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A BRIEF OUTLINE OF THE
OPPORTUNITIES FOR GROWTH
OF
THE CANADIAN FISHING INDUSTRY
IN
THE NORTHWEST ATLANTIC

PREPARED FOR
THE DEPARTMENT OF REGIONAL ECONOMIC
EXPANSION
CENTENNIAL BUILDING
HALIFAX, N.S.



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CHAPTER I

INTRODUCTION

This brief describes the Opportunities for Growth of the Canadian Atlantic Fishing Industry.

The work was carried out by a task group acting under the auspices of Mr. Eugene Chatterton of the Department of Regional Economic Expansion, Halifax, Nova Scotia.

The brief itself is a visualization of:

- . what may be done
- . what may become a reality
- . the hopes and opportunities

in the fishing industry, assuming that there are adequate public and private funds, intelligent fisheries policies and able men in the different sectors.

The brief is an attempt to describe what may be ahead, starting from the present day situation, with the realization that the Canadian Fishing Industry is on the threshold of a new era. Time is becoming a most important factor. To wait for things to happen and then subsequently react according will, in the end, result in a fading out of the Canadian Atlantic Fishing Industry. Bold new ideas are needed or the Canadian share of the fishery resources in the Northwest Atlantic will steadily diminish.

Positive suggestions are easy to criticize. Human nature is such that most people will react to new ideas as follows:

- First : by saying that "It will not work; it cannot be done"
- Secondly : by saying that "It may be done, but we will not be able to do it; we do not have the resources or the money to do it"
- Thirdly : and finally, when it is done - "We knew all the time it was a good idea, but we don't think it is fair that we cannot share in the benefits".

We in the task group have no illusions about this brief, and the way most people will react to the suggestions and ideas presented. This means that the onus is not so much on the relative merits of the ideas presented as it is on the people and individuals charged with the responsibility of making things work, creating opportunities, and yet, are not so high in their own self esteem that they are not open to suggestions.

If there is to be criticism of any kind regarding the present day status, and the future growth of the fishing industry, good or bad, then let it first of all be realized that such criticism has to be addressed to specific persons. If this is not true; if there is no one responsible, then it must follow that there will be no responsible action, nor will there be any responsible planning.

Opportunities for growth of the Canadian Fishing Industry are therefore tied directly to the various organizations and institutions and the individual people therein who are charged with the responsibility of creating opportunities for Canadian Atlantic fishermen. The individuals so charged, we hope, may benefit from this brief. We are making no claims that the ideas presented are fully examined and evaluated. They are suggestions and ideas which are food for thought. Something that persons in charge should examine for themselves and seek ways of implementing.

It is not the intent of this report to review landings and landed values, species by species, province by province, and then conclude that Canada must develop new markets. This information is well known. It should be, much money has been spent on reviewing the fisheries in such a manner. Instead it is the intent to present provocative ideas which will challenge the traditional concepts of fisheries, and thus to provide a guide for the Growth of the Canadian Atlantic Fishery Industry.

If this brief fails and merely becomes another report to be forgotten and hidden away, with nothing concrete being done, then let this brief be a record which says:

- . here is what we think can be done
- . here is the chance
- . here is the responsibility of individuals who are paid to look after the future of the fishing industry.

This is the basis on which the brief was created. We must assume that the reader is positive and open for ideas. Opportunities cannot be understood by negative individuals. The brief is addressed to positive thinkers only.

CHAPTER 2

GENERAL BACKGROUND

The Canadian Fishing Industry in the Northwest Atlantic is on the threshold of a change.

The fishing industry may be divided into the following sectors:

- . inshore fisheries
- . offshore fisheries
- . fish farming

The inshore fisheries is identified as the type of fishing carried out by fishermen within a few miles of shore in one to three day trips with vessels varying in size from an 18 ft. row boat to a 60 ft. longliner. Their activities are:

- . trapping fish, lobsters, crabs.
- . harvesting Irish moss
- . handlining
- . longlining
- . gill netting
- . seining, etc.
- . hand harpooning

The equipment used is generally the most primitive one can imagine in this technological age. Yet about 7,300 men in N.S., 16,000 men in Newfoundland, 2,800 men in P.E.I. and about 4,500 men in New Brunswick are engaged in this form of fishing.

The fish, when landed, can be of high quality; i.e., the fish is only one or two days old.

In terms of pound of fish per man, clearly the offshore fishery is more productive than the inshore fishery. In terms of value, since many of the species landed by inshore fishermen are of a high price per pound, such as lobster and salmon, the relative productivity difference between the inshore and offshore fisheries is far smaller, and in terms of net yield it is smaller still since the accounting prices used by offshore fish processors are designed to show a loss on the primary operation. In fact, in terms of net yield, i.e., revenue less costs, we may find that the inshore fisheries are more productive, and consequently more efficient than the offshore fisheries.

Since the mid-1960's, the rationalization policy pursued by the federal government has been predicated on the assumption that the inshore fisheries are dead and cannot serve as a growth center for the fishing industry. The freeze on the number of fishermen permitted to trap lobsters, albeit a very necessary move, has had the undesirable side effect of freezing the whole inshore fisheries since most inshore fishermen, at least in the Maritime Provinces, depend upon the lobster fishery for the bulk of their income. This prevailing and negative policy has resulted in untold lost opportunities. One can now observe that, in fact, the inshore fisheries offer opportunities for:

- selective fishing
 - cheaper fish
 - better quality fish
- and
- an economic livelihood for the fishermen and the fishing industry in general.

This is when one compares the inshore fisheries with the offshore fisheries.

It should be noted, however, that a comparison of this sort is not entirely valid. The error is that one cannot compare offshore fish and inshore fish pound for pound, species by species. Offshore and inshore fish in one specie alone may mean two or three different products, prices and qualities. Offshore fish is up to 10 days old and inshore fish may be only a few hours old when landed. Fresher fish means that different products may be made.

The cost of producing inshore groundfish may be approximated as follows:

Approximate average cost of all species is about 7 cents per pound round. The average yield is about 33%, i.e., 1 pound of fillet per 3 pounds of round fish. Thus:

the raw material cost	21 cents/lb. of fillet
production cost	<u>15 cents/lb. of fillet</u>
total cost of fish f.o.b. plant =	36 cents/lb. of fillet

High quality inshore fish is selling f.o.b. plant from 45¢ to 55¢ per pound of fillet, depending on the product and the species.

Looking ahead one may expect cost increases as follows:

Decreasing availability of resources will lead to decreasing returns per unit of effort. The overall tendency will be an increase in the price of fish landed. Modernization of the inshore fleet may help offset these price increases, while a decision not to modernize the inshore fleet may mean a runaway cost increase of the raw material. What the cost of raw fish will be 5 years hence will therefore depend very much on what is done now. However, assuming that the opportunities that are available are realized, one may then estimate an inshore fish cost push picture as follows:

Say for 1976: cost of landed fish 10¢/lb. round = 30¢/lb. fillet
production cost - in plant = 17¢/lb. fillet
the estimated cost f.o.b. plant = 47¢/lb. fillet

Scarcity of fish will drive the market price to 50-60 cents per pound of fillet (selected market price for some species, especially fresh inshore fish, is already 83-90 cents per pound).

The projected cost increases take into account a decrease in raw material supply and an increase in fishing, and fish processing costs, i.e., higher returns for plant workers, but not necessarily for fishermen.

Now, it may be that offshore trawl fishery will become increasingly more ^{or (more)} as the offshore resources are depleted. This is a pessimistic possibility, but considering the long range picture, this may ironically be of benefit to the inshore fisheries. That is, an uneconomic offshore fishery will make the inshore fishery relatively more economical. The high cost of offshore fishing is already dragging the inshore fisheries along, making the inshore activities more and more profitable. The cost push factor is in the offshore fisheries. The average cost of offshore fish (the real cost - not counting subsidies) is 9.15¢/lb. as compared to about 7¢/lb. for inshore fish. This gap in cost will increase as the offshore resources are depleted.

To prevent fishery resources depletion inshore as well as offshore, it will be necessary to place restrictions and quotas on species. This means selective fishing. It is almost impossible to carry out selective fishing in terms of size and species while dragging or trawling. Longlining is the nearest form of selective fishing known. Longlining is carried out in 40-60 ft. inshore vessels. There is relatively less waste from longlining than there is for trawling and dragging. In trawling, about as much small fish, or trash fish, is thrown away as there is being landed by one trawler in a year. A trawler may land 5 million pounds of fish a year and

throw away another 5 million pounds as trash fish. Utilization of this 5 million lbs. of fish waste a year per boat is one of the most challenging problems for the offshore fisheries. Herein lies a potential and an opportunity for the fishing industry.

The offshore fisheries is identified as the type of fishing carried out by the larger fish companies, using 100 to 160 ft. side and stern trawlers. There are practically no independently captain owned trawlers left. Fish plants must subsidize their trawler operations in order to hold fish prices down to a level comparable to the price of fish coming from the independently owned inshore fishing fleet.

Subsidization of offshore trawlers serves two main purposes. The fishermen - the crew - are contracted to share 40 to 45% of the value of the catch. By suppressing the real price by 2 or 3 cents, this means a cheating on the crew of 1 to 1.5 cents per pound of fish landed. It is an explosive situation. A one cent saving in the raw material cost is equal to a 3 cent saving in the overall production cost. At times this 3 cents was all the profit a company was able to make on the whole production. This is something that is generally recognized by all fishermen and fish processors, but there is very little anyone can do about it. It is an economic fact of life, thus it is very difficult to find a good crew to go fishing in offshore trawlers. Most responsible fish companies are trying the best they can to correct this situation. The high market price of fish in the last few years has helped the situation somewhat, but the "existing price" is far from stable. A slight shift and lower fish prices may start a landslide of strikes as plant operators try to adjust fish prices and payments accordingly.

The offshore fishing fleet, as it is known in Canada, developed on the concept that the Atlantic Provinces were close to the offshore resources, and close to the U.S. market. It was argued that this locational advantage was sufficient to give Canada the greatest relative advantage vis a vis other nations. Naturally it would

follow that Canada would get the greatest share of the catch of the fishery resources in the Northwest Atlantic.

A whole system, a complete fishing industry, was built on this premise. Consequently, it became official policy to build large shore plants which would give lots of employment ashore, and to build modern vessels which could go offshore and catch the fish.

It was assumed that the structure of the industry was dictated by the geographics of the system. The problem is, there are few advantages in the geographics of the system.

A foreign fish factory ship fishing from a port 3,000 miles away from home can have more actual fishing days on the fishing grounds off Canada than most modern Canadian stern trawlers. A modern Canadian stern trawler must return to port every 10 days; bringing raw iced fish 6-7 days old, before being processed. The real cost of catching this old fish is about 9.15 cents per pound round, or about 27.45 cents per pound of fillet. It costs about 15 cents to process the fish, so the f.o.b. plant cost of the frozen fish is 42.45 cents per pound of fillet. This is boneless and well packed fish that will sell from 45 to 55 cents per pound at present. But the quality of this fish is not as good as fish that is processed only hours after being caught.

Canada has made it an unofficial policy not to promote the development of fish factory ships. It was felt that it would be impossible to get crew for a ship that would stay at sea 3 to 4 months a trip. Then there is the possibility that Canadian fish factory ships, if used, could upset the economy of an already fully developed system. This concern still prevails today.

The problem is, of course, that a fish factory ship, for example, out of Norway a few years ago could fish the Northwest Atlantic and produce about 1200-1800 tons of fillet a year. Their cost price (not their price delivered Grimsby, England) was 21 cents per pound of fillet, which is the same as saying that the fish factory ship

could land processed fish in England at an equivalent price of 7 cents per pound round, or about the same as it would cost us in Canada to land unprocessed inshore round fish. The cost of operating factory ships has also changed in recent years. Landings have dropped off to about 900-1000 tons of fillet a year, so the cost has nearly doubled for the fish factory ships as well, to about 34-40 cents per pound of fillet. So we are back to a cost figure comparable to the present day cost of inshore fishing and fish processing. This is not to say that offshore fishing as presently practiced is a poor idea, and that the development of the inshore fisheries and fish factory ships are singularly good ideas. Far from it. The error in the past was that there was too much emphasis on one type of fishing and fish processing. The point is that there is no need to promote one type at the expense of the other.

To demonstrate this point one must realize the following:

There is a certain economy of scale in fish processing. There is an optimum size of ^{ground} fish processing plants. The productivity per man employed increases to a plateau stretching from 27 million to 36 million pounds of round fish a year. Then it falls off. Plants as we now know them have a decreasing productivity rate in terms of pounds per man employed as the size of the plant is increased to produce a volume greater than 36 million pounds per year.

This means, at any given location, one must have a fish filleting plant capable of processing 20-30 million pounds of groundfish a year. Seasonable variations in landings are important, and in order to have an even flow of fish it is necessary to have a combination of inshore and offshore vessels fishing for any given plant. Fish factory ships cannot produce boneless fish or high value added products, I.Q.F., canned products and so on. This means that fish factory ships can only satisfy specific markets. The Russians are overcoming this by making large mother ship vessels, but there are restrictions on the economy of scale for fish factory ships as well.

Norwegian fish factory ship owners have found greater economy in smaller sized vessels. There is one example where the owners first built a ship 206 ft. long, then one 220 ft. long and finally went back to one 187 ft. long because it gave the best return.

All this means that the problems are not simple ones to solve. The opportunities are there in many varieties and combinations.

There is an increasing outburst of talk and expressions of disgust about policies laid down against fishermen, restricting their activities and growth. The fishing industry is primarily concerned about this life and not the hereafter. Policies that promise the hereafter are of little interest to the realists. In short, there is much unhappiness about the state of affairs in the fisheries, and there are many problems to be solved.

The opportunities for growth in the Canadian fishing industry lie in the ability of all Canadians and the people charged with the respective responsibilities of making laws, administering policies, providing funds, developing resources, protecting markets and resources, carrying out research, building and designing plants, managing plants, processing fish and fishing.

Every opportunity will be eroded away by every single individual in this system unable to accept responsibility. Most opportunities are killed by people in so called responsible positions who make it their policy neither to say yes, nor say no, but maybe next year. Arbitrary budgets are often made a "god", greater and more powerful than any man. Opportunities are lost by playing games. People in the fish business pray that all game players will find another industry with which to play.

Research is needed, there is no question, but answers are important. Research has, and is still producing valuable results. Scientists can open up great new areas. There is the fish farming idea. It

is very complex and may take years to develop properly. In fish farming the opportunities will be found in what the scientists can accomplish in the near future. There must, however, be found some method by which the ideas of the scientists can be turned into concrete projects. To know how to do something and not to do it, does little for the economy other than to transfer funds from the public to the researchers.

There are several problems facing the Canadian Atlantic fishing industry. Competition from foreign nations in harvesting the off-shore stocks, restrictions on imports in the form of duties imposed by other nations to protect their own fishing industry, and diminishing return per unit of fishing effort as a consequence of most species being harvested at or beyond their maximum sustainable (and net economic) yield. The two main goals of the federal government for the Fishing Industry during the last decade were modernization of the industry. The first objective, for all intents and purposes, has been met. Unfortunately it has had the undesirable side effect of placing control of the fleet in the hands of the processors. The second objective cannot be clearly defined. To some it means reducing the number of fishermen, to other reducing or freezing the total capital investment. Regardless of how it is defined, it is a policy of conservatism in which it becomes easy to say "no" to any new developments, which have not been time tested. This is not to say that there have not been many useful innovations in fisheries during the past decade, for there have. New fishing techniques have been introduced, new products have been developed (some successfully and some unsuccessfully), and some previously unexploited and under-exploited species have been utilized. The fact remains, however, that most changes introduced have been geared to the traditional method of harvesting and processing fishery species and with the traditional view of the Atlantic Provinces as "hewers of wood and drawers of water".

There are, of course, certain social advantages to a pastoral community

Nevertheless, policy cannot be predicted on the assumption that all persons in the Atlantic Provinces are content and indeed happy to live in a state of idyllic poverty and bliss. A poor fishing village, with its shacks and inadequate and rundown houses, may appear quaint to tourists, but one would probably find that its inhabitants consider it to be depressed and that its "quaintness" does not generate the economic potential for its members to realize a decent standard of living.

What is needed is a bold new approach to the fishing industry; one in which all parts are conceived as a system. Policy, for too long a time, has focused on fish rather than fishermen and others engaged in the industry. Obviously fish are important, for without them there would be no industry, but to consider them more important than fishermen is indeed a perverse and ludicrous policy, yet for years most of the research funds allocated to fisheries have been for research on fish. Canada has only just begun to exploit its position vis a vis other nations. Closing the Gulf of St. Lawrence to other nations of the world, taking a firm stand on Atlantic salmon, and introducing quotas for the Northwest Atlantic through ICNAF are all indications that Canada is beginning to assert its authority with regard to the fisheries off its Atlantic coast. With the increasing demand for protein in all parts of the world, of which fish is perhaps one of the best sources, and increasing population and incomes, Atlantic Canada, by virtue of its location, is in a position to exploit to the fullest its relative advantages with regard to fisheries.

The objective for the Canadian Atlantic fishing industry should be to ensure that all fishery products that leave the Atlantic Provinces, whether they are being exported to other regions of Canada, United States or other nations, are completely processed, that is; ready for sale to the consumer without further processing, even if this means owning processing plants in foreign countries. This includes not only processing, but also transportation, whether by

truck, boat or airplane. By so doing, the value added of the Canadian Atlantic fishing industry can be increased immensely. Novel concepts in processing and transporting fishery products will have to be introduced if this objective is to be met.

CHAPTER 111

CONCLUSIONS

The Canadian Atlantic fishing industry is on the threshold of a new era. This industry can be made to provide the continued livelihood to people in the different categories of work outlined as follows:

	<u>Presently</u>	<u>New Jobs</u>
Directly involved in the fishing industry	50,000	5,000
Involved in banking & financing	Unknown	-
Involved in equipment manufacturing	"	2,500
Involved in transportation	"	120
Involved in legal, accounting and engineering	800	200
Involved in electronics industry	Unknown	10
Involved in research	"	200
Involved in development	"	800

The estimated value of these businesses are approximately:

	<u>Presently</u>	<u>Potential Increase</u>
The fishing industry	\$254 million	\$100 million
banking and financing	100 "	60 "
equipment manufacturing	38 "	19 "
transportation	13.2 "	1.2 "
legal, accounting & engineering	8.2 "	2 "
electronics industry	0.5 "	0.1 "
research	-	2 "
development	-	8 "

The above figures as they apply to the fishing industry only.

These figures give an indication of the potential. It does not mean that this can be done, but that these objectives are possible only if and when specific changes take place. This potential may exist only at this stage in time and may disappear completely in a period of one, maybe, two years, depending what will be decided in the next few months ahead. The story of the fishing industry (as best it can be explained in a 15 day effort) is described in the report. The report identifies some of the many problems and suggests that there are numerous opportunities and alternatives to be explored and implemented. No specific suggestions can be forcefully recommended in an environmental vacuum where there is a lack of decisions and a general "will!" When hope is gone, as it is for many people in the fishing industry, then it is silly to wish. Hope must be created and the fishing industry and the people in it will survive and grow.

The Canadian alternatives at this stage in time can lead to two possibilities. In the not too distant future the majority of Canadian fishermen and fish processors may find themselves in:

Position 1 - either being the proprietors, the owner and operators of ships and vessels.

Position 2 - or being the servants, working in a few large firms which may or may not be owned by Canadians.

The time for a basic decision is now, and everything else may then follow certain paths in sequence. There are opportunities to be realized in both paths. More opportunities can be realized in the path leading to position 1. We are presently following the path leading to position 2.

CHAPTER IV

RECOMMENDATIONS

It would be wrong, as a result of this brief study, to make too specific and strong recommendations. There are too many variables to be considered, and it is rather silly to make recommendations which, for many and varied reasons, cannot be implemented. The best that can be done now, without doing any more work on assessing various possibilities and opportunities, is simply to make suggestions and recommend that they be given further consideration.

The most general suggestion is that we propose that a certain amount of "seed money" be appropriated for the purpose of looking at the future for the fishing industry; to assemble the necessary documentation on facts and possibilities to be realized; to visit foreign lands and try to make deals where this may be of value, and maybe remove unnecessary restrictions and red tape hindering the industry.

It is not known how much this will cost, but a million dollars would go a long way to get things started.

Then it is suggested that a special task group be appointed to serve with DREE or another appropriate agency located in the Atlantic Provinces. It is suggested that this group work outside the influence and the restrictions of bureaucratic procedures and thus have sufficient freedom to think and deal outside the stringent rules of established policies. The group must be free to explore the wisdom of existing policies and the wisdom of new policies as well.

It is suggested that this task group examine certain ideas and suggestions and test them in terms of validity and acceptance.

It is recommended that nothing be imposed on the fishing industry as a new way of doing things, without first having the matter tested in smaller pilot projects, or by testing the idea with selected people in the fishing industry itself. Flexibility is important and it may not be necessary to make any new idea national policies without first having some of these ideas tested in selected regions. Policies need only be formed when one knows exactly how they work.

If such a task group was formed, they could then test certain ideas, and to this purpose it is suggested that appropriate funds be made available. Some of the ideas worth testing is indicated on the following pages. A certain amount of success in the realization of these and other suggestions, and the end result, may be new jobs and the opening of new opportunities for the fishing industry.

SUGGESTION NO. I

OBJECTIVE: Increase margin to fishermen in inshore fishing

SOLUTION: Establish a FISHERY MARKETING BOARD

FUNCTION: .Set and maintain reasonable prices on fish landed
(primary level) and on fish sold (secondary level)
.Force cash payment to fishermen on delivery of
catch
.Insure adequacy and availability of shore facilities
for ice production, bait storage, transportation, etc.
at fair market price to the fleet.

JUSTIFICATION: Necessity of reducing or eliminating vulnerability
of fishermen to whims of processors and to enhance
fishermens returns on the sale of quality fresh
fish

SUGGESTION NO. 2

- OBJECTION:** Increase the supply and smooth out the seasonal availability of new products to processor of offshore ground fish (cod, flounder, haddock, redfish, etc.)
- SOLUTION:** Make provisions for the purchase of foreign caught offshore species by domestic processors. Program can be administered by the FISHERY MARKETING BOARD recommended previously.
- REQUIREMENTS:** Allocation of concessions on a geographic, seasonal and economic basis as well as transportation, equalization payments for both domestic and foreign vessels.
- JUSTIFICATION:** Smooth out supply to processors so they can operate plants at close to optimum level on a year round basis.

SUGGESTION NO. 3

- OBJECTIVE:** Provide vehicle for direct communication between industry and government representatives.
- SOLUTION:** Create the position of a "FISHERY OMBUDSMAN"
- FUNCTION:** To communicate directly with the government on matters of concern to the fishing industry in such a manner that the industries views will be fairly considered and will receive prompt attention from those concerned.
- JUSTIFICATION:** Other than the Fisheries Federation, a largely processor controlled body, there is no way in which an individual fisherman, processor, etc. can express his views if he feels he has been unduly harmed by government decisions. The creation of an ombudsman's position should help to alleviate some of the discontent that presently exists between industry and government and within the industry.

SUGGESTION NO. 4

- OBJECTIVE:** Provide mechanism for orderly management of resource development and environmental protection.
- SOLUTION:** Establish a CONSERVATION, APPLIED TECHNOLOGY & ECONOMIC EVALUATION ADMINISTRATION.
- FUNCTION:** Coordinate efforts and manage findings for technological developments (food technology, product development, equipment development, aquaculture evaluation, etc); establish network to accumulate, process & distribute relevant catch data by time, conditions and location where fish are caught; make recommendations to proper government agencies or departments for exceptions or tariffs, duties & restrictions on importation & use of foreign produced vessels, equipment, and supplies; encourage & support efforts to introduce new technologies from outside the region; oversee and limit, when necessary, exploitation that degrades or wastes the resources and the environment.
- JUSTIFICATION:** A more systematic approach to problem solving, exploring new possibilities, exploring new equipment and methods is needed.

SUGGESTION NO. 5

- OBJECTIVE:** Facilitate the borrowing power for the various segments of the industry, fishermen, processors, equipment manufacturers, etc.
- SOLUTION:** Assign authority to a single Federal Agency to administer loans and grants to the various segments of the industry.
- FUNCTION:** Make direction loans
Assist industry in obtaining commercial loans
Coordinate policies & programs with Provincial lending and granting agencies
- JUSTIFICATION:** Present uncoordinated system doesn't lend itself to a fair and orderly development of the industry

CHAPTER 5

OPPORTUNITIES IN THE FISHERIES

Some of the main constraints.

If one asks anybody in the fishing industry what the main constraints are, they will answer:

- . money
- . hard to make a living
- . difficult to find good men
- . foolishness
- . the Russians, i.e. overfishing,
diminishing supplies
- . market and price fluctuations

One may find many opportunities within the categories of these constraints. They may be called opportunities of corrections. Thus, in order to recognize some of the possibilities one may elaborate a bit on the constraints.

Money

The constraints as far as money is concerned is simply that there is too little of it available. Private fund will flow where conditions are reasonably stable and where there is a reasonable chance of good returns. As it is commonly expressed by people in the fishing industry, "only a stark raving lunatic with fish blood in his veins will invest in the fisheries".

Basically, the interpretation is that there are too many risks, uncertainties in catches, fish prices and markets, fluctuations

and meddling within the fishing industry in general. Yet, in this environment there are some who become millionaires; but most end up as poor, or poorer than when they started. The fishing industry operates in the no-mans land of federal, provincial and international jurisdiction. The fishing industry is unattractive to the private investor because of the many uncertainties and risks. To name an example: To stop inflation, and credit is tightened, interest rates go up. These moves add to the cost of fish processing. Thus when it is decided federally to slow down the country, the fishing industry must take its share of the suffering, but not share in the gains. Another example in the fishing industry is related to the instability of foreign exchange rates. Costs are in Canadian dollars and sales are in U.S. dollars. The U.S. dollar may vary as much as 10% on the Canadian dollar at any given time, and that is more often than the profit potential of any fish company. It is indeed a risky environment for an industry to be in, and it is amazing that it works at all. It is much too sensitive a system. Bankers and investors, when trying to assess this situation and the fishing industry, in order to determine the risks, have a tough time of it. A banker's decision on whether or not to give a loan is often based on not so much what the plant will do or what the fishing industry is like, but more often on what certain individuals are thought capable of doing. Thus, personalities of individuals are often the basis on which money is provided to the fishing industry.

It is hard to make a living

The fact that money is scarce and hard to come by means that it is hard to get good equipment, a new boat or a new plant. Now it must be said that there has been in recent years a number of programs available for the fishing industry. Grants and assistance and the like are available. But, they have not been effective in helping with the gradual small improvements needed. The aids are big deal aids. To merely apply, and make up an application will cost a

minimum of \$3,000 for the smallest projects. This is very definitely a restraint on the development of the fishing industry. It is hard to make a living because it is hard to get money to improve things - small things. The shipyards want the fishing industry to pay for their inefficiency. Fish plant owners must build community services such as wharves, effluent systems, water systems, etc.

It is difficult to find good men

When it is hard to make a living, then it follows that it is hard to find good men for an industry. Good men, motivated men, are looking for opportunities. There are better opportunities in other industries than there are presently in the fishing industry. Fisheries training and education is a good thing, but good men once trained and educated in this field tend to drift into other industries where living conditions are better, the work easier and the pay better. Good men can be found once a solution is found to make the fishing industry more attractive to the individuals.

Foolishness

Many people in the fishing industry are concerned about a lot of waste and "foolishness". It is an emotional thing which may be expressed as follows: There is so much talk about what Canada ought not to do, what the Canadian fishing industry ought not to do - Canada will show the rest of the world how good we are in restraining ourselves; not to fish; to manage our resources and stop further developments; to relocate people and put them in areas and locations where they don't want to live. Then you hear: "sociologists, economists, scientists, engineers, planners, preachers, politicians and civil servants ask us (the fishermen) Why don't you do this, or Why don't you do that - and when we turn around and say we will if you do something that will improve our lot, then the answer is - they can't, or there is no money. Papers upon papers, studies upon studies and millions upon millions are being used to study us and the fish. We are waiting for con-

crete results which will make the fishing industry better, the rest is foolishness.

This is the criticism. Maybe it is not fair. The point is this: There is some truth in it and it is necessary to seek the truth and the remedy.

The fishing industry is saying to the rest of the people in Canada "you have had a look at us, now look at yourselves". What are you doing to us and for us? Who is best equipped? Who has the means, the education and the skills to correct and adjust their own activities to improve the fishing industry in Canada? Who can decide where the fishing industry is going? Who can plan ahead in broad terms? Who can legislate, and what are you doing that is good for us?

The Russians overfishing, diminishing supplies

Foreign vessels catch more fish than Canadian vessels in the Northwest Atlantic. The old belief in thinking that nearness to the grounds gives us an advantage has been proven wrong. Fishing pressure is great. The Canadian share is decreasing. It is getting more and more difficult to catch fish. The cry is out to save our fisheries, to find ways and means to stop overfishing, or the fishing industry will perish.

Canada is trying to do something about it. The word is out to protect the fish stocks.

The Canadian approach is to claim internationally the right to manage the fishery resources off the Canadian Atlantic coast.

Quotas is the official answer. Sustainable yield is the measure. Canada's approach is to try to negotiate international deals, requesting other countries to suffer restraints as we must suffer the consequences of restraints ourselves. Canada is prepared to

demonstrate its willingness to suffer by example, and stop certain developments within the fishing industry, and stop and limit certain types of fishing. It is hoped that this will do the trick and if these negotiations are successful, then the resources will be protected. This is a constraint on the development of the Canadian fishing industry, and the problem is that this constraint does not have a proven scientific base.

There is no scientific evidence that quotas will work, and that this will protect the resources. Even if quotas do work, the economic consequences may be so undesirable, that it is better not to have quotas. Too little is understood or known about fish behaviour in the oceans. Fishing has its effect on the fish stock, but how much of an effect is not known. We may be negotiating for something we don't want.

The biologists responsible for recommending quotas as the answer to resources protection carry a great responsibility. It is hoped that they are certain that their recommendations are scientifically based and economically sound.

There is indeed a great need for caution. Suppose it was found later that present day resources protection policies cannot work, then the Canadian fishing industry shall have to pay a heavy price for somebody else's mistakes.

The whole question of resources protection is such an important issue that it cannot be left alone to one man, to a biologist or to a group of scientists alone.

Maybe there are simpler ways to solve the problem of overfishing. We can use different gear, more longlining, more selective fishing, higher utilization of the fish caught. Overfishing is not simply a scientific problem, but rather an economic problem. Overfishing simply means diminishing returns per unit of fishing effort; in other words, returns from fishing increase at a slower

rate than costs increase, measured in terms of fishing effort. Maximum sustainable yield is an unsound policy upon which to base decisions. Biologists tend to think in terms of maximum sustainable yield as if it were magic prescription that will solve all of the problems of the fishing industry. Nothing could be further from the truth. The focus of policy should be the fishery, that is; capital and labour employed in all sectors of the industry, not on the fish. If, for instance, it is necessary to curtail fishing effort to allow stocks to rehabilitate, then the costs incurred in terms of unemployed capital and labour must be accounted for and, it must be demonstrated that the future returns, approximately discounted, are greater from pursuing such a policy than from permitting fishing effort to continue uncurtailed. Obviously, compensation must be given to those who are harmed. Although we may experiment and manipulate fish stocks since there is a demand for them, we cannot experiment with fishermen and the fishing industry. There are many ways to be explored and considered before we make an irrevocable decision.

Market and Price Fluctuations

The market is good now. Most fish is exported to the U.S.A., so the market is outside Canadian jurisdiction. The future of the Canadian fishing industry depends on what happens in this market. Scarcity of fish supply is considered a good thing for many fish processors. It drives up fish prices, and when one looks at the world fishery resource situation and compares it with population and consumption growth, one may think that the future is bright for the Canadian fishing industry. However, a simple supply and demand examination to assess the price trend is too simple an approach. There is a tolerance level within which the fish prices may fluctuate, but once it becomes a question of securing a diminishing supply, then anything can happen.

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Like the fish companies in Canada having to force the independent trawlers out of business and take on the operation themselves, and then fix the fish price at an uneconomic level - the larger fish buyers in the U.S. may be forced to take over the ownership of Canadian fish companies. Thus, Canadian fish prices need not be determined by demand, but by simple corporate decision. Canada can lose millions in foreign exchange.

The development of the Canadian fishing industry, by Canadians, should not only be a national sort of thing, but a multinational industry.

To protect the Canadian fishing industry and the fishing communities in the Atlantic Provinces from the possibility of being driven into despair, we in Canada must look beyond our borders. We must be prepared to build fish packing plants right on the market. We must be prepared to create jobs in other countries if this is the most economical way. We must be prepared to look at multinational systems and developments, and we must rid ourselves of the idea that regional development is sufficient. The restraints are that a multinational approach of this sort, centered around our industry, demanding that Canadian tax dollars be invested abroad, is against all prevailing policies. Canada can do it, call it foreign aid if you like. The Japanese are masters at this sort of thing.

In order to develop the Canadian fishing industry and stabilize within reason, the fish prices, we can choose two ways.

- One way, the boldest one, is to deem the Canadian fishing industry a multinational development and gear our efforts to this end.
- The other way, the simplest one, presumably, is a barter approach, restrict foreign ownership, impose government control, set up raw fish marketing authori-

ties, fish product marketing authorities under government control, etc.

Both ways can be made to work. Do nothing and the Atlantic fishing industry is doomed.

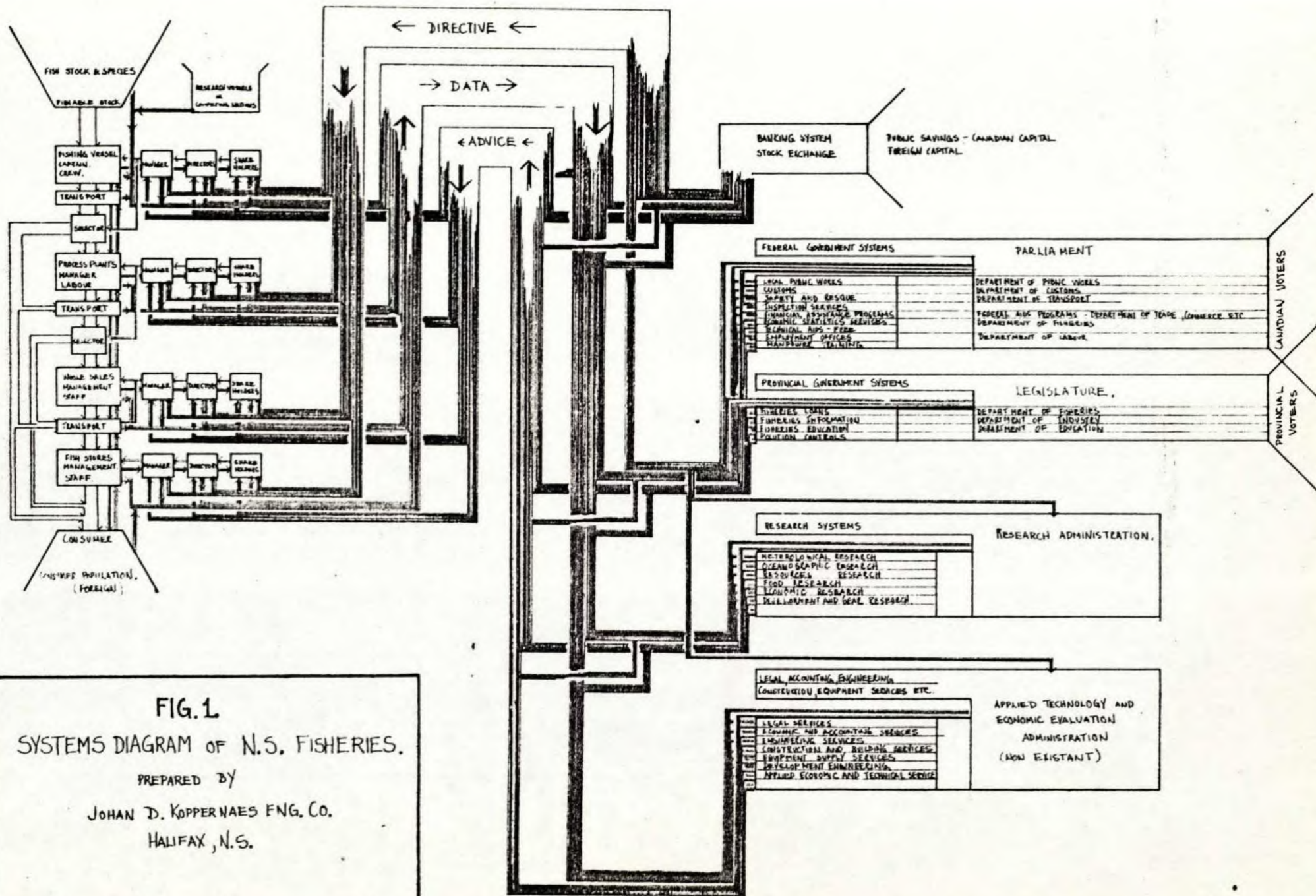


FIG. 1
SYSTEMS DIAGRAM OF N.S. FISHERIES.

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These men may then be charged with the responsibility of operating and planning the future of the Canadian fishing industry system.

The fishing industry system is shown on the following diagram. This diagram also shows the lines of communications as they presently exist.

The Fishing Industry May Be Improved

It is easy to get lost and lose heart when one thinks about the fishing industry as it has been over the years and looking at present day problems and the difficulties approaching. There are indeed many dark clouds on the horizon. Right now there is a lull before the storm. It would be foolish to think otherwise. So, the thing to do now is batten up the ship and be prepared for what can happen. Strange enough, large sums of money and a rapid burst of expenditures is not what is needed.

What is needed most now is leadership, a captain of the ship to speak and a crew who knows what to do.

That is how the fishing industry may be improved, and that is singularly the most important opportunity, so it may be worth considering this point for a moment.

Leadership for the fishing industry should not be an insurmountable problem. Leadership must start with one man having the overall responsibility of improving, developing and safeguarding the Canadian fishing industry. These responsibilities must also be the official objectives, and must be so decreed. There can be no confusion about the objectives and the priorities.

The chain of command, extending from parliament, the policy makers, and down through the line to this particular leader, must be clear. His powers must be defined and so must be the decision timing from his superiors.

Serving this leader there must be a staff and a crew. A twelve man task group is enough.

The opportunities of developing the Canadian fishing industry are thus simply to streamline and improve this system, and all that it entails:

- . on the one side - the product flow side
 - . to explore the existing and the untapped resource potential off our shores and in other areas in the world as well - where such activities may have a chance to be utilized by Canadian fishermen.
 - . to create a fish stock report system that will show where the fish are located at any time of the year.
 - . to formulate objectives and instructions in order to integrate the activities of the coast guard, the protection boats and the various types of research vessels.
 - . to assess the need for new vessels, numbers, types and gear to be used.
 - . to make certain that the vessels can be built and manned as per the need identified.
 - . to assess and develop a raw fish marketing system that will take into account the cost of fishing, fishermen's earnings and the freedom of the individual, the protection of the independent fish boat owners and so on. Fishing as well as fish processing ought to be a private enterprise.
 - . to make available to fishermen wharves, harbour facilities, water, ice, bait freezers and the like, in areas where they do the fishing.
 - . to promote the development of specific shore facilities which will service the fishing vessels and will be capable of taking all the various types of marketable fish the vessels can land in any given location.

- . to provide transportation facilities, busses, trucks, trains, aircrafts, and vessel transportation as best suited to the particular location.
- . to promote and develop one or more Canadian owned fish
- . packing and marketing systems, extending over international borders and all the way to the consumer, any place, if need be.
- . to carry out research to develop new fish products and packages.
- . to build fish receiving stations in the markets as new changes and adjustments all according to changing demands.

The other side of the Canadian fishing industry system, consisting of:

- . the banking system
 - . the federal government system
 - . the provincial government system
 - . the research system
- and
- . the legal, accounting, engineering, manufacturing and equipment supply system.

Many problems may be solved if these service systems are integrated and matched carefully to the needs of the fish product flow system. The opportunities one may see in these systems may be identified as follows:

The Banking System

As was previously mentioned, the fishing industry has a hard time getting money. The fishing industry is different in many ways, and these differences are large enough to require a special fish bank system. So, the opportunities are to make a

regional or a fisheries bank, an identity which will enable private banks to give special consideration to the need and development of the fishing industry.

The Federal System

There are many agencies responsible for various aspects of the fishing industry. Unnecessary restraints must be removed, where they may be detrimental to the development of the Atlantic fisheries. Special policies and exceptions must be made. So, the opportunities are to identify and show in exact terms what the fishing industry needs are, and then to negotiate changes and make arrangements most suitable to the needs.

The Provincial System

The same as is said about the federal system applies. Duplication of effort should be avoided. Industrial loan boards, fisheries loan boards, federal assistance and grants should be brought under the roof of one lending agency; maybe the proposed fisheries bank. The appointment of competitors being on a Loan Board to decide on another's loans should be discontinued.

Research System

All research funds relating to fisheries development should be channeled through the proposed Fisheries Authority System. Research activities may thus be geared more in line with the needs of the fishing industry.

The Legal, Accounting, Engineering, Manufacturing and Equipment Supply System

The future of the fishing industry depends to a large extent on what can be achieved, and what is done within this system. The needs of the fishing industry must be demonstrated. Funds must be made available to this segment of the economy so that the problems facing the fishing industry may be solved.

A special coordinating authority is needed. It is proposed that this be an authority which can discuss problems with the Fisheries Authority. Once the needs are known, this so called Applied Technology and Economic Evaluation Authority could then turn around and mobilize both the manufacturing and the service sector of the economy.

This is merely a brief outline of the opportunities available.

This leaves one segment, the plant owners, the shareholders and the investors. Nothing has been said about the opportunities for this group of people. There is no need to. This group will recognize and seize the opportunities as soon as they are available. It is the system that must be improved and streamlined so that the fishing industry again may become an attractive investment.

Some Identifiable and Readily Available Opportunities

When one thinks about opportunities for the fishing industry, one tends to think of things one may do to explore, pioneer and develop in the product flow section of the system.

The objectives are

- . to increase the product flow if possible
- . to reduce cost and yet obtain satisfactory prices
- . to seek a balance in the system in terms of volumes and prices so that fishing and fish processing can be maintained and grow as an industry.

These are really the primary objectives. From these it follows that one can anticipate the realization of other objectives such as;

- . to create and provide employment
- . to create a better life for people in the Atlantic Communities
- . to predict the resources for future generations
- . to protect the environment so that an area is livable both for animals and humans.

Thus, when considering opportunities in the Atlantic Fishing Industry, it is important to realize that there is a destruction between primary and secondary objectives, and the priorities must be as indicated above. The product flow and production comes first.

The product flow in the Atlantic Fishing Industry may be divided into sectors, relating to the different kinds of raw materials available and the end products that may be developed from these.

The most common kinds of raw material may be identified as follows:

1. Groundfish species:

Cod
Haddock
Flounder
Halibut
Grey Sole
Redfish
Turbot
Pollock
Catfish

2. Pelagic fish species:

Herring
Mackerel
Capelin
Sand Eel
Smelts
Trout
Salmon
Hake

3. Molluscs and Crustaceas

Lobster
Crab
Shrimp
Mussels
Scallops
Squid
Others

The time proven method for catching and processing these fish species may be identified as follows:

- Fishing
- . trap fishing - shore locks
 - . trap fishing off shore - surface and bottom
 - . trap fishing - cages, baskets (lobster traps, etc.)
 - . hand-lining, bait and hook, jigging
 - . long-lining, bait and hook
 - . drift netting
 - . gill netting
 - . seining
 - . trawling
 - . dragging and raking (scallops, etc.)
 - . harpooning, hand and gun

- Processing
- gutting and cleaning
 - weighing
 - cutting and filleting
 - dissecting and cleaning
 - packing and freezing
 - salting and drying
 - salting and smoking
 - pickling
 - cooking
 - canning
 - digesting
 - reducing to meal and oil
 - reducing to fish protein

These activities identify the known methods, the state of the art so to speak, of fishing and fish processing as it is known to date and as it has been known for centuries.

Things have changed over the years, new and better methods have been found to simplify or improve on each one of these activities,

but it must be remembered that man's basic functions have always been the same and so it will remain as long as fish is in the ocean and there to be fished.

Thus, all man can do to create opportunities in fishing, is to improve on these known basic functions and maybe find and develop new methods and equipment that will economize fishing and fish processing, and, in addition, develop new and more valuable products from the various fish species known to exist.

Thus, in searching for opportunities for the fishing industry, one can identify the following areas where concentrated efforts are needed.

Fish Catching.

There are two aspects to fish catching:

- . It is to know and understand the behaviour of each species of fish and then
- . to develop suitable gear and equipment to catch the fish.

The equipment and the gear presently used, takes into account the behaviour of the fish, and this equipment development has been a slow and drawn-out process until quite recently. Now, though, we can see many new innovations and new techniques coming into play. The technology of this age is opening many new possibilities. One can thus observe the impact of the nylon and polyester twine. New nets have made fishing easier. Then, when one thinks about the electronic impact as one may observe the impact of radar, echo sounders, astic, decca and loran, and also about the impact of hydraulics, refrigeration and all, one may basically observe that the growth of the fishing industry is in many ways the result of a growth in other industries.

It is hard for other industries here in Canada to learn to know and understand the needs of the Canadian Fishing Industry. The market is small, and the development costs are high. Local manufacturers basically cannot afford to gamble on the cost to develop new equipment and methods. Thus the Canadian Fishing Industry is forced to take a second position to other countries, where such developments to make new gear for the fishing industry are a matter of national policy. The Canadian Fishing Industry must therefore import both technical know-how and equipment from other countries. This means that Canada often does not get the best; Canada must wait. The innovations needed in the fishing industry often come as a spin-off from defence research.

Thus, there are opportunities to be realized, if, similarly, Canada made it its policy to award a multiplicity of development contracts to local manufacturers in the fields of Defence Research, Electronics Research, Acoustic Research, Hydraulics Research. Research of this kind requires a close co-operation and an integration of the efforts carried out in the scientific, engineering, legal, accounting and the manufacturing communities of the Atlantic Provinces.

To explain this point the following example may be used.

The fishing industry in the Atlantic Provinces will be well served if a way can be found to catch certain species of fish so that there is little or no waste, i.e., there is resource protection, yet the method of fishing is such that it is economic and viable.

It is easy to say today: "This is impossible". Yet it is known that the Russians, the Norwegians and the Americans are working on exactly this idea. Maybe Canada is doing the same, the point is that the fishing industry in Canada would not know. To name an example. It was discovered some years ago that fish among other things orient themselves in the ocean by means of sound. The line on the side of a fish is a sound sensing nerve. The

fish, like the bat, is equipped with its own sonar. Sound will indicate temperature differences, stream layers, ocean stratas and obstacles. The Russians discovered that fish is both repelled and attracted to certain frequencies of sound. Something went wrong with their underwater sonar, it sent out a sound at a certain level, and then it was discovered that every time the set was turned on, fish swam right up against the sonar, and the Russians got a full catch of one type of fish; one full set after another. We, here in Canada, heard about this years ago. The question is, what is Canada doing in this particular field? We have the Oceanographic facilities, but are these being used in areas of this type as well? It must not be that the scientists alone shall determine what studies shall be conducted, what research is needed. Yet the scientific community cannot guess what is needed or wanted - the fishing industry must formulate its own desires, and inform the scientists what they want. It is unrealistic to think that the fishing industry as it now is in Canada can do this themselves. It is the engineers who are the ones that can identify what technical innovations are needed, and the ones that can take the scientific results and transform these data into something useful, who can be the go between the fishing industry on the one side and the scientific community on the other side.

Many opportunities are lost, many opportunities can be achieved, depending on how we in Canada are going to decide to act in this particular area.

The point to keep in mind is that decisions of this kind must relate back to what may be considered good business for Canadians. And to do this without the imposition of restrictions, which in the end may have an undesirable effect on the fishing industry. One must be careful not to give the scientific or the engineering community in Canada, nor the manufacturing, the equipment supply, nor the ship yards in Canada any right or privileges which may be detrimental to the Canadian Fishing Industry. It is a world

community we live in, and we must buy our goods and services where the buying is best, yet we must prepare ourselves to compete, and to negotiate and bargain where limited accessibility to markets are imposed the other way on Canadian Goods and Services. Right now Canada is relatively open while other countries are closed.

One of our opportunities is to look at our resources, the human resources as well as natural resources, fish resources and all, then our processes and the product flows of both goods and services, more in national economic terms than in regional economic terms, and then bargain for concessions nationally as well as internationally. We must look at the goods and services coming in as well as going out, in a more integrated picture. In a world where corporations are as big as countries, and countries are run as big corporations, we must face the facts, do our own things or be absorbed in prices or as a whole. There is time yet, but the bargaining position of the Canadian Fishing Industry is fast disappearing.

Our immediate opportunity is to change this as soon as possible and take constructive actions that will give the Canadian Fish Processors an advantage in the World Community.

This can be done with bold actions. To name some examples, and what ideas may be worth considering, the following suggestions are made.

Idea No. 1 -- In Canada we have a tough time finding people willing to fish on the offshore vessels. Canadians prefer to process fish.

Yet foreign fishermen catch our fish and many of them do not even bring the fish home to their own country, but to Britain or somewhere else.

We in Canada could probably get a large portion of this fish, if we opened our ports and allowed foreign fishermen to land their fish to Canadian owned and controlled fish processing companies only. This would instantaneously create thousands of jobs, and make the Canadian Fish Processing Industry very profitable.

If we think of resource protection, the best thing we could do would be to make foreign fishermen dependent on the availability of Canadian fish processing plants. Then we would have something to say.

Idea No. 2 -- The Canadian owned fish processing companies ought to have some advantages and privileges over foreign owned companies. The advantages can be given in terms of concessions and grants rather than grants alone. The object should be to make Canadians, rather than foreigners, millionaires.

Idea No. 3 -- Fish processing in Canada is tied very closely to the various means and costs of transportation, plus what facilities are available at the other end, in the markets. We must streamline the whole operation, and run it vertically in such a manner that it can be tied directly to Canadian Fisheries Policies.

This entails that Canadian fish companies be given loans and finances towards the creation of multi-national Canadian fish firms. It is not enough to restrict our efforts to what we can do in Canada. We can build on what we already have and yet keep open the opportunity of having Canadian firms competing against one another. International competition is necessary.

Idea No. 4 -- The transportation of fish can be improved. There is a time element in fish processing and in fish transportation. Time is the integrating factor in what is needed both in terms of plants and in transportation facilities. Thus in terms of speed and time, the following transport systems must be made available:

- a.) High Speed -- Air transport, to transport fish
1 day fillets, lobster and other high value products fresh, to selected areas in the world market.
- b.) Medium Speed -- Truck transport, to transport
2-3 days fresh and frozen fish, to continental markets.
- c.) Slow Speed -- Train and Truck and Ships, to
10-15 days transport frozen or canned fish products in containers to North American and European markets.
- d.) Extra Slow Speed -- Train and Ships, to trans-
15-30 days port in bulk frozen fish, canned fish, fish oil, fish meal, to any market.

What we can do in the field of transportation, to supply the planes, the truck, the trains and the ships, and how

we are able to solve the problem of both receiving and holding the various fisheries products, after they have left the plants -- This in the end is going to determine what can be accomplished in the fisheries.

Transportation is a vital link in the chain of costs. These costs relate right back to the plant and to a figure which may be called the "allowable" cost of fishing or the price of raw fish. Thus everything must be tied together from the market prices and back. Canada must safeguard its bargaining position and make certain that there is sufficient leverage and an indirect price control at least. Wide price fluctuations in fish products these days of food shortages is inexcusable, and Canada plays a vital part in the total scheme of things. It may be, that if Canada was more positive in its position vis-a-vis the world fish market and its prices, that this in turn may be of sufficient interest to other nations such as Ireland, Denmark and Norway -- so that these in turn will take a second look at their own activities, particularly in regard to the salmon fisheries off Greenland -- and they may find that it would be of their economic interest to play along with Canada, and stop fishing salmon on the high seas. It is all a question of how Canada intends to play its own game.

We may venture to guess that these nations and the world fishery communities at large are in a way waiting to see what Canada is about to do herself, how the Canadian Fishing Industry will be, and what Canada will do when it talks about managing the resources. Canada's claim to manage the resources are more in the nature of negative demand on everybody concerned. A more positive

suggestion, one that may be of greater value to, for example, Denmark, than it is to fish salmon, may reach some receptive ears and be more effective.

Idea No. 5 -- To overcome myths, actions and policies that are making it difficult for the fishing industry to innovate, and do new things:

- There is that myth about fish factory ships
- There is that myth about inshore fisheries -- and how bad it is
- This is the myth that best advice, the advice that will improve the fishing industry, should come from the larger fish companies. The idea supposedly is, that what is good for the big ones, ought to be good for the small ones. It is a bit naive.
- There is the apparent myth that a Ph.D. in Biology, and in fish, that this is the most desirable qualification and background for persons charged with the responsibility of planning the future for the Canadian Fishing Industry and what the fishing industry should and should not do. To know the fish is not the same as to know the fishing industry.
- There are many myths in the fishing industry itself
- Some fishermen claim that keeping foreign vessels away from being serviced in Canadian ports will make it more difficult for them to operate. This has been proven wrong.
- Some fish companies feel that they must keep the fishermen poor or exert economic controls in order to secure the fish supply, and that workers independence is not a good thing.

- There is the myth that some think unions are all bad, bad for the industry and bad for the people, etc.

There are hundreds of such myths and half truths with both good and bad sides. It is a hornet's nest full of taboos, customs and beliefs; and it will be no easy task to find an answer satisfactory to all parts concerned. Therefore it is proposed, in order to overcome these many myths, that something new be considered. And it is thought that the something new be to seek ways and means whereby the private sector stand to gain; so that the industry itself will demand that the many constraining myths be eliminated.

This means that we should let someone build and own factory ships if this is desired.

We should make it easier for the inshore fisheries to develop, make bait freezers, ice storage and small fish plants or receiving stations where needed.

We should let the smaller operators have a say -- and take a close look at the hierarchy within the fishing industry; and seek out the men that have something to offer towards developing the fishing industry, regardless of Degrees. A Degree of any sort need not be considered a guaranteed meal ticket, one person vis-a-vis another. It is the man that counts.

We should make it so that fishermen can become independent capitalists, whose main function in life is to

catch and sell their fish.

We should make it so that fish processors can concentrate on production and make money processing fish every day.

We should make it so that the work force, the crew and the workers in the plant can earn a living, and yet turn around and give a man's worth for a man's pay. Money ought not be given to anybody for doing nothing.

Idea No. 6 -- The money initiation and the way money is now being used in the form of incentives and grants, etc., will not work in the long run, unless there is some drastic change in terms of policies and a clearer specification and identification of overall Canadian objectives.

As it is now being done, we may be spending Canadian tax money in a way that ultimately may force the individual Canadian to be totally dependent on corporate decisions in foreign hands. Thus it is proposed that money and assistances be made available with clear and overall objectives in mind. The idea, the need, the benefits to be gained and the capability of man and individuals, ought to be the basis on which funds are invested. A simple means test of men and companies, what they have saved in years past, etc., is much too simple a criterion on which to base a regional development decision. The equity, means tests, as they are now being used, promulgated the philosophy that only those that made money in the past will get money to develop the future. Thus the money granting process

as it is now often practiced, is in itself a destroyer of regional growth and development. Surely the philosophy of growth must have at its base the simple concept, that it is not what we have that counts, but what we can do.

Any other way of looking at monetary assistances and grants will tend to destroy the very purpose of the assistances and the grants themselves. Thus a bold new look at the "monetary granting process" is needed.

It is not for a moment thought that it will be a simple affair to develop a new money granting process. There will always be an element of risk. The best one can do in any process of this kind is to seek the best advice and then decide. The question then arises, who can decide and who can give advice. There are only a certain type of individuals capable of deciding, taking a risk and that are prepared to live by their own decisions and recommendations. Only men of this caliber can be charged with the responsibility of area development, and the awarding of grants. Any lesser individuals will tend to destroy the development program, not intentionally, but by insisting on playing it safe.

Playing it safe, is playing the rules; yet there is no such thing as a safe investment anywhere.

If some of the constraints were lifted, and if some other way were found whereby money can be granted or

be made available to an area and an industry -- to simply realize an idea or an objective -- then untold opportunities may unfold. It is proposed that this idea be given serious consideration.

CHAPTER 6THE STRATEGY

BACKGROUND

The dominating feature of the fishing industry which any report on the development of the fishing industry must recognize, is the common property nature of the resource. It is becoming increasingly more evident and alarming that the stock of fish in the world, and particularly in the Northwest Atlantic, is limited. Any policy predicated on the assumption that increasing the supply of raw material by the traditional method of increasing fishing effort (capital and labour) is doomed to failure. Since many species in the Northwest Atlantic are being fished at or beyond their maximum sustained yield, further increases in fishing effort will have the perverse effect of actually decreasing output while at the same time increasing costs.

While the prospects of increasing output by traditional methods are not at all hopeful, the industry is beset by problems resulting from the common property nature of the resource. Returns to capital and labour are low in all sectors of the industry and excess capacity is prevalent. The usual method put forward for coping with these problems is to introduce regulations which limit fishing effort, thereby making the resource more of a private property and thus allocating the returns attributable to the resource itself, to the capital and labour engaged in it. In the case of inshore fisheries, such as the lobster fishery, which are under national control this approach is possible but in the case of international fisheries in which many nations with various objectives participate, regulation of fishing

effort is by no means an easy task.

Does Canada's offshore fishery have an locational advantage over other nations in the Northwest Atlantic? This argument has been debated for a long period. After World War II, the locational advantage that Canada possessed faded as other nations became more technologically advanced in their fishing methods. To some nations such as the U.S.S.R., whose objective was to produce protein foods, locational advantage was unimportant. It can be argued that with factory ships and mother ships, to some extent the locational advantage in processing fell to other nations since processing was conducted alongside the fishing operation while Canada's vessels still had to steam several hundred miles to and from the banks.

The locational advantage may, however, be shifting back towards Canada again. For one thing, eastern bloc nations are becoming much more profit conscious as protein objectives for the nation are reached. The decreasing yield of Northwest Atlantic fish is going to drive up the per unit costs very rapidly and some nations may find it to their advantage to produce those goods in which they have a comparative advantage and exchange them for goods, such as fish, in which they do not have a comparative advantage. Canada, of course, will not be exempt from this increase in costs. Without any accurate data on costs of fishing of other nations, it is impossible to do more than speculate and observe trends.

Given this situation in the Northwest Atlantic, what are the options open to Canada? We can continue expanding and modernizing the fleet and increasing processing facilities, but it seems clear, given the common property nature of the resource, there is little to be gained from so doing. Effort should be devoted to better utilizing the existing stock of capital rather than increasing it and modernizing rather than expand the industry.

Canadian vessels can begin fishing in the waters off other nations in order to increase supply. This, however, will again increase costs, other nations may be considering the same move, and it is unlikely, given the prevailing returns to labour, that crews would be willing to suffer the inconvenience of long trips at sea for low returns. Another possibility is to increase supply through agriculture. However, this is not very hopeful at present, although it must be considered as a distinct possibility within the not-to-distant future. The last alternative and the one that Canada is pursuing at present is to control the Northwest Atlantic fisheries. The route Canada is taking is a difficult one, however. Even though the decreasing yield of most species and the concomitant increase in costs has made other nations more willing to negotiate on international control, each nation will attempt, in its own best interest, to gain as large a share as possible of any catch quotas that are introduced. Consequently, Canada may be able to hold a constant proportion of a declining yield but increasing supply from the offshore fishery by this method does not look at all hopeful. It appears, therefore, that the only way in which Canada can increase its supply is to secure the catch of other nations fishing in the Northwest Atlantic. The strategy for the offshore fishery is based on this argument.

Some people have asserted that economics cannot be applied to the fishing industry. Economic analysis can be applied to the fishing industry, but the resulting picture is not a very pleasant one. The industry, in particular the processing sector, is an oligapoly with one large firm dominating it. Like most oligapsonies and monopsonies, there is very little factor price competition. Virtually the only competition that exists is in the supply of raw material. The larger firms have largely circumvented this type of competition by integrating backwards. Even where there is no direct control of fishing vessels,

other forms of control of the fishing operations are used, in particular credit. The very large firms control mainly the offshore sector. It would appear at just a glance that there is competition within the inshore sector. Although there is undoubtedly more competition than in the offshore sector, there are still monopolistic elements present. A single processing plant or buyer in one port exerts a degree of monopoly control even though, of course, there is always a fear of another company entering the port. The inshore fishery probably fits most closely the economist's monopolistic competition model. Characteristic of this type of industry are low return to both labour and capital. Add to this the inherent inefficiencies of a common property resource and the returns become ridiculously low.

Returns to primary producers in the inshore sector are determined largely by the offshore sector which, through the control of the oligopolistic firms, are kept to the minimum necessary to induce labour. Although captains, mates and a few other positions in the crew can earn reasonably high returns, deckhands generally earn very low wages. Fishermen in the inshore fisheries earn approximately the same as deckhands, on the average. Plant workers, in most cases, are paid minimum wages permitted by law. Consequently, government welfare payments are very high in most fishing communities since fishermen and plant workers, acting perfectly rationally, trade-off welfare payments for low fishing returns.

Since such a large proportion of labour in the fishing industry is engaged either in inshore fishing or processing (approximately 90% of the labour force) it is imperative, if the fishing industry is to be developed, that returns to these workers be increased. The fishing industry will never become self sustaining, let alone serve as a growth sector, unless this occurs. Consequently, the strategy regarding inshore fisheries reflects

the need for increasing returns to labour.

A particular problem of government involvement in the fishing industry, as it is presently constituted, is a lack of co-ordinated direction and the establishment of overall goals. This is particularly true with regard to loans and grants to the industry. The Department of Trade, Industry and Commerce as well as the Department of the Environment give financial aid to construct vessels. The Department of the Environment's objectives are to modernize the fleet while the Department of Trade, Industry and Commerce's objective is to subsidize the shipbuilding industry. These objectives are not necessarily compatible and, since the offshore fleet has to all intents and purposes been modernized, the objectives of the two programs will become more divergent than they have been in the past. In the case of financial aid to the processing sector, the problem is further compounded. Grants are given by the Department of Regional Economic Expansion, loans may come from the Industrial Development Bank (a leader of last resort that doesn't act like one), provincial lending agencies, or chartered banks. The Department of the Environment recommends on grant applications but does not give financial aid. It would indeed be amazing if the objectives of all agencies involved in giving financial aid to the industry coincided. There does not appear to be need for additional financial aid and, in fact, less aid may be desirable since any increase in processing capacity not matched by an increase in the supply of raw material will keep returns to capital and labour low, but rather a more co-ordinated approach. The outlined strategy reflects this need.

Research on fisheries appears, as well, to be uncoordinated and without direction. According to a background study prepared for the Science Council of Canada:

The attempt to determine the goals of fisheries..... indicated that few individuals or agencies have thought of their programs in terms of overall goals or objectives. Research problem areas could be described by many scientists, but to what end they should be pursued and for how long was seldom evident. Such aimlessness seems to give rise to resignation on the part of many scientists to managing the resource into mediocrity, if not to oblivion.¹

There appears to be an inordinate amount of research funds devoted to the study of fish with insufficient funds devoted to research on the fishing industry. Even though it is recognized that fish are essential to the fishing industry, to study them in isolation, as it appears sometimes happens, is to misconstrue objectives. The primary objectives of research, whether it is biological, chemical, oceanographic, social, economic, legal, industrial, engineering or of any other form must be the welfare of those engaged in the industry. There is a real need for research on the structure of the industry, fishing methods, transportation, the politics of international regulations, vessel design and so on. The authors of the background study for the Science Council recommended that research be under the direction of the fishing industry², and there is certainly a good deal of merit in this recommendation.

¹ D.N. Pimlott, C.J. Kerswill, J.R. Bider, Scientific Activities in Fisheries and Wildlife Resources (Ottawa: Queen's Printer, 1971) p. 26.

² Ibid, p. 107.

AN OVERALL STRATEGY IS ESSENTIAL

The fishing industry is very important to the people of the Atlantic Provinces. It must be protected. It must grow and be viable. It must continue to provide the livelihood of more than 36,000 people who are directly involved in fishing and maybe another 5,000 other people in associated industries. Poor performances in the past is no basis on which to build the strategy for the future. It is the present that counts. It is at this moment in life that it is necessary to take stock, to decide what can be done, to compare ourselves with what others do and to decide for ourselves what shall be our future and what shall be the future of the fishing industry and the thousands of people involved in it; - that is the overall strategy.

It may be thought that things will happen, the right things will happen by themselves, and that there is no need of a plan or a strategy other than just live and let live. Things just don't happen that way, not any more if ever.

One cannot expect in this day and age for example that a fisherman alone shall be able to compete with the whole State of Russia, which is what many fishermen are now doing.

What is to be the future and our strategy is very much a question of a philosophy, an approach and the desired life style of Canadians. It is a deep rooted sort of thing and yet it ought to be realized that we as Canadians cannot determine our own future - as we would like it, without giving sufficient thought to what other nations may do. Our wisdom may be great, we may totally right. We may insist that the environment be protected, and that we therefore ought to restrain ourselves in our endeavours.

When someone else has a strategy, a will and a desire, systematically applied, then there is need for a balance, another strategy, a will and a desire that will look after the interests of the

people under attack.

The Canadian Fishing Industry is under attack.

The attack comes in many forms. There are local, regional, national and international aspects to these many and varied attacks. There are industrial and environmental preferences and priorities to be considered. The fishing industry may consider itself under attack while others may consider the industry and fishermen exploiters, destroyers of fish, land and sea, bad for tourism, bad for sport fishing, too demanding - costing too much, the benefits are low, and maybe we would be better off forgetting the whole thing.

The point is no one really knows what it all means, and where it may lead to.

No one knows for certain whether it is a question of economics or a question of life style and people that are the underlying issues when one shall decide the future for the Atlantic Fishing Industry.

Sociology and economy ought to go hand in hand. Economic growth and improvements ought to mean social improvements, yet in the fishing industry one may too often see the opposite, social disparity is often used as a leverage to achieve economic growth in an area. Actions of this sort are often promulgated by conscious or unconscious sanctions given to new expansions and new projects, the result being an alienation of people, one group versus the other, one area versus the other, and so on.

Ironically to some this is a good thing. It calls for individualism and a "laissez-faire" attitude and an individual strength that is often channeled to the good, yet one cannot say that this is or would be the result when one looks at the fishing industry. A depressed region ends up having depressed people as the good.

The overriding objective of fisheries policy must be to increase the welfare of those engaged in the industry, that is, fishermen, plant workers and entrepreneurs. The welfare of one group, however, cannot be increased at the expense of another group. Secondary

objectives should be:

- (a) To increase employment and reduce underemployment of both capital and labour;
- (b) To provide fishery resources for future generations;
- (c) To protect the environment;
- (d) To increase the output of the industry;
- (e) To make the industry more efficient.

The objectives in most cases are complementary and fulfilling, for instance, the secondary objectives will, generally speaking, realize the primary objective. However, it is important to point out that the goal of fishery policy must be to increase the welfare of those engaged. Within this policy framework, an objective sustained yield has no meaning unless it can be demonstrated that such a goal would lead to increased welfare. One could introduce as an objective the provision of fishery products to consumers at the lowest possible price, or even at competitive prices. This objective has, however, been rejected in favour of the one previously stated since fishery products make up only a small part of consumer's expenditures.

OBJECTIVES MUST BE SOLD

Inasmuch as there are many conflicting interests within the fishing industry, and between other industries and various regional socio-economic aspects as well, it is to be realized that it will not be a simple task to change things and to create opportunities for the fishing industry. The complexity of the many aspects are enormous; maybe more than one can handle. It boils down to a question of approach. The objectives must be clear and the apparatus created to carry through and do the work so the objectives can be reached. Yet, the formulation of reasonable objectives is not enough. Objectives must be sold. A special effort is thus required merely to set the stage; to make deals; negotiate companies, and both offer and give compromises and concessions where needed and where it is in the best interest of the people in the region. The fishing industry and the people in it cannot do this. This is the responsibility of the government; not to sell objectives necessarily, but to make certain that reasonable compromises are ready.

The problem is that the fishing industry in itself is not capable of formulating the objectives that are needed in broad terms, and it is an undermined question who can do it and who will do it. It will take time, effort and money merely to explore and identify the objectives, and much more time and effort will be needed to sell these to the various parties concerned. The only conclusion one can draw is that governments, provincial and federal, must take the lead in this and provide the means so something can be settled and worked out towards eventual predetermined objectives. This is a part of the strategy proposed.

TIMING, THE SPEED OF ACTION AND THE ABILITY TO CREATE AND SEIZE OPPORTUNITIES ARE ALL IMPORTANT FACTORS

The probability of success depends on speed and timing. It must be part of the strategy to assess the chances of success; to determine the probability of achieving a given set of objectives in terms of time and the means available. A systematic approach has meaning only when and if it can be implemented to be effective in solving problems in a given period of available time. If a plan exceeds its time limitations, then it may be found to be of less use, and may in fact become an obstacle and a destroyer of its own objectives. Thus, if it is to be found that a master plan cannot be implemented to create opportunities for the fishing industry within a certain time limitation of, say, 3 to 5 years, then the best answer may be to let all planning go and let the fishing industry find its own course in our international environment, that is to say, the answer may be to remove all restrictions and protections, and other nationalistic considerations. If jobs are the only criteria, then one can say that jobs will be created this way as well; simply by removing all encumbrances and restrictions that Canada, as a nation, now finds in her interests to impose. It is a tricky question. No one can presuppose and say for certain which of the two ways is the best for Canadians. This is a question of the times, and it is a question the fishing industry cannot answer alone.

Part of the strategy, therefore, must be to examine the time factor and the means available to either create and implement an overall plan of growth for the fishing industry, or to create a more laissez-faire environment, which will cost less and which, as far as the interests of the established industries are concerned, may be a far better approach than to impose further restrictions or limitations which are the results of planning.

PLANNING REQUIRES MEN OF EXTRAORDINARY QUALIFICATIONS
AND EXPERIENCES

A strategy is a component part of a plan and a vision of what may or may not be. The complexibility of a vision and the vision itself is something very difficult to share. Extraordinary men can have both a vision and an ability to share this vision with others, and from this can evolve a plan and a strategy. It is an irreversible process. It is difficult, if not impossible, for a committee to create a vision. It is important to recognize this basic fact, and its ramifications. That it is so, is generally accepted, but it is easily forgotten. Thus, tied in with the strategy to improve things there must be a supplementary system, an arrangement and an incentive so that men of high qualifications and perceptions can participate and make their contributions. Yet, as this seems logical one must not forget that this task is not easy to do. The established hierarchy will feel themselves under attack in their higher scales of needs, thus, there may be an instinctive reaction against any move to upset the existing hierarchy, and let new men and men of extraordinary qualifications into the higher echelons of the fishing industry.

"New blood" is needed - more qualified men and fishery training programs are essential. A co-ordinated fisheries training and education system is needed. So the strategy must be to create opportunities for extraordinary individuals at all levels of endeavour relating to the fishing industry, and finally that a fisheries education system with adequate facilities be developed.

See enclosed report (Appendix I); a summary report on a study of the recruitment, training and education of manpower in the Nova Scotia Fisheries.

THE PLAN OF ACTION MUST BE FLEXIBLE

No one can say for certain what the future may be. Planners have a tendency to generalize, compare, and then conclude that one way of fishing and fish processing is better than another. The worst that can happen is that planners with access to the policy makers may draw conclusions, which, when turned into policy can ruin hundreds of new and never thought of possibilities. Any plan of action and any strategy must be flexible. It is possible to legislate the fishing industry right out of business. The application of technology and improving techniques can easily be stopped by an unofficial policy, and thus, entrepreneurial emphasis may be channeled in the wrong direction. This point cannot be stressed enough.

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CHAPTER 7

THE ECONOMIC IMPACT

REALIZATION OF OPPORTUNITIES CAN HAVE AN ALL IMPORTANT IMPACT ON THE ECONOMY OF THE ATLANTIC PROVINCES.

The fishing industry is very important to the Atlantic Provinces. Its future and its viability will determine the welfare of many people in the area.

In terms of numbers, the industry may be described as follows:

In 1970, the landed value of Atlantic Provinces' fishery species was \$121 million and marketed value was \$254 million, broken down by provinces as follows:

	<u>Landed Value.</u>	<u>Market Value*</u>
Newfoundland	\$ 36,350,000	\$ 85,104,000
Prince Edward Island	11,174,000	18,375,000
Nova Scotia	55,557,000	105,939,000
New Brunswick	17,639,000	67,058,000

* Because of duplication, does not sum up to \$254,000,000

Source: Canada, Department of the Environment, Annual Statistical Review of Canadian Fisheries, Vol. 3, 1955-1970 (Ottawa: Department of the Environment, 1971), p. 26

Approximately 36,000 people were employed in primary fishing operations in 1970, of which approximately 30,000 were engaged in inshore fishing and 5,400 in offshore fishing. An additional 14,000 persons were engaged in fishing processing plants.

Both the primary sector and processing sector of the industry have demonstrated a good rate of growth during the past decade, although employment in the primary sector has declined recently, while employment in the processing sector has increased substantially. Nevertheless, prospects for the future, if the fishing industry continues on its present course, do not look good. During the first six months of 1972, the quantities and landed values of almost all species have fallen markedly. In other words, prospects for increasing the raw material supply by the traditional method of increasing the number of fishing vessels are not at all encouraging. On the other hand, a strong market demand will probably continue, thus, placing a further upward pressure on prices.

In the Northwest Atlantic, where Canada, in terms of volume, is the largest fishing nation, the future for increasing the raw material supply is not great, since it is generally agreed that most species are being fished at or beyond their maximum sustained yield. Recent attempts by Canada to bring this fishing area under the control and regulation of the Canadian government have met with only limited success. Nor has the International Commission for the Northwest Atlantic Fisheries been very successful in bringing this fishery under international control, since management of the fishery is usually subordinated to political considerations of the nations involved. In terms of efficiency, although comparisons of this nature are difficult to make, Canada probably does not fare well.

The major species of the Atlantic Provinces' fishing industry, together with landings and landed values for 1970, are:

GROUND FISH	Landings (thousand lb.)	Landed Value (thousand \$)
COD	424,063	19,182
HADDOCK	49,356	5,288
REDFISH	180,732	5,795
HALIBUT	3,142	1,502
PLAICE	52,826	2,551
TURBOT	25,409	1,076
FLOUNDER & SOLE	239,537	11,877
POLLOCK	20,008	673
HAKE	16,738	582
CUSK	7,320	332
CATFISH	6,717	238
TOMCOD	858	22
OTHER	5,897	11
TOTAL	<u>1,033,603</u>	<u>49,229</u>

PELAGIC AND ESTUARIAL

HERRING	936,519	11,844
MACKEREL	34,212	1,235
SWORDFISH	8,016	3,689
TUNA	6,960	1,486
ALEWIVE	7,233	156
EELS	1,342	240
SALMON	4,228	2,387
SMELTS	3,325	360
OTHER	8,293	183
	<u>1,010,128</u>	<u>21,580</u>

MOLLUSCS AND CRUSTACEANS

CLAMS	9,042	700
OYSTERS	2,718	542
SCALLOPS	11,882	12,962
LOBSTERS	33,953	27,830
CRABS	13,523	1,284
OTHER	4,110	680
	<u>75,228</u>	<u>43,998</u>

SEAWEEDS

IRISH MOSS	105,619	2,867
OTHER	13,858	85
	<u>119,477</u>	<u>2,952</u>

SEAL SKINS (NO.)	136,495	1,195
WHALES (NO.)	1,362	1,137
OTHER	<u> </u>	<u>35</u>
	<u> </u>	<u>2,367</u>

If Atlantic Provinces' ports were opened to foreign vessels and Canada pursued an aggressive policy towards securing their raw material supplies, which might involve trade-offs and concessions in other areas, then we might reasonably expect increased landings in the vicinity of 600 to 800 million pounds. This would increase gross output by approximately \$90 to \$120 million and value added of \$45 to \$60 million. Such an increase could be realized quickly and should result in the employment of an additional 2,000 to 3,000 persons without any large addition to existing plant capacity. Processing plans would be able to realize economies of scale, thus leading to greater returns for fishermen and plant workers alike.

Although it is impossible to be precise, substantial gains in terms of value added and employment could be made if, either through international control or negotiation, Atlantic Provinces' processors further processed fish and switched to the production of higher value added products such as gourmet items and food herring (in limited amounts). This could be accomplished by increased grants to companies specializing in high value added products in a manner similar to the present one for new products.

Similar gains could be made with regard to greater utilization of fish, for, at present, about one half of what is landed by offshore vessels in particular is not utilized. The utilization of so called "trash" fish; further development of uses for capelin and Irish moss, to name only a few, could greatly increase the value added of the Atlantic Provinces' fishing industry.

It is conceivable that with an aggressive policy and sound planning \$100 million value added and 5,000 jobs, mainly in processing plants, could be created.

THERE ARE MANY ECONOMIC SIDE BENEFITS TO BE REALIZED.

By first looking at the fishing industry and the many and varied activities carried out by the industry, one may from this obtain a general picture of potential side benefits which may be realized. It is difficult to assign specific numbers to any of these benefits, so the best one can do at this stage is merely indicate what problems to solve, and what may be done. Thus, in a search for opportunities in the fishing industry and related activities, one may identify certain areas where concentrated efforts are required, presupposing that we learn:

- (a) to know and understand more about the behavior of each species of fish, and
- (b) to develop suitable gear and equipment for catching processing, transporting and marketing the fish.

There are economic side benefits to be derived from performing these first tasks, however, assuming that there is a strategy and a systematic approach to solving the many and varied problems of the fishing industry, one may deem it possible that there will be a new growth in a multiplicity of new and related industries in fields such as:

- . Banking and Financing
 - . Equipment Manufacturing and Product Supply
 - . Transportation
 - . Legal Services
 - . Accounting Services
 - . Engineering Services
 - . Electronics
 - . Research and Development
 - . General Trade (both foreign and domestic)
- and

Banking and Financing

Banking and financing is a question of risks. The risks relate to questions on economic environment. The present day economic environment of the fishing and related industries is poor, and more money in terms of grants or capital from any source is not necessarily conducive to what one may consider good risks. This can be changed, providing one can focus decisively to have this problem solved. Entrepreneurial activities, and banking activities are presently hampered by the difficulties associated with the fact that overall national policies are being applied generally to all regions without necessarily being flexible enough to exempt or compensate certain areas, or industries in areas where this may be in the best interest of the nation as a whole. It will be difficult to find the answer, but an answer to this problem is needed. A regional banking system or a fisheries bank may provide a solution to some of the problems.

Bank earnings are not known, but it is conceivable that with the proposed improvement in the fishing industry, and an ultimate potential for \$50 million dollars a year increase, plus maybe an increase of 10 million a year for associated activities in complementary industries, that there may be a substantial increase in banking and financing activities in the Atlantic Provinces as well. It ought to be worth the effort to try to improve the "financial environment" in the area

Equipment Manufacturing and Product Supply

The equipment manufacturing industry and the product supply industry of the area may be related to the fishing industry as follows:

The cost of equipment and facilities, plant, ships, etc. should be about equal to the yearly sales value. This is an easy "rule of thumb" that may be verified with further study. When the cost of facilities is higher than the yearly sales, then subsidies and grants are needed. Just off hand, if one can accept this criteria as a rule, this means that the Atlantic Provinces should have fish catching and processing facilities worth about \$254,000,000, and, as mentioned, there is a potential to increase the sales by \$100 million if foreign ships were allowed to land their fish here. Out of this \$100 million about \$50 million would be the value of foreign boats and \$50 million would be the cost of improved shore facilities to serve the boats. Assuming there is an overall 15% depreciation for plants, boats and all (i.e., the foreign boats may repair in Canada), then there is a potential of approximately $\$254,000,000 \times 15\% = \$38,000,000$ in new equipment and facilities per year right now, with a potential increase of about \$15,000,000 more business if the foreign vessels were allowed to land their fish at Canadian plants. These are only rough figures. All in all there is a market for the equipment industries of about \$38,000,000 a year now, which may be increased to \$53,000,000 sometime in the future. The existing local equipment industries do not fully supply this market, maybe half, about \$19,000,000 a year. It is only a guess, the rest is probably imported to the region either from abroad or from other areas of the country. It may be worth looking closer at these guesstimates. The point though is this; there is, we feel, an existing and future potential for the local equipment manufacturing and product supply industry. In terms of employment there may be room for about 2500 new jobs in this area alone.

Transportation

The fishing industry is closely tied to transportation. Transportation is an integral part of fish catching, fish processing and fish marketing. Roughly, one billion pounds of fish are landed per year. Assuming an overall 1/3 yield, this means that 330 million pounds of fish are transported to market. Using a low figure of 4 cents per pound, plant to market cost, then one shall have a transportation volume of about 13.2 million dollars per year to transport the finished product. Adding to this the cost of bulk transportation of raw material by trucks and boats it is then conceivable that the total transportation volume is somewhere in the vicinity of about 15-17 million dollars per year. A 100 million pound increase in landings from foreign ships may be a 1.2 million dollar increase in transportation revenue. All in all we may be talking about 120 new jobs in this area, providing the transportation facilities are Canadian.

Legal, Accounting and Engineering Services

It is difficult to say what volume there may be in these fields. However, considering that there is a 250 million dollar business, which may be increased another 100 million, a renewal business of about 38 million, and a transportation business of maybe 15 million, one may guesstimate the legal, accounting and engineering volume as follows:

15% of the total renewal volume of \$38 million	= \$5.7 million
0.01% of the sales volume of \$250 million	= <u>\$2.5 million</u>
i.e. Total service volume	= \$8.2 million

This amount represents about 270 jobs in the fields of accounting, legal and engineering activities, using a high charge out rate of \$30,000 per man. For each professional man there are 1 or 2 other people involved in the work, thus, all in all, the total employment potential right now would be about 800 people.

If foreign ships were allowed to land their fish in Canada, then this may be increased to a total of about 1000 jobs, i.e., there is a potential of 200 new jobs to look after an approximate increase of \$2 million in service volume.

Electronics and Instrumentation Industry

The electronics industry provides about \$6000 - \$8000 a year in services for every 5 million pounds of fish landed.

So there is an electronics volume of about one dollar per 1000 pounds of fish landed.

Roughly, 1 billion pounds of fish are landed each year, so one may estimate a contribution of about \$1,000,000 by the fishing industry to the electronics industry in the area.

Most of the electronics equipment comes from abroad. Electronics equipment is normally rented, so about half of this amount goes to pay for the equipment, and the other half goes to servicing. Thus, local firms may have a business potential of about \$500,000 a year. The employment potential to serve the fishing industry alone is about 50 people; it may be possible to increase this by 10 new jobs if foreign vessels were allowed to land the fish in this area.

The electronics service industry in Canada may have another greater potential if a deal was made so that local electronics firms could travel offshore by boat and helicopter to serve the foreign offshore fleet as well. It may be worth investigating, but then there may be a problem of security, considering the fact that some foreign vessels may do more than just fish.

The electronics industry has many things to offer the fishing industry. Some of these things are presently being explored and implemented by the Department of the Environment, Fisheries Branch. The communication and the reporting intelligence system presently being contemplated or implemented will create many new jobs and a new potential of the electronics industry in the area. This potential is tied in with defence, oceanographic research and fishing. The total potential is much greater than what one may think of in terms of fishing. The fishing industry merely provides an important contribution to the total scope. There may be a total potential of about 300 jobs in this field, if fully exploited, but the fishing industry can support about 60 of these; maybe another 60 if the electronics equipment was manufactured locally. The economy of scale would be a problem for any local electronics and instrumentation industry.

Research

Research is essential if the fishing industry is to grow and be viable. It is estimated that about 5% of the sales volume is needed for this kind of activity. The more aggressive industries set aside as much as 10%, figuring that this is the basic need to stay alive and be competitive in the world communities. What is being spent now is not known, and, of course, it is essential that the money

spent is being directed, at least in intent, to the solution of economic problems. The 5% is considered a minimum amount of money that must be used to this purpose - to serve the needs of the fishing industry. If this was done, then the research and development volume should be about 10 million dollars a year, out of which 2 million may be used for research and 8 million may be used for development.

Two million for research is about 200 men, 50 scientists, 50 technologists and 100 staff.

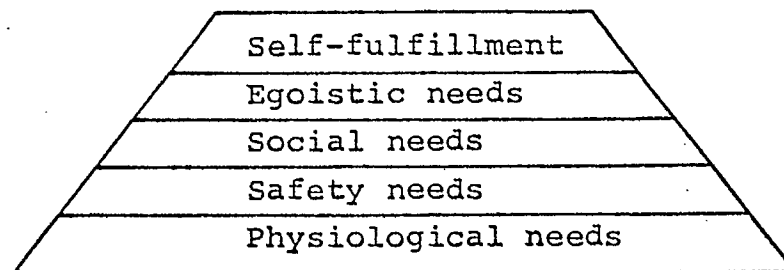
Eight million for development is about 800 people, 250 engineers and scientists, 250 technologists and approximately 300 draftsmen and staff.

Neither research or development needs to be conducted by government agencies alone. Private firms may be contracted to carry out both research and development. Fish companies themselves may be given encouragement to do a lot of the research and the development work themselves. Rather than grants, it is proposed that tax concessions be given to fisheries firms that are willing to employ or hire engineers and scientists to explore the future. PAIT grants, and other programmes presently used are only of value to larger fish companies. PAIT, as it is, only applies to producers, and not to the engineering and scientific service industries. This means that those who know what may be accomplished have no way of funding their explorations. There is a vital link missing, and the result is that very little useful research and development is presently being done by the fishing industry, and the industry itself suffers. Government Agencies are the only ones who do this work in order to help the industry. The problem is an academic detachment.

HOPE AND MOTIVATION AFFECTS THE ECONOMY

The objectives must be designed to improve the lot of the men in the fishing and allied industries. If the industry is to be improved, individuals must participate in the development. There are many forces working to induce an individual to seek a better life. Financial gain is only one of these forces. The environmental and social forces are related to the mental attitudes and capabilities of each individual. These forces and attitudes combined in the individual are called motivation. Although the forces and attitudes combined in each individual, in a manner unique to that individual, man has discovered in his search for knowledge of his motivating forces that there are certain characteristics and relationships between cause and effect which are common to all men. It is to these common factors that attention must be paid, so that individuals may be induced or motivated to participate in education and industry in both greater numbers and with greater efficiency.

Motivation is the force which gives impetus to the actions which the individual directs towards the fulfillment of a need or attainment of a goal. By this definition, man is motivated because he has needs or goals which direct his behavior. This is so for the individual as well as for a group of individuals. There are many theories of motivation, but there is some general agreement that needs are the basis of all theories. In Abraham Maslow's theory of the Hierarchy of Needs, the needs were categorized and classed as follows:



Physiological needs are the needs of the body. These needs are directly for food, water, air and shelter, and indirectly for sex, rest, exercise, and some degree of comfort in shelter. If these needs are not met, they will assume priority in the motivation of behavior. Because a satisfied need cannot induce behavior, the higher level needs begin to dominate behavior as the base physiological needs are satisfied.

The next level of needs is the need for safety. By safety, Maslow meant protection against danger and the threat of being deprived of things. The need to be dealt with fairly by management is basically a safety need. Examples of favoritism or discrimination on the part of management can become powerful motivators of behavior if the men feel or can be led to feel that their safety and security is threatened by such action.

When a man's physiological needs are satisfied, and when he is secure, his social needs become the motivators of behavior. Social needs are the need to belong, for association, for acceptance by one's fellows in the giving and receiving of friendship and love. Next are the egoistic needs, which are of two kinds: those relating to self esteem, self respect, self confidence, competence and knowledge; and those relating to reputation, status, recognition, appreciation and respect. Finally, there is the need for self-fulfillment. This means the realization of one's potential, continuing development and being creative in the broadest sense of the term.

It has been found that an individual's needs move up or down the hierarchy scale, and that specific behavior may be explained in terms of more than one need. However, if the needs at the lower level are unfulfilled, the needs at the higher level tend to be inactive for as long as the basic needs are unsatisfied. The reverse is not as universally true, although in many cases where motivation is based on the higher level of needs, the lower level of needs are definitely in the background and subservient.

Broadly speaking, there are two types of motivation. Motives stimulated from outside the person, that is, from the environment, are referred to as extrinsic motivations. Intrinsic motivation, on the other hand, comes from within the individual and is based on early environment; the development of individual characteristics and personality.

A fishing industry analysis can only be related to the external or the extrinsic motivation, in other words, the stimuli from work situations which impinge and elicit responses in desired directions. However, it is realized that all motivation ultimately comes from within the individual and that this is the only convenient way of distinguishing between the source of stimuli.

Dealing now with extrinsic motivation, it could be shown that the motives of individuals working in any system often differ drastically from the motives of the system as a whole, or at least from the individuals or groups in a control position within the system. The correlation between the motives of one man and those of a system or organization is the motivation of one individual directed toward the fulfillment of organizational needs, and for the realization of organizational goals. Where the desired system motivation to work is largely differing from individual motivation, a serious conflict results in a drastic drop in efficiency and productivity. The fishing industry in Nova Scotia, therefore, as it now is, does not want motivated people per se, but wants people who are motivated toward doing only those things which will make the industry more effective.

Considering motivation in relation to the individual, the fisheries industries as a group, and fisheries training in particular, it is important to note that the crews of trawlers, draggers, longliners

and inshore fishing vessels, the fish plant workers and others are struggling to satisfy the physiological needs. These struggles of course govern behavior. As long as the basic needs are unsatisfied, appeals to the higher levels of capability will go unheeded. There are numerous exceptions to such a generalized statement about any industry. We do not know, and indeed will probably never be able to discover, the exact quantitative scale of men in the scale of the Hierarchy of Needs. The best one can do is generalize, bearing in mind that in certain areas, to be effective, a program must be set up to satisfy the needs, so that the men are motivated toward success.

Training, however, can only go so far. It is only one of the many extrinsic motivations. Ideally, the training situation should be completely co-ordinated with all the other extrinsic motivations, so the motivations of the fishermen, the fish processors, the fishing industry as a whole, and government combine for the most efficient use of every phase of operation in the industry. This is easy to say in logic, but almost impossible in practice. Success would be Utopia. However, partial success is possible with careful attention to the little we do know about motivation, and we must be careful to ensure that any motivation created by men in responsible positions is at least striving toward Utopia, and not actually retarding progress.

The fishing industry in Nova Scotia is not only affected by a lack of trained men, but also by the fact that, generally speaking, and with few exceptions, men in the industry already trained are working at the lower levels of the scale of Hierarchy of Needs. Environmental forces beyond the control of the individually educated man are the cause of this situation. The executives, the men in control of the industry, must recognize this and, as operators at the higher level of the hierarchy, must set about making corrections

in the environment, with a disregard for their own personal gain, or lower need levels. The growth of the Nova Scotia fishing industry depends on the recognition of the factors motivating men. The effectiveness of a fisheries training and fishing industry improvement program depends on these same factors. They are inseparably linked.

It seems that there are two basic methods of approach which will utilize known existing motivational patterns. One is called management by objectives - the classic approach. Studies by Maslow and others (Hergberg) suggest that individuals are more motivated and perform better when they have the opportunity to achieve, and where these achievements will be recognized and rewarded. This reward may be an addition of responsibility and advancement in status, or an increase in salary. An important part of this process is the participation by the individual in the establishment of his own job objectives and standards. This same principle applies to any act to improve the fishing industry. The formulation of the course to be taken should be done by those involved in the industry. This is easily done if the program is so arranged that the fishermen themselves become involved in the formulation of their future. This will of course take some time. As a stop-gap measure it will be necessary to arbitrarily dictate what the course should be. It must be realized that no recommendations are final, but intended to be changed as time passes. The motivations of individuals change as conditions change, and the structure must remain flexible so that it may constantly use, to the best advantage the motivations active at any particular time.

The above statements are not meant to imply that this procedure has not been followed, or that the policies so far developed are

academically detached from the individuals and industry they are meant to serve - far from it. The policies now in existence are, in fact, based upon the need of the industry, rather than the needs of the individuals. This is only to confirm that what has been done is correct to some extent and many ideas ought to be continued. However, it is also to warn that imposed changes for the sake of institutional efficiency or money can have a severe detrimental effect on the natural motivated feed-back of opinion and individual development necessary for any given policy to remain relevant.

Quite often, in trying to enrich a man's job, management and officials alike tend to dilute the employee's or the individual's personal contribution, rather than give him opportunity for growth. This is termed horizontal job loading that merely enlarges the meaninglessness of the job. It is to be cautioned that a fisheries program may easily become horizontally job loaded as per the following example.

A program can become a bore to the workers if it is so arranged that it merely increases the amount of production expected from him, by adding other meaningless jobs to existing ones, and by removing the difficult parts of the assignment in order to free the individual to accomplish more of the less challenging assignments.

Vertical job loading, on the other hand, attempts to make changes in the job that will activate the motivating factors. To date several principles of vertical job loading have been isolated and appear to have some value in creating a more productive work situation. The following is an outline of motivators which should attempt to stimulate the individuals. They are:

1. responsibility
2. personal achievement
3. recognition
4. growth
5. advancement

Most individuals, it is found, receive the greatest satisfaction and the strongest motivation in skills and trades designed to satisfy the above stimuli.

A limited number of individuals, particularly among female workers, it is found, are satisfied when preoccupied with "maintenance" factors surrounding the jobs. They tend to avoid rather than seek motivational opportunities. It has been found, however, that "maintenance seekers" placed in an environment of growth and achievement tend to acquire the values of motivation seekers; similarly, the absence of motivators in the environment of motivation seekers causes them to behave like maintenance seekers. It is therefore very important that a fisheries improvement program take these behavior patterns into account and that the courses, the system and the system administration be created accordingly. The economy of the area is affected by how opportunities and hope are created, and maybe the way it is done is the most important aspect, rather than a lot of money being used or allocated to a given area.

THE OVERALL COST AND RETURN BENEFITS CAN BE IDENTIFIED

Assuming that something is to be done to improve the fishing industry in the Atlantic Provinces. It has been said that it is impossible to get an overall cost and return benefit assessment; the reason being the fishing industry is too complex and there are too many variables.

This may not be correct. There are many things one can do to identify the variables and simplify the procedure so that one, at least, will get an idea of the economics involved and what to look for in the years ahead.

The fishing industry is governed by the same basic economic rules as any other industry. The difference, and maybe the difficulty, being that an economic analysis of the fishing industry cannot be a point evaluation; it must be a multipoint study of many different variations as they may apply to a given system or facility.

In order to separate these complexities, one may thus know and define the non properties and the properties of any system.

If this is done, one may then prepare performance curves of the different vessels, plants and facilities which are independent of the properties of the environment, which are then non properties to the fish processing system.

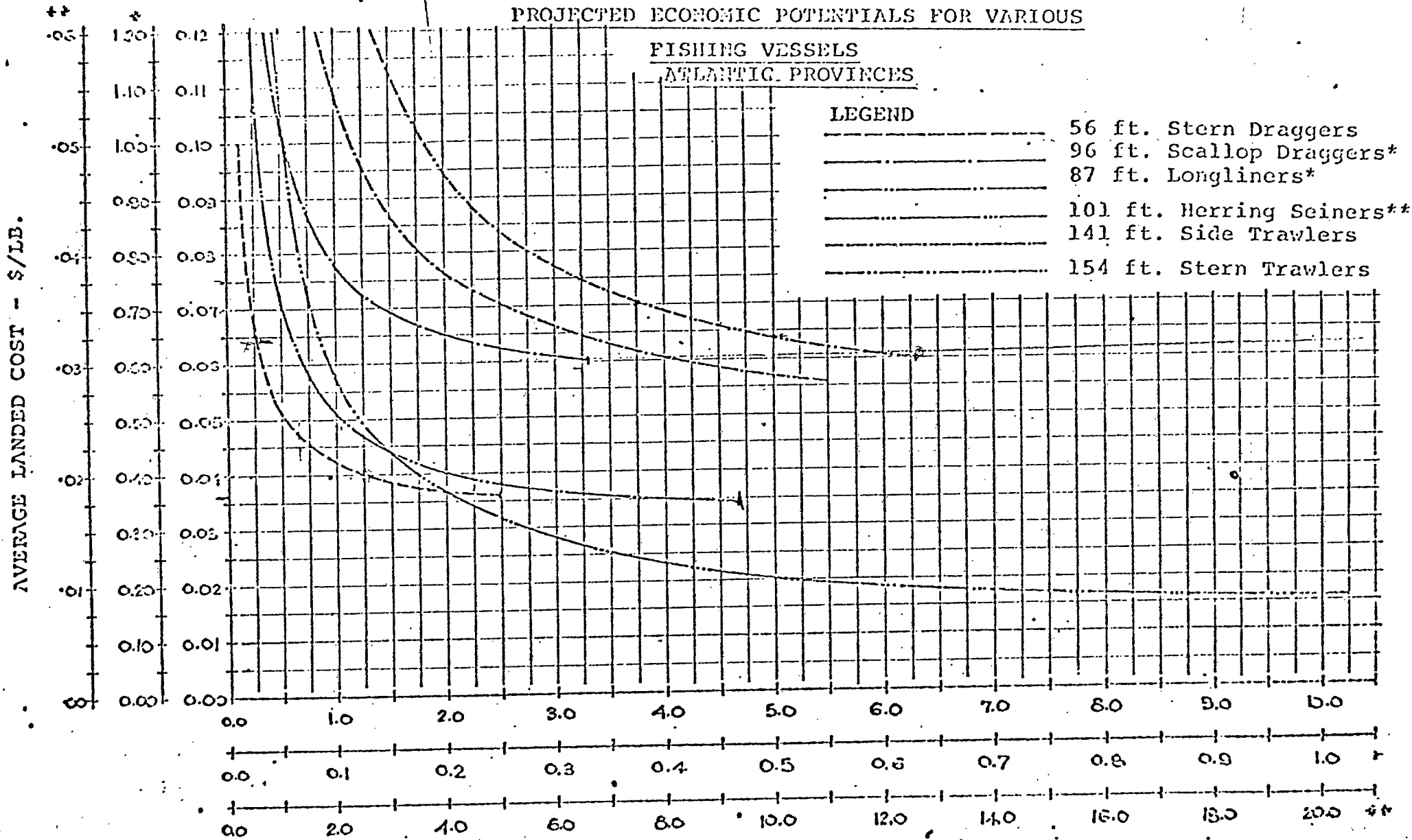
The properties of any fish equipment may then be created as shown on the following pages.

The corollaries, the economic impact derived from having any one, or a system of fisheries equipment located in a given area, may thus be assessed and measured by the simple criteria of determining what may or may not be possible for a certain person, or a certain group of people to do.

The analogy one may use is to think of a fish plant as a big pump, and for such and such a plant it will cost so much to pump and transform the fish. This method can be applied generally to all the different kinds of fishing and fish processing. A sample of the performance curves is shown on the following pages.

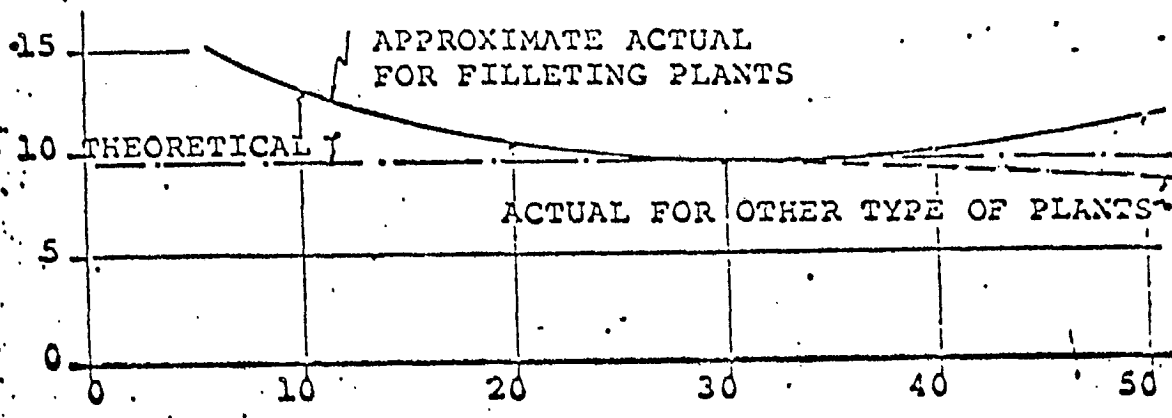
FIGURE 20

PROJECTED ECONOMIC POTENTIALS FOR VARIOUS
FISHING VESSELS
ATLANTIC PROVINCES



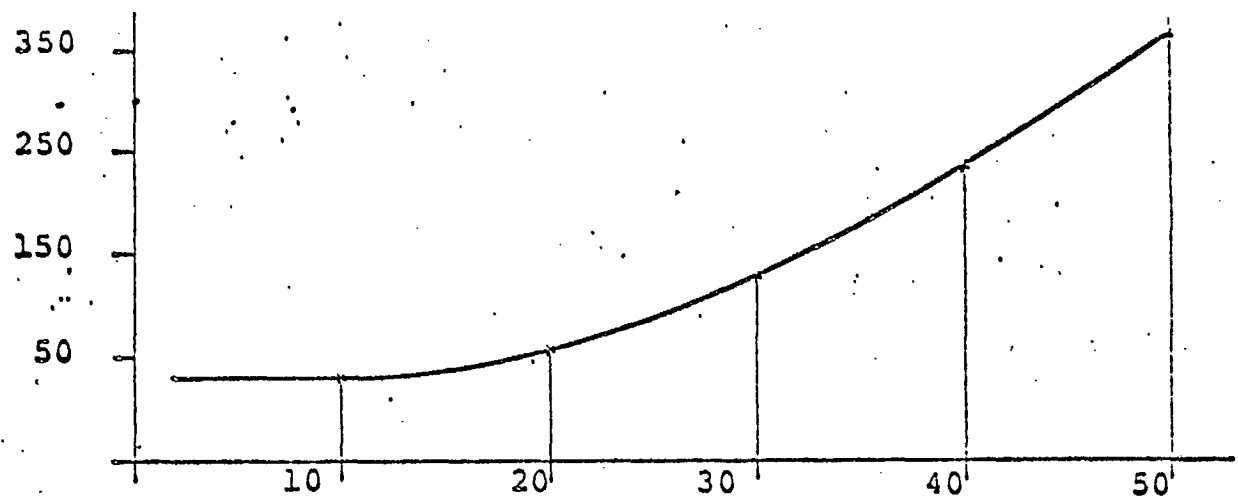
ANNUAL LANDED CAPACITY - 1,000,000 LBS.

OPERATING COST \$/LB.
OF PRODUCT



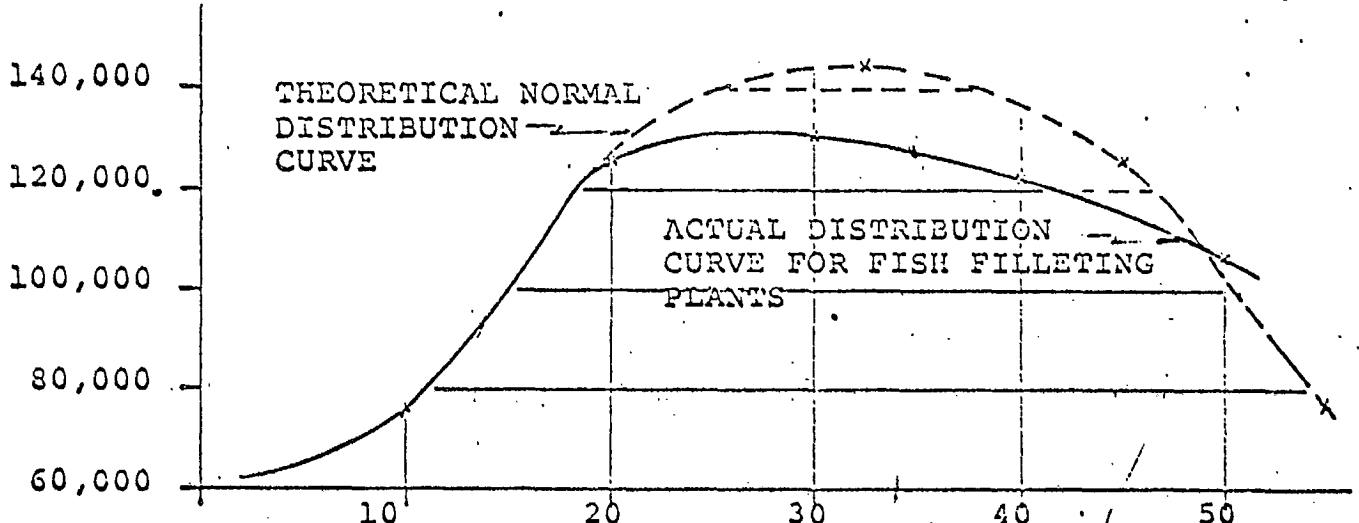
PLANT CAPACITIES - LBS. OF ROUND FISH/YEAR

NUMBER OF EMPLOYEES



PLANT CAPACITIES IN 1,000,000 LB. OF ROUND FISH

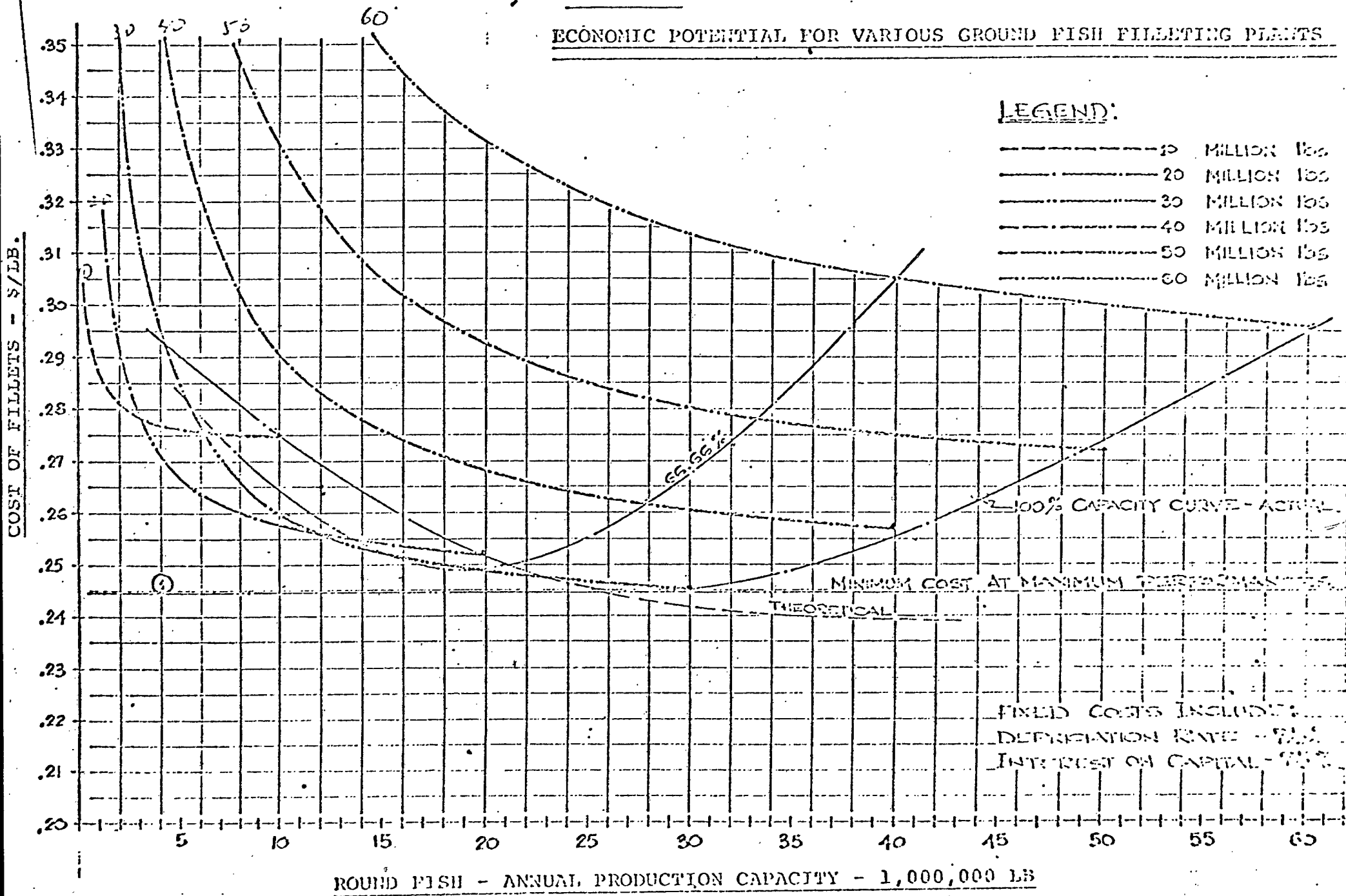
OUTPUT PER EMPLOYEE LBS
OF ROUND FISH



PLANT CAPACITIES IN 1,000,000 LBS.

FIGURE 25

ECONOMIC POTENTIAL FOR VARIOUS GROUND FISH FILETING PLANTS



GRAPH

FINANCIAL PERFORMANCE CURVES FOR VARIOUS
HERRING REDUCTION PLANTS

PREPARED BY
J. D. KOPPERNAES ENGINEERING COMPANY
HALIFAX, N.S.

Curves based on yield/ton of raw material:

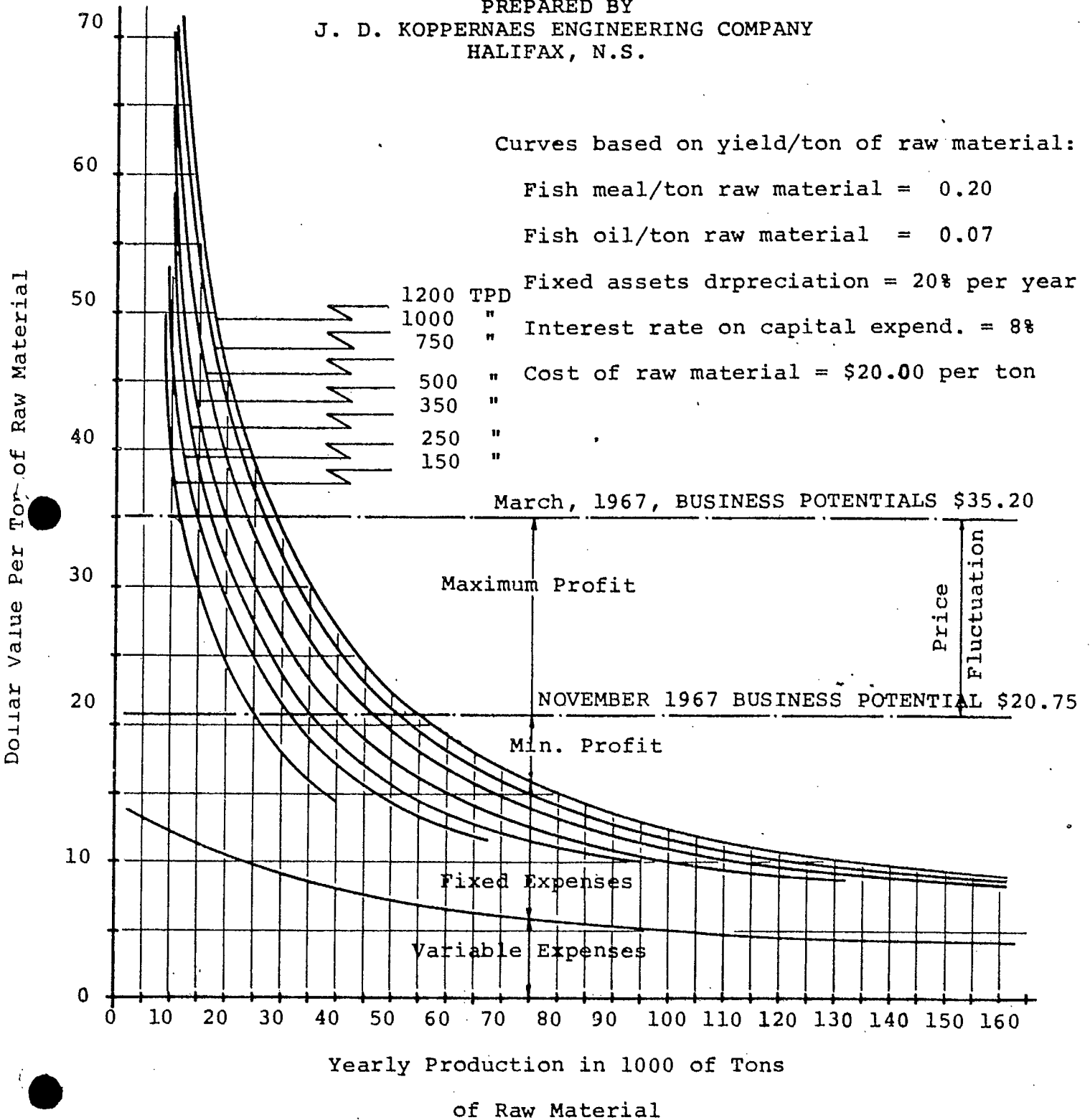
Fish meal/ton raw material = 0.20

Fish oil/ton raw material = 0.07

Fixed assets depreciation = 20% per year

Interest rate on capital expend. = 8%

Cost of raw material = \$20.00 per ton



GRAPH FINANCIAL PERFORMANCE CURVES FOR VARIOUS HERRING REDUCTION PLANTS

PREPARED BY
J. D. KOPPERNAES ENGINEERING COMPANY
HALIFAX, N.S.

Curves based on yield ton of raw material

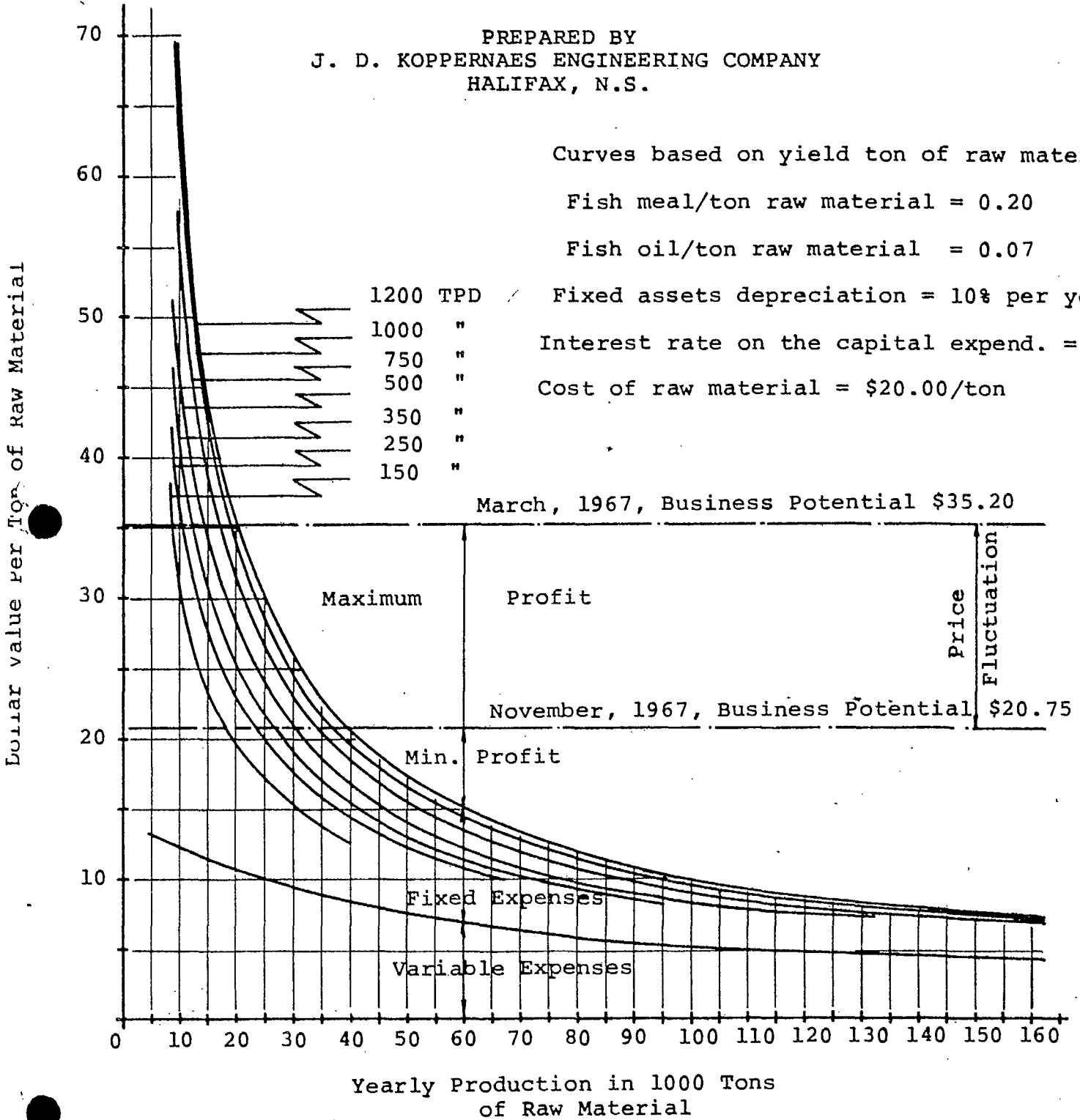
Fish meal/ton raw material = 0.20

Fish oil/ton raw material = 0.07

Fixed assets depreciation = 10% per year

Interest rate on the capital expend. = 8%

Cost of raw material = \$20.00/ton

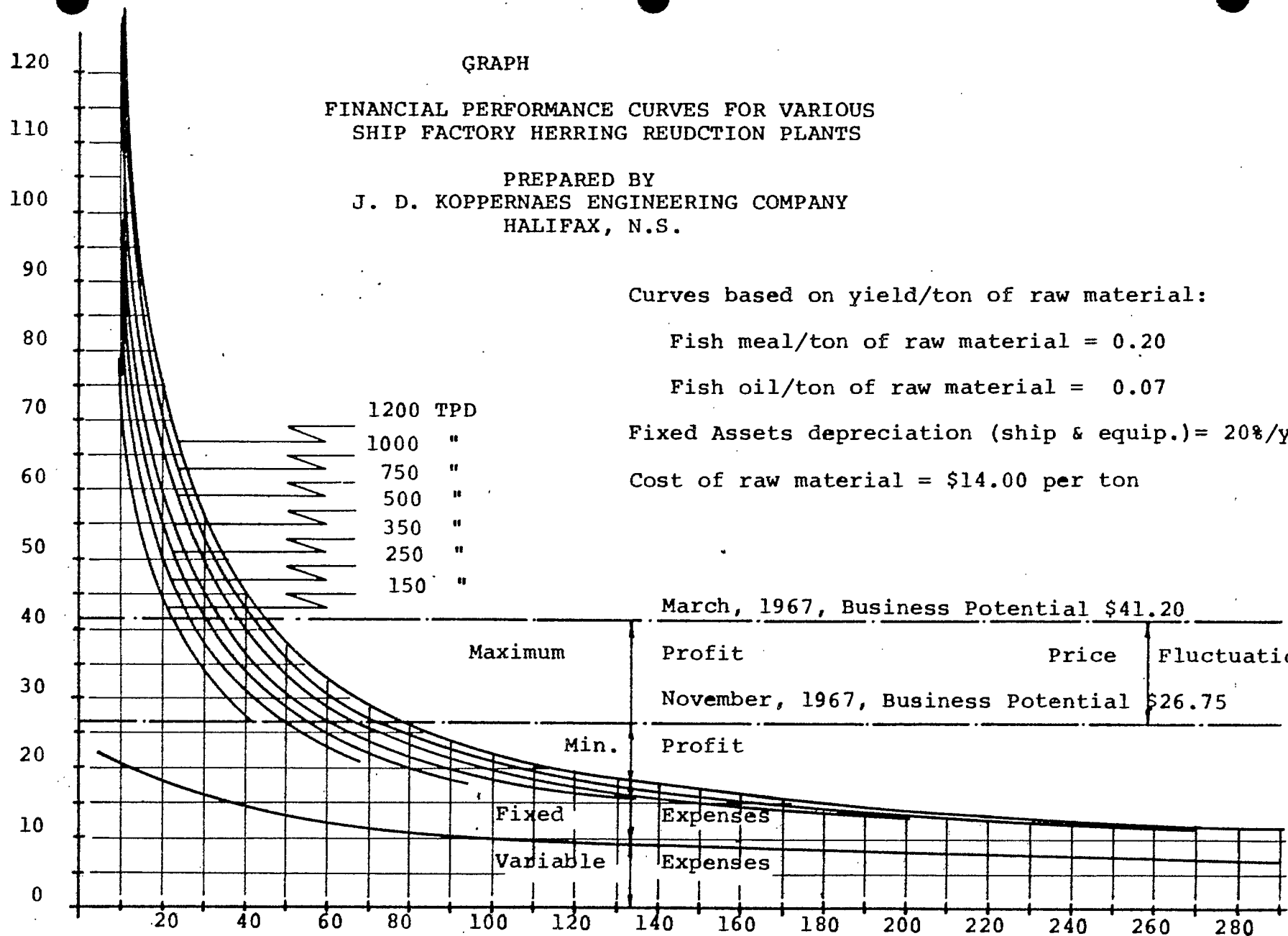


GRAPH

FINANCIAL PERFORMANCE CURVES FOR VARIOUS
SHIP FACTORY HERRING REDUCTION PLANTS

PREPARED BY
J. D. KOPPERNAES ENGINEERING COMPANY
HALIFAX, N.S.

Dollar Value Per Ton of Raw Material



Curves based on yield/ton of raw material:

Fish meal/ton of raw material = 0.20

Fish oil/ton of raw material = 0.07

Fixed Assets depreciation (ship & equip.) = 20%/year

Cost of raw material = \$14.00 per ton

- 1200 TPD
- 1000 "
- 750 "
- 500 "
- 350 "
- 250 "
- 150 "

March, 1967, Business Potential \$41.20

Maximum Profit Price Fluctuation

November, 1967, Business Potential \$26.75

Min. Profit

Fixed Expenses

Variable Expenses

YEARLY PRODUCTION IN 1000 TONS
OF RAW MATERIAL

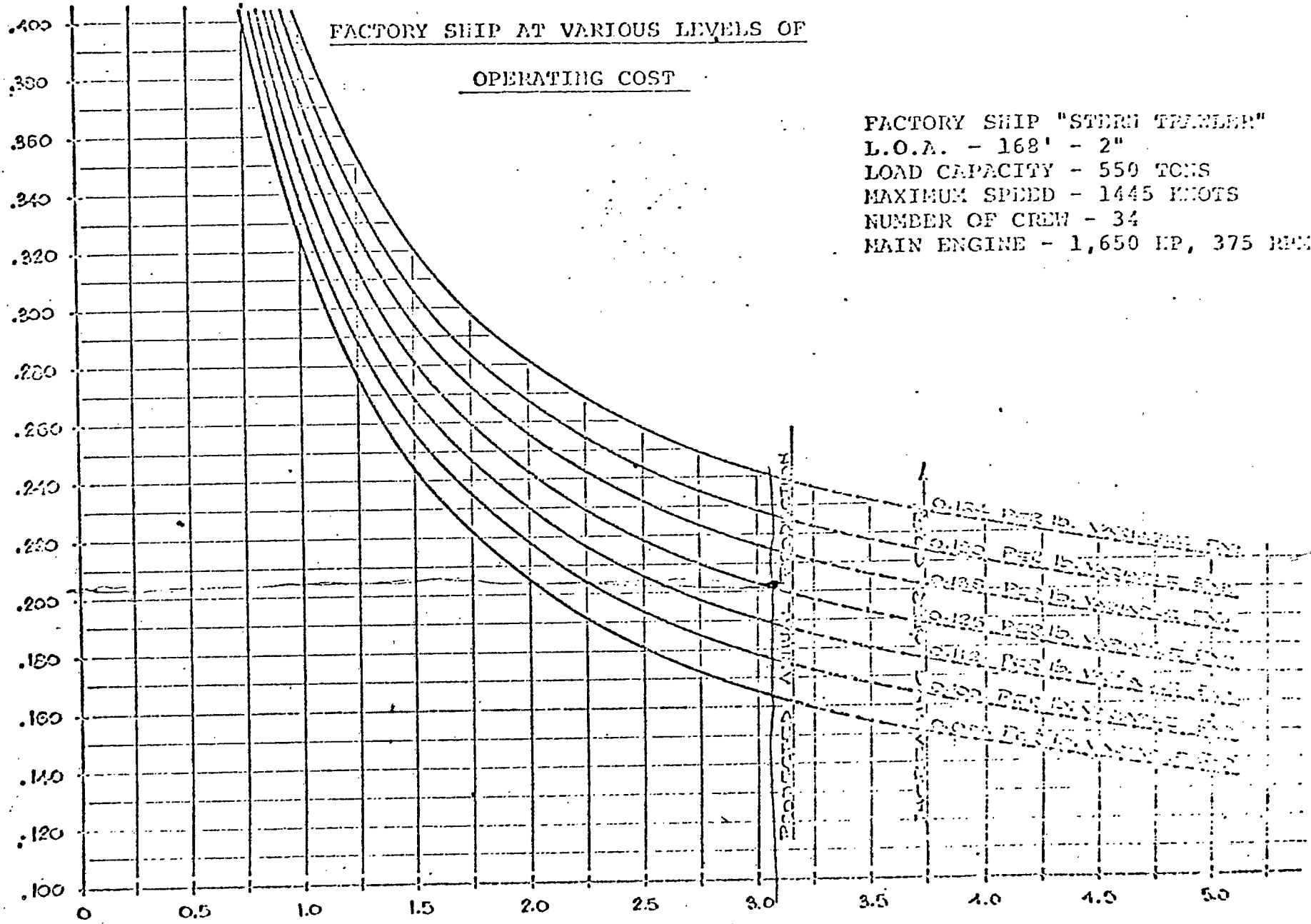
FIGURE 26

PROJECTED ECONOMIC PERFORMANCE FOR GROUND FISH -

FACTORY SHIP AT VARIOUS LEVELS OF
OPERATING COST

FACTORY SHIP "STERN TRAWLER"
L.O.A. - 168' - 2"
LOAD CAPACITY - 550 TONS
MAXIMUM SPEED - 14.45 KNOTS
NUMBER OF CREW - 34
MAIN ENGINE - 1,650 HP, 375 RPM

COST OF FILLETS - \$/LB.



ANNUAL PRODUCTION CAPACITY - 1,000,000 LBS. OF FILLETS

The main difficulty is not so much in determining the economic performance characteristics of the specifics of one plant, but in determining the overall performance parameters of a whole industry. It is easy to get lost in details and make the task so complex that reasonable answers cannot be found until they are outdated. Thus, it is important to remember that the fishing industry is like any other industry governed by the following formula:

$$F + V + P = S$$

where:

- F = fixed expenses per year.
- V = variable expenses per year
- P = profit per year
- S = sales per year

This formula applies to every part, every activity, as well as the total system, the whole fishing industry and all its allied industries as well.

This formula may be made dimensionless, as follows:-

$$F/S + V/S + P/S = 1$$

One may examine this formula in terms of time and technological evolution, as follows:

- a) bare hand labour - self employed V/S = 1
- b) simple tool labour - no profit F/S + V/S = 1
- c) complex tools - return on investment, etc. F/S + V/S + P/S = 1

The quality of this is significant if one can determine the value of the various ratios as they presently apply to the fishing industry. The exact value is not known, but the ratios for the fishing industry is now somewhere in the vicinity of:

F/S	=	0.22	
V/S	=	0.75	This is where the state of the
P/S	=	0.03	art is at present
Total		<u>1.00</u>	

As time goes by this will change to something like:

F/S	=	0.30
V/S	=	0.60
P/S	=	0.10
		<u>1.00</u>

And maybe 20 to 30 years from now it will be:

F/S	=	0.35
V/S	=	0.55
P/S	=	0.10
		<u>1.00</u>

The significance of this may be explained as follows: These ratios are in themselves a measure of the overall cost and return benefits. They can be determined with a certain amount of accuracy, rather than by intuition as indicated here.

Thus, to show what this means one may apply the guesstimated existing ratio to the existing situation as follows:

$$\begin{array}{l} \text{Total Fish Sales} \quad S = \$254 \text{ million} \\ F/S = 0.15 \text{ or} \quad F = \frac{\$254 \text{ million}}{100} = \$56 \text{ million} \end{array}$$

The yearly fixed expenses are \$56 million. These fixed expenses are constituted of capital (c) times interest (i), plus (c) times depreciation (d), plus (c) times administration (a)

$$F = C (i + d + a)$$

Say: Interest (i) = 7%
 Deprec. (d) = 10%
 Admin. (a) = 5%

$$F = C (0.07 + 0.10 + 0.05) = 0.22 C$$

The capital investment then is: $C = \frac{F}{0.22}$
 or $C = \$56 \text{ million} / 0.22 = \254 million

The benefit profit wise is: $P/S = 0.03$

$$P = \$254 \text{ million} \times 0.03 = \$7,62 \text{ million}$$

The benefit employment wise, purchase of goods, payment for electricity services, etc is:

$$\begin{array}{l} V/S = 0.75 \\ V = \$254 \times 0.75 = \$190 \text{ million} \end{array}$$

As mentioned, as time goes by the ratios will change. Too large a difference in the ratios as they apply to one industry vis a vis another, in a given area, means that there will be industry problems in the one industry where the ratios lag behind the times

This may be the actual problem as far as the fishing industry is concerned, inasmuch as it is now hard to find people for the industry. Maybe the strive should be to make the ratios as follows:

$$\begin{array}{rcl}
 F/S & = & 0.30 \\
 V/S & = & 0.60 \\
 P/S & = & 0.10 \\
 \hline
 & & 1.00
 \end{array}$$

This means more modern equipment, less labour and higher profits for the industry and for the people working in it. The question is, can this be done?

If we are to maintain the present day sales volume of \$254 million per year, then it means that we should aim for:

\$ 25.4 million a year in profits
 152 million a year for variable expenses - labour,
 and 76.0 million a year for fixed expenses .

The cost of equipment and facilities will have to be as per the following:

$$F = C (i+d+a) = C (0.07 + 0.10 + 0.05) = 0.22C$$

$$\frac{0.22 C}{S} = 0.30$$

and $C = S \frac{0.30}{0.22} = 1.5 S = \underline{\underline{\$380 \text{ million}}}$

So, a more modern industry will need a \$126 million improvement on top of what is presently available. The existing industry will have to be improved at a rate of about \$40 million a year at any rate, thus, looking ahead this means that Canada may have to spend about \$326 million in the next 5 years in order for the fishing industry to stay competitive with other industries; if one is to presuppose that other industries will reach the performance ratios indicated, and which are used as a basis for these calculations. Thus, an estimated \$326 million is needed in new equipment in order for the fishing industry to keep pace with the overall technological evolution of the times.

APPENDIX 1

A STUDY OF THE RECRUITMENT,
TRAINING AND EDUCATION
OF MANPOWER
IN THE NOVA SCOTIA FISHERIES

A summary of the report of the Johan D. Koppernaes Engineering Company,
prepared by Ron MacDonald, with an introduction prepared in the

NOVA SCOTIA DEPARTMENT OF FISHERIES

HALIFAX

1969

A STUDY OF THE RECRUITMENT, TRAINING AND EDUCATION
OF MANPOWER IN THE NOVA SCOTIA FISHERIES

INTRODUCTION

The Department of Fisheries commissioned this study of recruitment, training and education in the fisheries industry in June, 1968.

The study was conducted by the Johan D. Koppernaes Engineering Company, a firm of consulting engineers established in Halifax in 1957. The firm's industrial engineering activities have been mainly in the fields of fisheries technology and fish processing and it has undertaken also a number of contracts involving studies of markets, economics, feasibility, raw material potentials and transportation, also evaluations of existing operations, special technical services, construction inspection, engineering and design. Mr. Koppernaes, the proprietor, is a naturalized Canadian who was born in Norway and received his early education there. He holds the degree of Bachelor of Engineering from Nova Scotia Technical College and Master of Science, Massachusetts Institute of Technology. He has had practical experience at many levels in the fishing industry both at sea and on shore and has been associated in business with fisheries enterprises in both Norway and Nova Scotia.

Background Studies

The consultants were given a good measure of freedom to analyse and comment upon the economics and organization of the industry because it was felt, from the beginning, that the input and

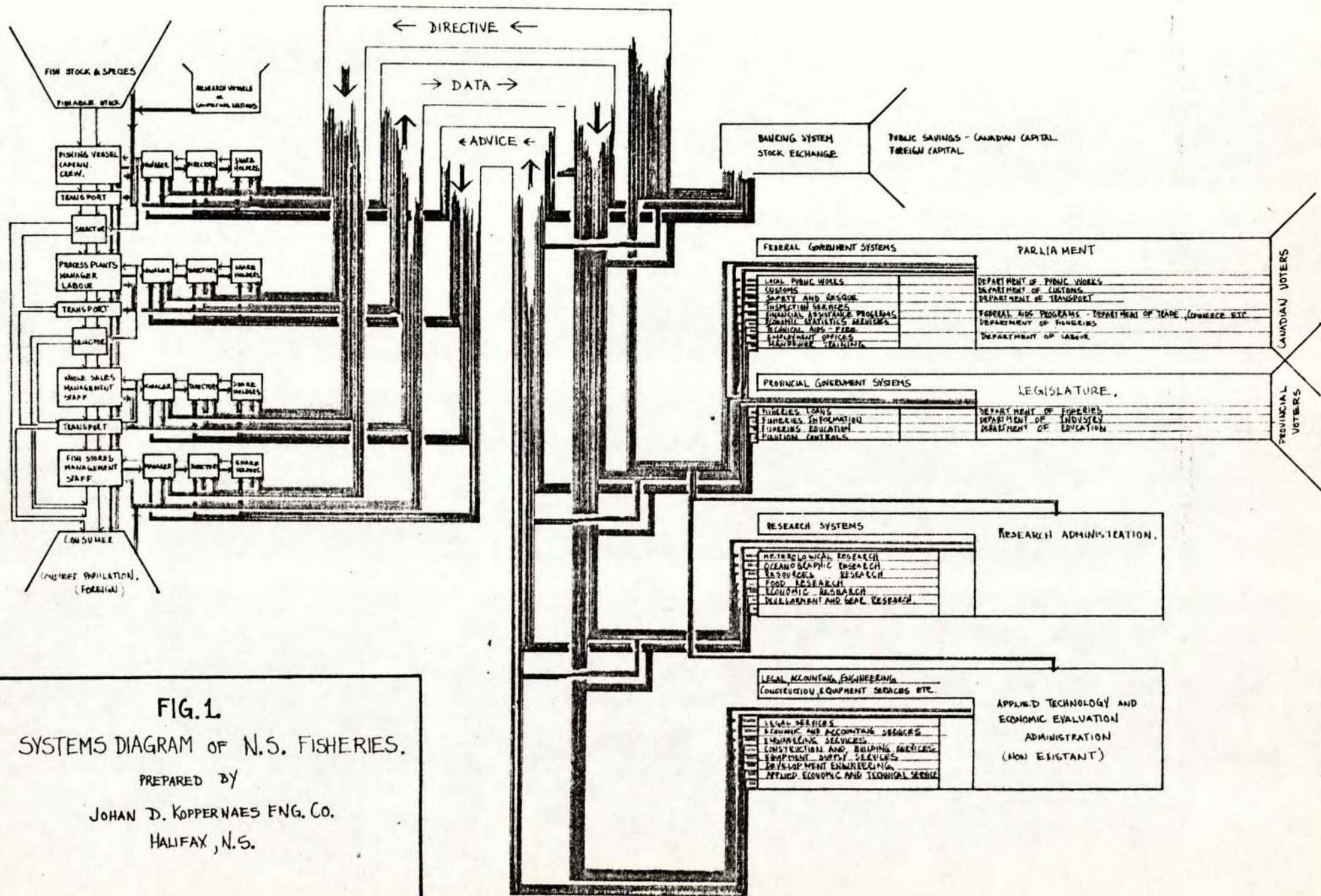


FIG. 1
SYSTEMS DIAGRAM OF N.S. FISHERIES.

PREPARED BY

JOHAN D. KOPPERNAES ENG. CO.
 HALIFAX, N.S.

utilization of capital and manpower is affected by these things. Input of manpower means chiefly recruitment. Training and education could not be studied adequately without an appreciation of the factors affecting the quality and scale of recruitment.

The consultants' studies of the economics and organization of the industry resulted in a quite voluminous report. Not all the material could be reviewed or summarized in this publication, although some of it is, and scattered throughout this summary one will find instances where comments pertaining to recruitment, training and education are coloured by opinions that were formed during study of the conditions that lie in the background.

The first step in their consideration of the economic and organizational aspects involved the construction of a systems diagram and in this they attempted to represent graphically the flow of products from source to consumer and the established relationships between that flow and the federal government, the provincial government, the research institutions, the financial institutions and various auxiliary and allied services. A copy of the diagram is reproduced herewith because it will serve to illustrate at least one point. It will be observed that in the consultants' opinion an administrative organization for "applied technology and economic evaluation" is non-existent, that although there is a flow of directives and data suitable for such an organization there can be no flow of interpretative advice from it to the industry because it does not exist. The consultants regard this as a serious lack, one that we should regard as good justification for providing, at least, a fisheries training administration.

In the further consideration of the economic and organizational aspects of the industry the consultants examined the role of government as a source of capital and in the process raised some interesting questions. Their questions basically were related to the admitted difficulty of ensuring that government subsidies reach and reside in the hands for whom they were intended or, in practice, produce the hoped-for benefits. Some remarks of this kind appear on page 4 in respect of vessel construction subsidies.

The consultants have questioned also some of the results that can accrue from a program of plant construction grants. Their example in this case is a Canadian who may have assembled capital to an amount nearly sufficient to qualify him for a grant in a 50-50 deal with the government to build a plant of a given capital cost. He is unable to find the deficiency except by coming to agreement with a foreign firm and the latter demands 51 per cent of the shares. The plant is built with ~~\$350,000 from Canadian investors, \$150,000 from the government,~~ 350,000 from the Canadian government but it is a foreign-controlled plant. Moreover distribution of profits, sale of the plant and/or re-financing can result in the draining away of the government grant -- a substantial drain on the economy in return for a disproportionately few jobs in the lower echelons of employment. The final question here is whether or not this is a procedure from which Canada may expect accruals of native managerial capabilities and capital and it is pointed out that in respect of the fisheries industry this question is important.

Another series of provocative questions concerning the status of Canadians in the fisheries world of tomorrow is touched upon at Page 10

of the precis. Proper consideration of these questions requires that we have an appreciation of certain facts and trends. In brief, we should appreciate that the fisheries resources of the Northwest Atlantic are the object of much attention in many parts of the world, that the European resources are failing by more and more to meet the demand over there, that the human population is increasing rapidly on both sides of the ocean, that the pressure on "our" resources will steadily increase. Also we should note that retail fish prices in the United States have not decreased, have gone up in some cases, that the United States prices for imported fish have gone down, that some countries seem more able than we to meet those prices, that those countries seem to be the ones using factory ships, that these ships in themselves represent large accumulations of capital. We are asked to consider also the significance there may be in the emergence of the new price levels and profit margins (that are so heavily weighted against us) at a time when it is not unreasonable to expect the pressure on "our" resources will steadily increase and demand and/or depletion will cause prices to rise again. And we are asked to recognize the growth of large financial conglomerates and business combines, even in the fisheries industry in some parts of the world, and to consider if it is not possible that by means of vertical integration on an international scale, and price pressure of the kind we have seen recently, the control of "our" resources, and the wealth to be derived from them, will be taken out of our hands.

Conclusions re Background Investigations

All the points mentioned here and in the precis, in respect of the economic and organizational factors, although they may initially appear irrelevant, are used by the consultants to support their recommendations for a comprehensive system of training and education. If our industry is going to have to cope with outside forces of the kinds just mentioned, better training and education is needed. If our fishermen and processors are to become the producers for large foreign corporations, better training and education is needed. Although subsidies and quasi-welfare payments to fishermen have had a social value, their economic value, their value in a developmental sense, has been dissipated and in the current situation they may even act toward the enrichment of foreign buyers by prolonging the depression in prices. At least some of this money could be better invested in training and education.

The consultants believe that much can be done to improve the economics and the organization of this industry -- by adopting the best of modern technology in everything from the catching to the transportation and distribution of fish, by adopting the best of modern management and administrative methods at sea and on shore. They believe that fish prices will improve and that prices paid to fishermen inevitably will increase as fishing pressure and consumer demand grow. These beliefs also support their recommendations for better training and education.

Recommendations

The consultants' first and basic recommendation is for the immediate creation of a fisheries training administration. It is visualized as a body comprising a president, a faculty, a director of training and a staff of roving instructor-advisers who will act in liaison with the public schools, vocational schools, technical institutes and universities in the province and the College of Fisheries in Newfoundland. Its proposed functions and activities are summarized at Page 14 of the precis.

The consultants estimate that this administration can be established and operated at an annual cost of not more than \$250,000 in its early years, its future development and costs determinable only after it has begun to function and dependent on governmental decisions.

A complete statement of the consultants' recommendations in respect of this and other matters is given at Page of the precis.

RECOMMENDATIONS

The consultants' recommendations are summarized as follows:

1. That fisheries education and training in Nova Scotia be continued and expanded.
2. That there be an early decision on matters of policies, priorities and appropriations for expenditures.
3. That a fisheries training administration be established as a discrete legal entity. (Suggestions in respect of governing and advisory groups are given in the full report.)
4. That appropriate personnel be found and appointed to positions to be created in the said administration.
5. That the Department of Fisheries, the Department of Education and the Department of Trade and Industry work out an arrangement for the sharing of the costs of projects and programs having to do with fisheries training and education.
6. That the aforementioned provincial departments negotiate policy and cost sharing agreements with the fisheries industry and appropriate departments of the Government of Canada.
7. That "ship-ashore" simulation schools be designed, built and put into operation.
8. That fisheries courses and seminars be promoted in existing schools.
9. That the fisheries training program provide for two types of courses:
 - (1) short courses; and
 - (2) long range fisheries education courses.

10. That Type 1 courses be of 3 to 4 months' duration designed for men now in the fisheries industries.

11. That the program of Type 1 courses at the Fisheries Training Centre, Pictou, be expanded.

12. That the program of Type 1 courses as a whole be expanded and, further, that it include courses for fish plant personnel.

13. That Type 2 courses be designed primarily for young men and to provide for linear progression to any desired level in sequence without leading to dead-ends.

14. That the program of Type 2 courses include provision for utilization of existing courses and facilities in vocational schools and institutes of technology in the province and in the Newfoundland College of Fisheries and for establishment of new courses.

15. That courses of both Type 1 and Type 2 be provided in selected vocational and regional high schools, and in the institutes of technology to the extent that it is possible for the latter to serve the two categories of students.

16. That in courses of both Type 1 and Type 2, the instruction be designed not only to teach the skill or profession but as well the manner in which the knowledge acquired can be applied by the individual to increase his earnings.

17. That in respect of every course there should be an advisory group appointed capable of assisting in matters of course construction, methods and operation.

18. That the Government of Nova Scotia request the Government of Canada to give consideration to the discussions and proposals advanced by these consultants in their report, in all cases where federal jurisdiction is involved and/or federal government action is desired.

19. That, where private initiative provides, or is willing to provide, in-plant training for hard core unemployables and others of deficient earning capacity, consideration be given to providing special assistance as a means to alleviate social problems in some fisheries areas.

20. That Nova Scotia Newstart Inc. or other appropriate organizations be requested to consider the creation of homes away from home for the crews of fishing vessels.

CONDITIONS IN THE FISHING INDUSTRY

Nova Scotia is bordered by the richest fishing grounds in the North Atlantic, nevertheless she is being outfished by other nations, whose fishermen come here from hundreds and thousands of miles away.

At the same time our fish processors and dealers are caught in a price squeeze of serious proportions, especially in the United States market. Although there have been increases in sales and prices to American consumers, Nova Scotian sellers have had to accept price reductions, and have been selling below cost in order to maintain access to their United States outlets.

An industry that employs some 20,000 people in the catching and processing of fish has encountered difficulties in selling. At the same time, the occupation of fishing is becoming less attractive to our people.

The unattractiveness of the occupation is due in some measure to the lack of consideration given fishermen by their employers. On trawlers and other deep sea fishing vessels, for example, the fisherman is expected to spend five-sixths of his time away from home. The long hours of work and the conditions of communal, below-deck living are not of a kind that should be imposed in this modern age. (Foreign vessels, it may be noted, fishing the same grounds, often provide single cabins for crewmen, affording them a more pleasant retreat and a measure of privacy.) Too often and for too long our fishermen have been treated as the riff-raff of society. Conditions on trawlers will have to be improved in order to attract men to go to sea.

Nations outperforming Canada on her home fishing grounds, nations with lower standards of living than Canada, find it necessary to pay their cooks well. It should not be different on Canadian vessels. Our cooks

must be well trained and able, for their services can influence the recruitment of manpower and the productivity of the crew at sea.

On a fishing vessel, crew members are not servants or employees, but co-adventurers by virtue of a decision of the Nova Scotia Supreme Court. The crew's share of the proceeds of a fishing voyage is calculated on the basis of the prices offered for the fish -- the smaller the price, the smaller the share. At one time this worked quite well but with the plants able to set prices on a take-it-or-leave-it basis, many men chose to leave the industry entirely. Manpower problems raised maintenance costs and plant operators were obliged to set up shore administrations. The direction of fishing operations by a shore administration is not easy and the operating profits of ships were reduced. A decline in the take-home pay of crewmen resulted in fewer men being attracted to the industry.

Research and exploration have received much emphasis in the federal government's administration of fisheries matters. Many studies have been conducted and much money has been made available for such things. But when the time has come to apply the findings to or in the industry, money and other incentives have been lacking. There has been a failure to apply information gained by Canadians, supposedly for Canadians. The industry leaders have not been quite with it.

There has been also a breakdown in communication within the Canadian fishing fleet itself. There is no such thing as systematic fishing here, despite the wide and successful adoption of such practices by other countries such as Russia and Japan. Furthermore, our trawlers have been consistently outfished by European factory ships because our trawlers spend more time sailing to and from the banks and because productivity is reduced by equipment breakdowns and other accidents.

In many ways the twentieth century seems to have passed the Nova Scotia fishery by, though it may be noted in this respect that it is not different from the other provinces bordering the Atlantic. There have been claims that the Nova Scotian industry is modern and efficient, that land-based plants and trawler fleets can out-produce foreign fleets of factory ships. Little checking was done in respect of these claims although some information was collected on some dated English (and some other European) factory ships. But today the modern factory ships require only 43 men and can land fish of the highest quality -- and without subsidy -- for 21 cents per pound. The Canadian break-even point (plant cost) is 27 cents per pound. The fishing industry is riddled with myths.

The points of significance in respect of conditions in the industry may be summarized as follows:

The industry is experiencing hard times.

Economic problems are degenerating into social problems.

Government aid is sought in order to survive.

The industry has a limited market for fresh fish.

Air transport of fish by other nations is a threat.

Inshore fishermen have no apparent future, even with subsidies.

Manpower problems are the result of low earnings and low levels of skill.

Capital sources have dried up, due to low returns on investment.

The industry itself is not strong enough to cure its ills.

In the existing organization of the fisheries, there is no direction, no power, no will but there is a lot of advice -- lots of studies, but no implementation.

The industry and the associated enterprises have not the money to carry on if present conditions continue. Either government or foreign capital and control must step in, if the fishery is to survive.

Subsidies in the past have not been an effective way to help fishermen. Too often they have wound up in the hands of shipyards, which have accumulated poor building practices. The ships, too often, have been of European design and not as well suited to these waters and fishing conditions as they might be. Subsidies have encouraged fishermen to think that the government will not let them starve and this has coloured their attitude toward work.

The fishery problem boils down to this: A decision must be made either to maintain existing practises and subsidize Nova Scotian fishermen even more, or change the practises so that Nova Scotians can make their own living.

THE DEVELOPMENT OF AIMS AND OBJECTIVES

Throughout the report there is the basic assumption that the unsatisfactory conditions outlined above are not insoluble and it is held that training and education are important elements in the chemistry of revitalization. The extent of training and education depends on decisions to be made as to the functions Nova Scotians will perform in the fisheries industry in the years ahead. Since these decisions must be made with reference to an industry that operates in international waters and sells in foreign markets, they must be to a great extent group decisions, i.e. political decisions, and it is pointed out that the international character of the

industry is such that only federal government action can influence or alter many of the things that are causing difficulties today. Significance is attached to the fact that the slump in wholesale prices for groundfish products is not reflected in the retail markets. This is looked upon as a shift in the profit potential on a pound of fish to the distributive end of the business chain, beyond the control of the producer and processor. It is argued that this shift can be altered now only by government action and perhaps only by concerted government action by several producing nations. It is argued, further, that if there had been greater foresight in the industry these circumstances might not have arisen, capital and good management might have averted them. And finally capital and good management could have been, and can be, assured only when there is a force in being composed of trained and educated men. On such grounds, therefore, it is argued that, regardless of what the overall political decisions may be, there is a need and a reward for broad training and educational opportunities in this industry. "The need for fisheries training is not dictated by the mere fact that there is an increasing need for crew, but also by the fact that there is an equal, and perhaps greater demand, for fisheries entrepreneurs and self-employers."

On the more mundane level: If the fishing industry is to improve, fishing methods must improve. New fishing practices must be employed, new technologies adopted. Fishermen and plant workers must be better trained if they are to adapt themselves to new ways.

Men must be satisfied to be fishermen. Men and women must be satisfied with their work in processing plants. Their environment -- surroundings, jobs, methods, pay -- must be upgraded. Ways must be found to attract not only the best men, but the best in men. As long as the basic needs are unsatisfied, appeals to higher levels of capability will go unheeded. The

growth of the fishery depends on recognition of the factors that motivate men. There has been little of this kind of recognition. A new training program, aimed at developing motivation in men, must be fashioned. It should challenge the individual to active participation and should promise rewards such as increased responsibility and higher pay.

In the fisheries industry, manpower recruitment meets widespread resistance. Many parents want their children to seek a better life than that available in the fishery. Too often fishermen and fish plant workers are looked down on by the various classes of society. To meet optimum recruitment demands, this must be altered.

It is necessary that the fishery be seen as an area of opportunity. Vigorous promotion of the fishery will be involved. Those engaged in the industry must play an integral part. The rule to be remembered is that the better the benefits, the better the chances for recruitment.

School curriculae should include aids to an appreciation of the fisheries of Nova Scotia. Information pamphlets should be circulated to interest young persons in the fishery. Skills and technical knowledge must be made available to those interested in joining the fishery, courses which ultimately carry the same degree of social standing and professional achievement as courses offered to the undergraduate at university. And, there must also be opportunities for those in the industry to improve themselves by further training.

The economics of the fishing industry and its rewards will, to a great extent, determine its future, insofar as its recruitment needs are to be satisfied. The recruitment of good men, as mentioned earlier, depends heavily on one-thing -- money. Trained men will not be attracted to small pay. The pay of men at sea ought to be at least 25 per cent higher than

that of a shore-based man doing similar work. Compensating returns can come from reduced shore administration costs, hull repair and refit costs, machine repair costs, electronic equipment costs, insurance costs and from increased landings and reduction in size of crews through automation. Both the owner and crew may, and should, gain from the improved profit-making capability of a vessel.

At present the fishing fleet is too often directed by shore-based personnel. One cannot direct a fishing operation from the shore, successfully. A trawler at sea must have the freedom to fish and search as conditions require. Therefore, a ship should be considered as an economic unit with full responsibility for its profit or loss. The job of the shore plant should be to take the fish, process it, sell it on the market or develop a market for it.

One of the difficulties that has hurt the Nova Scotian trawler captain over the years has been his "rugged individualism". He fishes by himself, hoping to do better than his brothers. It is deemed essential that this be changed, at least to some extent. There should be more and better communication at sea. The Russians have organized themselves for systematic fishing and instant communication accounts for a large part of their success.

The Russians have established, through several year's experience, a system for the translation of catch information into map form. Trawlers carry these maps which show the catching positions for the several preceding years, and the captains station their ships in the areas where schools of fish were found before. Fish movements are traced by highly technical equipment, mother ships may process the data and feed it back to the trawlers by radio. Trawler captains are enabled to position their ships advantageously and to move quickly to new positions where the indications are best. The

rapping system enables the captains to chart fish movements, to follow them and to fish the schools systematically.

The Canadian trawler captain supposedly employs communications in a similar manner. But in his case the guiding principle is a by-product of free enterprise. He gives out little information himself, hoping to retain the best fishing for himself and he does not often pay much attention to the radio reports of his brother captains, figuring that they would do the same as he in the same circumstances. There is no systematic fishing carried out in the Canadian fleet. The fishermen are notoriously independent and highly skeptical as to the benefits they might derive from any group action. But co-ordination of efforts is necessary for survival in the fisheries of today and tomorrow. To this end, the fisheries training courses should emphasize the advantages to be gained from co-operative effort and communication, though it must be said that because of existing distrust, the material to be presented must be carefully prepared.

The advantages that can accrue from the inclusion in training material of scientific knowledge related to fishing methods should not be overlooked. Examples can be found in the knowledge gained by Russian, Norwegian and United States scientists in various types of experiments. They have, for example, determined that the black line along the side of a fish is a sound nerve enabling the fish to determine depth, temperature and orientation. Fishermen should have some knowledge of the effects of sound on this nerve. For one thing, such knowledge may lead to the development of a lure. For another, our fishermen, like those in Norway, should concern themselves with the possible effects of "singing" propellers, ship vibrations and other sounds that may scare away the fish.

Although the consumption of fish is rising, there are many markets that have not yet been tapped by the Nova Scotian industry. This is blamed on laxity and a seeming inability to adapt to new methods of transportation. The fear is expressed that the possibilities for new outlets may be soon lost to other countries. These thoughts flow from a study made by the consultants in 1967 of the possibilities for air transport of fresh Canadian fish to distant markets and from the fact that another large producer, Iceland, has a national airline which it might use for this purpose. The study suggested that the air-lifting of fresh fish to central U. S. markets, such as Chicago, is feasible; that high quality, good prices and good demand for fish landed by inshore fishermen should, quite logically, follow. It may be that the initial capital costs of aircraft, the cost of modifications and special containers are beyond the resources of Nova Scotian corporations. Nevertheless the study suggests that if return loads can be found, fresh fish can be shipped to Chicago more cheaply by air than it can be shipped by truck to New York.

The report is insistent on the point that to use the fishing fleet the way it is used today and to argue that the province itself with its land-based plants is as good as a factory ship is wrong. It is said that

(a) European factory ships operating in these waters land twice as much fish as our stern trawlers yet their catching rate is the same. The difference is accounted for by less time spent by the European ships in non-fishing activities — four overseas trips per annum, compared with 30-odd trips to and from port by our ships, for example. Faster vessels, quicker turn-arounds in port, rotation of crews could remove the disparity — but highly skilled crews, capable of operating efficiently on unfamiliar vessels in rotation would be needed.

The report includes a document prepared in Ottawa outlining proposals for a Canadian Atlantic Fishing Information Service. The comments that appear earlier in this precis in respect of communication within the Russian fleet and between Canadian trawler captains parallel some contained in that document. It points out that Japanese, Norwegian and United States vessels receive daily fish location reports from mother ships (in the case of the U. S. tuna fleet, from the Bureau of Commercial Fisheries) and suggests that Canadian fishermen should have access to similar services. The consultants support that view and point to Halifax as the logical location by virtue of the information gathering facilities that are already located here.

The report stresses the importance of government action to correct the imbalances that have appeared in the marketing of fish. It argues that the federal departments of fisheries and external affairs can do much to correct matters through proper negotiation with Iceland, Norway, Denmark and the United States. Negotiation should be aimed at agreement on an average minimum price of 31 cents per pound for frozen fillets in the United States market. That market is becoming centralized to a degree such that U. S. distributors have captured most of the profit margin in fish sales and their selling prices leave ample room for adjustment to the 31 cent level. But negotiation to that end will mean little for the Nova Scotia industry unless steps are taken to exercise some restraint on overall production and to make corresponding adjustments in ex-vessel and ex-plant prices.

TRAINING — GENERAL COMMENTS

The several matters discussed in the preceding sections of this summary are dealt with in the report with a three-fold objective in view:

- (1) To acquaint government administrators with some of the ills of the industry;
- (2) To suggest to them that they can be cured; and
- (3) To suggest that a comprehensive program of training and education would have helped in the past and is essential to enable this province to cope with conditions as they will develop in the future.

Because of the lack of skilled manpower in the present fishery, and the realization that if present recruiting trends continue there will be a grave shortage of personnel in the future, there is a need to establish a fisheries training apparatus. The function of this must be not only to prepare and make available specific fisheries' courses, but also to spoon feed the fishermen with information pertinent to their future needs.

If training programs and facilities are not adopted, the Nova Scotia fishing industry will be manned by men who either cannot or do not think ahead. Without trained men and women there can be no revitalization of the fishing industry here. The importance of skills will be recognizable when it is accepted that skills are needed to deal with perishable products like fish. And, to be attractive to thinking men, it is imperative that the fishing industry improve economically.

EXISTING FACILITIES -- UTILIZATION AND EXPANSION

Public schools situated in fishing communities, or close to fishery centres, have a part to play in the provision of trained manpower.

The Koppernaes report outlines in detail the Nova Scotian school system, its grade structure, course content and aims. It suggests where and how fisheries courses, or fisheries appreciation courses, would spark interest among students and prompt them to plan to prepare themselves to step into the industry at any one of a number of different levels. The increasing sophistication of the technologies and organizations that are involved is emphasized, as is the danger that too many will fail to appreciate this and will end up as manual workers, doing the jobs that fall to the lot of the uninformed and untrained. The education system must produce men who will be competent to challenge management in a constructive way.

In the lower grades some of the teaching should be related to the ocean and its resources. Teaching in junior high schools should relate studies in certain subjects to oceanography and fisheries problems -- geometry to navigation, to mention but one example. The same should be provided in senior high with special provision for fisheries subjects in the "general" or any "adjusted" course. In every case a fisheries training organization should actively seek to acquaint both teachers and students with the fisheries industry and with the training organization itself as it is being, or has been, developed.

Courses designed to prepare men for the fisheries industry can, and should be, provided in the regional vocational schools. Judicious selection of locations and of the courses to be offered at different locations is necessary. It is impractical to attempt to provide in

one school courses for all the occupations and trades related to the needs of the industry.

Examination reveals that many of the courses offered at the Nova Scotia Institute of Technology are useful to fisheries trainees or can be adapted to their needs. The Institute offers a number of short courses and a number of long courses in this category.

In the terminology coined for this report, the consultants recommend a dual system comprising both "short" courses and "long" courses. The "short" courses are those needed to train the men now in the industry; the expression "long courses" is used for reference to courses designed to provide for year to year progression in respect of students who wish to prepare themselves well before entering the industry.

As stated earlier, the Nova Scotia Institute of Technology offers courses suitable for, or adaptable to, the needs of the fishery in both the "long" and the "short" categories.

The Fisheries Training Centre at Pictou offers short courses in engines, navigation and gear. They are adjudged to be effective and popular, however, the consultants consider them to be too ^{short} ~~short~~ and the output of trained men too small for the industry's needs.

The Newfoundland College of Fisheries offers both short and long courses. The long courses are of special interest since they carry the student to university level. Duplication of these facilities is not considered to be necessary, but co-ordination of the training to be provided in various Nova Scotia facilities with that provided in Newfoundland is desirable and is deemed to be feasible.

The physical additions to the training system proposed by the consultants comprise principally two simulated "ship-ashore" schools, one probably at Pictou, another in southern Nova Scotia, each with its own trawler and each to provide practical training for all recruits and students. The report itemizes the numerous ways by which close simulation of shipboard operations would add to the effectiveness of training.

The report does not attempt to establish in any detail curriculum content at any of the institutions that have been mentioned. It proposes a fisheries training administration which would formulate the overall program and plan for individual segments of it with school principals, teachers and administrators. The report, however, does outline generally the objectives of the "short" and "long" courses, the composition and objectives of the fisheries training administration and the essential requirements for ship-ashore facilities. It provides also job descriptions for personnel on fishing vessels and in fish plants. Together, these provide guidance for the development of a comprehensive training program and for the development of curriculae for individual courses. Some of these matters are reviewed hereunder.

THE FISHERIES TRAINING ADMINISTRATION

The report makes the point that the proposed fisheries training administration is a relatively inexpensive means of getting started on the development of a program. The creation of new, additional physical facilities is dependent upon the rate of growth and evolution of the program. Putting aside the urgency as the consultants see it, there is

the acknowledgment implicit throughout that development may not be as rapid as they think it should be, that the creation of new facilities may have to wait upon the availability of funds and so on. Nevertheless it was necessary for them to assume that the new facilities will be created eventually and to plan accordingly.

In any event, the training administration in the early stages will be designing courses, preparing books and other material, finding skilled personnel, planning approaches and methods with the heads of schools and training institutions, indoctrinating teachers and instructors in respect of the needs and potentials in the industry, and the needs of the students.

The functions of the fisheries training administration are summarized as follows:

- (a) To integrate the existing schools and facilities, where practical, so that they will serve the purpose of fisheries training and education.
- (b) To assist in the formulation of fisheries courses to be offered in those schools and facilities.
- (c) To inform and advise teachers and students.
- (d) To establish priorities for the implementation and expansion of fisheries training programs and projects.
- (e) To establish and to administer new fisheries training facilities.
- (f) To find the talent and monetary resources necessary for successful implementation of a program.

The co-ordinator or director of the fisheries training administration should be a person who knows fishermen, plants and vessels and has a practical bent to his mind. We are reminded here that two kinds of training are proposed in order to serve those now in the industry and those planning to enter it. The aim must be that all types, those who want to be masters, and those who want to be servants, will be assisted. The training must have the dual purpose of showing men how to do things and what may be gained from becoming expert in various skills and capacities. It must be designed to show where money can be made in the fisheries and what skills will be needed to realize the possibilities at every level.

SHIP-ASHORE SIMULATION FACILITIES

The consultants regard such facilities as the backbone of the program.

The so called "ship ashore" is visualized as a building or a group of buildings containing the equipment and the machines normally found on a modern fishing vessel. This equipment must be interconnected so that it will simulate the conditions found on board a vessel at sea. Interconnection in this context, means interconnection both in technical terms and also in terms of the jobs to be performed by a team of men, first in training and then on the job at sea. It is not enough to train men independently in the various skills required and then send them out to sea. The men must learn to work together.

The suggested facilities for a shore ~~trip~~ training center may contain rooms which may be related to departments as follows:

- (a) General deck department.
- (b) Cook's department.
- (c) Engineer's department.
- (d) Captain and mates department.

The general deck department will consist of:

- (a) Deck and hold rooms with adjacent fishing gear room.
- (b) Two lecture rooms.
- (c) 36 single bedrooms, individual wash combination bath
- (d) 3 offices
- (e) 1 board room or projector room

In the deckroom it is visualized that there will be winches and deck machinery and equipment normally found on the vessel types to be simulated. In other words this room shall simulate the working decks of a ship.

The cook's department shall consist of a galley, a mess hall, a cooler, a cold storage, a lecture room and two offices for cooks instructors and ten single bedrooms, plus a common bathroom.

The cook's department is to be so arranged to simulate conditions at sea. There will be about ten cook trainees at one time, the galley must be arranged so that actual cooking can be taught. On the ship the cook is more or less working alone, it is, therefore, important that each cook be given his own facilities, stove, pots and pans, and his own table to serve and to maintain.

The engineers' department will require an engine room and adjacent repair room; a parts room; electric power distribution room; lecture room; two offices; 14 single bedrooms. Simulation of actual operating conditions is important. Dynamometers and other means of simulating load conditions on engines and electrical and hydraulic power devices should be provided.

The Captains and Mates Department, it is suggested, shall consist of a simulated ships bridge, navigation room, radio and electronics room, lecture room and 18 single bedrooms.

The simulated ship's bridge should be located so that windows will face the deck room. This would enable the Captain and the Mates to observe the activities in the deck room and to participate in the programming of jobs to be performed by the deck crew trainees. The programming of work of other crew members, to be carried out simultaneously with the work to be performed on the bridge, is part of the training needed, and to this end it would be desirable to have the necessary facilities.

In a system sense it is visualized that men will come from the schools and from the vessels and, at all levels of qualification, go through the ship-ashore training centre and from there to a ship associated with the training centre and finally out into the fishing industry.

The simulated ship should preferably be designed to handle 78 men: 36 in the deck department; 10 in the cooks' department; 14 engineers; 18 in the captains and mates department. Courses of three months' duration are proposed. One school would then graduate $2\frac{1}{4}$ men per annum, crews for 14 trawlers.

It is estimated that the capital costs will amount to about \$2,000,000 for one ship-ashore facility and about \$500,000 for one trawler for the sea-training phase. Operating costs of the ship-ashore facility are estimated at approximately \$370,000 per annum; for a training ship the operating costs are estimated at \$100,000 exclusive of crew costs but including instructors.

JOB DESCRIPTIONS - VESSELS

The report contains descriptions of the jobs on vessels and in fish plants. Much of this information will be useful for the purpose of indicating the breadth and variety of training deemed needful, however, it is feasible to present it here only in a severely condensed form.

Captain-owner

Has the duties of both a business manager and a master mariner (the latter described under "Captain"). The industry has done little to encourage development of business management capabilities, has done more to discourage independent ownership, with the result that most vessels now are owned by the plant owners, which in turn has required that fleet operations be directed by a shore-based administration. This does not appear to be a happy or efficient situation. Captain-owners need general education of a fairly high level plus special training in Marine Law, Customs Regulations, Business Administration and Economics related to the fisheries.

Captain

His duties require knowledge of a long list of subjects related to orientation and navigation at sea, the safety of his ship, necessary

duties in port and the finding and catching of fish. An understanding of fish behaviour patterns is essential. This can be taught and is taught in other countries. Nova Scotia will have to do the same. The old-fashioned concepts will have to be changed, the scientific data that has become available must be applied in our industry. Much basic theory and general information can be taught on shore. Practical application and training at sea is necessary also.

First mate

He should be able to assume the captain's duties and responsibilities without causing undue interruption of the running of the vessel or the fishing operations. He should learn much that the captain must know in respect of the ship's safety, navigation and fishing operations. As the second in command his authority must be backed by familiarity with the technical aspects of all phases of ship and equipment maintenance and operation.

Second mates and boatswains

Training should be organized so as to prepare them to become capable of advancing to first mate or captain. ^{These} Their duties on board are various: bridge relief, safety, deck machinery, gear, fish handling, command duties at the foreman level and the like. There is a need for training at the more sophisticated levels as well as at the practical level.

Engineers

The chief engineer must be fully capable of operating and servicing the mechanical and electrical apparatus on his ship. His position in respect of electronic equipment, which is operated on the bridge and serviced usually by shore-based maintenance personnel, is not often

clearly defined on fishing vessels. A briefing course in the functions and maintenance of electronic equipment would have much to recommend it. The chief engineer is responsible also for the maintenance of safety equipment: anchor winches, life boats, fire fighting equipment and the like. Other duties can be summarized by calling them sea and shore administrative duties; operating, repair, maintenance and recording duties and purchasing spare parts and supplies. The duties of the second and third engineers are to take watches in turn with the Chief therefore the basic training will be the same and a linear program of training for advancement can be devised.

Cooks

The cook must be able to prepare good food for the crew, to perform the duties of a purchasing agent, to plan his purchases so as to avoid spoilage and yet not run short of provisions and, at the same time, spend neither too little nor too much, according to the appetites and tastes and wishes of the crew, who pay their shares of the food costs. The cook is frequently underpaid and overworked and working conditions generally are poor. There has been little attention given to the design of food preparation facilities on fishing vessels. The training of cooks is important and so are the conditions they find in their galleys. Both have importance in relation to the recruitment of fishermen, their performance at sea, the productivity of the vessel.

Others

The remainder of a fishing vessel's crew comprises the chief of the fish hold, the fish hold crew, the icer, the third hand, regular and casual deck hands.

The chief in the hold is responsible for the quality of the fish. Proper training will require instruction in the best preservative methods for the various species of fish and the factors that cause deterioration in quality (time, temperature, washing, icing, bacteria) as they may be related to alternative handling methods. In fact all members of the fish hold crew should receive training in these matters. There is room for much upgrading of capabilities in these respects in all segments of the Canadian fishing fleet.

Training for the other hands mentioned will be related chiefly to the fishing operations conducted on deck, to the handling and repair of gear and to working methods designed to reduce accidents.

JOB DESCRIPTIONS - PLANTS

Fish filleting plants in Nova Scotia have capacities ranging from 80 million pounds of processed fish annually down to 5 or 6 million pounds or less.

The administrative staff would appear to function similarly to any other business unit but there are significant differences and the report stresses that fact. Chiefly they are associated with factors that affect the product flow pattern -- weather and accidents that affect vessel arrivals, perishability of the fish, the multiplicity of species and the variety of products that may be prepared from each. The programming of operations is a complex matter every day, and more often than not it is done by rule of thumb. The more successful operations are guided by men

of high intelligence who have had years of experience. There is a great field for training here, and education to prepare for a future that may well involve the use of computers for the programming of operations to conform to the vagaries mentioned and perhaps, as well, to the vagaries of market demand for the products.

In passing, the importance of the culler, or the grader of fish as they are received from the vessel, is noted and stressed. The points made are that by his culling decisions he is in effect acting as the programmer for the whole day's operation and determining, to a considerable extent, what that day's revenues will be.

The report provides considerable information in respect of many jobs found in fish filleting plants. It is felt that a few selected examples will be sufficient in this precis. Again in these cases the material is severely condensed.

Shore engineers

May be trained at the Nova Scotia Institute of Technology, should go from there to a three month semester at the ship-shore simulation facility. The shore engineer and his assistant are the men responsible for the maintenance of the filleting plant and equipment and for vessel refits. The duality of the job should require that he be as well qualified and trained as the chief engineers on the vessels.

Quality control staff

These persons have functions to perform throughout the plant, especially at the grading, candling and trimming tables. Quality control is one of the most important factors in the whole operation. It sets the

rules for the culling of fish as landed, which in turn determines the whole operating program, and directly affects the economics of production. Training is available in the Technical Institute, the universities and the Newfoundland College.

Cold storage foremen

His chief job is to arrange, efficiently and for easy access, the various types of products. Space is limited. Training in the best possible use of floor space is desirable.

Fresh fish crew

Fresh fish is very perishable. At the same time, a high profit margin can be realized when it is handled properly. Training in the judging and control of quality is extremely important.

Cutters

The hand cutting of fish is a skill gained mostly through practice and experience. The important points are to cut the fish for maximum yield of saleable product and to know how to cut for the different products required from time to time. The closely related operations of cutting, skinning, trimming, candling, weighing and distribution to the packing tables of the raw fish all involve matters of quality and hygiene. Training that will provide a proper appreciation of the overall significance of the operations they perform in respect of quality and rates of yield is desirable. The Newfoundland College provides training in these fields.

Fish Meal Plant

The job descriptions in fish meal plants are similarly treated in detail in this report.

ILLUSTRATIVE DIAGRAMS AND CHARTS

The consultants presented a number of drawings and diagrammatic expositions of their ideas and proposals. Some of these will be of interest here.

The first diagram represents an attempt by the consultants to illustrate graphically the various existing organizations that have to do with training and education. Several administrative organizations are involved. It is not suggested that that can be, or should be, changed for the particular benefit of training and education in fisheries. Rather, as indicated in the lower left-hand corner of the diagram, their proposal envisages a fisheries training board and administrative organization for the co-ordination of a fisheries program with the existing universe. The diagram indicates the lines and directions of communication within the existing universe and between that universe and the organization that is proposed for fisheries training administration. The lines are colour-coded:

Red for data

Green for advice

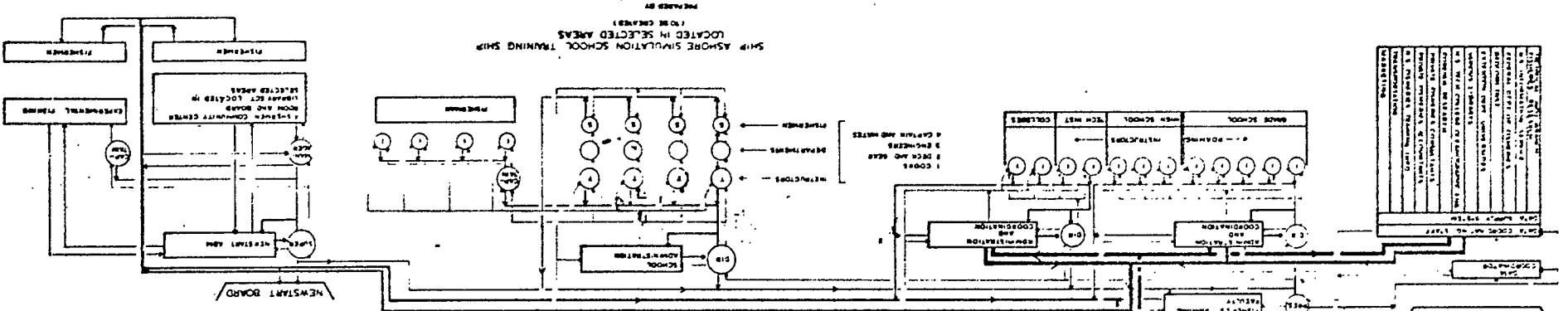
Blue for directives.

The second diagram indicates the "circulation" of students and trainees in the educational facilities, existing and proposed, and to and from the industry.

The third diagram is an elaboration of the idea contained in the second. It is a representation of the existing educational system when correlated with the fisheries training proposals and this in turn

is correlated with jobs and positions in the industry. It will be an aid to the discernment of the training and educational requirements in the industry in respect of individual jobs and professions. It is designed to show the means by which a full program, ideally arranged, would allow students to step upward through grade schools, high schools and universities or trade schools, vocational schools, technical institutes and the Newfoundland Fisheries College. It indicates also the exits from the system to the industry and the opportunities for employment at the various levels of education and skill attainment.

The fourth diagram presents a concept of the general arrangement of a "ship-ashore" simulation facility.



1. BRIDGE
2. MAIN SCHOOL
3. CLASSROOMS
4. OFFICE
5. RESTROOMS
6. KITCHEN
7. CATERING
8. DECK AND GEAR
9. CAPTAIN AND MATES
10. SHIP ASHORE SIMULATION SCHOOL TRAINING SHIP
11. BRIDGE
12. MAIN SCHOOL
13. CLASSROOMS
14. OFFICE
15. RESTROOMS
16. KITCHEN
17. CATERING
18. DECK AND GEAR
19. CAPTAIN AND MATES
20. SHIP ASHORE SIMULATION SCHOOL TRAINING SHIP

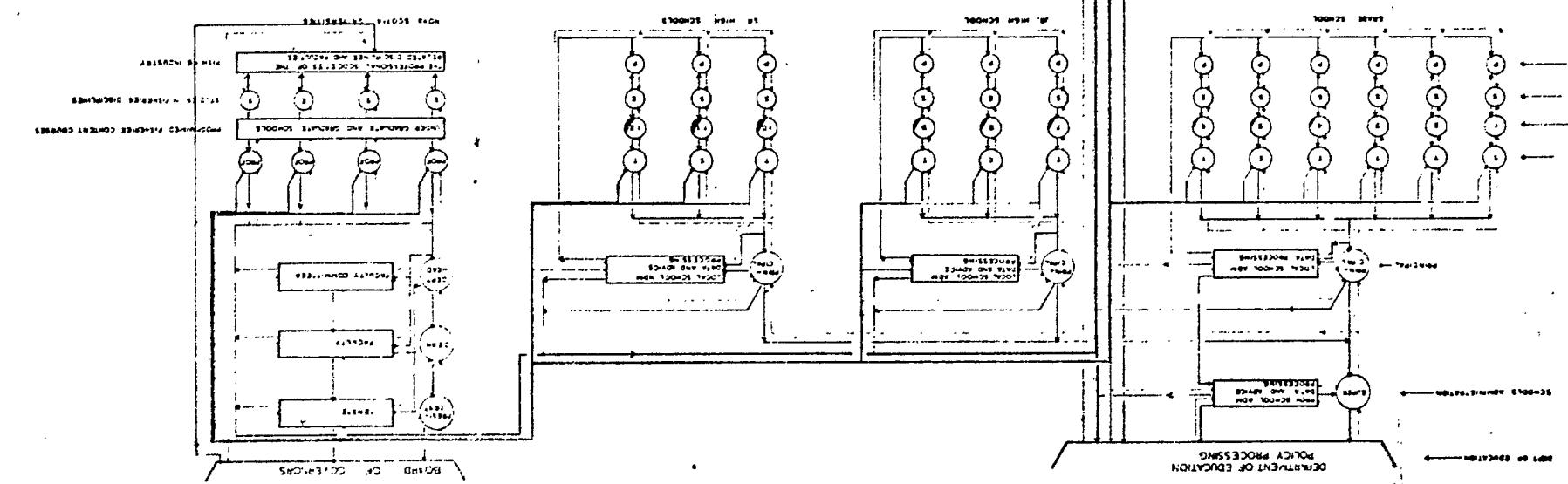
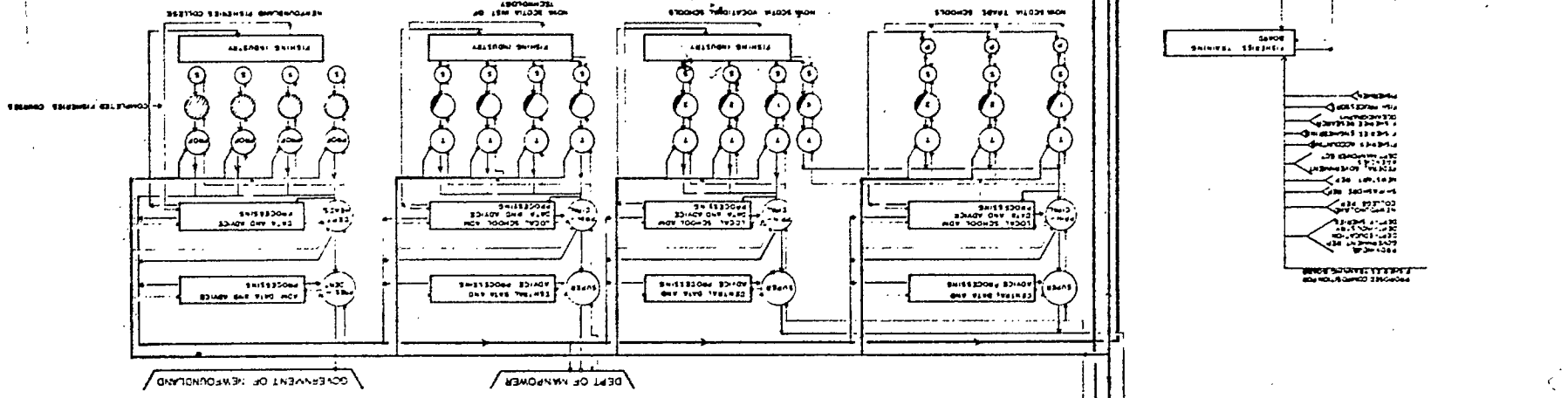
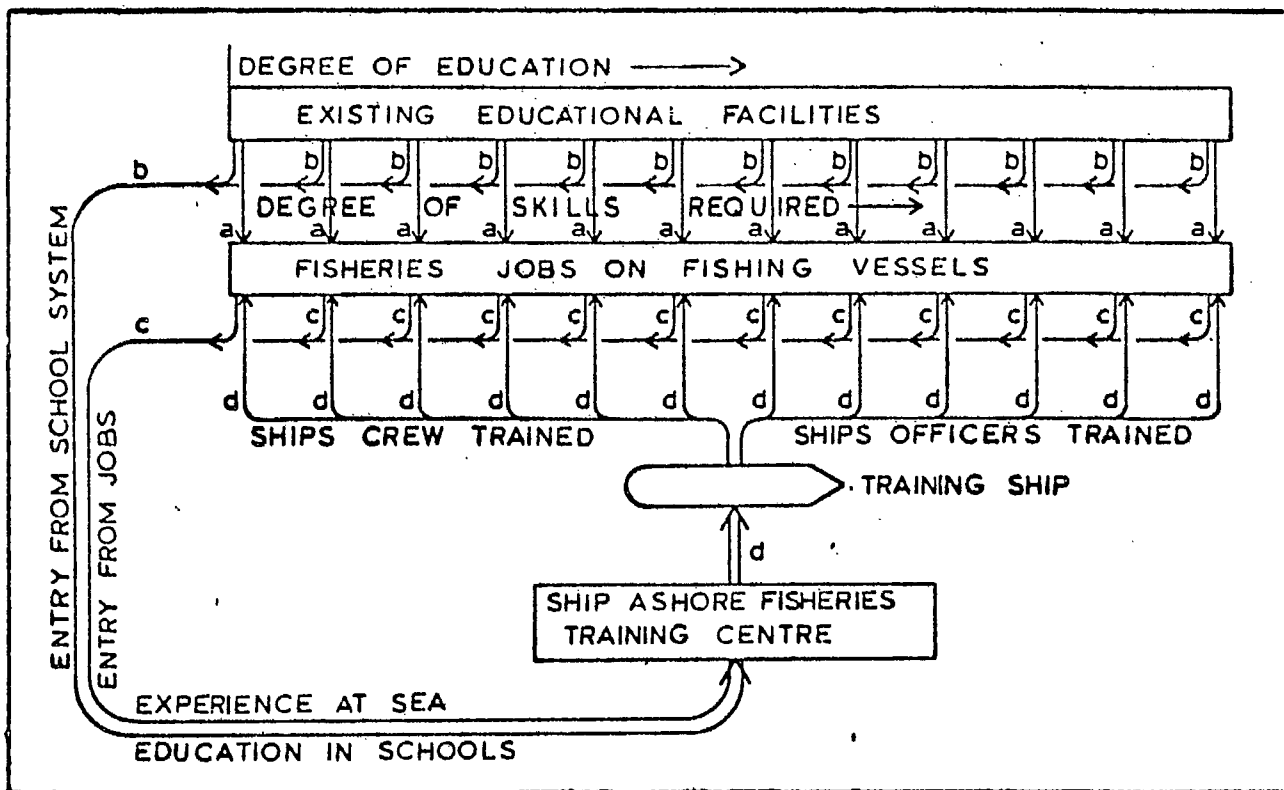
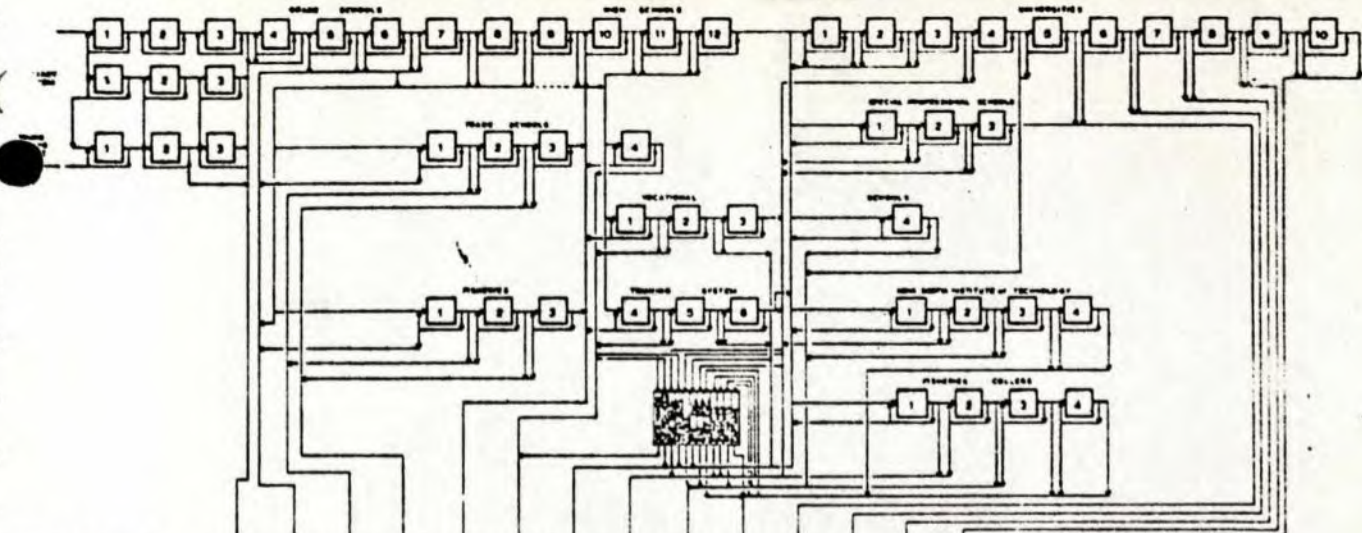


FIGURE 2



(The diagram illustrates the concept that men may step from the school system and from the industry and, at all levels of qualification, pass through the "ship-ashore" training centre, from there to a training ship, and then enter, or return to, the fishing fleet. The lines "a" indicate direct entry of students to the industry at all levels of qualification and employment. The lines "c" indicate that these men also may make use of the fisheries training facilities at any time in their careers.)

EXISTING EDUCATIONAL SYSTEM IN NEW SCOTIA
CORRELATED WITH A PROPOSAL FOR A FISHERIES TRAINING SYSTEM



GENERAL CLASSIFICATION	CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED	NON-CLASSIFIED
ABILITY: LEADER	2	3	4	5	6	7	8	9	10	11	12	13	14	15
COMPETENCE: LEADER	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SPECIAL ABILITY: LEADER	2	3	4	5	6	7	8	9	10	11	12	13	14	15

CLASSIFICATION GROUP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
GENERAL EDUCATION															
OPERATIONAL ACTIVITIES															
1. NUMBER OF RESEARCHERS															
2. RESEARCH TECHNIQUES															
3. RESEARCH EQUIPMENT															
4. RESEARCH FACILITIES															
5. RESEARCH PERSONNEL															
6. RESEARCH BUDGET															
7. RESEARCH OUTPUT															
8. RESEARCH IMPACT															
9. RESEARCH COLLABORATION															
10. RESEARCH INNOVATION															
11. RESEARCH ETHICS															
12. RESEARCH COMMUNICATION															
13. RESEARCH POLICY															
14. RESEARCH MANAGEMENT															
15. RESEARCH EVALUATION															

Summary table with columns: JOB CLASSIFICATION, HOURS, SPECIAL, SALARIES, etc.

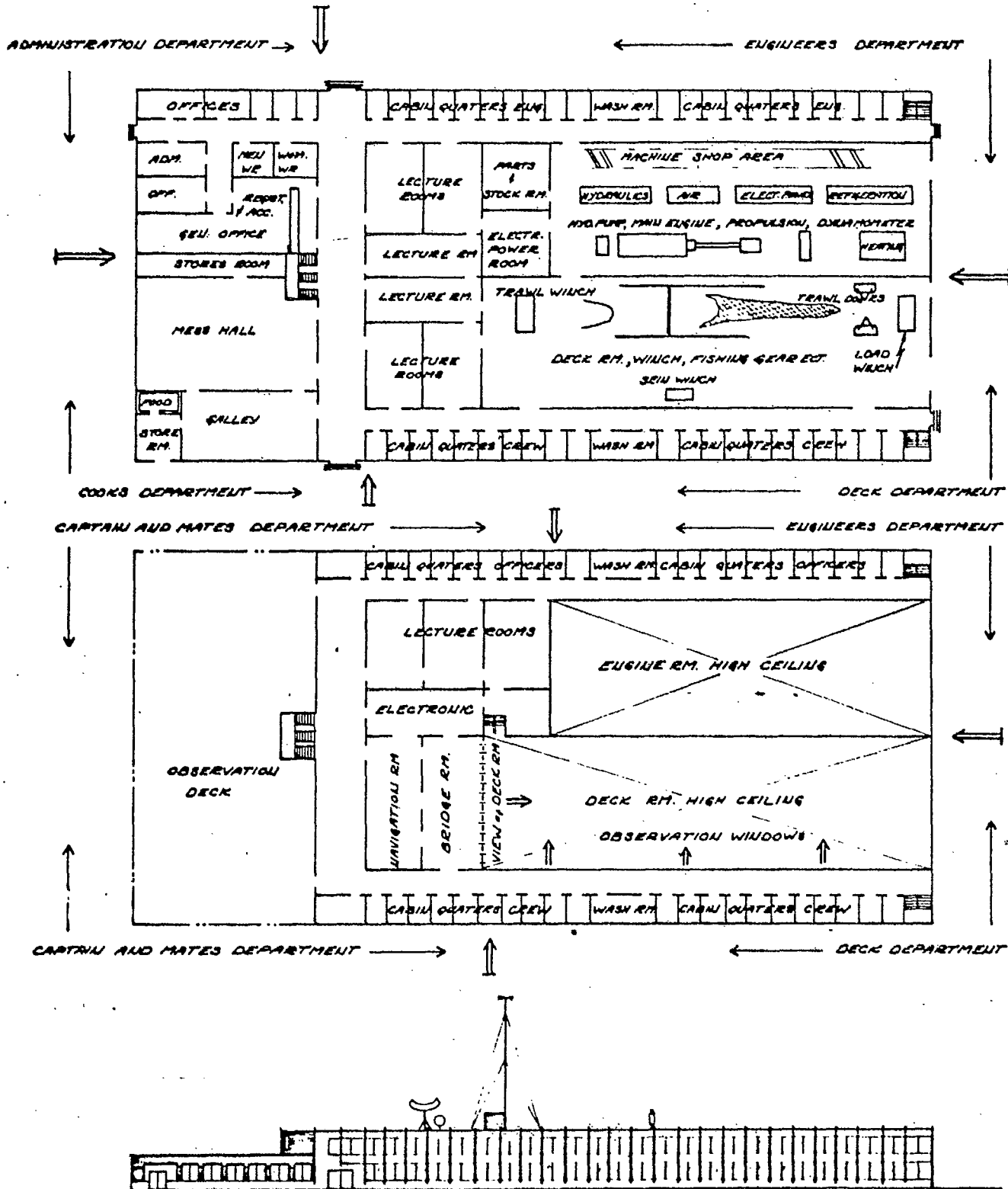
Summary table with columns: JOB CLASSIFICATION, HOURS, SPECIAL, SALARIES, etc.

Summary table with columns: JOB CLASSIFICATION, HOURS, SPECIAL, SALARIES, etc.

VISUALIZED SHIP - ASHORE SIMULATION FISHERIES TRAINING CENTRE

PREPARED FOR NOVA SCOTIA DEPT. OF FISHERIES

BY
 J.D. KOPPERNAES ENG. CO.
 HALIFAX N.S.
 JAN. 1969
 N.T.S.



APPENDIX II

Permanent depots to SCAR	27*
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Stations operating in the Antarctic, Winter 1965	28*
Japanese Antarctic Station reopened	28*
New United States Station in Antarctica	28*

SOVIET SEA FISHERIES SINCE THE SECOND WORLD WAR

BY TERENCE ARMSTRONG*

[MS. received 20 January 1966]

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Introduction

A number of recent publications in English (Borgstrom, 1961; Herman, 1964; Helin, 1964; Kravanja, 1964; Shparlinskiy, 1964) have dealt with aspects of the growth of Soviet fisheries since the Second World War. Some of these publications are written from inside the Soviet fishing industry, others by western fisheries specialists. There would be no advantage in covering the same ground again in detail. The object of this paper is to draw attention to certain features of the Soviet industry not very fully considered in the accounts just mentioned. Before this can be done, however, it will be necessary to sketch in, as background, enough indication of the growth to make the rest of the paper comprehensible.

Growth of Soviet catches since 1938

Table 1 shows the increase of total Soviet catches of fish from 1½ to 4½ million tons in the sixteen-year period 1948-64 (column 2). This was part of a world-wide increase, however, for the Soviet share of world production remained remarkably steady at 7 to 8 per cent (column 3). If, however the yield from inland fisheries is deducted both from the Soviet catch and the world catch (columns 4 and 5), it can be seen that the Soviet catch at sea increased faster than the world-wide average rate of expansion of sea fisheries, the Soviet share being augmented by over 50 per cent. So it is here that the post-war expansion of the Soviet industry has been most marked. The expansion has not been dramatic, like that of Peru between 1957 and 1962, but a steady climb which may confidently be expected to continue. An authoritative statement in early 1964 made clear that Soviet domestic demand for fish would not be satisfied until 5.5 to 6.0 million tons a year were provided (*Rybnoye Khozyaystvo*, 1964, Vol. p 4); in other words, supply was meeting only 70 per cent of the demand.

* Scott Polar Research Institute, Cambridge.

supposed. There can be tension between the state fishing administration and the collective farms, and within the state system, between competing authorities. Evidence of these, and measures to reduce them, have been mentioned. There are administrative muddles of a sort common in all very large organizations, and perhaps especially common in Soviet organization. The new refrigerated transport *Priboy*, which should have gone to collect the catch of the Kalinin fleet in the north-west Atlantic, was sent in error to the Murmansk fleet in the north-west Atlantic, where it was not wanted (*Vodnyy Transport*, 14 November 1964). Such mistakes are not uncommon. Nevertheless, there seems to be a cohesiveness about the Soviet industry, and it is the absence of this which is a notable feature of the British industry.

If one seeks the possible lessons that the Soviet experience may have for the British and other private-enterprise industries, one must conclude that they are such features as those just mentioned—standardization, versatility, information exchange. These are made more easily attainable in the Soviet case by the unified control of the industry, but it should not be beyond possibility to attain them without the same degree of centralization. They are steps which act in the long run to everyone's advantage, so there ought to be a consensus in favour of their adoption. Information exchange should logically lead to fleet operation of some sort. The extent to which mother-ship and refrigerated transport operation would become desirable would depend on economic factors, primarily on the distance to fishing grounds. If grounds new to the British industry were to be pioneered, say in the central or south Atlantic, this might well call for the mother-ship system. It has been tried in a small way in the British industry and found unprofitable, probably because the scale of operations was not large enough. A recommendation that this method should be explored was made by the Fleck Committee in 1961 (Report: Cmd. 1266). One of the main difficulties will be to persuade crews to spend longer at sea. It is a very real difficulty, as is apparent from recent experience in West Germany, where there has been more experience of fleet operation than in Britain (Birkhoff, 1965).

What seems certain is that the Soviet industry (with the Polish and East German industries copying it at a much lower level) will continue to deploy fleets and mother-ships, and will add to them. The very large ships already mentioned as being on the way will have a length of 225 m, displacement of 43000 tons, engine power of 26000 hp, endurance of at least 125 days, and will carry fourteen 900 hp fibreglass fishing vessels on deck. The first ship will be called *Vostok*. The processing capacity is to be 300 tons a day, and the storage will permit 10000 tons of frozen fish, 1000 tons of fish meal and ten million cans to be produced on each voyage (*Ekonomicheskaya Gazeta*, No 44, 1964, and Moscow Radio, 30 October 1965).

Fishing on this scale will affect the prospects for everybody. "The conclusion must be that a large increase in factory-ship or mother-ship operations will lead to a general decline in stocks" write two British fisheries biologists on prospects in the North Atlantic (Garrod and Gulland, 1965, p 26). It is no good arguing that single-ship operation will be less harmful to stocks. This is no doubt true, but the clock cannot be put back. International regulation of

fisheries must be extended, and when it is, it is likely to put a premium on the most efficient methods, rather than rule them out. Increasing the efficiency of catching methods is one matter, and conservation of stocks is another. Both are likely to be energetically pursued.

Acknowledgements

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So there is every incentive to continue the expansion to at least that level, and beyond it if exports are considered. The Soviet plan for 1970 is for 7.8 million tons of fish (*Vodnyy Transport*, 11 November 1965).

There is, in fact, a growing Soviet export of fish and fish products. The latest figures relate to 1961, when the trade was valued at \$40 million, and consisted mostly of canned goods but included 47 600 tons of fresh fish (Herman, 1964 p.26). The *FAO Yearbooks of fishery statistics* state that no Soviet fish is landed in non-Soviet ports—a statement which seems to be contradicted (but only to a small extent) by the foreign trade figures.

Table 1. Soviet catch of fish and crustacea, 1938-64

	Soviet total catch (million metric tons)	Soviet total catch as percentage of world catch	Soviet sea catch (million metric tons)	Soviet sea catch as percentage of world sea catch
1938	1.55	7.4	0.94	5.2
1948	1.49	7.1	0.85	5.0
1952	1.89	7.7	1.39	6.3
1953	1.98	7.7	1.41	6.4
1954	2.26	8.3	1.58	6.6
1955	2.5	8.7	1.79	7.2
1956	2.62	8.7	1.96	7.5
1957	2.53	8.1	2.05	7.5
1958	2.62	8.0	2.16	7.6
1959	2.76	7.7	2.29	7.3
1960	3.05	7.9	2.62	7.8
1961	3.25	7.8	2.83	7.6
1962	3.62	8.1	3.26	8.0
1963	3.98	8.7	3.65	8.8
1964	4.48	8.7	4.09	7.8

Source: *Yearbooks of fishery statistics*.

It may be noted that most Soviet published statistics include whales and seals with fish, increasing the totals by 10 to 15 per cent over the last six years or so. It is not always possible to eliminate the sea mammals from the figures, and where this has proved impossible, the fact is mentioned.

Another indication of the shifting emphasis to high seas fishing (called by the Russians "active fishing") is given in Table 2:

Table 2. Soviet fish catch by various fishing methods at selected dates

Method	1940 per cent	1950 per cent	1959 per cent
"Active" methods:			
Trawling	15.8	30.7	35.6
Drifting	6.3	5.5	20.6
Purse-seining	3.2	4.3	8.5
Electric light fishing	—	0.1	5.9
"Passive" methods:			
Fixed nets of various sorts	57.7	53.8	26
Traps, etc.	16.8	14.3	3.4

Source: Mikhaylov, 1962, p. 83, quoted also by Ishkov, 1961, p. 14. Adjusted for omission of sea mammal catch.

The next step is to try to analyse the Soviet sea catch, both by species and by region. The first is the easier, because Soviet catch figures, although not

published in the USSR except in the most general terms, have been reported to the FAO in sufficient detail (see Table 3).

Herring and anchovy have remained the largest item, but the margin by which they lead has been reduced. Cod has remained in second place, peaking in 1954-56 and troughing in 1958-59. Possibly the most significant change is the steady relative drop in the salmonoid catch. The flatfish have remained a fairly constant proportion since the war, similarly the crab. The redfish were

Table 3. Soviet sea catch, 1938-64: percentage by weight of main species caught

Main species	1938	1948	1953	1954	1955	1956	1957
Salmon, trout, smelt, etc.	14	19	15.5	9.7	11.4	10.1	9.5
Flounder, halibut, sole, etc.	0.8	4.6	4.5	5.0	7.1	7.9	7.2
Cod, hake, haddock, etc.	27	30	24	38	39	38	21
Herring, anchovy, etc.	46	38	47	42	38	40	48
Redfish, horse mackerel, etc.	—	—	—	—	—	—	10.6
King crab and other crustaceans	2	1.8	2.1	2.4	2.1	1.9	1.5
Main species	1958	1959	1960	1961	1962	1963	1964
Salmon, trout, smelt, etc.	5.4	6.1	4.6	4.5	3.3	3.8	2.6
Flounder, halibut, sole, etc.	9.4	8.8	9.2	9.7	7.3	5.1	4.6
Cod, hake, haddock, etc.	17	18	26	27	27	27.5	22.2
Herring, anchovy, etc.	51	46	41	38	39	34	44.5
Redfish, horse mackerel, etc.	13.5	14.9	10.7	9.2	7.9	9	13.6
King crab and other crustaceans	1.5	1.4	1.2	1.4	1.3	1.2	1.2

— no data.

Source: *Yearbooks of fishery statistics*.

only included in the statistics in 1957, since when they too have remained a fairly stable fraction. With the exception of the salmon, therefore, the expansion of Soviet fisheries has been carried out on a wide front.

Analysis of the figures by region is more difficult. FAO statistics do not help much, because there is no relevant subdivision by catching region as such. From general Soviet accounts it becomes clear that the North Atlantic and the North Pacific are the two principal growth areas. Fisheries in the North Atlantic are the concern of two international bodies, the Conseil Permanent International pour l'Exploration de la Mer for the north-east Atlantic, and the International Commission for North-west Atlantic Fisheries. Each publishes catch statistics, including Soviet catches in the north-east Atlantic since 1955 and the north-west Atlantic since 1956, the dates in which the USSR joined the appropriate body. In the North Pacific there is no international body to which the USSR belongs, so catch figures cannot be derived from any source comparable to those for the North Atlantic. Soviet sources, however, quote figures for some years; and the subdivision by species in the *FAO Yearbooks* provides the possibility of guessing North Pacific catches to within perhaps 10 per cent of the truth (Table 4).

Table 4 makes clear the steady expansion in both major areas. The North Atlantic loses some of its relative importance, but more fishing grounds within

Table 4. Soviet sea catch in particular regions, 1938-63.
Thousand metric tons, live weight

	U.S. coast	Nova Scotia	Grand Banks	Labrador	West Greenland	Iceland	Faroese grounds	Norwegian Sea (including Greenland Sea, but excluding Iceland waters)	Spitsbergen, Bjernøya	Barents Sea	North Sea	Baltic	Total, North Atlantic	As percentage of total Soviet sea catch	Total, North Pacific	As percentage of total Soviet sea catch	Other areas (p. 102)
1938	0	0	0	0	0	—	—	—	—	—	—	—	—	—	3207	34	—
1948	0	0	0	0	0	—	—	—	—	—	—	—	—	—	3007	34	—
1953	0	0	0	0	0	—	—	—	—	—	—	—	—	—	471	5	—
1954	0	0	0	0	0	—	—	—	—	—	—	—	—	—	404	4	—
1955	0	0	0	0	0	0	0	208	0	687	3	156	1075	60	512	24	—
1956	0	0	17	0	0	0	29	207	91	635	29	179	1205	61	552	29	—
1957	0	0	69	0	0	0	30	286	137	253	37	173	1062	52	7807	39	—
1958	0	0	103	13	0	0	27	392	151	194	35	153	1076	50	8507	39	—
1959	0	0	178	2	15	0	15	401	281	210	41	167	1230	53	8507	37	—
1960	0	0	165	91	2	12	19	428	115	334	65	155	1433	55	8007	31	—
1961	68	1	141	131	0	35	7	223	178	319	72	125	1376	49	10507	40	—
1962	209	31	62	68	0	21	5	212	149	485	108	156	1506	46	11007	34	—
1963	231	165	64	25	6	—	—	—	—	—	—	—	—	13007	36	—	

— = no data. ? = author's estimate.

Sources: *International Commission for North West Atlantic Fisheries: Statistical Bulletin*, *Bulletin Statistique des Pêches Maritimes*, *Yearbook of Fishery Statistics*, *Rybnoye Khozyaystvo* 1957, No 8, p 93-94. The rather higher figures for the Pacific quoted by Kravanja 1964, p 4 include sea mammals, but have been used as a check.

it are exploited. This wider search for fish is certainly true of the North Pacific too, but there are no figures to support the argument.

This growth of production reflects, of course, an increase in capital investment in the industry. The total investment in the fishing industry (here including whaling and sealing) has grown as follows:

Table 5. Capital investment in Soviet fishing industry, 1946-65

Period	Million roubles (1961 values)
1946-50	447.4
1951-55	760.2
1959-65 (plan)	2032

Source: Mikhaylov 1962, p 177-78.

Ships and their equipment are stated to account for 75 per cent of this investment. It is likely that the actual figure for 1959-65 was close to that planned, since the industry as a whole has remained close to its plan over the seven-year period. The increase in investment between 1946-50 and 1959-65 appears to be rather greater than the increase in production between the same limiting dates.

Comment is required on the reliability of the figures in the table given. The statistics are presumably compiled by the Soviet Central Statistical Administration from data supplied by the industry, and there is no independent, that is non-governmental, cross-check on them at any stage. There are two sorts of distortion which might be present (Nutter, 1962, p 26-51 and Grossman, 1960). First, the figures published could be quite fictitious, chosen to give the world of Soviet citizens, the impression of an efficient industry, while the real figures were kept the secret of the Central Statistical Administration. This idea of doublets of books cannot be categorically denied, but few western economists believe it to be true. The invention of output figures which still remained in balance and plausible when seen as part of the wider picture would be difficult; furthermore, when it is possible to compare published statistics with those circulated in documents not intended for publication (the 1941 national plan, captured during the war, is the standard example), no significant discrepancies are revealed. In the particular case of the Soviet fishing industry in the 1960's, some westerners may feel that the Soviet Government might wish to publicize smaller catches than were in fact taken, in order to avoid charges of over-fishing. But, in spite of the awareness of Soviet specialists to the dangers of over-fishing (to be discussed later), it is unlikely that Soviet officialdom would react in this way. What is widely done in Soviet practice, however, is to publish statistics selectively, omitting what is unfavourable, changing category headings, and failing to provide adequate explanatory comment. This will be sufficiently obfuscatory without being untrue; and the fact that this is done makes it more likely that the figures published are real ones.

The other sort of distortion is this. The pay structure of the Soviet fishing industry, indeed of the greater part of the whole of Soviet industry, is based on piece-work and the reaching of target production figures. Management also is substantially rewarded for over-fulfilment of plans. At all levels, therefore, there is a built-in motive to over-report production. There may also be some tendency to under-report, if the reporter is seeking opportunities for pilfering. The central authorities are of course well aware of these dangers, and have instituted many internal checks and inspections, with penalties for offenders in order to minimize them. It is probably fair to say that over-reporting is widespread wherever the reporter thinks he can get away with it. In the fishing industry, however, there are probably only limited chances of getting away with it. The product—catch in tons—is fairly easily measured. It is true that weighing is probably not done the moment the nets are hauled in. This could be arranged, but only with difficulty, and there would not be much point in doing so. Probably the weighing takes place when the catch is landed (as in the British industry), but by then some fish are gutted, some frozen, some filleted and some canned. So the live weight, which is the one quoted in all Soviet catch statistics, is likely to be reconstructed from landing weights. This might seem at first glance to provide an opportunity for over-reporting. But it is almost certain that the additions are made automatically on a fixed percentage basis ('conversion factors'), which will vary with the process the fish has undergone. Individual skippers would then not have such an obvious chance to

report uncorrected. Other ways no doubt exist, but if the checking system even more fully efficient, it is hard to see how they can lead to very significant distortion.

Organization and structure of the Soviet fishing industry

The fishing industry in the USSR has since about 1930 had two major components: on the one hand, large state enterprises, and on the other, fishing collective farms (*kolkhoz*). The collective farms were at first much the more important and contributed over half the total of fish caught until the early 1950's. They were, and are, concerned largely with inland fisheries, where they are responsible for almost the whole catch, but they are also active in sea fisheries. Collectives in the Baltic provinces, Karel'skaya ASSR and the region of Sakhalin operate fishing vessels, in some cases up to medium trawler size (Eventov, 1962, p 12; Goryunov, 1959; Koryako, 1959). It was planned that collectives should produce just under 30 per cent of the total catch in 1965 (Mikhaylov, 1962, p 85). If they are assumed to be responsible for 85 per cent of the inland catch, then they could be expected to take 23 per cent of the sea catch, or about a million tons. This is still quite a large proportion. While there are those in the USSR who urge the importance of fishing collectives as a social and political idea, and therefore wish to see them prosper (for instance, Eventov, 1962), the relative importance of the collectives, in comparison with state enterprise, is bound to continue to decrease, simply because of the growing importance of factory trawlers and similar very expensive equipment, which can only be operated by large organizations. *Pravda* of 30 July 1965 mentions that a very large collective in Kamchatka was about to acquire a factory trawler, but this is exceptional. Between 1930 and 1959, the collective farm catch increased by 30 per cent, while the state-organized catch was tripled (Shparlinskiy, 1964, p 23).

The state's side of the industry is controlled at ministerial level. There have been changes in the way in which it has been administered. In the post-war period, the Ministry of the Fishing Industry (*Ministerstvo Rybnoy Promyshlennosti*) was at first the focal body. It was a Union-Republican Ministry, which meant that it acted through the Ministries of the Fishing Industry in those constituent republics having such an industry—in fact, seven. In 1957, these ministries were replaced by the regional Economic Councils (*Sovmarkhoz*) in Khrushchev's decentralization moves. This led to certain improvements, but also to a lack of co-ordination. The North Pacific fishery, for instance, was divided between five Economic Councils, so a co-ordinating authority was set up for that region. Then, in 1962, central control was reasserted with the creation of the State Committee of the Council of Ministers of the USSR on Fisheries [*Gosudarstvennyy Komitet Soveta Ministrov SSSR po Rybnomu Khozyaystvu*], which in turn set up Main Basin Administrations of Economic Council status, to supervise fisheries in major sea areas (Mikhaylov, 1962, p 153). In October 1965, new economic reforms brought back the Union-Republican Ministry system, but this time called the Ministry of Fisheries [*Ministerstvo Rybnogo Khozyaystva*]. The Union Ministry controlled the five main basins: Far Eastern

Vladivostok), Northern (Murmansk), Western (Riga, Arkhangelsk Sea (Sevastopol'), and Caspian (Astrakhan). The man in charge of the whole apparatus or almost all this time was A. A. Ishkov, who was first Minister of the Fishing Industry, then Chairman of the State Committee, and is now Minister of Fisheries.

It is the enterprises controlled by this system which operate the newest equipment and exploit the most distant regions. They take about three quarters of the Soviet catch of fish at sea, and the productivity of their labour force is three or four times higher than in the collective farm system (Mikhaylov, 1962, p 202). As might be expected in these circumstances, the trend towards "concentration", that is, forming fewer and bigger production units, is seen as a desirable process. The Northern Basin Administration, operating in the North Atlantic and based on Murmansk, is the model in this respect, with its single port handling over 800000 tons of fish a year (about the total of all fish ports in the British Isles). Factory trawlers are much in favour, and their operation is found profitable (Mikhaylov, 1962, p 206).

The financial structure of the industry is similar to that in many other Soviet industries. Funds for capital investment are made available from the central budget as non-returnable grants, and the industry makes virtually no provision in its own budget for servicing its capital. This is one of the main differences between the Soviet and private-enterprise industries, and will be referred to again later (see p 178 below). Depreciation has to be paid for by each enterprise, however, and this, together with operating costs, must not exceed the income received. This is what is implied by "economic accounting" (*khozraschet*), the system in wide use throughout the fishing industry. It does not mean that certain enterprises may not be planned to show a loss, nor, on the other hand, does it mean that profitability is the main criterion by which success is judged. Rather, it is the "economic accounting" system used as a guide—one among several—to the efficient running of the enterprise. Individual ships, as well as larger units, are normally required to operate this system.

Workers' pay is made up chiefly by piece-work calculations, with extra pay for overtime and long service, prize money for fulfilment or overfulfilment of the task assigned for the voyage, and a "regional coefficient". This last varies from 100 per cent addition for the Arctic Ocean and the Bering Sea over 100 nautical miles offshore, 80 per cent for the North Atlantic and Kamchatka waters, 40 per cent for the Murmansk region (possibly implying the whole Barents Sea), to nothing for the Baltic or the Black Sea (Mikhaylov, 1962, p 218-19). These rates are centrally determined, and are not necessarily related to the industry's income from sale of its product. In fact, in about 1961 they were having the effect of making the Bering Sea operations unprofitable (Mikhaylov, 1962, p 58). This is a good example of a planned loss, justifiable on other grounds. The wages structure is, however, expected to be an incentive to greater production. The fact that certain of the elements mentioned above are not related to the quantity of fish caught has been criticized in the Soviet specialist press (Chulkovas, 1963; Mikhaylov, 1962, p 222). On the other hand, there is an obvious difficulty in setting the norm beyond which bonus payments are to be

made, and convincing everyone that it is a fair one (see, for instance, *Rt. Khozyaystvo*, 1963, No 9, p 75-81).

The industry has its own training schools. There are "higher training establishments" (VUZ) at Murmansk, Vladivostok, Kaliningrad and Astrakhan, nine fisheries technical schools, twelve intermediate sea schools, and others (Mikhaylov, 1962, p 211). The number of persons employed in the industry, including the collectives, was about 500,000 in 1961, and about a third of these were sea-going (Mikhaylov, 1962, p 208).

As elsewhere in the Soviet economy, the wages structure is not the only incentive to higher production. So-called "socialist competition" encourages friendly contests between ships, or other units of similar size to each other, and "exemplary ships" (*oporno-pokazatel'nyye suda*) are designated as such and held up as an example to the rest—a sort of group Stakhanovite movement. These ships are also used to try out new methods of work.

The question of the profitability of the industry, and the subsidy, if any, it receives from the state, is also relevant. It is a question to which there is no easy answer, however, owing to the nature of the Soviet economic system. It will be more convenient to discuss this issue as part of a wider comparison between the Soviet and private-enterprise fishing industries (see p 178-80 below).

The fishing grounds

Atlantic Ocean

The first move out from coastal waters into the oceans of the world came from the north-west corner of the country—the White Sea region and Murmansk the only major Soviet port which is ice-free at all times of year. The fishing potential of the Barents Sea was first studied at the turn of the twentieth century. A Russian scientific team did the work, but British, and then German, trawlers took advantage of its reports. Only in the 1930's did Soviet trawlers surpass the catch of the British and Germans combined. At the end of the Second World War there was a small but quite flourishing Soviet fishery in the southern Barents Sea, where herring, cod and plaice were taken.

The herring fishermen were the first to go further afield. They went to Spitsbergen and Lofoten waters in 1949, then to the Greenland Sea in 1951. From 1952 herring were fished on a year-round basis. The Soviet catch in the North Atlantic (but excluding the Baltic and the North Sea) rose from 5000 tons in 1949 to 261,300 tons in 1956, the 1956 figure being taken by 450 medium trawlers based on both Murmansk and Baltic ports (Bolotnova 1958, p 288-29. Shparlinskiy's (1964, p 11) statement that 'until the end of 1956, fishery did not extend beyond the limits of the eastern and central areas of the Barents Sea' must be regarded as a generalization which is not strictly accurate).

The hunt for bottom fish went further afield at the same time, the same ships being used for trawling and catching herring, but the extension of trawling seems to have been slower in gathering momentum. Baltic-based ships were active in the Norwegian Sea in the early 1950's, while Murmansk-based ships at about the same time were getting up to the north-west Barents Sea, round

Bjornøya and Spitsbergen (Tovbin, 1956; Sukhoruchenko, *Rybnoye Khozyaystvo* 1956, No 7, p 43). Already thoughts were turning to more distant regions. A reconnaissance to the Newfoundland banks was made in 1954, but it was probably the realization that catches were beginning to fall away in the Barents Sea in 1957 that sent Soviet trawlers to the north-west Atlantic in force. At first the Soviet ships took mainly redfish, which they followed up into Davis Strait, but later they took cod and haddock (Marti, 1959). The policy was always to send in research ships first, in order to make a study of the potentialities. In this way the Soviet fleets moved on to the shelf off Nova Scotia, exploiting herring stocks on George's Bank in 1960 and Banquereau Bank in 1961 (Vyalov and Fridlyand, 1962). Davis Strait was not forgotten, further studies leading to exploitation of cod in 1963 (Pechenik, 1965). The East Greenland shelf was studied also, despite ice problems (Pechenik and Mina, 1964). Meanwhile the herring migrations in the Norwegian Sea were followed each year by a large Soviet fishing fleet. The USSR was thus active in virtually all the North Atlantic fishing grounds by 1964. They were all well known, and had been fished by other nations; but the Soviet fishermen were able to find stocks of fish which had not been exploited before, and of which the existence was either unknown or judged unimportant.

Administratively, the fleets concerned came under the control of a number of different authorities: first, the three Baltic republics and the Russian Republic (RSFSR); then six Economic Councils, from 1957; then a smaller number, when some streamlining was introduced in 1962; and finally, back to the first arrangement with the re-introduction of Ministries of Fisheries in 1965. Rivalry between different parts of the system is not unknown—particularly between Baltic-based and Murmansk-based fleets.

While development in the North Atlantic was under way, reconnaissance voyages were already being made to the shelf waters off Spain and West Africa to study prospects for sardine and tuna fishing in those regions. The first was made in 1957 and others followed. By 1959 half a dozen medium and large trawlers were active there (Borodatov and Karpechenko, 1958; Khlystov, 1963). In 1961 and 1962 the research ships went further south, to investigate horse mackerel and sardine prospects between St Helena and Walvis Bay (Overko, 1964). Some part of the catch in these regions is landed in West Africa. Since 1961 research ships have also been visiting the South American shelf (Berenbeyn and Probatov, 1963). These operations appear all to be based on Baltic ports.

It has been recognized for some years in the USSR that Barents Sea catches are falling (Marti, 1961). More recently, notice has been taken of the drop in herring catch, mainly in the north-east Atlantic, between 1954 and 1963 (Fedorov, 1965). The attitude of the Soviet fishing industry in the Atlantic, therefore, is that the search for new grounds must be continued and increased in intensity, and it is more likely that these will be found in the south than in the rather well-exploited north. New fishing techniques, for sardine and tuna, for instance, must be mastered too. There has been mention of the need to examine the potential of the Southern Ocean (*Rybnoye Khozyaystvo*, 1962, No 7, p 7-9). Some biological studies have been made, including one by a research ship sent

for the purpose in 1965 (Moscow Radio, 12 July 1965), but no fishing vessels have yet gone there. If a decision to go ahead is made, the experience of the Soviet whaling flotillas in these waters annually since 1949 will be a tremendous help.

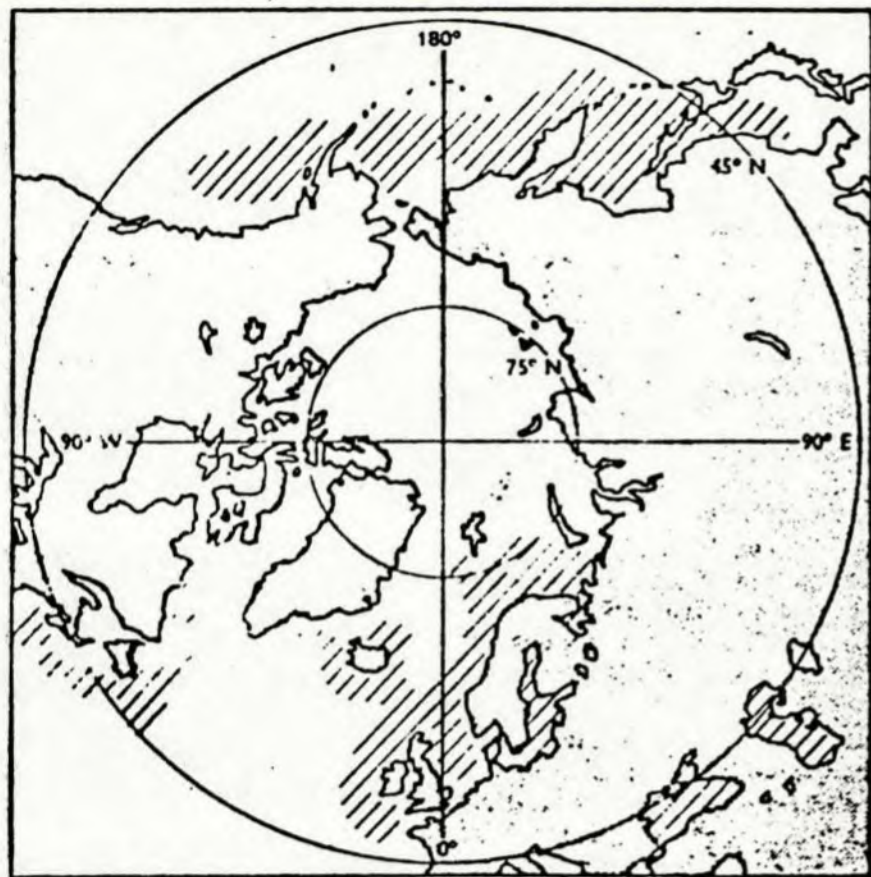


Fig. 1. Soviet fishing grounds. ▨ main fishing grounds used by Soviet vessels, 1965.

Pacific Ocean

Although the USSR has a long coast on the Pacific, that ocean has always been of lesser importance to the country because of its distance from large centres of population. It is therefore not surprising that the expansion of Soviet Pacific fisheries occurred later than had been the case in the Atlantic. Until about 1957, Soviet sea fishing was restricted to coastal waters and was largely for herring and salmon. The main bases were Vladivostok and its neighbouring port of Nakhodka, the island of Sakhalin, and Petropavlovsk in Kamchatka. The Soviet industry knew some, at least, of the potentialities further away. There had been reconnaissance expeditions, and anyway other countries were taking nine million tons of fish from the North Pacific in the mid-1950's.

The Bering Sea was the obvious direction in which to expand. Plaice was the

first fish taken in quantity (Drozdov, 1961). The arrival of the first large steam trawlers in the late 1950's was the signal to start looking for coalfish (Shubnikov, 1960). Interest was aroused, too, in halibut, which was just beginning to be exploited by United States and Canadian fishermen in the region between Unimak Pass and the Pribilof Islands (Novikov, 1960), and in redfish (Lyul'mova, 1961; Lestev, 1961); by now Soviet ships had reached out beyond the Bering Sea into the Gulf of Alaska. There are no very large catches of cod in the North Pacific, but the Pacific cod had been caught off the Kamchatka coast and was judged worth looking for out at sea, together with the related Alaskan pollack (*mintay*) (Shlyamin, 1958). Meanwhile herring were found in the central and eastern parts of the Bering Sea, and further south there was a major development in exploiting the herring-like saury, *Cololabis saira* (*sayra*). All this added up to an approximate doubling of the yield (see Table 4).

One of the staple yields of the North Pacific to Soviet fishermen has been salmon, and this has been in steady decline since the Second World War (Table 1 shows that this was true relatively, but it was also true in absolute figures). The Soviet catch was taken mainly at the mouths of rivers on Kamchatka and Sakhalin. The Japanese have long caught salmon in the North Pacific, and they started an open sea fishery in the early 1950's, netting the salmon on the migration routes between the Asiatic and the American coasts. The USSR claims that Japanese operations have been the cause for the reduction in catch from about 230000 to about 130000 tons a year. No legitimate complaint can be made about this alone; but the USSR goes further and accuses the Japanese of indiscriminate fishing, by taking immature fish and injuring others (Kuznetsov, 1957; Al'perovich, 1957), actions which are endangering stocks. A convention was signed in 1956 (Moiseyev, 1960), and by it catch limits were agreed and an annual meeting of scientists arranged. These meetings, which have to fix the limits for the next year, are often very protracted, and there is still much argument over infringement of the agreed conservation measures (Moiseyev, 1964).

Another, much smaller, fishery, which is also shared with Japan, is the king crab fishery in the eastern part of the Sea of Okhotsk. Three quarters of the world production of canned crab comes from this region. The Soviet catch has risen from 15000 to 42000 tons since the Second World War, while the Japanese catch has been at a somewhat lower level. The 1956 convention between the USSR and Japan also included the crab fishery, and certain conservation measures have been agreed. On the Soviet side alarm has been expressed on occasions (Galkin, 1959; Lavrent'yev, 1963), but the Soviet catch has continued to rise.

Expansion in the Pacific has largely been in the Bering Sea, reaching over the Gulf of Alaska. The new Soviet interest in tuna fishing off West Africa, however, is likely to lead the Soviet Pacific fishermen to exploit the tuna fisheries of the more southerly parts of the Pacific as soon as the specialised equipment is available. Further considerable expansion is therefore to be expected.

Indian Ocean

Research ships based in the Black Sea started investigating possibilities in the Indian Ocean in the early 1960's. At first the main interest appeared to be in the application of electric fishing methods in the Gulf of Aden region. It was announced in 1965 (Moscow Radio, 13 March) that two tuna fleets were active in the Indian Ocean, working on a year-round basis with one relieving the other so evidently major expansion is planned here also.

Arctic Ocean

The Barents Sea, along with the Norwegian and Greenland Seas and Davis Strait, have been considered part of the North Atlantic. This paragraph therefore refers only to the seas north of Siberia—the Kara, Laptev, East Siberian and Chukchi Seas. There are, broadly speaking, two potentially useful fishing assets. The first is the polar cod, *Boreogadus saida*, whose presence in most of these seas has been established (Ponomarenko, 1965), and which has been studied in some detail in the Barents Sea. There are two difficulties in the way of its commercial exploitation. First, the fish go bad very quickly after they have been caught; and secondly, the best fishing grounds are in open pack ice, so that ice-strengthened trawlers are required. The first difficulty can be avoided by grinding the catch at once into fish meal. This has been done on a limited scale in the Barents Sea and found satisfactory (Ponomarenko and others, 1962), but a private-enterprise industry would be unlikely to find it economic, since fish meal is normally a by-product, made of otherwise wasted parts of standard commercial fish. The other could obviously be met if the necessary expense seemed justified. There has, however, been very little exploitation of this species by the Soviet industry. The peak was a catch of 8000 tons in 1943, when any source of protein was obviously most welcome (Dmitriyev, 1958b).

The other asset is the diadromous fish of the great Siberian rivers. These fish are large and valuable—whitefish (*Coregonus* species) and sturgeon. The total annual catch at the estuaries, deltas and lower reaches of the Ob', Yenisey, Pyasina, Khatanga, Lena, Yana, Kolyma and Indigirka was about 26000 tons in the mid-1950's (Mikhaylov, 1958). Their importance is greater than this tonnage might imply, since the value is high. This is a long-known asset, and there have been cases of over-fishing. Certain temporary prohibitions were applied, as of sturgeon fishing in the Ob' estuary, and these have improved the situation (Bondarenko, 1960). Hydro-electric schemes upstream pose a threat of cutting fish off from their spawning grounds. The fisheries interests are alert to this, but in cases of direct conflict of interest, the hydro-electric interests would probably win.

Of these two Arctic resources, the estuarine fishery of diadromous species is the most promising. Some expansion of this is certainly possible, but probably not very much.

Fishing methods

Many of the methods used by Soviet fishermen are traditional and well enough known outside the USSR for comment to be unnecessary here. There is nothing very unusual, for instance, in the type of trawl or of drift net used. In some matters, however, there are points of difference which are worth examining. The chief of these are three: fleet operation of fishing vessels, types of vessel, and electric methods of fishing.

Fleet operation

By fleet operation is meant the centrally controlled and co-ordinated movement of a considerable number of fishing vessels in their search for fish. This is a method of fishing little practised in the west, where competing firms, and competing skippers within firms, rarely tell each other where the fish are to be found. The method may also include the operation of "mother ships" and transports to take the catch back to port.

There is surprisingly little in Soviet fishing literature on fleet operation, possibly because in Soviet eyes it is much the most obvious method. The information given below emerges from accounts which are not primarily concerned with fleet operation as such (Ayushin, 1965; Gontarev, 1957; Lysyakov, 1963). The size of fleet is variable. The commodore and his staff are aboard either the mother ship, if there is one, or any one of the catchers. Information about water temperature, plankton, and other indicators of fish is circulated daily round the fleet, together with catch figures of all ships in the fleet. The commodore has under his command a number of reconnaissance ships—one for every ten to twenty catching ships—and possibly also an aircraft if the operational area is not far from land (as in the Sea of Okhotsk, for instance). The reconnaissance units locate the fish, the catchers are directed to the area, and the reconnaissance units then move off in search of new shoals. The reconnaissance ships are fitted with fish-locating instruments; possibly it is only these ships which are so equipped, but there is no direct evidence on this point. It is likely that they also do some fishing. Individual skippers have some liberty of action. They are provided with much information, but choice of the exact region where each will fish is left to the skipper. It is regarded as important that the amount of initiative should remain with him. There was a conference of reconnaissance groups in June 1964, attended by Soviet, Polish and East German fishermen. Operational procedures and forecasting methods were discussed. This is expected to become an annual event (*Rybnoye Khozyaystvo*, 1964, No 11, p 93).

These arrangements obviously hold good when all the ships in the fleet are from the same fishing administration ashore. When several administrations are involved, there are also rules for appointing a commodore and his staff, so that the same system can apply. At least that is the way things work in the North Pacific. In the Atlantic, there would seem to be less co-operation between Baltic-based and Murmansk-based fleets. Since wage rates vary with the level of production reached, there is an obvious danger that the pursuit of more fish, and

therefore more pay, will conflict with a skipper's duty to tell his comrades and therefore his rivals, where the fish are. This is, of course, the mechanism which effectively prevents exchange of information among western fishermen. It is hard to believe, therefore, especially in view of the importance attached to leaving some initiative to skippers, that duty to comrades invariably comes first. Against this must be set one of the few pronouncements on this topic: the categorical statement made in 1961 that "there has not been a case in which a crew which found good shoals of fish has failed to tell its rival" (*Rybnoye Khozyaystvo*, 1961, No 7, p 60). Whichever side one feels inclined to believe, one has to accept that conclusive evidence is likely to come only from an unprejudiced fisherman with intimate knowledge of Soviet practice, and evidence of this sort is lacking.

An important feature of the Soviet mode of operation is the employment of larger ships in various capacities: both as mother ship (*plavbaza*, or floating base), and as transport for taking home the catch. Ship design, and the new types introduced into the Soviet fleets, are the subject of the next section below. The mother-ship idea is an old one. Such ships used to operate with fleets of sailing smacks after herring in the North Sea, and the schooners at the Grand Banks with dories on their decks were also mother ships. The present Soviet mother ship is a floating headquarters, store, fuel dump, welfare centre, and hospital, but perhaps her most important function is to take over the catch in order to enable the catching vessel to stay longer on the fishing grounds. She may or may not catch fish herself. The importance of having mother ships grows as the distance between home ports and fishing grounds increases. If there is no mother ship, or she is unable to accept more fish freight, transport ships can be used. Their function is simply to replenish stores and accept the catch from each vessel, and then make for home.

There is no rigid line of demarcation between mother ships and transports. Each must have either refrigerated holds, or processing equipment, or both, in order to preserve the catch in good condition. Processing equipment is the most favoured, since it permits the product to be ready for sale to the consumer on arrival in port (if it is filleting equipment, then refrigeration is also necessary). A high, and increasing, proportion of the Soviet catch is treated in this way—two thirds in late 1965, according to Ishkov (quoted by Moscow Radio, 22 December 1965). Many of the big trawlers are factory trawlers, with sufficient processing equipment for their whole catch. Even so, transport ships can still play a part by lengthening their stay at the fishing grounds. For instance, the refrigerated transport ship *Passat* was reported (Volkov, 1965) to be employed in collecting fish from large trawlers and taking them stores. Trans-shipment of freight in the open sea raises some by no means easy problems of seamanship, since coming alongside in bad weather can obviously be difficult. According to the same report, the *Passat* can do this in winds of strength five to six.

Some of the earlier Soviet thinking on this subject (Kavalerov, 1957) looked forward to a big increase in the number of mother ships of the type which processes the whole catch, and concluded that when sufficient were available ordinary transports and even refrigerated transports would not be required.

The latter are still in use, as the *Passat* report shows, and this may reflect a change in policy towards a higher proportion of deep-frozen fish, rather than other fish products, in the marketable output. In any case processing at sea is seen as more desirable for the smaller species living near the surface—herring, mackerel, sardine—than for demersal cod and haddock (Dubovskoy, 1963). The newest idea, of which more will be said later, is to have very large ships of over 40000 tons displacement. These will probably have processing and storage facilities of all desirable sorts, and will also carry their catching vessels about with them, deck storage being provided for these (*Rybnoye Khozyaystvo*, 1964, No 4, p 3-7). None of these are built yet, but they are on their way.

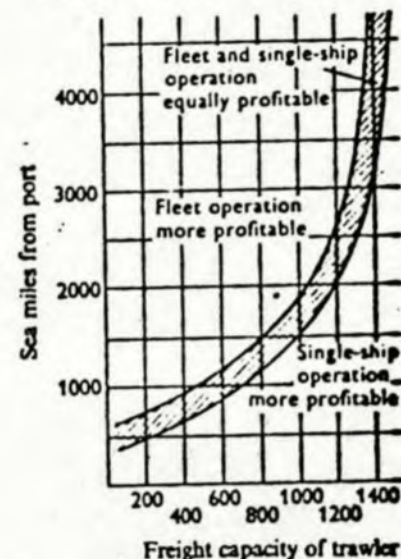


Fig. 2. Soviet estimate of profitability of single-ship and fleet operation of fishing vessels. Source: Avdeyev, 1964, p 32.

The mother-ship idea is certainly much favoured in the USSR. On economic grounds, fleet operation in general, and mother-ship operation in particular, are likely to drive out, if they have not already done so, the operations of single small or medium trawlers. The only exception could be in waters close to home ports. But they have not, and probably will not, exclude operation of single large factory trawlers. Fig. 2 shows how the Soviet fisheries economists view the competing claims of single-ship and fleet operation, and the conclusions reached are very much as a western economist might expect. It is pre-supposed that single ships are capable of freezing and also of processing their catch. Operation of single large factory trawlers has also the advantage, not reflected in the graph, of avoiding problems of trans-shipment at sea, which, although often surmountable, can nevertheless restrict activity. Another, and perhaps the most important, factor left out of account in the graph is the behaviour of the fish for which the catcher is searching. A mass assault is more effective with some than with others. A Soviet specialist commenting on the reconnaissance

of Davis Strait by Soviet ships in 1959, makes the statement: "Taking into account the great extent of the region and the mobility of the fish, the industry can be effective if not less than 10-15 ships are used, together with an appropriate number of reconnaissance ships. Single vessels will have only temporary successes" (Pechenik, 1960, p 12).

The advantage of mother-ship operation is derived from the greater time which it permits the catchers to spend actually catching, and therefore is directly dependent on the willingness of crews to spend longer at sea. There is no information on this aspect of the Soviet industry. There is no evidence, however that in the past the industry has been restricted by factors of this sort.

Fishing vessels

Ship design has played the key role in the expansion of Soviet sea fisheries. Table 6 lists the characteristics of the main types of ship now used.

The significance of this building programme lies both in its diversity and in lack of excessive diversity. Outside the USSR, most advanced fishing nations have been operating ships of medium trawler size, and not very much else. Development of large stern factory trawlers has been a main feature of the Soviet industry. The ideas behind these ships have often not been Soviet. The *Pushkin*-class stern trawlers were almost certainly copied from the plans of the British *Fairtry* class, and ideas incorporated in them had been tried out elsewhere too; but the translation of the ideas into large-scale practice is a wholly Soviet achievement. It was the twentieth Congress of the Communist Party of the USSR, held in early 1956, which gave the go-ahead to a big programme of construction of the larger types of ship, and the principle was accepted that building should not be confined to Soviet yards.

At the same time, there has been awareness of the danger of permitting the proliferation of many differing designs of ship when the differences do not reflect important changes of function. In 1947-51, before the period of greatest expansion of high seas fishing, standardization of design in the Soviet fishing industry is stated to have reduced the number of types of fishing vessel from 118 to 20, and of marine engine from 115 to 8 (Mikhaylov, 1962, p 81). Soviet national standards were introduced for fishing vessels in 1952. These were under revision in 1961, and the new standards made provision for eight types of catching vessel and seven types of transport ship (Terent'yev, 1962); the mother ships were apparently not included. If standards such as these are adhered to—and admittedly there does not seem to be much good evidence that they are—there are plenty of clear advantages on such points as construction and maintenance. The British fishing industry undoubtedly suffers from failure to standardize sufficiently. On the other hand, rigid adherence to standards when they have become outdated, as they all must, can also cause great loss of efficiency. This was no doubt the reason for the Soviet revision of standards in 1961.

The presence of numerous freezer trawlers and refrigerated transports in the Soviet fleet will be noticed. It is only clear in a few cases, however, at what temperatures fish holds are kept. No doubt there is variety, it may be supposed

Table 6. Vessels in use with the Soviet fishing industry, 1952-60

Class and model	Year introduced	Yard built	Crew	Speed (knots)	Deck length (m)	Deck width (m)	Full load capacity (mt)	Freezer capacity (mt)	Engine power (hp)	Range (days)	Remarks
Standard			22	9	50	—	160 m ²	65 mt	300-400	30	—
Pioneer class	1954	U.K.	—	—	58	6.850	—	—	1100	—	20 in class
Okean class	1957	E. Germany (later USSR)	—	—	51	7.740	—	—	540	—	—
Unnamed class	1958	—	28	10	—	—	410 m ²	—	600	40	Holds at 0° to -2°C.
Mayak class	1962	USSR	—	—	—	—	160 m ²	—	800	—	Holds at -6° to -18°C.
Unnamed class	Build- ing to 1965	—	29	12	54.2	940	352 m ²	180 mt	800	38	—
Pushkin class	1954	W. Germany	102	12.5	85	3700	1242 mt	—	1900	65	24 in class
Mayakovskiy class	1958	USSR	102	13	85	3658	3684 mt	—	2000	80	Storage at -30°C.
Lezov class, Kosmos class	1960	Poland	—	12.5	85	2298	1240 mt	—	2000	70	Kosmos class have small improvements and started in 1963
Tropik class	1961 or 1962	E. Germany	76	12.6	80	3261	1050 m ²	794 mt	1700	—	Primarily for mid- and S. Atlantic
Severobitsk class	1958	Poland	140	13	155	17140	6000 mt	—	5000	60	Storage at -6° and -18°C.
Pioneer class	1963	Poland	248	—	—	—	2600 mt	—	3530	—	Designed for whale meat and/or fish
Vitus Bering class	1963	Denmark	—	14	91	—	2600 mt	—	—	—	—
Andrey Zakharov class	1960	USSR	640 later, 525	12	161	15300	7500 mt	—	4000	75	—
Akt'yubinsk class	1956	USSR	—	17.8	131	10250	—	—	7200	—	Storage at -6° and -18°C.
Tavriya class	1959	USSR	82	13.6	99	5215	3200 m ²	—	4000	60	Designed for whale meat and/or fish
Sevastopol class	1959	—	—	16.5	118	8970	5400 m ²	—	7200	—	—
Brestak class	1960 or 1961	E. Germany	91	11	82	2495	1412 mt	1313 mt	1300	—	—

...the most useful table in Klein, 1964, p. 305, and is derived from the same sources.

that most ships with refrigerated holds cannot provide storage below -2°C , and deep freezing is provided for in some of the larger ships, and there seems to be a general intention to try to bring all refrigerated space down to -30°C (Rybnoye Khozyaystvo, 1962, No 8, p 9). This will take some time, of course. In the mid-1950's, fresh and frozen fish accounted for 38 per cent of Soviet fish products while the comparable figure for the USA was 55 per cent (Nutter, 1962, p 85-80). The trend in the Soviet Union may well follow the trend in the USA towards more fresh and frozen fish.

Accommodation for the crew is said to be good in the new Soviet ships. The voyages are often longer than is the case in the British and most other western industries, so comfort could be expected to receive more attention. There are

Table 7. Soviet fishing craft in 1956

Type	Number	Horsepower	Tonnage
Powered craft			
Trawlers	1785	549300	—
Sciners	1724	225700	—
Others	8878	207600	—
Total, powered craft	12387	982600	—
Non-powered craft	48056	—	127400
Total, all vessels	60443	—	—

Source: Yearbook of fishery statistics, Vol 6, 1955-56.

one-, two- and four-berth cabins. The standard in the Pioneer-class medium trawlers is that of the best western practice (these ships were built in Britain and accommodation was in conformity with British Board of Trade regulations). The Soviet specialist press describes crew accommodation as being "as good as in foreign ships" and "better than some foreign ships" (Blyumkin and Terent'yev, 1963). This seems to be a fairer assessment than some extravagant accounts of "luxurious" crew quarters recorded in the western press.

While there is quite a lot of information about the types of vessel employed, there is very little about the numbers in each class. Detailed figures on the strength of the fishing fleet are not published in the USSR. The last return to the Food and Agriculture Organisation of the United Nations was in respect of 1956 and is given in Table 7. This information for 1956 may be compared with the bald statement that in 1965 the fleet comprised 60000 vessels (Ishkov reported by Moscow Radio, 6 July 1965). Everything depends on the split-down of that figure into numbers of each class of vessel, and this is not given. The 1785 trawlers, with an average power of 300 hp, are the most important figure in the 1956 table, and it has no doubt grown dramatically, certainly in power, during the decade. Some sort of estimate can be made for present numbers. Soviet official figures for shipping at 1 January 1965 (Morskoy Flot, 1965, No 5, p 2) give 2370 vessels of over 100 Gross Register Tons in the Soviet fishing and whaling fleet, totalling 1790316 GRT. Taking this as the basis, and making allowance for additions in 1965, a reasonable estimate for the fishing fleet at the end of 1965 might be 800 medium and small trawlers (under 800 GRT), 250

large factory trawlers (800-3000 GRT), 50 mother ships, and 150 large refrigerated transports. The remainder, about 1200 vessels, mainly large sciners, are probably mostly used in home waters.

Catching techniques

Soviet research on catching techniques has followed quite orthodox lines (Zaytsev, 1961). Possibly the field in which the USSR has made most progress by comparison with some other countries is in electric methods. The technique of lowering an electric lamp to attract the fish, and then bringing them aboard either by nets or pumps, was tried experimentally on Caspian herring (*Clupea pellae*) from 1954, and was well established in the early 1960's in the Black Sea also, for horse mackerel as well as herring. From 1961 the same method was tried for saury in the Pacific, evidently successfully (Semenov, 1962, 1963).

If a current is passed between anode and cathode under water, some fish, in certain conditions, may be drawn towards the anode (electrotaxis), and a greater current may induce sleep (electronarcosis). These methods may be used instead of, or in addition to, lights. They are ways of concentrating the fish, whether in front of a trawl, over a net or under a pump. There has been Soviet experimental work on these techniques (Mal'kyavichus, 1961), but it does not seem to have led to wide application. One of the difficulties is the amount of electric power required, since this demands special generating equipment aboard the ships.

A survey of the Soviet industry published in 1962 (Mikhaylov, 1962, p 91, 260) urged further application of the electric light method to other species, particularly in the Caspian, Black and Baltic Seas, and pointed out that the method was widely used by Japanese, Norwegian, French and American fishermen. The reason why it is not used by the British industry seems to be that equipment is not yet sufficiently reliable to make the idea attractive.

The only other catching technique in which the Soviet industry is likely to be advanced is that of sub-ice fishing. The technique consists of putting nets into position, and withdrawing them, under ice which may be several feet thick. This is known to be successful, and yields good catches, but it is practiced largely in rivers and estuaries, and so is not strictly relevant to this enquiry.

Scientific support

Large-scale scientific support is a feature of the expansion of Soviet sea fisheries. The most important element in that support is a group of fisheries research institutes belonging to the Ministry (or State Committee) of Fisheries, headed by the All-Union Research Institute of Sea Fisheries and Oceanography (Vsesoyuznyy Nauchno-Issledovatel'skiy Institut Morskogo Rybnogo Khozyaystva i Okeanografii, abbreviated to VNIRO) in Moscow (Rybnoye Khozyaystvo, 1960, No 7, p 8-43). It was founded in 1933, by the amalgamation of two other institutes which then covered fisheries and oceanography. VNIRO set up branches for each fishing area—the north (Barents Sea), the Baltic, the Black Sea and Sea of Azov, the Caspian, and the Far East. There is a separate institute for fresh water fisheries.

VNIRO itself had a scientific staff of 80 in 1960, with technical and administrative staff of at least as many. It studies the long-term prospects of the industry, and mounts many expeditions. Under it is the Research Institute for Mechanisation of the Fishing Industry [Nauchno-Issledovatel'skiy Institut Mekhanizatsii Rybnoy Promyshlennosti] at Leningrad, working on design and construction of equipment since its foundation in 1956.

The Pacific Research Institute of Sea Fisheries and Oceanography [Tikhookeanskii Nauchno-Issledovatel'skiy Institut Morskogo Rybnogo Khozyaystva i Okeanografii, abbreviated to TINRO] is probably the largest of the regional institutes. It is based at Vladivostok, and has outstations for Magadanskaya Oblast', Kamchatka, Sakhalin and the Amur. It was set up, under another title in 1925, and had five ships and a scientific staff of 30 in 1960. It has probably increased in size since then, having undertaken a detailed study of the resource of the Bering Sea in the period 1958-62 (Moiseyev and others, 1963-64).

The Barents Sea fisheries base has the Polar Research Institute of Sea Fisheries and Oceanography, named after N. M. Knipovich, a leading fisheries biologist [Polyarnyy Nauchno-Issledovatel'skiy i Proyektnyy Institut Morskogo Rybnogo Khozyaystva i Okeanografii imeni N. M. Knipovicha, abbreviated to PINRO]. This is at Murmansk, where it has been since the early 1930's. As the Murmansk-based fishing fleet has moved out into the North Atlantic, so PINRO has extended its scope also. In 1962 it had five research ships.

The third regional institute in size is the Atlantic Research Institute of Sea Fisheries and Oceanography [Atlanticheskii Nauchno-Issledovatel'skiy Institut Morskogo Rybnogo Khozyaystva i Okeanografii, abbreviated to AtlantNIRO], at Kaliningrad. Until 1963 this was known as BaltNIRO, its activities being primarily concerned with the Baltic. Now it too has extended its scope, and presumably covers the central and south Atlantic to avoid overlap with PINRO.

The Azov and Black Sea Research Institute of Sea Fisheries and Oceanography [Azovskiy i Chernomorskoy Nauchno-Issledovatel'skiy Institut Morskogo Rybnogo Khozyaystva i Okeanografii, abbreviated to AzherNIRO], and the Caspian one [KaspNIRO] are concerned with these land-locked waters. But AzherNIRO is taking an interest in the distant fishing now being undertaken by the Black Sea fishing fleet in the Indian Ocean, and, also in parts of the Atlantic. The whole VNIRO system employed 860 people in 1957, among them over 200 scientists (Ishkov, 1957, p 16), and the number has undoubtedly increased since.

While these institutes are the backbone of fisheries research, a number of other scientific bodies also contribute, notably various biological institutes attached to the Academy of Sciences. Further, there is a training establishment for biologists, engineers, economists and shipbuilders required by the industry, called the Technical Institute of the Fishing Industry and Fishery Economics [Tekhnicheskii Institut Rybnoy Promyshlennosti i Khozyaystva], at Kaliningrad. This has been functioning since 1931, and in the first 30 years of its existence had produced 5240 graduates for the industry (Borisov, 1961).

An American journal (*Commercial Fisheries Review*, Vol 26, No 7, 1964, p 74) stated that in 1964 there were 20 Soviet research institutes working on fisheries

problems, and that they jointly employed a total of 4000 scientists and technicians. In view of the outline given above, this seems entirely plausible.

A detailed survey of the scientific investigations of these institutes would be out of place here. Much of the work is in any case standard and more or less routine, well known to fisheries scientists everywhere. The thoroughness with which full studies are made whenever new areas are under consideration is perhaps noteworthy. Two other points deserve special mention. One is the operation of an ex-naval submarine, *Severyanka*, for fisheries research. VNIRO acquired it in 1958, and has been using it in northern waters (Zaytsev and Azhazha, 1959). The idea is not new. Japan has used it, but few other countries have, and none on a whole-time basis for fisheries research. On the other hand, nothing very exciting in the way of scientific results has yet appeared. The explanation may be deducible from recent announcements in the Soviet press (*Vodnyy Transport*, 25 August and 30 October 1965). These made clear that she had only completed eight voyages in seven years, and her current, ninth, voyage, was to last three weeks—apparently the normal duration. Evidently she has been out of commission for a long time, and may yet, therefore, make interesting contributions.

The other experiment worth mentioning has been the attempts to introduce Pacific salmon to the Barents Sea. This had been tried, without success, in 1933-39. In 1956-58 pink salmon (*Oncorhynchus gorbuscha*) larvae were introduced to the rivers of Kol'skiy Poluostrov, and from 1959 to 1961 fry, at a rate of up to fifteen million a year. The experiment appeared to be going well in 1960, when an estimated 100000 pink salmon were caught in Norway, Scotland, Iceland and Svalbard. But recoveries fell off sharply, and only a few individuals were caught in 1963 (Azbelev and Larazev, 1964; Azbelev and Yakovenko, 1963). Chum salmon (*Oncorhynchus keta*), released as fry in 1959-61, do not appear to have been recovered at all (Bakshanskiy, 1963). These results are disappointing, but Soviet fisheries biologists, who have a good record of success in introducing new species to inland waters, will no doubt keep trying. There was a further massive introduction of pink salmon fry in 1963 (Karpevich and Lokshina 1965, p 700), and a volume of papers on the biological problems of the operation has just come out (Galkina, 1965). The suggestion was made (Rass, 1958) that redfish (Serranidae family) should be brought to the Barents Sea from the North Pacific, and the East Siberian cod (*Arctogadus morrisovi*) from the Kara, Laptev and East Siberian Seas to the White Sea and the Sea of Okhotsk. But nothing further has been heard of these suggestions.

International co-operation

International co-operation in the sphere of sea fisheries almost always means agreement to take joint action towards conservation of stocks. Since the resource which the industry exploits is not under national control, this is to be expected. The Soviet attitude towards conservation, therefore, is likely to determine the country's policy on adherence to international organisations and conventions.

That attitude is broadly favourable. Russian inland fisheries have been regulated since long before the Soviet period by so-called "fishing rules" (*rybolovstva*) which embody conservation practices. Pronouncements by Soviet scientists working on sea fishery problems often stress the importance of conservation (e.g. Marti, 1956; Dmitriyev, 1958; Nikol'skiy, 1962). This is a recent and typical statement by a senior member of the VNIRO staff: "Practice has shown that at the present level of fishing techniques, there are no raw materials which are inexhaustible. Therefore it is extremely important that the industry should be conducted in the World Ocean with consideration of the effective reserves of the species sought and of the recommendations which are worked out on the basis of available scientific data" (Moiseyev 1964b, p. 224). Many go beyond the concept of conservation, and urge that the idea of farming fish should replace that of hunting them (Marti, 1960)—another field where the USSR has much experience from its inland fisheries.

It may be argued that most of these statements are made, not by men running the industry, but by scientists, whose special knowledge makes the importance of conservation obvious to them. To what extent do they convince the industry? This is a much more difficult question. There is some significance in the fact that most of the conservationist statements are published in *Rybnoye Khozyaystvo*, which is the official journal of the industry as a whole, so their publication must indicate at least some official approval. Yet it is hard to imagine that the men running the fishing fleets, who have plans to fulfil and whose pay depends on what they catch, would take any more kindly than the private-enterprise fishing industry to the restrictions which effective conservation implies. An economist working in the State Planning Office [Gosplan] has recently published a paper in the same journal, in which he takes an optimistic view of the continuing availability of fish to catch, and foreshadows no restrictions, at least of a sort stringent enough to affect fast growth of catches (Shparlinskiy, 1965). Of particular interest is a short paper by a biologist (Baranov, 1962), also in the same journal. He presents the usual conservationist arguments, but his paper is prefaced by an editorial note disagreeing with the passive attitude implied in his call to estimate the stock and calculate desirable yields, and urging that man ought to interfere with the stock in order to increase it.

Perhaps the best evidence that the conservationists are being listened to, or at least not being totally disregarded, is the fact that the USSR has entered into a number of international agreements whose long-term objective is the regulation of fisheries. The most important of these are the two conventions covering North Atlantic waters: the "Convention for the regulation of the meshes of fishing nets and the size limits of fish", covering the north-east Atlantic, and the "International convention for the north-west Atlantic fisheries" (ICNAF). These had started operating in 1946 and 1949, and the USSR adhered to both in 1958. The first-named was broadened in scope and renamed the "North East Atlantic fisheries convention" in 1959, coming into force in 1963. The first international fisheries organization joined by the USSR was the *Conseil Permanent pour l'Exploration de la Mer*, a body without executive powers, but of considerable importance as a clearing-house for information and ideas. It had

been created in 1902, with Russia as a founder member; the USSR rejoined in 1955. In addition, the USSR has concluded other fisheries conventions of lesser importance: with Japan for parts of the North Pacific in 1956, with China, Vietnam and Korea also in 1956, with the United Kingdom for the Barents Sea in 1957, and with Norway for coastal waters in the same general region in 1962 (Volkov, 1958 and 1962). She has co-operated fully with her colleagues, at least on the North Atlantic conventions, and has contributed catch statistics for publication in the appropriate bulletins. The agreement which has occasioned most complaint from the Soviet side is the Soviet-Japanese convention of 1956. The complaint is of course concerned with the contentious issue of the Kamchatka salmon, already referred to. But the agreement was evidently thought worth preserving in 1962, when a new procedure for handing over arrested ships was agreed between the two parties.

Apart from adherence to international agreements, there is a more informal sort of co-operation which takes the form of working contacts between scientists and technicians. These the USSR certainly wishes to encourage, and VNIRO maintains amicable contacts with many of its opposite numbers in other countries.

It would seem, therefore, that the USSR wishes to play her full part in international regulation of fisheries. Her attitude to conservation of whales, however, presents something of a contrast. She is one of the few remaining nations with pelagic fleets in the Antarctic, which have persisted in taking the maximum harvest in defiance of clear scientific evidence. These nations have now adopted a rather more prudent policy, but the USSR must bear a large share of the responsibility for the lamentable condition to which the stocks have been reduced. Some will see in this an indication that, when it comes to the push, production takes precedence over conservation. This is a conclusion hard to resist, but the pattern may not necessarily be repeated in the fishing industry. The controlling factor is probably the state of the capital investment programme. If, as in the case of whaling, new factory ships have just been completed and have not yet shown much return, then this is clearly the most difficult moment to accept restrictions. At other phases in the cycle it will be easier.

Comparison with private-enterprise fishing industries

If comparison is to be made between the results achieved by the Soviet fishing industry and those of the British, or other private-enterprise fishing industries, there must be some assurance that like is being compared with like. The first point which arises here is whether Soviet catch figures are comparable to, say, British catch figures. As explained earlier, catch figures are probably always reconstructed from landing weights. There is, therefore, the chance that the conversion factor is not the same. In Britain, the conversion factor for cod, gutted but not beheaded, is 1.2, or an addition of 20 per cent. These factors do in some cases vary between countries, but it is not known what factor is used in Soviet statistical practice. It may be surmised, however, that the Soviet factor is not likely to vary greatly from those used elsewhere. The question

of whether the published Soviet catch figures are in other ways reliable has already been discussed (p 159-60), and the conclusion reached that there are not likely to be significant distortions of the truth from this cause either. In fact, Soviet published figures showing catch per hour of trawling or per fishing day are reasonable by British standards (for instance, Yudin, 1962; Muragin and Futter 1963; Pechenik, 1965).

A view commonly held in the British industry is that the Soviet industry "does not have to make a profit", and that its expansion in the last ten years therefore, is attributable to causes unrelated to economic efficiency. This view is given some weight by the experience of a British firm which operates factory trawlers. It has found the operation of these ships economically disappointing and yet it is convinced that its vessels are not being significantly outfished by their Soviet counterparts (alongside whom they have occasionally fished). In order to try to establish what truth there is in this view of the Soviet industry it is necessary to examine any evidence relating to its possible subsidisation. The point has already been made (p 161) that an enterprise in any Soviet industry does not have to make significant provision in its budget for servicing its capital. In most other respects, the accounts of Soviet enterprise are comparable with those of capitalist firms, and the two sides must balance; but in an industry requiring as much expensive capital equipment as the fishing industry today this difference is clearly important. To raise a loan for the British equivalent of one factory trawler would cost £40000 to £50000 a year in interest.

Apart from built-in subsidy of this sort (which the Soviet industry would not regard as subsidy), there is some evidence of unplanned losses, which imply subsidy of another kind. In a review of the country's economy made to the Central Committee of the Communist Party on 4 July 1955, Bulganin quoted examples of bad organization in the fishing industry (among many others). He argued that top-heavy administrative structure had led to a situation in which certain Far Eastern fishing enterprises were paying out more in wages than the value of the fish they caught. In one, the North Kuril Fishing Combine [Severo-Kuril'skiy Rybokombinat], expenditure was almost three times as much as income. This led Bulganin to make one of the rare jokes to be found in Soviet economic literature—that "every fish caught indeed becomes a goldfish" (*Pravda*, 17 July 1955). It must be assumed that notice taken at this level led to energetic action in the cases specifically referred to. Such cases are always cropping up in the Soviet economy, since an enterprise cannot go bankrupt on the capitalist pattern. Bulganin's object was to expose this sort of inefficiency wherever it might be, and not to criticize the fishing industry as such. The subsidy made here, therefore, was an unwitting one, to be eliminated as soon as discovered.

What western critics of the Soviet fishing industry have mainly in mind, no doubt, is a regular subsidy by the Soviet government to the industry, made out of consideration for some special usefulness it may have. There would seem to be two possible reasons, one strategic and one a matter of domestic politics. The strategic reason is that the fishing industry provides a good training for future sailors in the Red Navy, and also provides cover under which naval

intelligence can be collected. Both these points have substance. The training aspect offers a less expensive way of training men in seamanship than the Navy itself could provide; and the existence of intelligence ships operating with the fishing fleets has been noted on many occasions (Kassel, 1961). The political reason is that the government has to provide animal protein for the population, and prefers to obtain it from fishermen rather than peasants. There are two reasons for this preference. The strongest is that a comparatively small number of fishing concerns is obviously easier to deal with than a very large number of peasants. Plan-fulfilment by the peasants over the last fifteen years has in fact been poor, while that of the fishing industry has been satisfactory. The other reason is that, in present circumstances in the USSR, a given effort in terms of man-power will produce more fish-protein than meat-protein. In one year a good factory trawler with a crew of 100 is said to be able to get 6500 tons of fish (live weight, presumably). This is the protein equivalent of 23000 head of cattle, which require far greater man-power. The prime cost per ton is 18 roubles (*Gudok*, 17 November 1964), while that for meat is several times more. The large capital cost of the trawler is left out of account in this comparison. This will reduce the apparent advantage, but is unlikely to annul it altogether.

The question is, would any of these reasons, or all of them taken together, be sufficiently potent to cause the planners to permit operation of the fishing industry at a loss over a long term. This is not a question which any outsider can answer with more than a guess. One of the objects in constructing an economy of the Soviet type is to facilitate subsidy of enterprises judged to be especially desirable socially. The non-economic reasons given above for subsidizing the fishing industry may well have some force with the planners. But if one tries to view the USSR as a whole from the standpoint of the planners, one finds it hard to see how these reasons could justify more than a rather small subsidy. They might be used as arguments to tip a fairly equally-poised balance. It is surely unrealistic to suppose that quite a large and growing industry is in any important sense made possible by them.

All this would lead to the conclusion that it is somewhat easier, but probably not very much easier, for the Soviet Director of a fishing administration or combine to balance his books than it is for, say, the Board of Directors of a British trawler firm. The arguments have all been about the cost side of the account—the operation of fishing vessels. The selling side is just as important. The higher the price the Soviet industry gets for its fish, the easier for the industry. The price is set by the State, which has to balance the interests of the industry and the consumer. Unfortunately, direct evidence about this price is scarce. But the export price of fish may be compared to the wage level in both Britain and the USSR. In the British industry in 1964, remuneration in a distant-water vessel averaged over the whole crew, was £5. 4s. per day at sea, or say £125 a month of 24 sea-going days (British Trawler Federation, private communication). The retail price of distant-water cod fillets in 1964-65 varied between 2s. 10d. and 3s. 6d. per lb (*White Fish Authority annual report and accounts for year ended 31 March 1965*, p 25-26). Thus a month's pay for a member of the crew equals

the shop price of about 750-850 lb of fish. For the USSR, no wage rates are available for the fishing industry as such, but the average industrial wage in 1964 was 100.5 roubles a month, and the average in water transport, the highest category quoted, was 131.6 (*Narodnoye khozyaystvo SSSR v 1964 g.*, 1965, p 555). The fishing industry may be supposed to have a rate close to that in water transport (the high position relative to other industries is probably a result of the "regional coefficient" payments). The price of sea fish in Moscow shops in September 1965 ranged from 0.9 to 1.4 roubles per kilo. Cod was probably among the more expensive, say 1.2 roubles per kilo. This gives the result that the fishing industry employee's monthly pay equals the shop price of 240 lb of fish—between a third and a quarter of the British figure. If the comparison is made with such whole sale figures as are available, the proportion is nearer a fifth. The deduction can be drawn that the Soviet industry has a significant advantage over the British. The advantage results not so much from relatively higher wages in Britain—fishermen in each country appear to receive considerably more than the national industrial average wage—as from a relatively higher selling price of fish in the USSR. This advantage is also apparent in the fact that, at least until very recently, the Soviet industry has had no marketing problem. The USSR wants more animal protein, and a high-level decision has been taken to get a given quantity of it through fish. This contrasts strongly with the position in Britain, where fish has to be sold in competition with many other high-grade foodstuffs to a population long used to a higher standard of living.

It would be useful to compare labour productivity figures for the Soviet and a western fishing industry, but this is not possible, both because of the difficulty in making certain that like is being compared with like, and because the western industries do not usually publish such figures. Some Soviet figures published in 1962 (Mel'nikov and Sal'nikov, 1962) give the mean annual catch per fisherman in different types of vessel, and this varies from 51.6 tons aboard factory trawlers to 15 tons aboard seiners. While this affords no basis for outside comparison, it does show the reason for the Soviet decision to put the main emphasis on expansion of the factory trawler fleet. Yet this experience is contradicted by that of a British operator of comparable vessels. This is a case which offers a prospect of comparison, so it is worth examining further.

The contradiction cannot be resolved simply by reference to the Soviet industry's exemption from need to service its capital. The conclusion seems inescapable: unless the Soviet figures are disregarded as wholly unreliable, the British are doing worse than their Soviet opposite numbers. This could be due either to less efficient fishing, or to cost factors, or to both these causes. Some evidence has already been quoted to show that cost factors act to the Soviet advantage. There is also some evidence tending to show that the British catch per unit effort is smaller than the Soviet (Table 8). If the figures in the table are broken down by months, it is apparent that the Soviet lead is especially marked in those months when fish are abundant. The figures also point to a more specialized fishery by the British, in that the higher Soviet catching rates for "All species", especially in the Newfoundland area, reflect a rather intensive fishery for species not sought by the British (redfish). It is not clear whether

the larger catches are attributable to the greater catching capacity of individual ships, or to the greater searching power of a larger fleet of vessels. There are no figures to provide a basis for comparison of catching capacity, but Soviet numbers and methods would probably produce greater searching power. The British vessels whose catches are reflected in Table 8 never exceeded two, while the Soviet vessels must have been more numerous. These conclusions are tentative, and are in any case based on only one year's operations. It will be interesting to see if the 1964 figures confirm them.

Table 8. Hours fished and catching rates by British and Soviet factory trawlers of over 1800 GRT in the north-west atlantic, 1963. The figures refer to those months when both countries were fishing in the same ICNAF division.

Area	Great Britain			USSR		
	Ship-hours fished	Catch per ship per hour (tons)		Ship-hours fished	Catch per ship per hour (tons)	
		Cod	All species		Cod	All species
West Greenland (divisions 1B, 1C, 1D)	685	1.3	1.4	1397	2.1	2.6
Newfoundland* (divisions 3K, 3L, 3M, 3O)	1583	1.1	1.2	2771	2.5	3.1

Note. "Catch per ship per hour" is obtained by dividing the total catch by the total of ship-hours fished.

Source: Adapted from an unpublished table constructed by B. B. Parrish from data in *International Commission for the Northwest Atlantic Fisheries. Statistical Bulletin*, Vol 13, 1965.

Whether or not the Soviet operators enjoy advantages over their capitalist opposite numbers, there does seem to be an atmosphere which encourages experiment. New ideas, whether of Soviet or foreign origin, are put into practice commendably quickly. Ship-building and design programmes have been pushed ahead with great energy. The Soviet fishing industry was allotted 58 per cent of the capital investment grant to the whole food industry in 1952-58, and got over 50 per cent in 1959-65 (Mikhaylov, 1962, p 11). Much work is being done on automation of procedures aboard fishing vessels. The vigorous growth to which this activity testifies is no doubt the product also of long-term planning and of the assurance about the future which it gives. Once the decision has been taken for whatever reasons, to proceed with expansion of the fishing industry, there is no cause for faltering or apprehension on the part of those involved at lower levels.

Undoubtedly it is the centralized direction of the Soviet fishing industry which is its chief characteristic when seen from the world of private enterprise. Long-term planning is greatly facilitated by it, and unity of purpose within the industry is one of the results. From this unity spring many of the features which strike an outside observer as conducive to efficiency: standardization of equipment, versatility of ships and of crews, pooling of information. At the same time, the structure of the industry is not as monolithic as might at first be

APPENDIX III

OMSTEAD FOODS LIMITED

P.O. BOX 520 WHEATLEY ONTARIO CANADA

August 22nd, 1972.

Mr. Johan D. Koppernaes,
J.D. Koppernaes Engineering Ltd.,
1248 Bedford Highway,
P.O. Box 527,
Bedford, Nova Scotia

Dear Mr. Koppernaes:

Thanks very much for the copy of your draft entitled
"A New Vision for the Canadian Fishing Industry."

I will attempt to make comments on the subject matter
as it arises in your brief.

page 6 ... "The fish, when landed, can be of high quality."

From discussions I have had, I would suggest the quality of
inshore fish is very seldom good but usually substandard and
in some cases, only good for fish meal. The problem is that
the fishermen have no facilities for making ice or insufficient
facilities to keep the fish from spoiling at point of production.
A good rule of thumb is a pound of ice for each pound of fish
produced. Good ice making machines are not that expensive,
in comparison to the loss Canadians are experiencing when a
good percentage of the inshore fisheries production, especially
in the summertime, has to be turned into fish meal. This com-
ment of mine could be substantiated by talking to Dr. Blackwood
of the Inspection Branch in Ottawa.

Opportunities in the fisheries, chapter 5.

One of the restraints in the Canadian fishing industry
not mentioned in your brief is the Ad Valorem duty applied on
all prepared fishery products. Before the Kennedy Round, the
duty on precooked fishery products was 33% and 22% on breaded,
uncooked products. Today, the duty is still 15% and our 10%
exchange rate has eroded to zero. This duty has had the effect
of forcing the Canadian fishing industry to deal with processors
and distributors in the United States that further process our
fishery products before it is delivered to the end user.

...2

Any time the American processor could save a cent he would divert his purchasing power on very short notice. This always has a disastrous effect on prices. A good example is the big change from cod block to the imported Japanese Alaskan pollock for the fish stick and portion production which is taking place at the present time. The Canadian fishing industry should work for lower duty on prepared fishery products, and do all or most of the manufacturing in Canada.

This would also help our problem with underutilization of trash fish. Certainly, this product must be further processed before we ever hope to develop consumer acceptance.

If it is not possible to reduce duties, I would favour the multi-national development of our industry. If money was made available to build processing facilities in the United States, this would allow Canadians to control more of the market. Canada should promote and develop one or more Canadian owned fish processing and precooked packing plants in the United States. This would allow Canadians to market their resource in the finished form and eliminate the middle man who is really in control of our best markets today. I do not favour imposed government control or fish marketing authorities or marketing boards of any kind. The free enterprise system is still going to prove to be the most successful in the end.

Yours sincerely,
OMSTEAD FOODS LIMITED



Leonard H. Omstead, Jr.

LHO/a