained from Table 5, where the locally based catch is compared with the SHLC for the zone.[2] Figures are given for three years. The year 1971 represents a time well before extended jurisdiction, when the international fishing effort was near its peak in effectiveness. The year 1976 is the last year before the 200-mi line became universally accepted and applied. Iceland at that time was already claiming the 200-mi limit and had been partly successful in implementing it. In the Newfoundland zone, Canada at that time had been successful in persuading ICNAF members to accept reduced quotas for conservation purposes, and to concede a degree of preferential allocation to the coastal state. Finally, 1980 represents the most recent year for which full data were available at time of writing. It is a year in which the 200-mi limit was well established and enforced.

A first look at the data of Table 5 suggests that the Newfoundland domestic fleet has made headway in capturing a larger share of the SHLC since gaining protection from the 200-mi limit. In 1976, the Newfoundland all-species catch represented only 27.1% of the SHLC, but it reached 39.9% in 1980. This still suggests a rather weak performance in relation to fishing opportunities. Partly this must be related to the question of productivity in terms of the innate performance of the labor and capital inputs of the local fishing industry, about which more will be said below. There are a number of other factors that have contributed, including the following:

1) Three productive areas in the Newfoundland Zone (Flemish Cap and the "tail" and "nose" of the Grand Bank) lie outside Canada's 200-mi limit, and are heavily fished by other countries. Also, France has a special quota in the Newfoundland Zone, in recognition of its rights to the (as yet undelimited) waters around the French islands of St. Pierre and Miquelon. Altogether some 5–15% of the Newfoundland Zone catch is affected by these areas beyond Canada's jurisdiction.
2) Canada maintains total allowable catch (TAC) levels for some important stock components, such as cod, that are well below the SHLC levels, claiming that stocks need to be rebuilt because of severe international overfishing in the late 1960s and early 1970s. There have been suggestions that these TAC levels are too restrictive in view of the improved state of the stocks. The restrictive TAC levels help to resist foreign pressure for higher quota allocations in the Canadian 200-mi zone.
3) Some quotas continue to be allocated to foreign fleets from Canadian-controlled waters in return for various "commensurate benefits" obtained by Canada (Copes 1983, p. 14–15). Mostly they are from stocks which the domestic fleet has not been able to exploit profitably, or which are of marginal profitability only.
4) Within Canadian-controlled waters there is some crossover fishing by fleets from Newfoundland and other provinces. It would appear that the catch of non-Newfoundland vessels in the Newfoundland Zone is somewhat larger than the catch of Newfoundland vessels in other zones — though the crossover fishing is not of major proportions.

Judging by the data of Table 5, Iceland has succeeded impressively in expanding its catch over the years, while its control over the Iceland Zone was consolidated. In this connection, it bears noting that Iceland's 200-mi limit effectively includes all of the productive fishing grounds adjacent to Iceland.

[2] The local landings of Table 5 conform closely to the catch of the locally based fleet in the case of Newfoundland and Iceland. In the case of North Norway, local landings include a modest volume of landings by nonlocal vessels, while North Norway vessels land almost all of their catch locally. As a result, local landings in North Norway overstate the catch of the local fleet by about 4% (Flaaten 1983, p. 15).

TABLE 5. Actual local landings compared with estimated sustainable high level catches for the Newfoundland, Iceland, and North Norway Zones, for years 1971, 1976, and 1980.

Item		Catches in thousands of tonnes			Catches as a percentage of SHLC		
		Newfoundland	Iceland	North Norway	Newfoundland	Iceland	North Norway
SHLC all species[a]		1,250	1,125	1,193			
Local landings all species[b]	1971	394	684	1,295	31.5	60.8	108.5
	1976	339	979	1,784	27.1	87.0	149.5
	1980	499	1,508	1,226	39.9	134.0	102.8
SHCL groundfish[a]		1,076	694	645			
Local landings groundfish[b]	1971	245	425	528	22.8	61.2	81.9
	1976	256	477	475	23.8	68.7	73.6
	1980	381	674	379	35.4	97.1	58.8
SHCL cod[a]		805	384	281			
Local landings cod[b]	1971	116	250	376	14.4	65.1	133.8
	1976	120	281	323	14.9	73.2	114.9
	1980	250	430	234	31.1	112.0	83.3
SHLC capelin[a]		96	411	136			
Local landings capelin[b]	1971	2	183	706	.2	44.5	519.1
	1976	10	459	1,277	10.4	111.7	939.0
	1980	21	760	794	21.9	185.9	583.8

SOURCE: [a] Table 4; [b] From *Annual Stastistical Review of Canadian Fisheries* and calculations derived from Flaaten (1983), p. 7.

It is also notable that Iceland's groundfish catch by 1980 approximated the full SHLC, while its capelin catch greatly exceeded the calculated SHLC. However, this appears in part to have been a result of overfishing. Indeed, evidence of a severe decline in stock abundance caused the Icelandic government to suspend capelin fishing early in 1982, in order to allow stocks to recover (Magnússon 1983). The Icelandic cod catch in 1982 also fell back to the SHLC level, suggesting that recent catches above that level have been excessive. The catch of other groundfish, however, increased, so that total groundfish catches have stayed at the SHLC level.

The Norwegian statistics in Table 5 are the most difficult to interpret. As already mentioned, the SHLC figures are based on ICES fishing area IIa, which is an imperfect match for the North Norway zone. North Norway-based vessels do much of their fishing in ICES area I (Barents Sea), part of which in fact lies off North Norway (see Fig. 3), and in ICES area IIb (Spitsbergen) to which they have favorable access. They do face competition from vessels based in southern Norway and from foregin vessels, particularly from the USSR, that have quotas in the Norwegian 200-mi zone. Particularly important is the extent of crossover fishing in the adjacent Norwegian and Soviet zones, between which there are major fish migrations. There is some effort at joint management and an allocation of quotas reflecting in part the respective interests of Norwegian and Soviet fleets in particular species.

The Table 5 data show high catch levels for North Norway in relation to the SHLC of ICES area IIa, confirming that the North Norway fleet draws also on adjacent ICES fishing areas. The North Norway groundfish catch is below the SHLC, which may be related in part to catches landed in southern Norway and in part to quotas allocated to the Soviet Union, which were particularly large in 1980.[3] On the other hand, most of the very large North Norway catch of capelin came from outside area IIa, so that this catch was vastly in excess of the SHLC for IIa.

[3] This was especially for very large newly utilized deep water stocks of blue whiting.

TABLE 6. Value of landings for selected species and species groups in Newfoundland, Iceland, and North Norway, 1971, 1976 and 1980.

Item		Landed value in millions of Canadian dollars		
		Newfoundland[a]	Iceland[b]	North Norway[b]
All species	1971	38.8	65.5	110.1
	1976	64.7	147.1	264.0
	1980	161.3	440.3	426.0
Groundfish	1971	26.4	48.3	78.1
	1976	46.5	116.7	167.9
	1980	111.8	340.4	261.1
Cod	1971	13.6	28.8	58.2
	1976	24.5	81.2	124.6
	1980	80.8	230.3	180.6
Capelin	1971	.05	3.3	23.0
	1976	.3	12.7	77.6
	1980	3.2	54.2	91.6

SOURCE: [a]*Annual Statistics Review of Canadian Fisheries*; [b]Calculated from Flaaten (1983), p. 7.

ICES catch statistics for areas I, IIa, and IIb together show a serious decline in both capelin and cod catches in the late 1970s, suggesting that significant overfishing has taken place. Overall North Norway catches in 1980 are somewhat below those of 1971 and much below those of 1976. At the high levels of stock utilization in effect in North Norway, careful management is in order. It will require effective cooperation with the Soviet Union. The opportunities for further expansion of the North Norway catch are obviously limited.

In the final analysis the value of the catch taken by the fleets of Newfoundland, Iceland, and North Norway is more important than the weight of the harvest. Table 6 gives data for the value of landings in the three areas, expressed in Canadian dollars using going exchange rates.[4] These data need to be interpreted with caution. They are based on officially reported

[4] The rates used may be found in Flaaten (1983), p. 4.

landed values and are subject to a number of possible biases. These would include, for instance, the effects of exchange rate manipulations and differentials in taxes and subsidies, which we hope to explore in future work.

The reported landed values confirm the impression of the catch data that Newfoundland's fisheries output amounts to much less than half of that now produced in Iceland or North Norway. All three areas have increased the nominal value of their output greatly during the decade of the seventies, but much of the increase, of course, must be attributed to inflation. On a comparative basis it is clear that Iceland has made by far the most impressive progress.

Productivity Measures

The data surveyed so far allow for a fairly clear comparison between Newfoundland and Iceland. Although the former has a marked advantage in resource availability, the latter is achieving much higher catches. Resource availability in North Norway seems to be approximately of the same order as that in Newfoundland, and well ahead of that in Iceland, although a precise comparison is difficult because of the poorly defined statistical base for North Norway. On the catch side, North Norway has outfished Newfoundland by a wide margin, but has been matched by Iceland in recent years.

To provide an initial insight into the difference in operational performance of the fleets in the three areas, we will provide some rough comparative measures in physical terms of labor productivity and capital productivity. We will show the quantity of fish produced per unit of labor and per unit of capital in the three fleets. Ultimately it may be more important to compare net revenue of the three fleets in social cost-benefit terms, but to do that in a meaningful fashion requires much more information than we have available at this time.

The calculation of productivity comparisons in physical terms is not without difficulty. The units of input and output must be as nearly comparable as possible. It would not do to add together tonnes of lobster, cod, and capelin. They have entirely different values, justifying entirely different amounts of effort to effect their harvest. For units of output we have chosen to work with tonnes of groundfish harvested. Different species of groundfish tend to be harvested together and not to vary widely in value per tonne. As groundfish is by far the most important component in value terms of the fishery in all three zones, a productivity measure in groundfish harvesting may also be considered reasonably representative of fishing industries of the three zones as a whole.

For units of labor we have selected "full time equivalent" (FTE) numbers of fishermen. The logic of using FTE fishermen is simple enough: the fisherman who works the year round at his trade should count as one FTE fisherman, while the part-time fisherman, who spends only half a year in the fishery should count as one-half FTE fisherman.

There are conceptual difficulties in deciding on the criteria to use in measuring the extent of a fisherman's participation. The problem is particularly difficult in the case of Newfoundland. Essentially there are two basically different criteria.[5] One may be called the "occupational commitment" criterion. By this criterion a working man whose only job is in the fishery will be counted as one FTE fisherman, even if he can only fish for 7 mo, while weather and other conditions prevent him from fishing during the remaining months of the year. If in the economic environment in which he lives there are no employment opportunities during the idle months, his working year is in effect committed to the fishery. The occupational commitment criterion is useful when the aim is to compare the share of the labor force tied up in the fishery or when the aim is to compare annual earnings obtainable in the fishery.

With the "time commitment" criterion, one counts only the amount of time actually spent in fishing activity (whether at sea or on shore), in terms of days, weeks, or months committed. Idle time then does not count. There remains a difficulty in lumping together days of slack shore work or short fishing hours and days of peak fishing activity with few hours of rest. If measured appropriately, time commitment is useful in comparing the intrinsic effectiveness on a day-by-day basis of different fishing operations.

Because of severe winter ice conditions the fishery along most of Newfoundland's coast is greatly curtailed. The majority of Newfoundland fishermen on a time commitment basis are only "part-time" or "occasional" fishermen (Copes 1983). However, with very few alternative employment opportunities, as reflected in the high unemployment rate (Table 3), most fishermen find little or no work outside the fishery. A high proportion are therefore full-time fishermen on an occupational commitment basis. There is a great difference in the FTE count by occupational commitment and by time commitment (Table 7).

In Iceland and North Norway, weather and sea conditions generally permit year-round fishing. The proportion of full-time fishermen is high. Those who are part-time fishermen generally are so because they have more attractive alternative work during part of the year. There is, therefore, little if any difference in the application of the time commitment and occupational commitment criteria and thus only one way of calculating FTE figures (Tables 8, 9).

We have calculated labor productivity in the groundfish industries of the three areas in tonnes per FTE fisherman (Tables 7–9) and illustrated the results, using occupational commitment FTE for Newfoundland in Fig. 8 and time commitment FTE for Newfoundland in Fig. 9. As may be seen, labor productivity in the Iceland groundfish industry is very much higher than in the two other areas and has been rising during the 1970s. On an occupational commitment basis North Norway has significantly higher productivity than Newfoundland, although on a time commitment basis their productivity is about equal. Another way of putting this is to say that the average Newfoundland fisherman produces much less fish in a year than his North Norway counterpart, although on the days that he fishes he produces as much.

It is well known that labor productivity can be increased by capital investment that puts more equipment at the elbow of every worker. This is expressed in the capital/labor ratio. Capital investment is usually measured in terms of the value of the investment made. However, to make valid capital investment comparisons across the groundfish industries of Newfoundland, Iceland, and North Norway would require a mass of refined data on accounting criteria, taxes and subsidies to which we do not have access at this time. As a quick and rough measure of capital we have taken the tonnage size of the groundfish fleet in the three areas and with this have calculated capital/labor ratios in

[5] Actually a third criterion, related to income shares, may also be used, but no data were available to us in this respect. For a further review of this question see Copes (1983).

TABLE 7. Productivity in groundfish harvesting in Newfoundland, 1971–80.

Year	Catch (t)	FTE fishermen: Occupational commitment	FTE fishermen: Time commitment	Catch per FTE fisherman (t): Occupational commitment	Catch per FTE fisherman (t): Time commitment	Fleet size (GRT)	Catch per GRT (t)	Capital/labor ratio GRT per FTE: Occupational commitment	Capital/labor ratio GRT per FTE: Time commitment
1971	244 706	7 146	5 028	31.4	44.7	70 372	3.19	9.8	14.0
1972	238 210	6 725	4 380	35.4	54.4	58 380	4.08	8.7	13.3
1973	250 611	7 378	4 786	34.0	52.4	66 216	3.78	9.0	13.8
1974	188 953	6 364	4 063	29.7	46.5	65 598	2.88	10.3	16.1
1975	193 978	6 831	4 305	28.4	45.1	70 713	2.74	10.4	16.4
1976	256 224	6 917	4 420	37.0	58.0	66 808	3.84	9.7	15.1
1977	278 263	8 622	5 654	32.3	49.2	82 799	3.36	9.6	14.6
1978	324 984	10 206	6 654	31.8	48.8	88 959	3.65	8.7	13.4
1979	374 225	11 657	7 380	31.1	50.7	92 483	4.05	7.9	12.5
1980	380 575	14 759	9 307	25.8	40.9	109 430	3.48	7.4	11.8

SOURCE: Flaaten (1983), p. 16.

TABLE 8. Productivity in groundfish harvesting in Iceland, 1971–80.

Year	Catch (t)	FTE fishermen	Catch per FTE fisherman (t)	Fleet size (GRT)	Catch per GRT (t)	Capital/labor ratio GRT per FTE
1971	425 000	4 078	104.2	56 804	7.48	13.9
1972	390 000	3 958	98.5	60 675	6.43	15.3
1973	402 000	3 895	103.2	65 663	6.12	16.9
1974	427 000	4 152	102.8	69 422	6.15	16.7
1975	445 000	4 265	104.3	69 285	6.42	16.2
1976	477 000	4 261	111.9	66 577	7.16	15.6
1977	514 000	4 125	124.6	70 201	7.32	17.0
1978	536 000	4 184	128.1	69 143	7.75	16.5
1979	614 000	4 298	142.9	71 043	8.64	16.5
1980	674 000	4 660	144.6	69 335	9.72	14.9

SOURCE: Flaaten (1983), p. 17.

TABLE 9. Productivity in groundfish harvesting in North Norway, 1971–80.

Year	Catch[1] (t)	FTE fishermen	Catch per FTE fisherman (t)	Fleet size (GRT)	Catch per GRT (t)	Capital/labor ratio GRT per FTE
1971	501 361	10 810	46.4	99 817	5.02	9.2
1972	612 394	9 620	63.7	99 884	6.13	10.4
1973	459 190	9 400	48.8	94 530	4.86	10.1
1974	430 366	9 840	43.7	96 415	4.46	9.8
1975	390 771	9 830	39.8	98 206	3.98	10.0
1976	450 014	9 700	46.4	97 360	4.62	10.0
1977	480 159	9 640	49.8	101 885	4.71	10.6
1978	454 372	9 900	45.9	107 481	4.23	10.9
1979	407 463	9 770	41.7	102 603	3.97	10.5
1980	359 632	9 660	37.2	100 969	3.56	10.5

SOURCE: Flaaten (1983), p. 18.

NOTE: [1]Catches shown here are 5% lower than in Table 5, which includes a small volume of local landings by nonlocal vessels. Table 9 is based on landings by North Norway-based vessels only.

terms of gross registered tons (GRT) per FTE fisherman (Tables 7–9). The data indeed show that the higher productivity of Iceland fishermen is supported by a higher capital/labor ratio and that the lower productivity of occupational commitment FTE fishermen in Newfoundland is reflected in a lower capital/labor ratio.

We have also calculated the productivity of capital in tonnes of catch per GRT for the groundfish industry of the three areas (Tables 7–9) and have illustrated this in Fig. 10. Iceland shows the highest capital productivity also, with again a rising trend after 1973. North Norway's capital productivity generally has been declining, while that of Newfoundland has shown considerable fluctuation. North Norway's initial lead over Newfoundland in capital productivity during the 1970s was lost by the end of the decade.

Often a high capital/labor ratio is accompanied by relatively low capital productivity, as the relatively abundant capital investment is affected by diminishing returns. This evidently

has not been the case in the Iceland groundfish industry. In principle, the way to obtain high productivity for both labor and capital is to apply the most effective technology and combine a relatively large resource input with relatively more modest inputs of labor and capital. The large product per unit of labor and capital is testimony to the success of the Iceland groundfish industry. By comparison North Norway and particularly Newfoundland have used far too much labor and capital in relation to the groundfish harvest taken.

The Causes of Disparity

The data that have been analyzed in this paper present strong evidence that productivity in the Newfoundland fishing industry is greatly inferior to that of Iceland and also lags behind that of North Norway. Newfoundland's fishing industry posted this poor performance despite the fact that it had, on the face of it, a superior resource base, both in terms of the size of the resource and its composition. The causes of disparity must therefore be sought in factors other than resource availability.

As indicated at the beginning of this paper only the initial phase of our research has been completed. At this stage we are not ready to offer a refined analysis of the causes for disparity, but we are able to discuss in broad terms factors that offer plausible explanations. We shall offer comments under the five headings of "population," "unemployment," "subsidies," "seasonality," and "jurisdiction."

Population

All three of the areas under scrutiny have a location peripheral to the metropolitan and industrial centers in their part of the world. Economically their "comparative advantage" lies in resource exploitation. How well their people can expect to fare will depend in some measure on the quality and extent of their resources in relation to the size of their population. Newfoundland has a population approaching 600 000 with a resource base that must be considered modest in relation to the population it has to support economically. The resource base in the other two areas does not appear to be very much better, but the population that needs to be supported in North Norway is somewhat smaller and that in Iceland very much smaller. The much lower economic output per capita in Newfoundland, by comparison with the other two areas (Table 2) is consistent with the hypothesis that

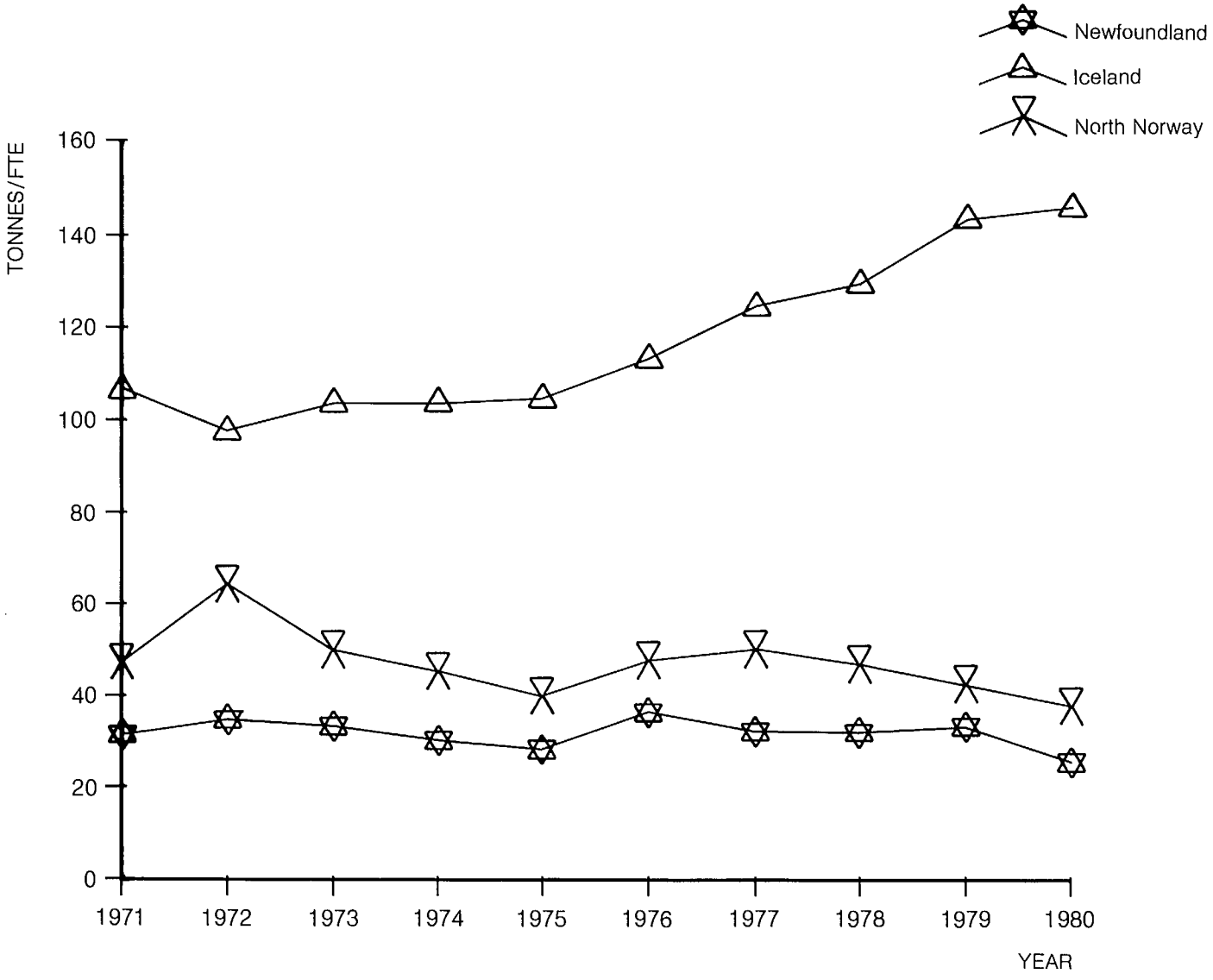

FIG. 8. Labor productivity (tonnes groundfish per FTE alternative 1).

Newfoundland has a relatively less favorable relationship between its population and the resource base available to support economic activity.

Unemployment

The extraordinarily high unemployment rate and low labor force participation rate in Newfoundland (Table 3) provide further supporting evidence of the insufficiency of the local resource base to provide adequate employment opportunities. In Iceland, by contrast, unemployment has been almost nonexistent — even in 1980 — which is an extraordinary achievement by any standard in the world. Obviously the local resource base is adequate to support the (fortunately?) small population of Iceland at a high level of per capita output and income. While standards of income and levels of employment in North Norway are somewhat below those of the rest of the country, they are still pretty high by world standards. This suggests that the local resource base may be more adequate than in the case of Newfoundland.

Subsidies

It is common knowledge that both Newfoundland and North Norway receive substantial net financial benefits from their respective national governments in recognition of their position as economically lagging regions. The fishing industries of the two areas are among the chief objects of subsidy assistance, in the hope it will promote developments that will raise both income and employment opportunities in the fisheries sector. Many economic analysts have commented on the frequently perverse effects of this assistance. Particularly in the case of Newfoundland, with its high unemployment rate, financial assistance to the fishing industry has attracted much more manpower (Copes 1972). This has been strongly associated with declining labor productivity (Copes 1983) and repeated crises in the industry. As an independent country, Iceland has not been able to call on a senior government to subsidize its fishing industry. With full employment and high productivity of its small labor force there has been, moreover, no temptation to use its own resources to subsidize additional employment in the fishing industry.

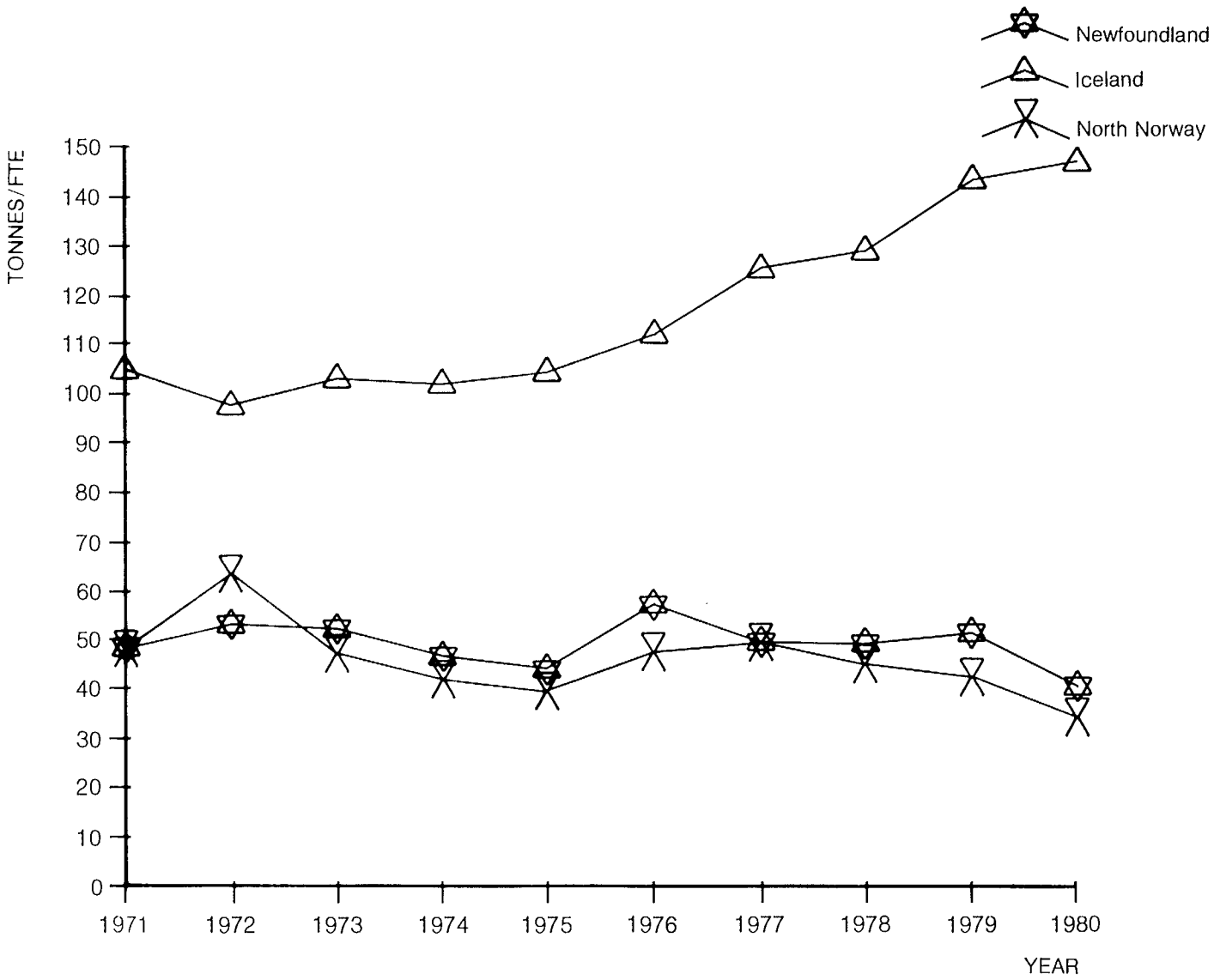

Fig. 9. Labor productivity (tonnes groundfish per FTE alternative 2).

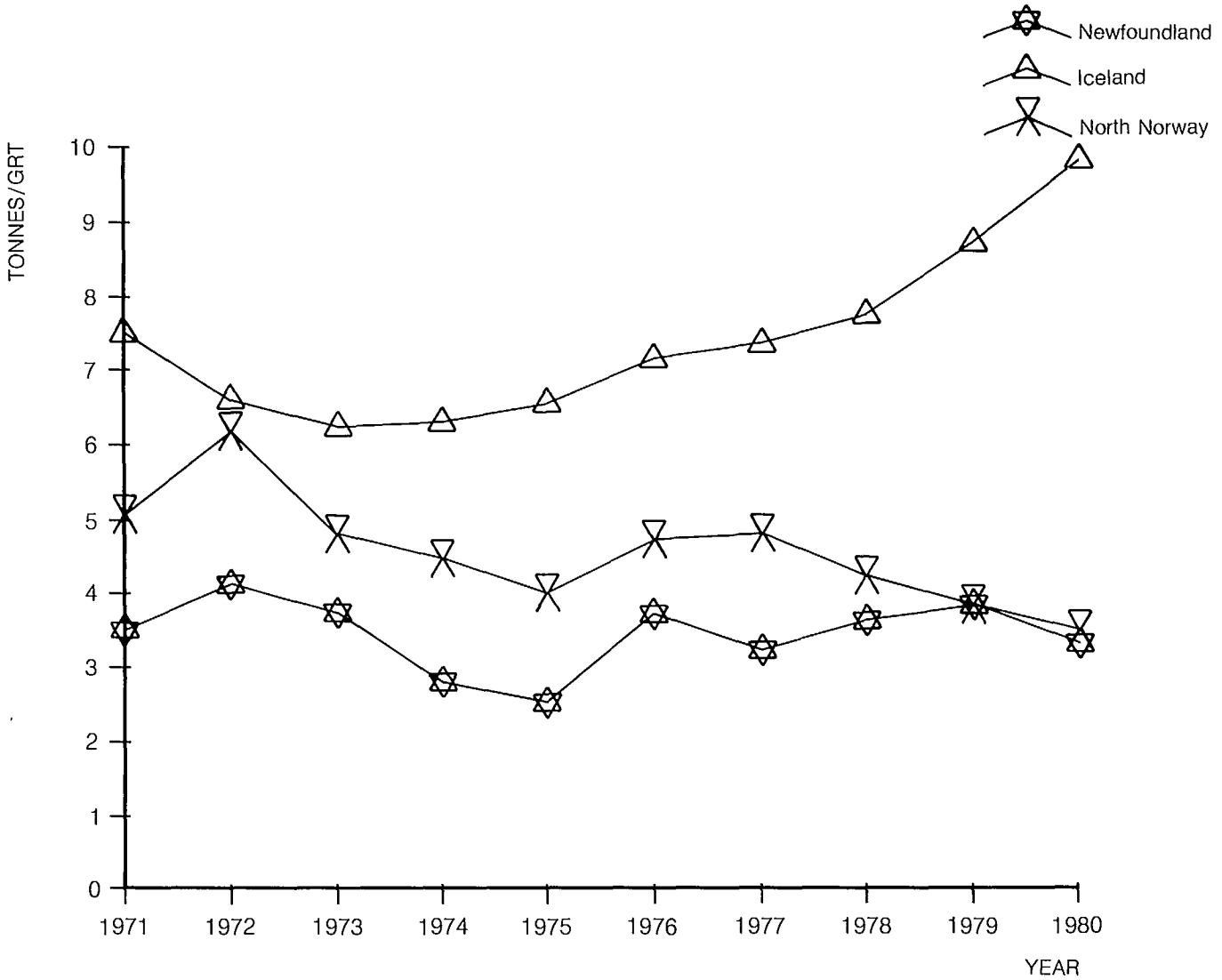

FIG. 10. Capital productivity (tonnes groundfish per GRT of the fleet).

SEASONALITY

While Newfoundland has a margin of advantage over Iceland and North Norway in the size and composition of its fishery resource, it has a serious disadvantage in the high degree of seasonality of its fishing operations. Ice conditions prevent fishing over a long winter season along most of the coast. The majority of Newfoundland's fishermen have work for a very limited part of the year only, which severely depresses the level of annual earned income they can achieve. The seasonality problem is greatly exacerbated by political and institutional conditions that have favored support for a very large and highly seasonal small-boat inshore fishery as against the nonseasonal offshore trawler fishery (Copes 1980). The failure so far of the Newfoundland fishing industry to absorb the additional catch potential resulting from the removal of most foreign fishing effort from the Canadian 200-mi zone, may be related in part to an effort to hold back on offshore quota allocations and thereby strengthen shoreward migration of fish to benefit the inshore fishery. The problem seems to be that in this process more fish is foregone offshore than becomes available inshore, thus lowering the total catch below its potential.

JURISDICTION

Newfoundland and North Norway are parts of larger countries and therefore part of the internal "common market" of Canada and Norway, respectively. International trade theory demonstrates that while common market arrangements tend to produce net benefits in the aggregate for the economic area encompassed by the common market through "trade creation," there may be local areas within the common market that suffer a net loss through "trade diversion." It is thus conceivable that the economies of lagging regions such as Newfoundland and North Norway suffer from being open to the wider national market of Canada and Norway. If Newfoundland and North Norway were independent, they would have the ability to erect trade barriers that might help them protect industries that would absorb unemployed workers and raise the total income produced in the

area. Of course, it is also possible to look at a converse aspect of the problem. If interregional labor mobility were greater, the unemployed from lagging regions might move more readily elsewhere, allowing per capita income to rise in the lagging region. The relatively low labor mobility of Newfoundland is a problem in the context of its high rate of unemployment (Copes 1972), although with the current high rate of unemployment throughout Canada, higher labor mobility would not do much good. The question of labor mobility is much less of a problem in North Norway, and none at all in Iceland.

The foregoing discussion has given an indication of the extent to which productivity in the Newfoundland fishing industry falls behind that of North Norway, and more particularly that of Iceland. The discussion has also revealed several factors that may help explain the differences in productivity. This, in turn, suggests areas in which new policies may be sought to bring about improved performance. It is worth noting at this point that the obverse of Newfoundland's current poor performance is a large potential for future gains — for the output of the Newfoundland fishing industry now is far below the proven catch potential for the waters off its shores. In contrast, the SHLC estimates and catch data presented in this paper suggest that in Iceland and North Norway catches are near the maximum yield for their fisheries and that some of their stocks may well have been overfished. Despite its poor current performance, the Newfoundland fishing industry may yet develop the capacity to match the accomplishments of its competitors.

Acknowledgments

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Social Continuity and Technical Change

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The fishery industry will have to be modernized to survive. However, if technological change is inevitable, it nevertheless has to be introduced with caution so that its impact doesn't jeopardize the already fragile social and economic balance of coastal areas. Susan McCorquodale makes us aware, through the Newfoundland example, of the consequences of this evolution, but also of the necessity to control such a change.

We hear a great deal these days about the economic viability of the fishing industry. At the same time, there is a great deal of nodding of the head to the idea that in Atlantic Canada fishing must also serve certain social needs. Thinking, then, tends to revolve around a search for compromise between what are seen as two opposing or competing necessities: a politically satisfactory "trade-off" between an economically viable industry and a socially acceptable reorganization of the current inefficient status quo. Choices are being made and decisions are being implemented, in a situation in which full knowledge of the "costs" involved does not really exist. No one can ignore the genuine economic problems of the industry. Kirby has told us that 70 of the fish processing plants in their sample of 100 lost money in 1981. Fishermen with a total vessel investment of about $133 million earned, in 1979, a cash income of only $25.8 million — an amount inadequate to meet the payments for debt, depreciation, the skipper's share, or capital accumulation. (Kirby 1982, p. 75).

Subsidies or contradictory policy choices merely compound the difficulties. Munro (1980) pointed out that while certain transportation policies of the federal government are intended to attract people into urban centers, other government policies on subsidies, taxation, and transfer payments tend to have the opposite effect. The special unemployment insurance payments for fishermen are a dramatic instance. Between 1976 and 1979, UIC payments to Newfoundland fishermen saw a nearly fivefold increase, from $6.5 to $24.6 million. On the one hand while these subsidies encourage people to live in outports, the payments may also have a major centralizing influence because they promote the rapid development of the service sector, which is more geographically concentrated than is the natural resource sector (Munro 1980, p. 20).

Provincial policymakers are no less confused. Their fisheries loan boards, for instance, permitted a 400% increase in indebtedness throughout Atlantic Canada between 1972 and 1982. Today, in Nova Scotia and Newfoundland, between one-third and one-half of all these loans are overdue (Kirby 1982, p. 76–77).

Contradiction, rising costs, both direct and indirect, and falling prices — is the game worth the candle? In 1972, Copes told us that a cost benefit analysis of government assistance to the Newfoundland fishing industry would be a very difficult task. However, he did call the rate of subsidization "extraordinarily high while making an exceptionally small contribution to public revenue" (Copes 1972, p. 75). In a study of the Prince Edward Island fishery, MacDonald concluded that,

> . . ., with administrative costs and subsidies of $13 million, it cost more than $41 million to produce $28 million worth of fishery products in PEI in 1978.

He added that even if the opportunity costs of labor were set at zero, it still cost $13 million in government funding to produce something less than $16 million in income to fishermen and processing workers (MacDonald 1980, p. 29). In the case of the Newfoundland ground fishery, Schrank et al. (1980) argued that the groundfish catch would not have been taken in 1978 without extensive subsidies and that the longliners (which policy had encouraged fishermen to buy) were an inappropriate technology insofar as groundfish were concerned; their range and productivity were more than offset by their increased costs. The authors concluded,

> . . . .ten years ago, much was heard in Newfoundland about the gillnet and longliner "revolution". We conclude that however revolutionary they might have been, they seem to have been inefficient ways of modernizing the Newfoundland ground fishery.
>
> (Schrank et al. 1980, p. 50–51).

The Kirby Report recommends economic viability as a first priority but it also accepts the need for "trade-offs." The Report admits that the context in which operational decisions have to be taken is far from clear cut:

> There will be technical problems of definition and initial assignment, as well as attitudinal problems that will have to be overcome.
>
> (Kirby 1982, p. 229).

The problem is not new, nor is it unique to the fisheries. In 1979, Heintzman commented of the National Policy and Canadian unity in general that "so often in social policy the claims of efficiency and community do seem to conflict. . . . There is a sense in which the tension between them is, and always has been, the essence of the Canadian question." If Heintzman is right, and this is a dialectic of which the fishing industry is just one expression, then it follows that a resolution is possible, that "the pursuit of efficiency furnishes means of comfort and mercy without which life would be a harsher experience for the mass of mankind, just as emphasis upon community yields forms of

efficiency which economists and social philisophers are only beginning to comprehend" (Heitzman 1979, p. 147). It is in that spirit that this paper is presented — as a plea for resolving the dialectical tension between community and efficiency in the Atlantic Canadian fishing industry, not by "trade-off" but by cooperation; and not by "lesser evil" but through the search for a means of employing the strengths of community and efficiency together.

The changes now taking place in the fishing industry make it clear that the idea of "trade-off" is still paramount in policy thinking. The inshore sector, seen as 'fragmented' by nature, is contrasted with a perception of the offshore sector as potentially efficient and viable: a leading sector. The Kirby Report itself casts doubt on this perception. It points out that a very small percentage of plants account for the majority of the new freezing capacity. A great deal of optimistic investment was based on a high throughput that has yet to materialize. When interest rates rose precipitiously (between 1978 and 1981 short-term debt over the whole industry rose over 200%), the large year-round plants were in trouble (Kirby 1982, p. 107–109). The highly seasonal plants on the other hand, have lower annual throughputs which is offset by lower capital investment. The small firms accepted more conservative financing and were, therefore, better able to withstand a period of falling margins and rising interest rates. This was one reason, Kirby concludes, why the smaller, independent plants outperformed the Big 5 in 1980 and 1981, "despite the alleged advantages of the latter group" (Kirby 1982, p. 109).

The facts of restructuring, as it begins, demonstrate that social costs are involved here too. Single industry towns, inshore or offshore, are equally affected by shutdowns: efficiency and social costs are colliding in both sectors. One-industry towns are always vulnerable, of course, and within the category some communities are more dependent or more isolated than others. Fishing communities like Burin or Grand Bank, however, are not like the "instant" new towns that dot the Canadian shield. Grand Bank has a proud tradition that goes back at least 100 years. After 1945, however, trawlers and a large processing plant took over the community and inflated the size of the one-industry work force up to an unreasonable size. Another community in the same area, St. Lawrence, is a classic example of the clash between efficiency and social costs. Starting out as a 16th century summer fishing station, St. Lawrence gradually evolved into a small-scale, inshore fishing community. In 1933, however, a private company began to exploit the fluorspar veins in the area and gradually most of the men left their traditional peasant economy for the world of industrial wage labor. In the 1970s, however, a combination of health and economic issues forced the mines to close down (Handelman and Leyton 1978). The response to community decline by the provincial government was to build a modern but small fish plant and try to turn miners back into fishermen. In our terms, the fishery was once again being treated as an employer of last resort. St. Lawrence is not an inefficient inshore facility; it is in trouble because of bad economics and bad social policy. Other mining towns in Newfoundland have been allowed to close down (Bell Island, Buchans, and Baie Verte) but in these communities the fishing alternative was not available....

Political and economic ideologies, pride, and rhetoric are adding to the confusion. The Kirby Report has condemned equally the "rural romantic school of social thought" (p. 187) and "free enterprise rhetoric" (p. 189). In Newfoundland in particular, there is at present a fear of "efficiency" which has been underlined by the disaster of resettlement and the enormous social costs which accompanied it. Resettlement or rationalization are fearsome words or concepts because they seem to carry implied threats to a relatively unskilled work force. To "rationalize" means "to cut the costs of labor"; it hardly ever means to increase productivity by a better use of capital or management, and in an area of high unemployment, efficiency often comes down to welfare or UIC.

The present Progressive Conservative government has promised the voters of Newfoundland that never again will government adopt a policy for industrialized economic development which carries with it involuntary shifts to larger urban centers. Instead, jobs will be brought to the people. In a province in which the fishery is such a vital sector of the economy, this translates into a promise to put the inshore fishery on a strong footing, thereby serving both cultural and economic goals. In concrete policy terms, the result has been government subsidies for the inshore fishery, guaranteeing protection for small, community-based, seasonal processing plants. Now, as costs rise and prices fall, those plants have to sell what they produce. To those who would argue the "efficiency" side of the dialectic, the preservation of the rural Newfoundland community seems to equate with rising opportunity costs for capital and disquieting inflexibility in economic policymaking.

Is the reality of the situation quite so irreconcilable as this sketch of current tenets would make it seem? We think not. Traditionally, maritimers have been flexible and mobile in their search for a living (Canning 1975), using occupational pluralism as a viable solution to inherent problems of seasonality and restricted ecological niches (Thornton 1979). The old custom of moving, during the 'seasonal round,' from the heads to the bottoms of the bay, from seals in the spring to woodswork in the winter, and from capelin to cod to herring as each season presented itself (Sanger 1973; Thornton 1979) was the accepted manner in which an apparently fragmented economy was integrated. Distance was no barrier: hence the 'floater' fishery on the Labrador, or the movement of Magdalen Islanders to the Lower North Shore of Quebec or to the Strait of Belle Isle to fish for cod after the seal and herring seasons were finished (Ommer 1979; Remiggi 1975).

Today the people of Port de Grave, Newfoundland, pursue a variety of fisheries over a range of marine resource niches spread between Cape St. Francis and White Bay to put together an integrated multiple marine resource-based economy which is demonstrably viable. Such strategies flow from the community naturally, violate no cultural perceptions of quality of life, and involve no serious 'social costs.' We add, however, that a wholesale adoption of this policy by every community in Newfoundland would not work. In the particular case of Port de Grave, the fishermen of the nearby community of St. Francis were willing to rent their berths because they had found alternative employment in St. John's. Their option, however, is not generally available. This example from a single community does point to two more general issues: on the one hand, fewer people in the fishery seems to mean better incomes, higher productivity; but likewise, it also points to the strength of community adaptation. The men of Port de Grave were astute enough to pick up on an option when it presented itself. Policymakers planning the future might be well advised to leave open some room for local initiative rather than attempt province-wide or region-wide schemes. Governments are best at creating equality of opportunity, less good at initiative and enterprise.

Another example of the strength of community which we

can cite is the Fogo Island Cooperative on the north-east coast of Newfoundland. The cooperative was formed in 1967 to fight the resettlement initiatives of the provincial government. Today the 1000 plus members have over $700,000 of their own money invested in the fishing industry. In the last 15 years the cooperative has declared a "surplus" in all but 2 years and one of these was 1974 when the whole of the Atlantic fishery was in trouble. In 1980, the cooperative began a program of diversification realizing as they did that salt fish had to be supplemented by fresh, frozen product and by crab. Both of these latter moves meant a heavy capital investment and an extended line of credit from their bankers.

In 1983, the cooperative was one of 19 small-to-medium enterprises that had their line of credit further extended by a loan guarantee from the provincial government, in this case for $700,000. They had been faced with a large inventory of valuable product they were unwilling to dump on the Boston market at "fire sale" prices. It was the classic problem of cash flow. The help from the provincial government was exactly the sort of thing that government should be doing — supporting local effort where needed without attempting to overwhelm. Only once in the last 2 years has the Government of Newfoundland needed to pay off one of these guarantees.

The inshore fishery has a reputation of being static, conservative, and unwieldy. The Fogo Island Cooperative is at least one clear case where this is not true. The cooperative has had the foresight to recognize the need for diversity and it is currently installing a financial control system run by computer that will give the plant managers detailed information on costs by plant and by product. The cooperative is modernizing in other ways: it has hired more full-time staff and is acting in partnership with the Department of Fisheries and Oceans on an experimental quality control program as recommended by Kirby. The members are involved and concerned in the management of their own enterprise and we think they set an example that need not be the only one in Newfoundland.

Policymaking and the adoption of technical change might be better off to build on such given communal strengths and try to find balance. It is totally within the nature of maritime peoples to move from aspect to aspect of their natural environment. In the "marginal" work world of the northern North Atlantic, such mobility and multifaceted work is the characteristic of the traditional society, and has its modern expression as well. In Scotland, Sweden, Norway, Iceland, and Newfoundland, transhumance, both pastoral and marine, has a long history of acceptance. Recently, that may have meant a seasonal move to Labrador City, or a 3-week spell on an oil rig, but mobility *as such* will not destroy the Newfoundland culture. The Newfoundland work force is recognized as unusually mobile in the general Canadian context. The Economic Council of Canada noted this characteristic several times in its report on the Newfoundland economy and went so far as to explain it this way:

> Mobility comes naturally to a people whose ancestors moved regularly to exploit a shifting fishery, and Newfoundlanders have proved willing to commute both to get jobs and to take advantage of .... developing towns. (ECC 1980, p. 16).

In recommending that governments should not force the creation of jobs in outports, the Council argued in favor of viable enterprises within commuting distance of outport people, noting as above "...the inherent mobility of Newfoundland workers and their willingness to commute" (p. 58). The reasons for this should be understood, perceived as a strength, and built on, but not ignored or abused. And this is as true for urban Newfoundland as it is for the outport — a considerable proportion of the St. John's work force drive each day up to 2 hours journey time so that they may live "round the Bay" and work in the city.

If this argument is accepted, how does it feed into policymaking? The dominant paradigm that has guided the making of fisheries policies in Canada has been biological. It has been based on a model of Total Allowable Catch (TAC) which is essentially Malthusian (Larkin 1977). Unregulated exploitation leads to stock depletion and dissipation of the economic rent (Gordon 1954). At the same time, all marine biologists and many economists are aware that certain new technologies can extend the limits of these resources: aquaculture is one promise for the future.

In the meantime, stock restriction must be accepted as a necessary limiting factor in strategy; quotas and licences are the tools of good management. How, then, is the industry to be organized so that the wealth of the limited resource can be equitably distributed? In the recent past, policymakers have attempted to preserve the natural, marine-focused nature of fish harvesting and processing. They have promoted the idea of bringing processing plants into small rural communities and they have linked these plants (often seasonal) to larger, year-round plants through a system of road transportation. In 5 years (1977–81), the number of licensed plants in Atlantic Canada has increased 35%, with the largest increase taking place in Newfoundland (147 up to 225), of which many were very small (Kirby 1982, p. 107).

It is clear that such a response is exaggerated and it has both good and bad effects. On the positive side, there has been local employment (often using women who have few other options for paid labor in the outport). The plants have often used an "appropriate" technology and small-scale capital. Under conditions of high interest rates and low fish prices this has made them less vulnerable to recession than larger plants (Kirby 1982, p. 109). On the negative side, there have been quality problems: as when, for example, community stages were permitted to set up a single "cutting line," after which the product — often without adequate freezing or icing — has been transported to a larger (regional catchment) plant for further processing. If the inshore sector continues to have the lion's share of the available stock, by 1987 more rural processing will be required, answering the complaint that there are too many processing plants, but not solving the problem of serious *economic* costs.

On the other hand, it can be argued that too much is spent on the offshore in terms of narrow thinking of the offshore as the only sector that can be made "viable." This seems to us an artificial and dangerous distinction. It denies the idea that the inshore either is, or can be, economically sound. Moreover, it does not solve the problem of which institutions, communities, or enterprises will carry the social costs of restructuring and rationalization.

All sectors of what is, at the end of the day, one industry have both economic and noneconomic costs associated with them. An alternative policy might be to adopt a system of marine transportation, building on the traditional mobility of communities and making it possible to achieve an integrated approach to the industry, whether off-, mid-, or inshore. On an ad hoc basis, the northeast coast of Newfoundland is already familiar with over-the-side sales, a short-term necessity which loses value-added but at least protects income. Kirby mentions a fleet of Canadian-owned freezer trawlers which might be used in this

way to supply plants that are resource-short during the winter months. Why should a mobile collector fleet not link inshore and offshore sectors according to need? Freezer trawlers, operating as collector boats, can link the inshore producers and those offshore, allowing large, year-round plants to capture economies of scale. Smaller community plants could then deal with the smaller volumes and specialized processing of currently underutilized species, thus introducing diversification at those parts of a multisegmented industry that require additional support; it is precisely where the cod resource is inadequate that multiple-marine resources are now, and have always been sought.

Marketing, of course, remains problematic, and indeed is all too often ignored. Not only is the inshore seen as fragmented: the whole industry is now perceived in separate "boxes" — whether those are labeled 'inshore,' 'midshore,' 'offshore,' or 'producers,' 'processors,' 'markets' — or the interests of regions, governments, or bankers. It is the curse of the fishery that it has been most efficient under quasi-monopolistic conditions which have not taken account of social costs. The response, or backlash, if you will, has been to accept fragmentation as necessary, since integration is fraught with ills. Yet, once again, this need not be so. The Iceland case is instructive. Early marketing strategies left Icelandic exporters in the hands of brokers in the marketplace or in the hands of fishermen with whom a fixed price was agreed. Selling to middlemen did not help because of low prices or slow returns. Ultimately, rational control of exports was achieved in most of the North Atlantic fishing countries, which resulted in lower overhead costs of marketing and stage bargaining positions in the marketplace. Quality control was achieved in 1932 in Iceland by a voluntary national export union; in 1936 the Faeroese followed suit, and then Norway in 1937 (Jónsson 1980). In Newfoundland, attempts at coordinated marketing and quality control failed (Alexander 1977) through a deep-rooted mistrust in the upper echelons of the fishery. Canada never attempted a national marketing strategy. Nonetheless, it is clear that the level of expertise required to deal with marketing, and the clout needed to bargain abroad and control at home, mean that marketing must also be taken out of its separate box and integrated into the fishing industry by government so that marketing requirements are felt all the way down to the primary producer. This probably means cooperation between provinces and the federal government, so that local knowledge can combine with national clout to deal effectively with a communication linkage that deals with the micro level at home and the macro level abroad.

What we are arguing here seems to turn the theme of this conference on its head. Mobility is not a disruption of the traditional maritime culture. The technology of the offshore harvest can be integrated into an inshore–midshore–offshore hierarchy of what is, after all, one industry, and not sectors operating without even the relationship of competition. The current impasse between governments and sectors comes (we think) from asking the wrong questions. We now look at industries where thinking centers around species of fish or communities defined by sector (offshore, inshore, fish plant, road improvement).

Why do we ignore the lessons of both traditional and modern economies? We have integrated oil and automobile industries. We used to have integrated local economies. We see developing technology in the oil exploration and development industry concentrate on the design of offshore oil platforms — why not offshore fishing platforms as well? Freezer trawlers had a bad name in the late 1960s when Russian factory ships were condemned as vacuum cleaners, but factory ships need not destroy a resource. Mobile Canadian-owned and controlled boats which respond to the needs of inshore fishermen in the summer 'glut' and to the smaller resource-short plants looking for a sufficient and sure source of raw product would be, we think, a boon to participants in the industry.

Individual suggestions that we offer may be valuable or problematic. What is important is the different *perception* inherent in this paper. If a way can be found to see the industry as *one*, it would become possible to foresee in detail its development in various new ways. Canada, after all, has responsibility for control and management of one of the richest marine environments in the world. This should not require poverty for some as a necessary accompaniment to plenty for others. In the past, these waters have supported less economic growth than can reasonably be expected (Ommer 1981); they have also created a cultural identity for Atlantic Canada in general and Newfoundland in particular. The modern industry should be capable of employing a variety of economic and ecological niches in such a way that the participants would *support* each other in the pursuit of efficiency and community. We would need, of course, in the short term, intensive capital support. It might also entail an adaptation in the role of government, perhaps to a support role at the federal level, except in marketing. The smaller plants and cooperatives most probably need some of the management benefits that come to larger enterprises. Various administrative agencies supply such sources to some small firms (engineering, accounting, management, marketing advice). This is an *efficient* use of resources. Why not build on this and enlarge the scope of such programmes? This is where government subsidies might be better employed.

Integrated pluralism in species, places, sectors, and markets is a concept worth exploring as something that is built into the community's strengths and could be economically organized.

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Materials for the Administration of Public Programs Relating to Occupational Health and Safety in the Fishing Industry[1]

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The activities associated with fishing occur essentially in regions far removed from major centers. Yet government policies and programs are produced by agencies which themselves are centralized and often foreign to the regional context. André Gagné discusses this question of the weight of regional concerns in political decisions made at another level. The case of Quebec's legal provisions on health and safety which correspond poorly with actual experience in the fishing industry is particularly striking.

Introduction

For some years now, it has been possible to observe the development of a growing interest in questions relating to occupational health and safety. This interest is reflected particularly in the creation, in 1980, of the Commission de la santé et de la sécurité du travail du Québec (CSST). The government of Quebec has assigned it responsibilities in the area of compensation, financing, inspection, and prevention. The observations which I shall make within the framework of this brief paper concern the latter mandate. More particularly, we shall attempt to identify some elements that may be useful in the administration of a policy of prevention in the fishing industry in eastern Quebec (North Shore, Lower St. Lawrence, Gaspé, and Magdalen Islands).

Until very recently, prevention activities in the area of occupational health and safety were relatively limited within Quebec's fishing industry. For the most part, they involved studies and research designed to extend our knowledge of working conditions. In any case, the changes in production and market conditions that have occurred over the last 5 years have encouraged officials within this industry to concern themselves primarily with questions other than those relating to occupational health and safety. Yet the problems of occupational health and safety are assuming growing importance. In fact, the regional office of the CSST for the Lower St. Lawrence–Gaspé is studying the possibility of having the fishing industry recognized as a sector for priority action at the regional level.

In this paper, I promise to examine two basic themes regarding the discussion of priorities and the implementation of policies, following presentation of the study currently underway with respect to occupational health and safety in the fishing industry. The first theme concerns the development of agendas for political and administrative authorities, or "how a question becomes the object of a decision." It offers some interesting light on the establishment of an agency's priorities and its choice of directions. The second identifies a number of factors which influence the translation of these directions into concrete acts, and the implementation of decisions. In the case with which we are concerned, intervention consists of the application of regulations which take the form of preparation of a program of prevention under employer responsibility.

Interventions Within the Framework of a Prevention Program and the Fishing Industry(1)

The Current Situation

In view of the relatively important role of fishing-related activities in the fishing industry in the Gaspé and the Magdalen Islands — approximately 30% of the active labor force in the Gaspé, and 50% in the Magdalen Islands, depend on this sector — the regional office of the Commission de la santé et de la sécurité du travail (CSST) for the Lower St. Lawrence–Gaspé is particularly concerned with conditions relating to health and safety in this industry. Within the context of the regional coordinating group,[2] an ad hoc committee has been set up to review the existing situation and to initiate a study on the need for and desirability of CSST recognition of prevention activities within the fishing industry as a regional priority. The ad hoc committee is composed of seven members, including three representatives of the Gaspé Community Health Department, two representatives of the regional office of the Commission de la santé et de la sécurité du travail, and one representative from each of the Community Health Departments of Rimouski and Baie-Comeau/Hauterive. The committee's mandate also covers questions relating to the catching and processing of seafood products.

One of the first acts by the ad hoc committee was the preparation of a listing of the information and data available on working conditions. This survery showed that the information available was very limited. Information was unavailable or seriously inadequate with respect to such questions as the organization of work and working conditions, the identification of risks to health and safety, and the evaluation of physical, chemical, and biological risks.

[1]Translation of the French.

[2]The regional coordinating group is composed of one representative from the CSST, one representative from each of the three Community Health Departments active in the region, one representative from the joint sector-based association of the Ministère des Affaires sociales, and one from the joint sector-based association on occupational health and safety.

In view of this, a decision was made last March to correct the situation. The members of the coordinating group recognized the importance of improving their knowledge of working conditions and risks to health and safety before deciding on the desirability of CSST intervention. The Gaspé Community Health Department was assigned the task of carrying out the relevant studies and obtaining the desired information.[3] In May, a project entitled "observations aboard fishing vessels" was submitted. Further information on standards in the processing industry was also to be compiled for a study on working conditions.

Project Objective and Methods

The project on "observations aboard fishing vessels" is designed to deal with the problem of inadequate information and to initiate a study of conditions relating to occupational health and safety in the fishing industry. The first step, then, involves observation and description of the work process aboard fishing vessels. Three themes in particular are to be examined:

- — organization of work: this relates to the description and analysis of the working conditions of the master and deckhand.
- — job safety: identification, description, and analysis of the risks to safety.
- — occupational health: identification, description, and analysis of risks to physical health, and report on the health of workers.

To collect the relevant information and achieve the study's objective, an analysis grid and observation sheets have been proposed to identify the characteristics of the fishing fleet, types of vessels, length, types of catches, number of crew members, and number of years of experience of crew members.

As regards the organization of the work, the study investigates fishing techniques (fishing gear and tackle, working tools and procedures), work schedules and job responsibilities (description of the work station). Questions relating to health and safety are clarified by a study of risks to health and safety, health problems, and health and sanitation conditions. Work on the project began several months ago. It is to be completed this year.

The data are collected on the basis of a sample of vessels representative of the three types of fishing fleets in the region: the artisanal fleet, the inshore fleet, and the deep-sea fleet.

A sociologist and a fisheries technician are responsible for the compilation of this information.

As we can see, interventions in the fishing industry arising from government policies are currently centered on the development of knowledge. The results of this operation may serve as the basis for later consideration regarding the desirability of having this industry recognized on a regional basis as a priority area.

Agenda Development, or How a Question Becomes the Object of a Decision(2, 3)

Observation of the evolution of social and political life shows that some questions or problems lead to action, while others produce no concrete results. This general observation applies as well to the actions of public administrations in the field of occupational health and safety.

To serve as the basis for reflection on the administration of public interventions in this sector, and to assess the possibilities or probabilities that steps or actions will be taken, we propose to examine the points that influence the preparation of "agendas" for the deliberations of political and administrative authorities. By doing so, we will understand somewhat more clearly the process of selection of those questions chosen for intervention. In short, we want to identify those factors that determine why some subjects receive attention while others are ignored.

The Relationship Between Matters of Concern and Decisions by Institutions

We frequently observe that certain situations or environmental conditions are perceived as not corresponding to the expectations of those concerned. Requests for corrective action are then addressed to the public authorities. Discussion of these matters of concern may then lead to interventions on the part of public officials. However, a limited number of situations become matters of concern, and some matters of concern remain unsettled. This observation can be explained by the fact that resources in the public sector, as in all branches of activity, are relatively scarce. This scarcity may take any of a number of forms: limited human, material and financial resources, equally limited time, energy, and technical and administrative capacities.

In addition, public interest may show varying levels of intensity, and the public will to act is subject to certain constraints and obstacles. The various situations are in competition with one another, as it were, for public attention.

In short, those matters of concern, which have the ability to stimulate action, are not only capable of attracting attention as matters for political choice, but are also perceived as legitimate. To reach the agenda, a subject or question must pass three tests: ability to attract attention, to be recognized as legitimate, and to stimulate action. To clarify the nature and scope of the observations presented above, we shall briefly examine each of these three tests.

How a Matter of Concern Attracts Attention

A situation becomes a matter of concern as a result of progress through and discussions or exchanges within various organizations and groups: groups of experts, specialists, administrators, politicians, and interest groups. Various means are used to attract attention, including the creation of coalitions between groups favoring the promotion of a question and the improvement of a situation, and the deployment of efforts to ensure that the question or situation becomes the object of media coverage. This is done in an effort to create greater interest in the problem or subject on which intervention is sought.

The ability to attract attention is closely linked to the degree of "particularity" of a situation. A question assumes special prominence when it can be identified with specific facts or events. The possibility of particularizing a situation is important because it helps to create interest in it by identifying clearly the nature of the subject or the question for debate. It clarifies better the events and conditions behind the situation, its causes and effects, and even the identity of the groups involved. This clarification merits our attention because the events behind these situations are important insofar as they influence the strategies

[3] A study was already underway on the working conditions of fishermen.

and tactics implemented to create interest in a given question in order to justify intervention.

How a Question Acquires Legitimacy

In order to lead to intervention, a question cannot simply attract attention, but must be legitimate, that is, it must be considered a matter of concern to political and administrative authorities. In this context, the relationship between a given question and the dominant values conveyed within the political system constitutes an important element in determining its power or ability to stimulate intervention.

These dominant values may be grouped into two categories: descriptive values and normative values. The first refers to the operating methods and organization of the sector or branch of activity considered. The second concerns what is considered acceptable or unacceptable. The latter group of values includes a number of elements which make it possible to assess the margin for maneuver open to administrations, and hence to determine the nature and scope of the measures of intervention.

When a question is closely related to the system of values, it acquires the capacity for a certain "generalization." It transcends the particular case. It is precisely this process that makes it possible to legitimize a question. This occurs when it has achieved sufficient strength or power in the process of collective choice. While the possibility of particularizing a question is important in ensuring, for example, media coverage and the development of interest within the population, mobilization of the forces capable of influencing decisions and actions is related to the ability to "generalize" the concern associated with a question among influential groups. To gauge the possibility of generalization, we must assess the degree of interest or concern which a question can readily arouse among influential groups.

The generalization of interest in a question can be achieved in a number of ways. These can be grouped, as in the case of the particularization of a question, into two categories: political ideologies and advisory and study groups or committees. These two types of means provide frames of reference to give an emerging question the possibility of acquiring the political strength required to be recognized as a question worthy of interest and concern.

How a Matter of Concern Stimulates Action

Attracting attention to a question and demonstrating its legitimacy are necessary, but not necessarily sufficient, steps in encouraging the decisionmaking authorities to take action, or to intervene. A question may appear on the agenda without automatically giving rise to action. In fact, a number of possibilities are open to those concerned: the decision may be postponed, the question may be sent back to a study group for more detailed analysis, or it may simply be decided that intervention would be inappropriate. In fact, there is a whole range of possibilities from which a choice may be made. The choice is not between action and inaction, but between various levels of intervention. The question, then, is one of choosing, with respect to the situation observed (the facts established and the remedy proposed), the nature and scope of the plan of action which appears the most satisfactory and the most relevant under the circumstances.

Once a question has attracted attention and been recognized as legitimate, it is difficult to dismiss it with a wave of the hand. However, there are situations in which no action is taken. The question is thus set aside. This situation can be explained by facts and events that modify the setting and the context, or, in other words, the environment.

In order to avoid a decision, a question may be transformed. This option justifies further studies and discussions. It should be pointed out that this phenomenon is not necessarily prejudicial to eventual action. The chances of intervention may be reduced, but they do still exist. However, when the parties concerned are hoping for relatively immediate intervention, they generally tend to oppose any form of transformation of the question.

General Framework of Analysis for the Administration of Interventions (4, 5)

Let us continue our reflections by examining the factors to be included in a framework of analysis and likely to influence the conditions, methods, and results of the implementation of a policy of occupational health and safety in the fishing industry. The question, then, is to identify certain elements that play a major role in the development and implementation of interventions.

The variables that influence the administration of activities and projects can be grouped in three major categories: the manageability of the problem, the ability of a policy or program to structure the administration of interventions in a satisfactory manner, and the fundamental characteristics of the environment within which the policy or program is effected.

The Manageability of the Problem

Quite apart from the difficulties and obstacles inherent in the implementation of any government program, some questions are easier to deal with than others. In fact, depending on the questions dealt with, the nature, scope, and consequences of changes in behavior, for example, are perceived with varying degrees of precision and clarity.

The manageability of a program is influenced by the difficulty of organizing change, the diversity of the behaviors involved, the relative importance of the number of people whose behavior is to be modified, and the extent of the desired change in behavior.

Organizing the change necessarily involves some difficulty. In fact, it is not easy to assess the scope of the problem (are we dealing with a principal problem or a secondary one?), to relate the changes of difficulties encountered to the modifications in behavior of the people and groups concerned, and to develop the technology or technical measures that will promote the desired adjustments in attitudes.

Within the framework of proper administration, interventions occur on the basis of the hypothesis that the application of certain standards or the use of a certain procedure or technique will guarantee the achievement of a desired result. However, the theoretical bases for these measures are all too often not particularly sound. In short, the cause-and-effect relationship between certain means of action and favorable results or consequences is not as clear as may be suggested. Thus, it is generally impossible to state with certainty that given activities or projects are capable of achieving the aims and objectives of a program.

Behavioral diversity relates to the problems arising out of the nonhomogeneity of the attitudes of the individuals and

groups concerned in the administration of a program. The resulting permanent uncertainty implies, in terms of choices, judgments based not only on facts, but also on values, impressions, feelings, and emotions.

The third factor to be taken into account in understanding the development and implementation of a plan of action, and assessing the chances of the proposed solution for success, is the relative importance of the number of people whose behavior is to be modified. The more clearly the target groups of a public program can be identified and defined, and the smaller they are, the easier the administration of interventions is. Under these conditions, the development of support for activities and projects is faced with constraints and obstacles that are more readily surmountable. Mobilization of the individuals concerned to ensure the defence and promotion of the desired interventions occurs in a less uncertain environment. For example, when the individuals most directly concerned are concentrated within a relatively limited and clearly identifiable geographical area, the chances of success in achieving the aims or objectives of the programs are greater. Some problems are often easier to deal with at the regional level than at the national level.

Finally, the last factor meriting special attention in this first category is the extent of the anticipated change in behavior. Various experiments have demonstrated the importance of the number of people involved in the target group or groups and the extent of the difference between the behavior observed and that which is sought.

Ability of a Policy or Program to Structure the Administration of Interventions

The content of a policy or program constitutes an important element in the framework of the administration of interventions. It is important, then, to ensure that the bases of the strategies and components of the administrative structure are made clear, and that the compatibility of these two major aspects of administration is verified to avoid unnecessary delays, ambiguities, and misunderstandings.

The presentation of clear and coherent objectives is an essential condition for the establishment of priorities and for the ranking in order of importance of possible alternative options or solutions.

These enable us to see where we are going, and to locate the contribution of the related activities and projects with respect to the orientations and goals of the policy or program. They serve as frames of reference to ensure follow-up of the consequences of the interventions and to permit assessment of the gap between the desired situation and that actually achieved.

Each policy or program, as we have already indicated, is based on theoretical foundations or a conceptual framework. Good administration requires that the theoretical foundations be presented in legislative and administrative documents. In this way, the theory underlying the desired changes is clearly set out. Thus, the policy or program demonstrates the principal relationships of cause and effect between the means of action and the anticipated results, and hence creates an awareness of the need to give administrators the appropriate administrative instruments which will enable them to deal in a satisfactory manner with these relationships.

Proper administration must have means appropriate to its ambitions. In short, there must be some assurance of compatibility and balance between the means used and the results anticipated. This is provided when the administrative units responsible for the implementation of the decisions have the financial resources to acquire the human and material resources — equipment, supplies, materials — required to achieve the desired goals and objectives.

Analysis of public policies and programs teaches that one of the principal obstacles to efficiency or to satisfactory performance is the lack of coordination between the actions and steps taken when a number of parties are involved. Hence, if a policy or program is to have every possible chance of success, it must define the conditions and methods of actions taken by those who participate in the administration of interventions.

One other factor deserves particular attention: the criteria for decision. These must be compatible with the objectives of the policy or program. Lack of compatibility between these elements of intervention administration can lead to "slippage" from the policy or program. This is reflected by actions or steps differing from those visualized in the development of a given plan of action.

The selection of the agents responsible for the administration of interventions has a great deal to do with the satisfactory implementation of the choices made. The achievement of the objectives designed to modify attitudes and behaviors of target groups demands that the public administrators concerned be personally committed to the desired results. Administrators who are indifferent or hostile to the aims or objectives are a source of delay, misunderstanding, and confusion in execution. Because of the powers assigned to them in the implementation phase, they have the ability to promote or to impede the achievement of projects and activities.

Finally, given the importance of the support of groups outside the administrative units, it seems reasonable to provide, in any policy or program, for their participation in the various stages of the administrative process. This is a useful method, too, of benefiting from the knowledge of individuals or groups who are involved on a daily basis in a given sector of activity, and who support or will benefit from the consequences of the interventions.

Fundamental Characteristics of the Environment

The third category of variables that influence the administration of policies and programs concerns elements related to the environment or context within which the interventions occur. These variables are not directly dependent on the legislative and regulatory framework, but they influence it.

The principal variables refelcting the state of the environment and capable of affecting the work of the administrative units, the behavior of the target groups, and the achievement of the aims of the interventions are: the evolution of economic, social, and technological conditions, media interest in the problem to be solved by a policy or program, the evolution of public support, the evolution of the attitude and means of action of the groups involved with respect to the aim of the interventions and the achievements of the administrative units responsible for their administration, the interest shown by the decisionmaking authorities, and the degree of commitment and leadership demonstrated by the administrators.

There are at least four ways in which changes in social, economic, and technological conditions influence the possibility of achieving the desired goals or objectives. First, they affect the perception of the importance and urgency of the problem. Political support declines when other problems gain

priority. Second, local and regional conditions produce pressures for greater flexibility in the development of plans of action, and hence may lead to types of interventions which are not necessarily compatible with the goals of legislation and regulations. Third, the support received by a policy or program depends heavily on the economic situation of the target groups and on their contribution to or role in the economic structure. In short, the more diversified the economy and the more prosperous the target groups, the better the chances for application of a policy or program involving certain costs. Finally, when policies are directly related to the state of technology, the intensity and rate of technological progress play a crucial role.

The interest shown by the media in a question has a significant influence because of the role it plays in the public's perception of the evolution of economic, social, and technological conditions. Furthermore, it tends to devote specific attention to a question or problem for a relatively short period of time.

These observations help us to realize the role of the evolution of public opinion and public support for a policy or program. The pressures which different groups exercise on the decisionmaking and administrative authorities are intended to defend and ensure the promotion of a wide range of interests. The desire to achieve a consensus and satisfactory agreements among the groups involved often leads to ambiguous decisions which leave some margin of discretion to administrators and explain, in part, the difficulty experienced by attempts to modify behavior.

We know that the various appeals to which the population is exposed frequently lead to wide and rapid variations in the interest in a given problem. The major task for those defending or promoting a specific type of intervention is the mobilization of enough support for a question that responsibility for that question is assigned to a specific administrative unit. When this happens, the necessary forms of intervention are more readily legitimized. The survival and development of the interventions associated with a given concern are better assured once access to resources and appropriate expertise becomes possible. Nevertheless, since opponents can continue to display their opposition for long periods, the maintenance of policies or programs in an uncertain environment, beset with obstacles, must be based on compromises with those groups that feel at least directly concerned.

Another factor which has a significant impact on administration is the interest in a question shown by the senior decisionmaking authorities. Their interest influences the legislative and regulatory framework in particular, and the resources available to implement decisions.

Finally, the last factor which we shall examine at this time, the degree of commitment and leadership displayed by the administrators concerned, has a direct impact on the nature and scope of the results of the interventions or achievements. In fact, administrators who do not feel truly involved in the administration of interventions are relatively indifferent to the consequences of the use of the resources available to them. The quality of administration, then, it should be emphasized, depends on the ability and political skills of the administrators.

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In an unsettled political context, at a period critical to the survival of a number of major Canadian fisheries, the federal Minister of Fisheries and Oceans, the Hon. Mr. De Bané, has attempted to define his view of the future of this industrial sector and the conditions essential to its recovery.

Ladies and Gentlemen,

It is a pleasure for me to be with you today and to have the opportunity to address a group of scientists who share with us a number of common concerns and interests at a time when technological changes are occurring so rapidly that, all too often, we tend to forget the influence and consequences they can have on social evolution and the economic and working conditions of the people involved.

I am doubly happy to be with you, because I come not only as Minister of Fisheries and Oceans, but also as the member for a riding whose social concerns are closely related to your own.

By meeting here today to share the results of your studies, to exchange your thoughts and to pool your energies, you are paving the way for the improvement of the social and working conditions not only of our own fellow citizens, but also of generations to come. And when we look at your symposium in this light, we realize that the fact that it is being held at the Université du Québec à Rimouski is extremely significant.

In fact, this institution of higher learning was established only through the determination of local leaders, over objections from other, long-established universities, particularly with respect to the relevance of establishing a university facility in such a decentralized location. The Université du Québec à Rimouski is thus one of Quebec's youngest universities. But it has not waited for the years to prove its worth, and the factor that particularly characterizes it is the interest it has shown in maritime resources and the people who work with them. It has recognized the necessity of applying techniques of higher learning to the realities of the region it serves, since the marine environment and the fisheries industry are intimately bound up with the social fabric of the Lower St. Lawrence region, the Gaspé, but also the North Shore and the Magdalen Islands. The relevance of this symposium and the presence of eminent representatives from a number of maritime countries reflect the success of this university.

Ladies and gentlemen, the problems raised in the introduction to your symposium are of enormous interest to us and, if I may, I would like to quote here three particularly thought-provoking paragraphs from that text. They read: "Because the maritime resource is renewable, it constitutes an essential contribution to the economy and, more particularly, to the socio-economic development of the coastal regions.

"In order to consolidate its activities and to meet international competition, the fishing industry must now begin to rationalize its operations if it is to achieve a level of productivity which will ensure its survival in harmony with the social context of the region.

"While many processing plants will have to be modernized, the introduction of new technologies will affect the fishing fleet as well. It is essential that we recognize the need to improve working conditions for fishermen and plant workers alike." [Translation]

Ladies and gentlemen, in a few paragraphs you have summarized the message of a number of the speeches I have had the honor of delivering since I became Minister of Fisheries and Oceans. And since we are on the same wavelength, since we share the same concerns, and seek the same solutions, I am convinced that your symposium constitutes the ideal forum that will enable us to learn many things together and to lay the foundation for a collaboration that can only be beneficial to all those associated with the fishing industry.

Your symposium falls within the framework of the various aspects of the social, technological, and economic evolution with which the fishing industry is faced. It falls, then, by extension, within the framework of the studies which my Department has commissioned over the past 2 years, and it falls within the framework of the actions which we have taken, in recent months, to restructure and revitalize the ocean fishing industry throughout eastern Canada and, as part of that process, in Newfoundland, Nova Scotia and Quebec.

Here in eastern Canada, the Report of the Task Force on Atlantic Fisheries reminds us that these fisheries, which are still, today, in a critical situation, have been the topic of a hundred studies over the past century. Who of us could have predicted, 15 years ago, that Canada's fishing zone would be extended to 200 miles off our shores; that foreign fishing fleets would be practically excluded; that we would harvest four times as much fish and that the Atlantic fisheries, like those of the Pacific, would still be experiencing a very serious crisis? Fifteen years ago, no one could have foreseen such a scenario, including both such promising and such alarming elements.

The lesson which, in my opinion, emerges from the present situation is that it is high time to put an end to the rigid attitudes that prevail in this sector. Setting aside our preconceived ideas, we must work to develop this industry for the greater good of Canada. The Atlantic fisheries represent a vital economic sector. Do you realize that over 1300 municipalities are dependent on them? Few people, in fact, recognize the socio-economic impact and potential of the fishing industry. We in Canada are more impressed by the auto industry, which provides employment for

[1]Translation of the French.
[2]Appointed to the Senate.

72 000 people in Ontario. Yet this sector generates over 90 000 jobs in the Atlantic provinces, which have a population one-quarter the size of Ontario's.

It is high time that all the groups involved — governments, unions, fishermen, and processing plants — decide once and for all to take stock of the situation of this resource, which is renewable and will continue to exist, year after year. It represents wealth, it is like money in the bank, and it should be used to improve the socio-economic situation of the Atlantic provinces. The Kirby Report will have served no purpose unless we stop going around in circles and start recognizing the potential of our fisheries.

Our fisheries resources are among the greatest in the world, and the richest market in the world, the United States of America, is at our doorstep. Yet the United States buys fish from other countries. I was in Boston a while ago with the Fisheries Ministers for Newfoundland and New Brunswick and representatives from Nova Scotia. One of the representatives from one of the largest supermarket chains in the world, with 1200 stores, admitted to us that he had not bought fish from Canada for several years, although he said that he would prefer to do business with Canada. "You are closer to us. We speak the same language; we know you. For several years now, however, we have bought all our fish for our 1200 stores from other countries, although we would prefer to do business with you, all things being equal."

Our fisheries, let me repeat, are a vital sector, both in terms of the number of people and communities which depend on them, and for Canada. They represent a vital industry for Canada as a whole, ranking third in terms of export value, immediately behind our forest and grain industries. There are, in fact, few sectors of the Canadian economy where exports total $1.5 billion a year.

Canada is currently the world's leading exporter of fish. The fishing industry provides employment for an impressive proportion of our population. The fisheries constitute an industry that has rarely been fully understood by those who have criticized it the most severely and the most openly, sometimes from within the industry itself. In the past, the fishing industry has been characterized by an atmosphere of confrontation and misunderstanding and has helped perpetuate parochial attitudes and the pursuit of personal interests at the expense of the long-term interests of the fisheries.

I have reason to hope that those days are now over and that we have finished with the internal disputes which have afflicted every sector of the industry.

The studies carried out by the Task Force are the most detailed ever performed on the Atlantic fisheries and together constitute the most impressive compilation of data ever published on this industry. There are three of these studies: a survey of the incomes and expenses of more than 1000 fishermen; a survey of the incomes and expenses of some 100 processing plants, representing approximately 85% of the groundfish industry in the Atlantic provinces; and, finally, a study of possible markets for our groundfish and herring on a world scale. These studies indicate that, in the past 2 years, there has been a sharp decline in net value within the processing industry.

When we consider the Kirby Report as the result of a study covering their financial statements of 100 processing plants, it is extremely disconcerting to realize how far the industry's operating capital has declined, and the same could be said of its capital movements and net value. It is inconceivable that a business slowdown should bring about such a collapse.

Without a solid, stable, sure and economically viable basis, the fisheries will continue to be a sector of uncertain employment, a sector in which employee safety and satisfaction will leave much to be desired and will affect the social climate of our regions for years to come. Yet it is equally essential that the industry achieve a level at which it can survive without depending on periodic grants. Economic viability must be achieved, and achieved now.

A second objective of fisheries policy is to ensure that the Atlantic fisheries produce as many jobs as possible, provided the individuals so employed earn acceptable wages, including income transfers from fisheries-related activities. We must make every effort to stimulate employment as far as possible, without adversely affecting the incomes of those involved in the activities of this industry.

You are well aware of the economic and social impact of the fishing industry on the population of the Atlantic provinces. There are over 700 communities in which the economy is based entirely on fishing. It is a fundamental obligation of the Government of Canada and of each of the provinces to ensure that these jobs continue to exist in these rural and often isolated regions. I firmly believe that our fisheries policy must reflect both social and economic realities and that we cannot consider economic viability as maximum economic profitability, without regard to the social cost in terms of jobs.

But where is the happy medium? We will have to come to some agreement on this subject if we are to succeed in our aims. We do not live in the New England states, where it once was impossible to fish for a few years and then, when stocks were depleted, find work in a factory in New York or somewhere else, with the option of returning to fishing 10 years later. For some residents of Nova Scotia, Newfoundland, New Brunswick, or Quebec, fishing is the only possible livelihood: there are no other jobs available.

Workers in the fishing industry, whether they are fishermen or plant employees, are the first victims of the crisis through which their industry is now passing, a crisis not unrelated to that experienced, in the past year, by all of this country's small and medium-sized industries. It is a general crisis, and its causes are many.

The financial dynamics of a firm are not difficult to grasp. The market price, minus the unit cost of production, multiplied by production, should normally be enough to cover the costs of sales, administration, interest, amortization, taxes, and shareholders' profits; otherwise, the firm will eventually have to declare bankruptcy or find a new financing.

It is this situation which we have experienced in the fishing industry over the past year, and this is why the Government of Canada has had to invest hundreds of millions of dollars to refinance and restructure the fishing industry in Newfoundland and Prince Edward Island, as it is now attempting to do in Quebec, with the offer we have just submitted to restructure the Pêcheurs unis du Québec cooperative.

But restructuring and refinancing are not enough, in my opinion. They still represent only a temporary solution. And it is for this reason that my Department has developed a plan for renewal designed to improve the quality of the products of fishing, from catch to table, in order to give new impetus to this industry and to lead fishermen and processing plant employees towards a new era of economic prosperity and a healthier social climate.

Unfortunately, even considering all their sources of cash income (including unemployment insurance benefits), a relatively great majority of fishermen, both full- and part-time, earn gross incomes, before taxes, which are below the level officially recognized, on a national scale, as the poverty line for rural residents. Only 10% of all full-time fishermen today earn over $23,000 a year. Over half of all fishermen earn less and have annual incomes of under $12,000.

Simply stated, the fishing industry, as it stands today, cannot support its people. It is only in recent years that fishermen have begun to organize to improve their economic situation. They have taken a number of giant steps, but they still have far to go. I have recommended that those provinces that have not yet recognized the right of fishermen to collective agreements prepare legislation to this effect, legislation which, in my opinion, will improve the lot of these primary-sector workers.

For ultimately, the improvements of living and working conditions depend largely on the presence of a union. In Newfoundland, for example, workers from all sectors of this industry are grouped into a single union. This is certainly an interesting example.

Your symposium has dealt with the question of technology and productivity. This is another aspect of the plan for renewal of the maritime fisheries to which I attach great importance. First of all, we have to realize that the resource will not grow. There is still some potential in the North which is not being fully exploited. This is also true of redfish in some regions. But our strategies must be aimed instead at:

— reducing costs

— obtaining more from the same fishing category.

While fishing techniques have evolved around the world, in order to respond to a more refined market and a more difficult economic situation, the situation has changed very little, particularly in Quebec, and our fishing fleet does not necessarily meet the criteria of quality and efficiency that should normally exist in an industry of such importance to the population of all of eastern Canada. We still do not have a prototype vessel which would meet the principal needs of our fishermen. Yet boats which have become obsolete and in many cases dangerous should be replaced by boats that are more responsive to the technological requirements of modern fishing. I know that some fishermen are concerned today, because they cannot afford the expense of these boats. To relieve this concern and to help fishermen to continue exercising their trade, we have decided to assist them by increasing our contribution to the renewal of the fishing fleet.

We do not want to build new boats just for the pleasure of building them. We want these boats to come closer to meeting the needs of an industry that cannot continue to operate as it did 25 or 50 years ago. We want these boats to be safer and we want them to enable fishermen to increase their income and improve their standard of living. And to do this, the possibilities are limited. It is impossible to increase the fishing effort indefinitely, because it is based on a resource which, while renewable, has certain limits to its growth. Instead, we must have boats that will enable fishermen to reduce their operating costs and to provide the processing plant with better quality fish, which will, as a result, command a better price.

We are about to implement a plan for the development of the maritime fisheries which will meet these goals. In connection with this plan, one program will concentrate on the technological development of fishing and handling equipment (gutting and bleeding aboard ship); a second program will concern the modernization of the fleet (repair, replacement, refrigeration, and refitting), while a third program proposes the development of a new prototype of an inshore fishing vessel which will go further towards meeting the demands of quality, energy efficiency, productivity, safety, and cost reduction.

The technological improvement of fishing gear and handling tools will make it possible to increase profits and reduce energy consumption. It will also provide employment in fishing-related enterprises, including those that manufacture and supply equipment, gear, etc.

In addition, and this is where the plan for renewal assumes particular importance, the measures advocated will help to improve the quality of the fish aboard fishing vessels and thus increase landed values and, with them, fishermen's profits.

My Department has also undertaken a broad program for the improvement of fishing ports and dockside handling and transhipment facilities, since we know that it is useless to attempt to improve shipboard quality if this quality cannot be maintained on landing. It is for this reason that we are currently involved in programs aimed at the development of integrated landing systems with associated water, electricity, and ice systems which will ensure the maintenance of fish quality.

However, once the fish has reached the dock, it must be processed. This is another area where problems abound. If we look at Quebec, for example, we find that 95% of the 119 processing plants now in existence do not meet operating standards and that, without financial assistance, only half of them can improve their facilities to meet these new standards.

To save these industries and these jobs, our programs will enable us to provide financial assistance for the improvement of refrigeration and storage systems in the plant, and for the modernization of the plants to permit producers to diversify their production, meet quality standards, and make the fishing industry more competitive in world markets for finished products.

Our resource management has proven so effective because it is based on advanced scientific research. For a number of years now, Canada has been an international leader in the field of fisheries research and marine sciences. In Quebec, this research is carried out primarily by the Department's laboratories at Quebec City and Sainte-Anne-de-Bellevue, and by the Champlain Centre for Marine Science and Surveys at Quebec City.

My Department is now preparing a new effort in the field of fisheries and ocean research in Quebec, with the upcoming construction of the new Maurice Lamontagne Research Institute, which is to be built in the near future at Sainte-Flavie, near Mont-Joli.

This institute will be equipped with extremely sophisticated equipment and staffed by leading scientists. The Maurice Lamontagne Institute will be responsible primarily for scientific studies relating to the Gulf of St Lawrence and the St Lawrence River estuary as a complete and original marine environment. This is a sector which has perhaps been overly neglected in the past, but one which will enable us to benefit from this natural resource which lies at our doorstep and which can surely contribute to the improvement of standards of living in the eastern part of the province.

This world-class institute will represent an asset not only for the region, but also for the fishing industry of eastern Canada as a whole. And, in passing, I would like to pay tribute here to the rector of the Université du Québec à Rimouski, who has so wisely recognized the advantages of the project proposed by my Department. It is through the support of men like him that we will succeed in developing not only the sciences, but all the

aspects of social life within a region, and so enable its people and workers to be happy there, and to prosper.

My officials and I want to work with you, with the governments of the provinces, and with the fishermen's associations. Some may suggest new structures for consultation, urging that they may be useful, but the important thing is to develop an *attitude* of consultation and cooperation. Improving the industry must not be like the weather that everyone talks about and no one does anything about. By working together, we can change the whole climate of this industry.

We can sail out the gale, tie ourselves to the mast if need be, overcome our seasickness, and everything else, if we work together. We *can* get where we are going from where we are now, but we must be patient, we must be resourceful and we must, above all, have faith and confidence in one another. My officials and I must try to put ourselves in your place, to understand the situation as you see it, and, from time to time, you must do the same for us. This applies to fishermen as well. If there is an answer to the problems which regularly afflict this industry, it may be based on a new attitude which, I believe and hope, is now emerging: an attitude that welcomes change, shares the burdens equitably, and also shares the greater part of the profits.

It is only in this way that we can succeed together, in giving our industry a new vitality, that we can guarantee jobs for all fishermen and plant workers, and that we can offer the various parties concerned new motivation and greater security, essential elements in the creation of an ever healthier social and labor climate.

The improvement of working conditions for all fishermen and plant workers must not remain a pious hope, but can only be achieved with the cooperation of all in making the fishing industry one of which we can all be proud and one which will benefit every one of our communities.

Fishermen and Oil Pollution Damage: The Regimes of Compensation

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The Governments' efforts to answer fishermen's concerns are varied and contribute to ensure decent living conditions for those who work in the field. Mukherjee and Lefebvre show us how fishermen's needs are taken into account, faced with the specific risk of seeing their supply source (and consequently their revenues) threatened by pollution, and the protection governments can offer up to the international level.

Introduction

In recent decades, two predominant uses of the oceans have been the exploitation of offshore oil and gas and their transportation in bulk. These two ocean activities today comprise a potential threat to fisheries resources and the continuing livelihood of fishermen.

Over the past years, several international conferences have been convened which have generated a number of multilateral pollution conventions. Some of them deal with the issues of preventing, combating and controlling ship-source pollution, while others deal specifically with the issues of legal liability for ship-source oil pollution damage, and the scheme of compensation available to victims thereof.

Canada has enacted several pieces of domestic legislation incorporating the most suitable provisions of these international conventions. Indeed, Canada is at present in the process of considering becoming a party to some of these conventions in order to secure the most advantageous regulatory scheme and compensation package for Canadian victims of oil pollution damage.

The purpose of this paper is to focus on the issue of "compensation," as distinguished from the regulatory features of pollution control legislation. We propose, in the first part of this paper, to examine the present international regime with respect to liability and compensation for oil pollution damage. In this context, we will first present an overview of the background against which the international regime has developed. Next, we will review the relevant provisions of the pertinent international instruments and also make reference to some of the "private" international compensation arrangements in existence. We will then discuss the forthcoming amendments to the international instruments relevant and briefly assess the anticipated improvements.

In the second part of this paper, we will examine the domestic liability and compensation regime in place, pursuant to Part XX of the *Canada Shipping Act*, and also make some reference to the amendments to this legislation which have been prepared. We also intend to briefly address the Non-Ship Source Pollution Regime, i.e. compensation for pollution caused by oil and gas exploitation and production activities.

NOTE: The opinions expressed in this article are those of the authors in their personal capacities.

Part I — International Regime

BACKGROUND

In legal terms, damage resulting from pollution at sea is known as a maritime tort. A tort is best defined as a civil wrong for which a victim can claim, among other legal remedies, monetary recompense. At common law, a victim of environmental damage may seek such a civil remedy of damages by instituting an action in private or public nuisance or negligence. In the case of a fisherman's claims, however, the actions in nuisance are far from suitable.

A tort is actionable in private nuisance only if there has been unwarranted interference with the beneficial use of the plaintiff's land or the enjoyment of servitudes (e.g. riparian rights) incidental to his property interest. Also the nuisance must originate from the defendant's land, which is impossible to prove in the case of a ship-generated spill. The public nuisance action is the mechanism used to protect the individual in the exercise of his public rights. However, in order to acquire judicial standing, he must show an excess of damage suffered over and above that of the community. Thus, public nuisance is only a tort insofar as the victim has suffered special damage.[1]

Again, liability in tort at common law is based on fault proven on a balance of probabilities. In a negligence action, fault must be determined by establishing causation between the alleged tortious act of the defendant and the damage allegedly suffered by the plaintiff. Even if a causal link is established, there are the questions of remoteness and foreseeability of the injury.[2]

By far the major limitation on the availability of common law remedies is that damages are generally not awarded for economic losses. By and large, courts are reluctant to award damages for economic losses other than in special circumstances where the losses have been consequential upon injury to the plaintiff's person or property. This precludes a fisherman from claiming damages for actual or potential loss of current or future earnings.

The decision of the House of Lords in *Southport Corporation* v. *Esso Petroleum*,[3] and that of the Privy Council in *The Wagon Mound*,[4] upheld the proposition that damage resulting from an oil spillage is not compensable without proof of fault, but in *Rylands* v. *Fletcher*,[5] the House of Lords upheld the notion of "strict liability" for damage caused by the escape of harmful materials from an "extra-hazardous activity." Although transportation of huge quantities of oil could not arguably be characterized as an "extra-hazardous activity" within the ambit of the rule in *Rylands* v. *Fletcher*, Engish common law jurisprudence had not developed to a stage where a definitive statement of the law was discernible.[6]

In international law, the notion of strict liability was gradually emerging through decisions such as the *Trail Smelter Arbitration*,[7] and the *Corfu Channel*[8] and *Lac Laroux*[9] cases.[10]

Meanwhile, in March 1967, the Liberian tanker *Torrey Canyon* ran aground on the Seven Stones Reef, off the coast of southwest England, releasing over half of her full cargo of 119 328 tons of Kuwaiti crude.[11] The magnitude of the spill was unprecedented in terms of the totality of its catastrophic effects. It created a multidimensional global impact which had far-reaching implications. The positive aspect of the disaster was its catalytic role in the development of international pollution law.

The Intergovernmental Maritime Consultative Organization (IMCO),[12] the U.N. specialized agency mandated to deal with shipping matters, reacted to the *Torrey Canyon* disaster without delay. The IMCO Council summoned an urgent extraordinary session in May 1967, at the instance of France and the United Kingdom. A legal committee was created to address the legal aspects of marine pollution, among other issues.

In 1969, under the auspices of IMCO, the international maritime community finally met at a conference in Brussels to deliberate on the global impact of marine pollution. Two international conventions emerged from the 1969 Brussels Conference: the *International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualities*, commonly known as the "Intervention Convention" and the *International Convention on Civil Liability for Oil Pollution Damage*, commonly known as the "Civil Liability Convention" (CLC).[13] The Intervention Convention codified the rights of coastal states to intervene in pollution disaster situations off their coastlines, while the CLC established uniform international rules and procedures for determining questions of liability and compensation.

The Civil Liability Convention (CLC)

Salient Features

The issue of compensation for pollution damage involves the resolution of three questions:[14]

1) the basis of liability;
2) who should be liable; and
3) the limits of liability.

At the Conference, the first question was intensely debated. The issue was whether liability ought to be based on fault, or should there be a strict liability regime or even an absolute one.[15]

In traditional maritime law and under most legal systems, liability is based on fault, i.e. the defendant is liable only if the plaintiff can prove that his injury resulted from the defendant's fault or negligence. In a strict liability regime, which is more rigorous, liability is imposed on the party causing the injury, regardless of whether or not he was at fault. Under this regime, the defendant may, however, escape liability if he is able to prove that the injury resulted from an extraordinary cause which was beyond his control. A common example of this would be an "act of God." In contrast, in an absolute liability regime, which is the most rigorous, the party causing the injury is liable, notwithstanding the circumstances.[16]

Closely related to this issue of the basis of liability is the second question: who should be liable? In the context of ship-source oil pollution, the question then is: should it be the shipowner, the cargo owners, or should there be an apportionment between both? This became a crucial issue at the Brussels Conference because prior to the advent of tankers, traditional cargoes did not pose an environmental hazard.

The last question refers to the concept of "limitation of liability" which, although not unique to maritime law, is nevertheless a predominant feature. The limitation concept does not compel the defendant — in this case, a shipowner or cargo owner — to provide full compensation for all the damage and injury caused, but rather enables him to limit his liability to a stipulated amount.

In 1969, the limitation amounts that shipowners could claim were governed by the 1957 Convention on the Limitation of Liability, which was a global limitation convention, i.e. it was applicable for all maritime damage claims. The limit under this was 1000 gold francs (approximately $67.00 in 1969 U.S. dollar terms) per ton of vessel tonnage. The victim himself had to bear the excess damage, if any. At Brussels, the question of whether that limit should be raised or whether the status quo should be maintained was a fundamental issue. Indeed, the question was also raised as to whether liability for pollution damage should be unlimited.[17]

Negotiations on all of the above three questions reached a near deadlock, due to the divergent interests being represented. Eventually, however, a compromise was reached and the CLC came into existence, in which the above three questions were resolved as follows:

1) the legal regime is one of strict liability;[18]
2) only the shipowner is liable for pollution damage;
3) the limitation amount is 2000 gold francs (approximately $134.00 in 1969 U.S. dollar terms) per ton of vessel damage, with a maximum ceiling of 210 million gold francs (approximately $14 million in 1969 U.S. dollar terms) per incident.[19]

Other Features

Among other features of the CLC particularly relevant to potential claims by fishermen, the following are noteworthy:

1) From a procedural point of view, the Convention allows all claims to be channelled through the shipowner who is defined as the registered owner of the vessel at the time of the pollution incident. This affords considerable convenience to a potential fisherman claimant.

2) Under the Convention, the owner of a vessel carrying over 2000 tons of bulk oil cargo must carry financial responsibility in the form of liability insurance or other security such as a bank guarantee in the amount equal to the applicable limit. This allows the potential fisherman claimant to seek legal recourse against the insurer or guarantor.
3) To invoke his right to limit liability following an incident, a shipowner, under the Convention, must constitute a fund equivalent to the amount of the applicable limitation within the courts of the Contracting State where legal proceedings have been commenced. This precludes a claimant from maintaining an "action in rem" under traditional maritime law.[20]
4) The shipowner may lose his right to limit his liability if he is found to be in "actual fault or privity."[21]
5) The geographical scope of application of the CLC extends to the territorial sea which, under present international law, is generally accepted to be 12 nautical miles.[22]
6) Payment of compensation under the Convention is restricted to damage caused by "persistent oil."[23]

The Fund Convention

Background

As indicated earlier, the question of whether liability for pollution damage should be borne exclusively by shipowners was vigorously debated at Brussels. The CLC, as noted, imposes liability on the shipowner. At the Conference, however, delegations which were opposed to that position argued that it was unfair to the shipping industry to be compelled to carry the entire U.S. $14 million burden which was essentially twice the maximum limitation amount under the 1957 Global Limitation Convention. It was further argued that oil pollution damage was unique and unprecedented in that the cause of the damage could, at least in part, be attributed to the nature of the cargo and the immense quantities in which it is carried. Furthermore, it was considered that the $14 million limitation amount would be insufficient in the event of a "catastrophic" oil spill.[24]

Towards the conclusion of the Conference, a Resolution was thus adopted calling for another Diplomatic Conference to be convened before 1971 under the auspices of IMCO to deal with the question of liability of cargo interests with respect to oil pollution damage.

Thus, Brussels became the venue again in 1971 for another Diplomatic Conference. From its deliberations emerged what is commonly known as the Fund Convention.[25]

Salient Features

The purpose of the Convention is contained in its Preamble and also in Article 2. Basically, the purpose is twofold:
1) to provide compensation for pollution damage to the extent that the protection afforded by the CLC is inadequate; and
2) to give relief to shipowners in respect of the additional financial burden imposed on them by the CLC.

The CLC and Fund Conventions are so closely linked that a State can only be a party to the Fund Convention if it is already a party to the CLC. More specifically, compensation is available under the Fund to a victim of pollution damage who has been unable to obtain full and adequate compensation under the CLC, due to one or more of the following reasons:
1) no liability arises under the CLC;
2) the shipowner is financially incapable of providing full compensation under the CLC; and
3) damages are in excess of the shipowner's liability under the CLC.

The global amount of compensation available under the two Conventions at the present time is 675 million gold francs (approximately U.S. $50 million) in respect of any one incident, of which the first 210 million gold francs is payable under the CLC. It is noteworthy in this context that the original ceiling amount was 450 million gold francs. As a result of a decision of the Fund Assembly in April 1979, the ceiling was raised to the present amount.[26]

Amendments to the Civil Liability and Fund Conventions

Background

In the wake of the Amoco Cadiz incident off the coast of Britany in March 1978, the French Government decided, in the light of the enormity of the incident, to bring to the attention of IMCO certain matters triggered by the incident, in particular the inadequacy of the limits provided under both Conventions.[27] Similarly, various sectors of the industry voiced their concerns over the inadequacy of the limits, fearing that if action was not taken immediately, there could be a breakdown in the international system established under the two Conventions as countries moved to establish independent liability regimes.

Starting in March 1982, the IMCO Legal Committee devoted some time in reviewing and discussing proposed amendments to the Conventions, and a Diplomatic Conference has now been scheduled to take place in May 1984 to consider these proposed amendments. The basic objective of these negotiations is to improve upon the totality of the compensation scheme presently established under the two Conventions. To achieve this objective, it will be necessary not only to raise the limitation amounts but also to amend other provisions of the two Conventions. In conducting this task, the Legal Committee also proposes to amend certain provisions which in their present form appear to be ambiguous or incomplete.

Within the Legal Committee, the debate over raising of the limits is centered around two divergent perceptions of the very purpose and objective of the compensation regime established by the Conventions. On the one hand, tanker interests (i.e. shipowners) contend that the objective of the compensation scheme is to divide liability between carrier interests and cargo interests.[28] On the other hand, the cargo interests which, in essence, are the oil companies, maintain that primary liability for oil pollution damage must lie with the carrier who is responsible for the safe transportation of the oil. They do concede, however, that in the event of catastrophic spills the cargo interests contribute towards the compensation for pollution damage through the mechanism of the Fund.[29]

Various proposals on possible limitation amounts of liability have already been presented within the Legal Committee. Without going into the technicalities of these proposals, it can be said as an indication of the kind of limits envisaged, that the oil companies have proposed an upper limit of $50 million for the shipowner's liability and a global limit of compensation of $125 million, i.e., the Fund would take up $75 million. The French delegation has proposed that the upper limit of the shipowner's liability be set at $100 million, the global com-

pensation limit being established at $250 million. The United Kingdom delegation, on the other hand, has suggested an upper limit of $50 million for the shipowner's liability, with a global compensation limit of $200 million.[30] It is, however, an issue of such crucial importance that it will only be resolved at the forthcoming Diplomatic Conference, and probably, at the eleventh hour as a result of a compromise.

Amendments Proposed

Among proposed amendments to the two Conventions, the following are significant:

1) It has been suggested that the Conventions be extended to cover pollution damage caused by unladen tankers and by nontankers (the Conventions presently apply to laden tankers only). The extension to unladen tankers has already been accepted in principle within the Legal Committee. On the other hand, the extension of the Conventions to nontankers may create complications in both instruments from an administrative point of view, as well as from an insurance perspective.
2) It has also been suggested that any revision of the Convention should include the application of the two instruments to non-persistent oils. It will be recalled that the CLC applies to "persistent oils" only. This proposal has received some support in the Legal Committee, but probably will not be accepted.
3) It has also been recommended that the geographical scope of application be extended beyond the territorial sea to the 200-mile limit. There appears to be no consensus on this issue within the Legal Committee so that this matter will only be resolved at the Diplomatic Conference. This will no doubt be a contentious issue. Some States would prefer an extended jurisdiction in keeping with the recent Law of the Sea Convention whereas traditional maritime States would view it as a further encroachment of the high seas.
4) It has been suggested that the definition of pollution damage be amended to include certain heads of damages such as economic losses (e.g. loss of income, access to fishing grounds and restoration of the marine environment) not presently covered under both Conventions. It is anticipated that this issue will be resolved at the Diplomatic Conference.

NONGOVERNMENTAL COMPENSATION ARRANGEMENTS

The phenomenon of marine pollution came to be identified as a matter of real concern to the world community at large following the *Torrey Canyon* disaster. In particular, the incident triggered fierce public criticism towards all actors involved in the oil business to the extent that shortly thereafter, in 1968, international tanker owners reacted to this growing public antipathy by establishing a private compensation fund for victims of oil pollution damage. Thus the Tanker Owners' Voluntary Agreement Concerning Liability for Oil Pollution (TOVALOP) was created.

It should perhaps be pointed out, at the outset, that TOVALOP is limited to claims by national administrations for cleanup costs, i.e. private claims such as those of fishermen that are not compensable under the scheme. It is therefore not intended to describe the TOVALOP scheme in any detail in this paper. It is sufficient to say that its advantages are somewhat less than those afforded by the CLC.

In a nutshell, TOVALOP is an arrangement which depends on voluntary participation by tanker owners. Proof of negligence is required before a claim can be payable. There is a limit of liability of $100 per gross registered ton up to a maximum of $10 million. The advantages are that it does not require the carriage of oil in bulk as a cargo which is a requirement under the CLC. It also served a useful purpose as an interim arrangement during the period when the CLC was not yet in force, i.e. from 1968 to 1975.[31]

Subsequently, another international voluntary arrangement known as CRISTAL, acronym for "Contract Regarding an Interim Supplement to Tankers Liability for Oil Pollution," came into being. CRISTAL was formed by the oil companies with a view to supplementing the CLC and TOVALOP during the interim period until the Fund Convention came into force. It provides for compensation up to $30 million per incident and extends to claims filed by governments and private individuals alike. The Fund itself is financed through levies exacted from oil companies transporting oil by sea. No proof of fault or negligence is required on the part of the shipowner/operator or the cargo owner.

Under its own terms, the interpretation of CRISTAL provisions is subject to English law. The courts of Great Britain are given exclusive jurisdiction in the Contract for resolution of disputes. The actual amount of compensation available under CRISTAL is the maximum limit of $30 million, less payouts made under TOVALOP (only relevant to Government claims), less owner's entitlement to expenses for removal of oil, also pursuant to TOVALOP, and less liability of the owner as per the local law of the spill site.[32]

Even though CRISTAL appears to be somewhat more advantageous from a fisherman claimant's point of view than TOVALOP, it is certainly not the ideal compensation scheme simply because of its basic characteristic of being a voluntary arrangement.

Part II — Domestic Regimes

VESSEL SOURCE POLLUTION: LIABILITY AND COMPENSATION

With respect to vessel source pollution, existing Canadian law consists of two regimes applied geographically. In waters north of the sixtieth parallel, the governing legislation is the *Arctic Waters Pollution Prevention Act*,[33] whereas Part XX of the *Canada Shipping Act* governs the remainder of waters under Canadian jurisdiction.[34]

Part XX of the *Canada Shipping Act* was enacted with a view to modifying the existing common law which was clearly inadequate as described earlier. The liability and compensation regime found in Part XX deals essentially with two sets of provisions, one dealing with civil liability[35] and the other with the Maritime Pollution Claims Fund.[36] These two together constitute the total scheme of liability and compensation under Part XX.

Canada Shipping Act, Part XX: Liability Provisions

Firstly, the basis of liability is "strict," i.e. no fault need be proven for liability to be found.[37] The strict liability regime is subject to three limited exceptions, namely,

1) act of war or God;

2) act or omission of a third party;[38]
3) negligence of government authorities for installation of navigational aids.

Part XX provides for the concept of "joint and several" liability, whereby the shipowner and/or the cargo owner is suable by the victim and can be held liable.[39]

The limitation of liability under Part XX is the same as in the CLC.[40] However, for a defendant to avail himself of the limitation, the incident must have occurred without his "actual fault or privity" as in the CLC; otherwise liability is unlimited.[41]

Secondly, the Act imposes liability for "all actual loss or damage... resulting from the discharge of a pollutant."[42] This appears to embrace all causally linked losses regardless of the remoteness and foreseeability factors.[43] Also, in the context of fishermen's claims, this may be interpreted to include liability for lost or damaged gear as well as loss of use of the gear, i.e. loss of income during repair and cleaning or until the gear is replaced.

Thirdly, the liability regime applies only to ships carrying a pollutant in "bulk."[44] This would include cargo as well as bunkers or stores. It is noteworthy that in contrast to the CLC which covers only persistent oils, Part XX extends to all types of oil.

Fourthly, the Act requires shipowners and cargo owners to furnish evidence of financial responsibility in the form of insurance or an indemnity bond for the total amount recoverable under the liability provisions. Such evidence must be in a form permitting direct action against the insurer or guarantor of the bond.[45]

The Maritime Pollution Claims Fund (MPCF)

Aside from the above provisions which deal with the claimant's recourse against the shipowner through legal action, the most remarkable and exemplary feature of the compensation scheme is the establishment of a Maritime Pollution Claims Fund. The Fund is maintained by the exaction of a levy created by Regulations pursuant to the *Canada Shipping Act*, imposed on all oil carried in bulk, shipped into, within or out of Canada. The method by which the Fund is maintained is consistent with a fundamental Canadian view that pollution damage is at least in part attributable to the nature and characteristic of the commodity. From February 16, 1972 to September 1, 1976 the amount of the levy was 0.15 cents per ton, when it was discontinued upon an accumulation of approximately $40 million.[46]

Role of the Administrator: The Claims Process and Procedural Aspects — The Fund is administered by an Administrator appointed by the Governor-in-Council. He stays in office for 5 years and cannot be reappointed. The Administrator's duties and power are clearly stated in the statute and are quite far-reaching.

Perhaps the most unique feature of the disposition of the Fund is the special consideration for fishermen. Under the Act, a fisherman is entitled to give written notice to the Administrator of the Fund alleging "that he has suffered a loss of income, including future income, from his activities as a fisherman," if such loss has occurred as a result of a ship-generated oil spill, and is not otherwise recoverable by law.[47] The Administrator, upon receipt of such notice may take one of the following courses of action:

1) He may direct payment of the amount as alleged in the notice.
2) He may direct payment of an amount agreed upon between himself and the fisherman concerned.
3) He may transmit the notice to the Minister of Transport if he does not consider payment out of the Fund an appropriate action under the circumstances.[48]

The Statute empowers the Administrator to determine whether the claim is justifiable. If he considers the amount of the claim unreasonably high, he may return it to the fisherman for reassessment and renegotiation. If no settlement can be reached, the claim is referred to the Minister who must then set up an arbitration mechanism. He appoints one or more assessors who meet with the Administrator and the fisherman concerned or their authorized representatives. When the amount of the claim is determined by the assessors, it is reported to the Minister who informs the Administrator. The latter then directs the payment of the claim out of the Fund.[49]

Proposed Amendments to the Canada Shipping Act

The regime of liability and compensation provided under Part XX of the *Canada Shipping Act*, as well as the role and functions of the MPCF have been under extensive review for some time now. Such revision was undertaken at the instigation of both the former Ministers of Transport and Fisheries and Oceans. Concern was expressed in reference to four basic issues related to the existing liability and compensation regime of Part XX, that is:

"(1) the geographic limits placed on remedies for recovery of damages for discharges;
(2) the lack of provision for compensation in respect of discharges from small ships;
(3) the inability to give effect to the compulsory insurance provisions of Part XX, including direct action against insurers;
(4) the adequacy and availability of the MPCF as a source of ultimate compensation."[50]

The proposed modifications will constitute significant improvements to the current regime of marine ship-source oil pollution, especially from the perspective of labor developments in the fishing industry. More particularly, "The MPCF will be given a more active and effective role in compensating victims of oil pollution."[51] Currently, the Fund is constituted essentially as a means of indemnity for unsatisfied judgment claims. In other words, the fisherman claimant is not entitled to seek compensation from the Fund until he has exhausted all his legal remedies against the shipowner and owners of the pollutant.[52] This means that the claimant may have to suffer through the lengthy process of litigation and the costs incidental to legal proceedings which, in instances of relatively small yet significant claims, could be quite burdensome to the individual fisherman. Pursuant to the proposed amendments, the Governor-in-Council would be able to direct the Administrator of the Fund to pay all or part of the established claims in emergency situations. This provision will undoubtedly be of considerable advantage to small claimants in that it will afford easier access to the Fund and alleviate hardships. The Administrator, after paying out from the Fund, would then be subrogated to the rights of the claimant and be in a position to recover the amounts from the shipowner or his insurer.

The proposed amendments will also afford easier recovery of damages in events of "mystery spills," i.e. instances where the source of the spill cannot be identified. The present regime places the onus on a claimant to prove that his damage was

caused by a ship-source spill. Under the new provision, the Administrator bears the onus of proving that the spill did not originate from a ship.

Another significant feature of the proposed amendments is that categories of persons entitled to claim for loss of income will be expanded to include subsistence fishermen and hunters such as native Indians and Inuits, fish plant workers (excluding supervisory and managerial staff, except in cases of small, family-type cooperative operations), and persons who rent or charter out boats for sport fishing as a means of livelihood.

Other important improvements are listed below:

1) The limitation periods will be extended to conform to those in the CLC, i.e. within 3 years from the date the damage occurred and no later than 6 years from the date the incident occurred. These same limitation periods will apply to claims for loss of income directed to the SSOPF.
2) The levy will be increased to 30 cents per ton and will be subject to annual indexation. The levy may be reimposed or discontinued by the Minister of Transport after he has consulted with his colleagues, the Ministers of Fisheries and Oceans, and the Environment.
3) Established claims may be prorated if there is insufficient money in the Fund, until it is replenished to an amount sufficient to pay all claims in full.
4) The Administrator will be eligible for reappointment upon the expiry of his current 5-year term. This will provide the continuity and experiential stability to the Office of the Administrator.
5) The provisions of the SSOPF as well as the application of the CLC and Fund Convention will be extended to Arctic waters.
6) Claims not covered by the international conventions, such as spills from ships other than laden tankers, will be recoverable under the SSOPF provisions.
7) Amounts available from the SSOPF in respect of any one incident will be subject to annual indexation.[53]
8) Last but not least, the amendments are designed to enable Canada to become a party to the CLC and Fund Conventions which, together, would provide access to approximately Canadian $67 million in addition to the Canadian $100 million which is intended to be made available under the SSOPF pursuant to the new scheme. It is contemplated by the amendments that the Fund would also be available for claims not covered by the international conventions.[54]

Non-Ship-Source Pollution Regime

Among the various forms of non-ship-source pollution, the most significant is pollution originating from land-based sources. Indeed, land-based pollution accounts for most of the totality of marine pollution that occurs.

This discussion, however, will be confined to the form of non-ship-source pollution resulting from offshore oil and gas exploration and exploitation activities such as those emanating from or discharged by oil rigs.

It is noteworthy that in the international sphere, no regime exists as such which deals with this type of pollution.[55] This is partly because oil rigs are relatively new creatures and their legal status in terms of traditional admiralty law is as yet undefined. The laws of some countries treat them as vessels; others treat them as something new and distinctively different from the traditional vessel. Furthermore, due to the fact that oil rigs are basically stationary structures, at least when they pose a potential environmental threat, i.e. when in the process of drilling, they have not given rise to the type of international concerns triggered by tankers which are inherently mobile creatures. Thus, regulation of oil rig activities has largely remained within the national domains of coastal states.

Canada has recently enacted oil and gas legislation within which the issue of liability and compensation resulting from offshore oil and gas activities is expressly addressed. This paper will attempt to briefly outline those provisions of the *Canada Oil and Gas Act*[56] relevant to this discussion.

Liability and Compensation Scheme

The salient features of the liability and compensation provisions may be summarized as follows.[57]

1) First, the basis of liability for all oil or gas spills, authorized and otherwise, is "absolute" as distinguished from "strict" as explained earlier.[58] In other words, liability attaches "without proof of fault or negligence" and defences such as "act of God" are not available to the polluter. This in itself represents a far-reaching measure in terms of similar national legislation and indeed places Canada as a world pioneer in this legislative field. It may be recalled that under Part XX of the *Canada Shipping Act* discussed earlier, the liability regime is one of "strict liability" wherein four defences are available to the polluter. Thus, the *Canada Oil and Gas Act* goes beyond the strict liability regime which allows the polluter to escape liability if pollution results from certain circumstances beyond his control.
2) Second, the liability and compensation regime under the new Act extends beyond "spills" to include damage resulting from "debris" lying on the ocean floor.[59] This provision is particularly relevant to fishermen's interests whose nets and gears are highly susceptible to damage by debris such as equipment and structural pieces discarded by the oil industry. This provision is quite progressive in terms of relief for fishermen. It is well recognized that the debris problem has raised serious concerns in the North Sea fisheries communities.
3) Third, liability attaches, and consequently compenation is payable, for "all actual loss or damage incurred."[60] It is of prime significance that the definition of "actual loss or damage" includes "loss of income, including future income."[61] This provision, it must be emphasized, goes beyond the basis for the award of damages under the common law, and is unprecedented in any similar legislation.[62]
4) The Act provides an extended limitation period for instituting proceedings in respect of claims.[63] In sum the periods are:
   a) within 3 years from the date of the damage or loss;
   b) not exceeding 6 years from the date of the spill; or in the case of debris, the date of abandonment or displacement of the structure.

   These limitation periods are estimated to be adequate in terms of assessing damage, actual or potential, to fish and other living resources.
5) The limitation amounts are not set out in the Act, but will be established through Regulations under the Act.

6) Finally, the compensation scheme provides for the carrying of financial responsibility by the oil industry, in the form of a letter of credit, a guarantee, or indemnity bond.[64] This provision will enable potential claimants such as fishermen to gain access to funds immediately, without being subjected to the inherently slow pace of judicial proceedings. The form and amount of the security are subject to the satisfaction of the minister responsible for administering the Act. This provision in the *Canada Oil and Gas Act* is parallel to the provisions for the MPCF in Part XX of the *Canada Shipping Act*.

ADMINISTRATIVE AND PROCEDURAL ASPECTS

It is pertinent at this point to present a brief review of the administrative scheme of the *Canada Oil and Gas Act*. The statutory authority and responsibility for administering the Act lies with the Minister of Energy, Mines and Resources for "Canada Lands"[65] south of the 60th parallel, and with the Minister of Indian and Northern Affairs, north of the 60th parallel.

In practice, the *Oil and Gas Production and Conservation Act*, which is the parent Act incorporating the liability and compensation provisions discussed earlier, and the *Canada Oil and Gas Act* are administered through the Canada Oil and Gas Lands Administration (COGLA). This body was created through a memorandum of understanding between the Ministers of Energy, Mines and Resources and Indian and Northern Affairs. The head of COGLA is the Administrator who is responsible to the two respective Ministers for Canada lands north and south of the 60th parallel.

There are a number of regulation-making powers given to the respective Ministers or the Governor-in-Council under the Act.[66] Some matters have not been specified in the Act and it is presumed these details will be addressed through Regulations.[67] Some of the regulatory schemes interact with mandates of other government departments, such as in the case of compensation for fishermen. In such situations, the administrative and regulatory framework involves an interdepartmental consultative process implementable through informal instruments such as memoranda of understanding.

Apart from this general administrative framework, what is of more relevance to the fisherman who is a potential claimant is the procedure afforded in the legislation to facilitate the filing and processing of a claim and eventual receipt of compensation.

The potential claimant who has suffered any damage compensable under the Act may sue for damages and recover in "any court of competent jursidiction,"[68] by invoking the appropriate liability provision in Section 19.2.[69]

Regardless of whether the claimant institutes proceedings pursuant to s. 19.2, the Minister is empowered under s. 19.3 (2) to pay out of funds available under the letter of credit or other instrument of financial responsibility, amounts in respect of any claim which is actionable under s. 19.2. This provision is similar to the role of the MPCF and the powers of its Administrator under Part XX of the *Canada Shipping Act*.

Under the *Canada Oil and Gas Act*, although the appropriate Minister is the statutory body parallel to the Administrator of the MPCF, in actual practice, administrative responsibility for processing of claims under s. 19.3 (2) of the *Canada Oil and Gas Act* is carried out by COGLA.

In the hopefully unlikely event of a major incident giving rise to a multitude of claims by fishermen, it is anticipated that an ad hoc mechanism will be set up by the Department of Fisheries and Oceans to liaise between the claimants and COGLA and thereby provide necessary assistance and guidance to the fishermen claimants.

Summary and Conclusion

Within the overall scenario of labor developments in the fishing industry, the issue of compensation for oil pollution damage is undoubtedly one of major significance. As indicated in this paper, both the national and international compensation regimes for ship-source oil pollution damage are, at the present time, undergoing some dramatic changes, the most significant being the increase in the total amounts of compensation available.

As regards the proposed modifications to the role and function of the MPCF under Part XX of the *Canada Shipping Act*, the greater accessibility of the Fund, the reverse burden of proof with respect to mystery spills, and most importantly, the raising of the total amount of compensation to $100 million per incident, are highlighted as major improvements. These progressive changes will undoubtedly be of considerable advantage to potential claimants such as fishermen.

Furthermore, by entering the CLC and Fund Convention, Canada will gain access to the international Fund. This will be an added advantage to Canadian claimants in terms of the aggregate amount of available compensation, i.e. approximately $167 million. In this context, it should be pointed out that the primary purpose of the forthcoming diplomatic conference scheduled for the spring of 1984, is to upgrade the international limits, which have been generally considered to be grossly inadequate in light of recent experiences with catastrophic oil spills, as well as the effects of worldwide inflation.

As regards pollution from nonvessel sources, although there is no international regime in place, the compensation scheme established by the new oil and gas legislation in Canada will afford fishermen added protection from pollution damage caused by offshore oil and gas activities.

In conclusion, it is perhaps fair to say that the total package of compensation benefits for Canadian fishermen, contemplated under the revised national and international regimes, will constitute a scheme second to none.

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Rylands v. *Fletcher*, [1968] L.R. 3, (H.L.) 330.
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Notes

[1] For a detailed discussion on nuisance in the context of impairment of the livelihood of fishermen caused by marine pollution, see *Hickey et al.* v. *Electric Reduction Co. of Canada Ltd.* (1970), 21 D.L.R. (3d) 368 (Nfld. S.C.).

[2] In negligence law, "remoteness" and foreseeability" are essential considerations in the determination of the defendant's liability.

[3] [1956] A.C. 218 (H.L.).

[4] [1961] A.C. 388 (P.C.).

[5] [1968] L.R. 3, (H.L.) 330.
[6] See generally M'Gonigle and Zacher (1979), p. 151.
[7] 3 U.N. Rep. on Intl. Arbitration Awards 1905.
[8] [1947] I.C.J. Rep. 4
[9] 12 U.N. Rep. on Intl. Arbitration Awards 281.
[10] See *supra*, note 6 at p. 152.

[11] E. Gold (1971), 13 at 21.

[12] Since 22 May 1982, the name has been changed to International Maritime Organization (IMO).

[13] The CLC was done at Brussels on 29 November 1969. It came into force on June 19, 1975 and, as of 1 November 1983, 52 States were party to the CLC. The text of the Convention can be found in (1970), 9 *Intl. Leg. Mat'ls* at 20–67.

[14] *Supra*, note 6 at 167.

[15] *Id.*, at 170. See also Healy (1970), 317 at 319.

[16] *Supra*, note 6 at 151.

[17] *Id.*, at 152–54.

[18] In the CLC, the exceptions pertaining to the strict liability regime are expressed as follows:
a) resulted from an act of war, hostilities, civil war, insurrection or a natural phenomenon of an exceptional, inevitable and irresistable character, or
b) was wholly caused by an act or omission done with intent to cause damage by a third party, or
c) was wholly caused by the negligence or other wrongful act of any Government or other authority responsible for the maintenance of lights or other navigational aids in the exercise of that function.

[19] For a discussion on the positions of various delegations at Brussels, see *supra*, note 6 at 170–78. Canada was the only country to vote against the Convention, having advocated throughout the Conference an absolute liability regime imposed jointly and severally on the shipowner and cargo owner and being practically unlimited on the basis of the notion of "maximum credible damage." For a discussion on the Canadian position, see Gold, *supra*, note 11 at 26–28; and Legault (1971), 211 at 215.

[20] In simplistic terms, an action *in rem* is an action against a "thing" such as a ship, regardless of its ownership or possession, as distinguished from an action *in personam* which is an action against a person such as the shipowner.

[21] The words "actual fault or privity" have been judicially interpreted to signify a direct link between the conduct or knowledge of the shipowner and the negligent act in question, as distinguished from the notion of vicarious responsibility of the shipowner for negligent acts of his employees.

[22] Canada voted against this proposal at the Conference, advocating that the Convention should be applicable for damage occuring outside the territorial sea, i.e. in the contiguous fishing zones or on the high seas (e.g. the Grand Banks of Newfoundland).

[23] "Persistent oil" is defined in the CLC only by way of examples, i.e. crude oil, fuel oil, heavy diesel oil, lubricating oil and whale oil.

[24] Hunter (1972), 117 at 118. See also Doud (1973) p. 525.

[25] International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, done at Brussels on 18 December 1971. It came into force on 16 October 1978 and, as of 1 November 1983, twenty-eight States were party to the Fund Convention. The text of the Convention can be found in (1972), 11 *Intl. Leg. Mat'ls* at 284–302.

[26] Under the terms of the Fund Convention, this global amount of compensation could be increased up to a maximum of 900 million gold francs [Article 4(6)].

[27] The matter was first discussed within the Legal Committee at its 35th Session, held in June 1978.

[28] The positions of shipping interests are stated in the following IMO Docs. Note by International Chamber of Shipping (ICS), LEG 51/3/9 dated Aug. 19, 1983; Submission by International Group of P&I Associations, LEG 50/4/6 dated Jan. 25, 1983; and Submission by INTERTANKO, LEG 50/4/9 dated Feb. 11, 1983.

[29] The positions of cargo interests are stated in Position Statements submitted to IMO by the Oil Companies International Marine Forum (OCIMF) and the Oil Companies Institute for Marine Pollution Compensation Limited (The CRISTAL Institute) which are contained in IMO Docs. LEG 49/3/8 of Sept. 1, 1982; LEG 50/4/1 of Jan. 17, 1983; and LEG 51/3/8 of Aug. 11, 1983.

[30] For a detailed discussion of these proposals, see Report Of The Legal Committee On The Work Of Its Fifty-First Session, IMO Leg 51/10, dated October 12, 1983.

[31] Gold, *supra*, note 11 at 30–31; Doud, *supra*, note 23 at 539–41.

[32] *Id.*

[33] R.S.C., 1970, c.2 (1st Supp.).
[34] R.S.C., 1970, c–27 (2nd Supp.). Pursuant to s. 727(2), Part XX and Regulations made thereunder apply:
(a) to all Canadian waters south of the sixtieth parallel of north latitude;
(b) to all Canadian waters north of the sixtieth parallel of north latitude

that are not within a shipping safety control zone prescribed pursuant to the Arctic Waters Pollution Prevention Act;
(c) to any fishing zones of Canada prescribed pursuant to the Territorial Sea and Fishing Zones Act; and
(d) to all ships in waters described in paragraphs (a) to (c).

[35] ss. 734 to 736.
[36] ss. 737 to 745.

[37] s. 735 (1).
[38] The legislation does not preclude legal recourse by the defendant against third parties.

[39] This prevision, however, has not been implemented. In practice the liability is borne by the shipowner only.

[40] s. 735 (4) (c). The limit of liability is 2000 gold francs (CAN $176.58) per ton of ship's tonnage with a maximum ceiling of 210 million gold francs (CAN $18,540,900) per incident. The gold franc is taken to be equal to 8.999 Canadian cents, based on 1 SDR (Special Drawing Right) being equal to CAN $1.3309 on March 31, 1983 and is calculated in accordance with the Canada Shipping Act Gold Franc Conversion Regulations SOR/78–73, January 24, 1978. (See *Proposals to Amend the Canada Shipping Act, Information Paper*, September 19, 1983, Coast Guard Legislation Development, Department of Transport Canada, at p. 12, hereafter referred to as "Transport Canadian Information Paper").

[41] s. 735 (4) (d). See *supra*, note 21.

[42] s. 734 (1) (d).

[43] See *supra*, note 2.

[44] The term in "bulk" is defined in regulations pursuant to the *Canada Shipping Act* as carriage of oil of 100 tons or more.

[45] s. 736 (1). It would appear that the purpose of this provision is to ensure compensatory protection for the claimant where the shipowner is not traceable after the incident. Also, in cases where the defendant vessel is the shipowner's only ship and is rendered an actual or constructive total loss, there may be no recourse left for the claimant either by way of an *in rem* or *in personam* action. In such situations the claimant can bring proceedings directly against the guarantor or underwriter. Notably, this provision has not been proclaimed and is therefore not yet in force. However, the protection afforded by this provision is still available to a claimant by way of the Maritime Pollution Claims Fund discussed hereafter.

[46] The exact figure was $40,189,440.85. As of March 31, 1983 the balance of the Fund, including accumulated interest, was $84,593,645.04 (Source: Transport Canada Information Paper, *supra*, note 40 at p. 13.).

[47] s. 746 (1). See *supra*, p. 4 for a discussion on the common law position on claims for economic losses.

[48] s. 746 (2).

[49] s. 746 (3) to (6).

[50] *Supra*, note 40, Transport Canada Information Paper, at p. 14.

[51] Minister of Transport, Public Affairs: Information Release No. 18/81 dated February 17, 1981. The MPCF will be renamed the Ship Source Oil Pollution Fund (SSOPF) in the new Part XXI. See also Transport Canada Information Paper, *supra*, note 40, at p. 10.

[52] s. 744.

[53] Transport Canada Information Paper, *supra*, note 40, at p. 15–17.

[54] *Supra*, note 51.

[55] However, it should be noted that there is in place an international, albeit regional Convention entitled "Convention on Civil Liability for Oil Pollution Damage from Offshore Operations." (See Intl. Legal Materials, Vol. XVI, No. 6, November 1977, p. 1450). The two conferences, held at London in October 1975 and December 1976 which led to this Convention, were attended by representatives of the governments of Belgium, Denmark, France, Federal Republic of Germany, Ireland, Netherlands, Norway, Sweden, and the United Kingdom. As of May 4, 1977, Netherlands, Norway, and the U.K. had signed the Convention. Article 18 of the Convention provides that "States which have coastlines on the North Sea, the Baltic Sea or that part of the Atlantic Ocean to the north of 36 North Latitude." This provision demonstrates the geographical/regional scope of the Convention.

[56] An Act to regulate oil and gas interests in Canada lands and to amend the Oil and Gas Production and Conservation Act, S.C. 1980–81–82–83, c. 81. Sections 74 to 85 of this Act constitute the amendments to the *Oil and Gas Production and Conservation Act*, R.S.C. 1970, c. 0–4.

[57] The entire liability and compensation scheme is contained within s. 80 of the *Canada Oil and Gas Act* pursuant to which, s. 19 of the *Oil and Gas Production and Conservation Act* is repealed and sections 19, 19.1, 19.2, 19.3, and 19.4 are substituted therefor.

[58] New s. 19.2

[59] The definition of "debris" is found in new s. 19 (2).

[60] New s. 19.2 (1) (a) (i).

[61] New s. 19 (3).

[62] Under Part XX of the *Canada Shipping Act*, compensation for loss of future income is covered under the provisions dealing with the MPCF but not under the liability provisions. See *supra*, note 47.

[63] New s. 19.2 (5).

[64] New s. 19.3. Prior to the enactment of this legislation, financial responsibility was implemented and enforced through "Liability Agreements" reached between the Government and the "Operator" (Oil Company), pursuant and subject to the Exploration and Production Permit issued by the appropriate government authority.

[65] "Canada Lands" is defined in s. 2 (1) of the Act.

[66] *E.g.* s. 19 (4) empowers the Governor-in-Council to make Regulations respecting authorized spills.

[67] *E.g.* the amounts of limitations referred to earlier.

[68] New s. 19.2 (3).

[69] s. 19.2 (1) for a spill or s. 19.2 (2) for debris.

Difficulties Associated with the Industrialization of Fishing in Tropical Zones: the Case of Mexico[1]

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The survival and development of our fishing industries can no longer be visualized solely within a purely national or regional context. Perspectives in terms of markets and resource exploitation will develop increasingly within the framework of international relations. It is particularly interesting to know the view developed by a country like Mexico, as a developing country increasingly concerned with self-sufficiency in terms of food and with the survival of its rural and coastal communities. Mrs. Romero Zertuche presented this paper in Spanish as the official representative of the Mexican government.

Introduction

Fishing as an economic activity has a number of unique characteristics relating primarily to the high risk of investment, its uncertain results, and the fact that our knowledge of the interactions governing life in the sea is still extremely empirical.

In Mexico, the fundamental nature of fishing as a source of human subsistence has long been overlooked. In 1976, it became evident that the fishing industry was directly threatened with disappearance. The foreign interests which owned it almost exclusively were interested in exploiting, as rapidly as possible, the species that offered the highest commercial values on the export market.

Mexicans thus had access only to those inshore species that did not require major investments in equipment. With no fleet, no infrastructure, and no financial support, the fishing industry could not develop towards rational exploitation of the resource appropriate to the needs of the population.

The situation today remains a matter for concern. Our unfavorable balance of payments demands that corrective measures be applied to the fishing industry. However, the traditional markets are still poorly structured and developed. These constraints will demand new skills on the part of fisheries officials, if they are to succeed in developing the industry within this context.

Once again, Mexico must embark on a study of strategies at the international level and in relation to its own domestic market, but this time regarding maritime resources.

General Framework of the Fishing Industry in Mexico

It may be useful to describe the evolution of the ocean fisheries in Mexico. In the first phase, extending to the first half of this century, fishing was a primary, artisanal activity limited to the exploitation of coastal resources. However, it was foreign capital that controlled research, exploitation, processing, and marketing operations.

The second phase was marked by the emergence of an authentically national fishing industry. This transfer of authority made it possible to increase catch volumes and to restructure the exportation of such high-value species as shrimp and abalone. The presence of American capital and expertise remained important in terms of the training, technology, and financing of American producers, who were concerned primarily with export markets. It was precisely this almost exclusive orientation towards exports of products of high commercial value that attracted American support.

It was not until 1975 that the Mexican government intervened in this industry in an effort to modify the ownership of the means of production to the benefit of national interests. This effort took the form of investments and the creation of infrastructures, mechanisms for the training of manpower and the development of research in the fisheries field. This support became even more significant after 1977 and the fishing industry was, in fact, declared a priority within the framework of the National Development Project.

The current situation reveals the presence of two relatively different sectors: one is modern, dynamic, influenced and supported by foreign interests, and its production is oriented towards products which are in heavy demand on foreign markets and towards the preparation of products for small, privileged clienteles. The other sector retains a traditional, less dynamic structure, and attempts to meet the needs of the native population.

This historical evolution has thus led to a production structure which is oriented towards the satisfaction of high-income population groups, to the detriment of the much larger groups which constitute the greater part of the Mexican labor force. The most dynamic sector of our industry is thus dedicated to a very limited domestic market (via such firms as Api-Aba, Purina, etc) or to export.

Our dependence on outsiders is also evident in the scientific and technological fields.

While State intervention has represented a very important factor in the development of this industry, it nonetheless reflects a high degree of geographic and capital concentration which favors a monopoly situation. The limited national market and

[1]Translation of the French.

low incomes of the population, together with the tendency to export, reinforce this tendency.

The Fishing Industry in Mexico

In economic terms, the model currently developed in Mexico encourages the creation of enterprises based on national capital and has resulted in a structural polarization of economic activities in the fisheries field. However, in the case of such traditional primary activities as agriculture and fishing, which, in our national context, have relatively limited domestic markets for their products, there has been a sumultaneous development of exports, which tend to bring about a concentration of capital and denationalization.

The Mexican continental shelf, however, is extremely rich. It has permitted the development of a complementary artisanal inshore fishery for many coastal communities, which, however, have access only to local markets.

Mexico's agricultural crisis, which has led to a certain shortage of food products, has contributed to the development of new government strategies favorable to the fishing industry and aimed primarily at greater exploitation and distribution of species capable of meeting national or local consumption needs. These include sardines, sharks, tuna, and oysters.

To initiate this evolution, the State has been forced to intervene to modify social inequalities and permit production and processing activities to develop locally in order to satisfy the population's need for seafood products, create jobs, promote regional development, and bolster the national currency. Despite these efforts, fishing still represents only a small proportion of our economic activity: 0.2% of the gross national product. This figure, however, fails to reflect the number of people involved in or dependent on the activities of this sector.

Production

The industrial organization of fishing-related activities began during the 1950s, with the involvement of private enterprise and cooperatives. During the 1970s, the government intervened economically to deal with the debt of problems faced by certain firms. Since that time, there have been three types of administration within the fisheries field: the private sector, the sociocooperative sector, and the public sector.

If we analyze the relative proportion of activities in each of these categories, the private sector appears to be dominant in terms of turnover. However, it is the public sector that processes the largest amount of fish, operates the most extensive facilities, and employs the most manpower. Unfortunately, it operates at a loss, primarily because it has higher production costs than other types of administration. The revenues generated by the private sector amount to approximately 16% of the gross value of production. Average wages in this sector are the highest in the fishing industry.

The sociocooperative sector lies between the other two, particularly in terms of employment, productivity, and investments. Mexican cooperatives in the fishing industry enjoy special legal and economic status. The law assigns them certain exclusive rights to catch abalones, spiny lobsters, oysters, shrimps, totaba, sea bass, clams, and sea turtles.

Finally, the most modern sector is the private sector, which produces over 70% of all food products of marine origin. More specifically, these species involved include: sardines, tuna, and anchovies, which are plentiful in Mexican waters. The abundance of these types of fish permits relatively low production costs on products intended for the domestic market, including, for example, canned sardines and fish meal (now obtained by means of modern technology). The fish meal and oil industry in Mexico has developed to the point that it currently employs 1200 individuals directly or indirectly.

At this point, I would like to describe the various types of fishing in effect in the private and public sectors.

Tuna

Little financing was available for the tuna fishing fleet, until 1979. Since then, however, government assistance has helped to increase catch capacity to 87 500 tonnes. The eventual result has been overequipment, since this capacity exceeds the stock's potential annual catch. This situation led, in 1983, to a relative decline in catches in terms of tonnage and number of days at sea, foreshadowing a reduction in the profitability of this type of fishing in the next few years.

The processing industry has inadequate production capacity and an unsatisfactory level of technology, and, as a result, its efficiency is very low. It is located primarily in the northwestern part of the country. Port and unloading facilities are also inadequate, requiring too much time for inloading operations and delaying the departure of the fishing vessels.

The same observations apply with respect to the number of shipyards and fishing gear maintenance stations. Too often, our boats have to go to the United States for their repairs.

Finally, we should note certain problems of overproduction associated primarily with inadequate efforts in terms of the marketing of tuna in new forms or the development of new products. The excessive inventories caused by this situation help to raise production costs.

Sardines and Anchovies

In 1981 and 1982, catches of these species totalled 660 000 tonnes. The fleet consists of 168 vessels, with a capacity of 22 470 tonnes. Most of these boats, however, were purchased from foreign sources (in dollars) and these investments proved far too difficult to carry following the devaluations of our currency. To protect jobs and maintain satisfactory production levels, the government has had to intervene and reduce interest rates to more accessible levels.

The canning industry is confronted with a serious problem of overproduction, which has led to the buildup of considerable stocks. The industrial infrastructure, however, is considered acceptable for this type of activity. In any event, the financial situation of these firms rules out any plans for expansion at this time.

Shellfish

Because of the great variety of species found in Mexico's estuarial and coastal waters, it has not yet been possible to assess the true potential for shellfish with any degree of accuracy.

The Department of Fisheries estimates the catch for 1980 at 244 000 tonnes. The fleet, consisting of 989 boats, is operating at only 30% of its capacity. The total number of fishermen is close to 70 000, distributed between sea-going vessels (7572 individuals, crews of 8) and smaller rapids boats (55 200

fishermen, in crews of 3). Fishing methods remain extremely artisanal.

The processing of shellfish offers substantial profit margins (but not to the fisherman). Profits are even greater in the marketing phase.

This type of fishing is oriented almost exclusively towards the needs of the national market. It involves little capital investment and constitutes one of the most traditional types of fishing in Mexico.

Shark and Dogfish

These species are apparently available year-round along the entire Mexican coast, although the ideal fishing period is between May and August. In 1981, the catch totalled approximately 30 000 tonnes, with 16 900 of shark and 11 300 of dogfish.

There are 28 plants that process these and other species. Production is for the Mexican market, with the exception of the fins, which are exported to the United States and Asia.

Squid

According to the Department of Fisheries, the stocks are large enough to permit a catch of approximately 100 000 tonnes a year. However, the potential varies with the different species of this category. Extensive migrations have been observed, for example, among giant squid (as a result of hydrological variations), with the result that the catch for 1982 dropped to only 200 tonnes. In fact, we know very little of the characteristics of this resource.

Nine boats are involved in this type of fishing, although others participate on an incidental basis. Processing is limited primarily to freezing (83%) and canning.

The Labor Force

From 1930 to 1975, the number of individuals directly employed in this sector rose from 300 to approximately 13 200, an annual growth rate of approximately 9.1%. However, this development varied with the type of fishing involved. For example, despite limited capitalization, artisanal and traditional operations have accounted for the greater part of this increase in employment, although productivity and remuneration are also lower. It is estimated that 80% of the labor force in the fishing industry is involved in this traditional form of fishing and processing, while the rest (20%) work in the more modern sectors, where, however, the processing plants discontinue operations for several months at a time.

Incomes are also very different, depending on the different types of operation and organization. For example, in the cooperative, shrimp and lobster fishermen earn much higher incomes than those who deal with shellfish. The latter are involved in a much more artisanal type of activity, are less well organized and receive no social benefits. As a result, there are marked differences in the incomes that Mexican fishermen receive. For some, fishing is merely a secondary activity. It is estimated, in fact, that a large proportion of this labor force works first at farming and stock raising before turning to fishing.

The most industrial sector of the Mexican fishing industry also reveals differences in structure. Some plants are highly mechanized, while others rely on essentially manual processing methods. Many of these plants cannot count on regular supplies.

Both processing plants and fishing vessels make use of casual labor. Job insecurity, then, is high. The precarious nature of employment is certainly less evident in the marketing sector, but wage levels are not particularly high. Valuable benefits, however, are available at this stage.

Conclusion

Tuna, sardine, and anchovy fishing appear to have reached an optimum level, at least in the exclusive economic zone (known in Canada as the 200 mile zone). Tuna catches could be increased, but only on the basis of the ability of the Mexican fleet to compete with other countries in international waters. The tuna processing industry is concentrated around the port of Ensenada on the Baja California peninsula. This centralization has now proven damaging, since the facilities might better have been distributed more widely along the Pacific coast to reduce traveling time to the fishing grounds.

As regards the various types of fishing, we feel:

— that it is difficult to assess the potential for squid, since it appears to experience cycles of abundance;

— that shellfish operations, on the other hand, could be developed. The Department of Fisheries is accelerating its analyses of the stocks and these should lead to government support for this type of fishing and processing. Fishermen's incomes (for catches) should improve as a result, since the government appears determined to establish a better balance in the distribution of increases in value between the different phases in the processing of this species. The government also appears determined to encourage the construction of cold storage facilities and to promote the consumption of this type of fish.

— that the shark catch may have reached its maximum limit but that processing outlets could be diversified and developed, particularly with respect to byproducts (skin, fins). Increased government assistance is planned, particularly with respect to the training of skilled manpower in the areas of processing and marketing.

In short, it appears that only 30% of Mexico's fishing and processing capacity is currently being used. As a result, new sources of raw materials are being actively sought, and subcontracting has been proposed to ensure more intensive use of the equipment available. The inadequacy of the infrastructures is apparently contributing to the underutilization of our fleet and its problems of profitability. Corrective measures will have to be taken in this connection.

Mexico is a young country with only limited experience in the exploitation of maritime resources. Specific efforts have already been made, particularly in terms of technology, with respect to the sardine and anchovy fisheries. The results are encouraging and suggest that we are moving closer towards optimum utilization of these resources as part of our primary goal of satisfying the needs and improving the standard of living of the Mexican people.

Joint Statement by Union Representatives[1]

We have had the opportunity during this conference to learn of a number of common problems facing fisheries workers in Canada, whether they are fishermen, crew members, or plant workers.

Among these problems, we would emphasize in particular the precarious employment situation, unemployment, and the problems associated with the application of the Unemployment Insurance Act, plant closings, leading to inadequate income levels, working conditions and, more specifically, health and safety conditions in processing plants and on fishing vessels.

These observations have been repeated by a number of the participants in this symposium, including the Minister of Fisheries, The Honorable Pierre De Bané. Now we must ensure that concrete corrective measures are applied to this situation.

Our participation in this international symposium enables us to raise a basic question. In view of the fact that fishermen and plant workers are key participants in the fishing industry, we ask to participate actively in the organization of conferences of this nature.

We wish to state, in conclusion, that this symposium represents an important contact between Canadian labor organizations within the fishing industry and we intend to reinforce these ties in the future. Linguistic and geographic barriers become secondary to the common bonds that unite us.

- United Fishermen and Allied Workers British Columbia — 6000
- Canadian Seafood and Allied Workers Union
  New Brunswick 5000
  Nova Scotia 6000
- Maritime Fishermen's Union
  3000 N.B. P.E.I. N.S.
- CSN (Confédération des syndicats nationaux) — labor unions: 1500 members.

[1]Translation of the French.

Final Remarks[1]

Wendy F. Porteous

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The opportunity to discuss and share perspectives on matters of mutual interest and concern is always a useful and rewarding experience. This has certainly been true of our discussions here today.

I would like to commend CIRAST for its initiative in organizing this symposium and for the many other worthwhile initiatives which it is presently pursuing in support of social and economic improvement within the Gaspé Region.

We are conscious of the difficult problems confronting the Canadian fishery — the east coast fishery in particular — an awareness prompted most recently by the Kirby study and recommendations. Without becoming more involved in the debate now taking place on these issues, we can certainly agree on the pressing need for fundamental structural and other changes if our fisheries are to remain economically viable and supportive of the many Canadians whose livelihoods will continue to be dependent on exploiting the riches of our seas. Such changes are bound to have far-reaching effects on the individuals, organizations, and communities that form part of this vitally important Canadian industry. The transitional period will undoubtedly entail disruption, uncertainty, and insecurity. Strategies and plans for dealing with the human consequences of such changes — for minimizing the inevitable disruption and easing the transition — would seem an obvious need. The concerted efforts of government, industry, labour, educational institutions, and other community groups — including, I would hasten to add, the efforts of groups such as CIRAST, are required.

It seems to me that the present conditions are perfect for this symposium. It has enabled us to focus, on the one hand, on the many problems facing the industry and, on the other hand, on the nature of technological and other changes which are necessary to improve employment, productivity, health, security, and working conditions aboard ships and in processing plants. It has also stressed the importance of these changes on the social and cultural life of the communities involved and the close relationship between the workplace and the community.

I know that CIRAST looks forward to establishing, in Canada and abroad, new relationships with individuals and organizations sharing the same interests and ideas on matters and concerns related to fisheries and that it was with this in mind that you organized the symposium. Such relationships and the possibility of establishing a network will promote increased knowledge and a better understanding of the problems and of the steps to be taken to enable change to take place.

We in Labour Canada are highly supportive of such initiatives — networking being a vitally important component of our quality of working life program which will be the subject of my remarks this afternoon. I hope that this symposium will lead to continuing dialogue among us and help facilitate the establishment of a viable network in the fisheries sector.

In a speech at Niagara College by one of my colleagues earlier this week on the theme "Partners In Economic Survival," the point was made that Canadians will have to learn to pull together in a new spirit of cooperation and mutual support if we are to move beyond mere economic survival.

The challenges which we face not only in the fisheries, but elsewhere in our economic life are formidable. Particularly so since events are so often beyond our local or even national control — determined as they frequently are by international market forces, the policies of other national governments, wars, and other human catastrophies at home and abroad. Within broad limits, however, our collective response can be highly effective in developing strategies supportive of economic health at both the organization and community levels.

Change has become one of the rare constants of our life. It is so invading that we sometimes forget its effects on individuals and organizations. In the last ten years or so, our world has undergone deep transformations, with all our computers, industrial robots, and automated working methods. Furthermore, the international trading community, upon which our economic welfare depends so much, has also been completely transformed by the presence of developing countries and of new trading partners and by the discovery of better communications means as well as other technological changes.

As a society, we are more aware of the need to protect the environment and consumers, to provide safe working environments, to protect human rights, and to take measures to meet the particular needs of handicapped people and other disadvantaged members of the community.

Canada's labour force has also changed: younger, better educated, more diversified, and more representative of both sexes, its expectations, as far as work is concerned, are much higher.

One of the important consequences of these changes is that employees are not as willing as before to accept excessive discipline and arbitrary decisions at work. They look for more opportunities to make use of their talent, to take up challenges, to develop themselves, and to increase their knowledge as well as to have a say in the decisions that have an impact on their work. In short, they want a more democratic workplace.

To generate the appropriate adjustments, we urgently need more dialogue between labour and management and more joint problem solving, more open communication and exchanges on both employee needs and aspirations as well as management objectives, policies, and plans. We must move beyond dialogue and discussion, however, to action — from unilateral management approaches, however well motivated, to joint endeavours by managers, union officers, and employees.

Labour Canada has been a strong and consistent advocate of greater dialogue and closer collaboration between labour and management over the years. I am thinking of our former and perhaps still familiar labour management consultative services program and our present Quality of Working Life Program.

[1]Presented in English and in French.

Through the QWL Program, the Department actively promotes and suports workplace change and innovation through joint initiatives to improve the quality of jobs and the overall environment within which work is performed.

Our QWL Program objectives are ambitious. Through joint efforts by employers, unions, and employees we aim to achieve:

- greater employee participation in workplace decision making
- better physical working conditions
- improved occupational health and safety, and
- better quality jobs that respond to the sociopsychological needs of employees.

In our view, such joint efforts complement the collective bargaining system by enabling the parties to address workplace issues and concerns not covered by the collective agreement — matters which, if left unresolved, breed dissatisfaction and undermine worker and organization effectiveness. As a joint process, it follows that employees (and their unions where applicable) must be full participants with management through all stages of the QWL change process — from initial problem identification through to the implementation of jointly agreed upon solutions.

How does our QWL Program relate to fisheries? Let me describe the kinds of activity we are prepared to support financially. Workplace change within organizations is our primary objective. Its achievement is obviously dependent on the development of supportive conditions: namely, knowledge, and awareness through trained facilitators and workplace commitment. A substantial portion of our program budget is devoted to these ends.

To create an awareness of QWL processes and their potential benefits among key management and union decisionmakers, we produce publications, audiovisuals, and conferences. We aim to publish case studies within selected industries, as a major focus in the months ahead. However, managers, union officers, and employees must also be provided with opportunities to acquire the requisite knowledge and skills. We have promoted and financially supported the development and presentation of QWL courses, workshops, and seminars throughout the various regions of Canada. Seminars by CIRAST for local management and labour groups, and by the McGill QWL Centre for management and labour personnel in Canadian hospitals, are illustrative. Support has also been provided for course and workshop initiatives undertaken by the labour movement. Our funding assistance here has taken different forms — from support for course and workshop design to the provision of bursaries to facilitate union and worker participation.

Another of our objectives is the development of a variety of supportive institutions and networks across the country which themselves can exercise leadership in advancing the cause of workplace change and innovation. We have supported University-based QWL Centres as well as facilitated the formation of new multidisciplinary University groups dedicated to the pursuit of similar objectives.

If we consider the nature of regional industry, the projects implemented by CIRAST to improve the working conditions on fishing vessels and in processing plants as well as in sawmills and other workplaces seem to be very appropriate. The project related to the fishery sector is particularly relevant as far as this symposium is concerned.

We have supported the development of national, regional, and local QWL networks. Networks including company managers, union representatives, and QWL practitioners have been created, some under the Canadian Council on Working Life, a national association devoted to workplace change. The B.C. Working Life Forum, which has just organized its first major conference on QWL, is one of the most active members of these networks. Other networks have been established more recently in southwestern and eastern Ontario as well as in western Quebec and the Montreal metropolitan area.

We also give financial assistance to the organizations that implement work improvement programs. We provide them with the capital needed to start helping the parties involved to undertake the preliminary work necessary, such as the collection and analysis of data pertaining to the problems and concerns related to the workplace. As the parties need capable practitioners to help them during the preliminary stage, and often during the implementation stage itself, our financial assistance is often used to pay consultants and counsellors.

While the tangible application on QWL initiatives within individual companies is our primary focus, we also support joint initiatives by employers, unions, and other groups working at the community level. Interest in such local self-help initiatives has been sparked in part at least by the success of the Jamestown, N.Y., experience a few years ago — a cooperative venture involving various stakeholders in concerted efforts to revitalize a declining economic community.

Interest in these initiatives has been heightened by the effects of economic recession on particular communities (although many Canadian communities were suffering severe economic difficulties long before the onset of the recent recession) — and the realization that communities too can accomplish a great deal through the joint efforts of labour, management, educational institutions, Government, and other groups. Such may be the case in those communities where fisheries is the prevailing occupation.

Self-help initiatives of this kind of course could play a useful role in facilitating adjustment to the economic realities now confronting the fishery with resulting benefits to all stakeholders concerned — companies, cooperative organizations, unions, employees and the communities of which they are part.

We regard community-based activities designed to undertake community development as part of the supportive infrastructure to which I referred earlier — important in terms of both community economic renewal and the more widespread application of QWL change processes within the workplace.

For example, we are currently supporting community development initiatives in industrial Cape Breton, assisted by the York action learning resources group. A community-wide three-day search conference to explore joint possibilities within the Island community is taking place this weekend. Others include the Drummondville and Alma/Lac St-Jean areas in Quebec.

In sum, there may be a variety of ways in which our QWL Program might be of assistance to the fishing industry. I understand, for example, that exploratory discussions regarding the establishment of an Atlantic fisheries network are to take place tomorrow morning. Such a network of committed and knowledgeable individuals and institutions could play an important

role in promoting and facilitating the kind of workplace innovations to which I have referred. The combined efforts of an Atlantic network over time might eventually prove as effective as those of the Norwegian network established in the early 1960s — a network of dedicated individuals and institutions whose efforts were instrumental in effecting fundamental and far-reaching work reforms in the Norwegian merchant marine and fishing industry.

Conclusion

For the first time, this event has made it possible to bring together many of those who are striving for the improvement of working conditions in the fishing industry. Even more important, it has demonstrated the importance of those concerns to the future of the fisheries and the need for greater co-ordination of these efforts. For this reason, the Centre d'intervention pour l'amélioration des conditions de travail of the Université du Québec à Rimouski has agreed, temporarily at least, to develop an instrument which will permit exchanges of information among these various parties and thus facilitate collaboration.

A bilingual newsletter dealing with various questions relating to labor in the fishing industry is now being distributed on a periodic basis. To receive this newsletter, simply contact:

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