CANADA'S OCEANS POLICY

THE REPORT OF THE TASK FORCE ON OCEAN INDUSTRY, SCIENCE AND TECHNOLOGY

A. E. COLLIN
CHAIRMAN

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SUMMARY

In the early summer of 1973, the Task Force on Ocean Industry, Science and Technology presented its report and recommendations to the federal government. This culminated about nine months of intensive effort on the Task Force's part, an earlier Cabinet decision, and some three years of activity by a number of other workers in the marine area prior to that. The following recommendations were accepted by Cabinet and formed the basis for the statement on a National Oceans Policy issued on July 12, 1973. The Task Force recommended that Cabinet

1. Adopt a policy to stimulate the development and most effective participation of Canadian industry consistent with the intent to develop and control in Canada the elements of industrial and technological capability essential to the exploitation of Canada's offshore resources.
2. Continue the review of all Canadian legislation relevant to offshore resource development, taking into account the experience of other countries in managing offshore resources.
3. Affirm the intent that Canada develop within five years an internationally recognized excellence in operating on and below ice-covered waters.
4. Adopt a policy that Canada develop and maintain a current information base on offshore resources that would be equivalent or superior to that available to large multi-national corporations and foreign governments.
5. Give special emphasis to marine science and technology programs which support
   a. protection and, where appropriate, management of the Canadian marine environment;
   b. development and management of Canada's

renewable and non-renewable ocean resources;

c. an adequate response to international and domestic ocean commitments;

d. management of the esturian, coastal and near shore zones;

e. international scientific programs having clear Canadian concern and in which Canadian resources can be used effectively;

f. increased development and application of ocean engineering at selected universities and government laboratories;

g. improved capabilities to predict marine atmospheric and oceanic factors such as weather, sea state, currents, and ice;

6. Charge the Minister of Industry, Trade and Commerce, in consultation with the Minister of the Environment, the Minister of Transport, the Minister of Energy, Mines and Resources, the Minister of State for Science and Technology, and other interested departments and agencies to bring forward proposals for the development and support of Canadian ocean industry in accordance with the conclusions and recommendations of this submission.

7. Charge the Canadian Committee on Oceanography with the responsibility to coordinate Canada's programs of marine science and technology, and to report to Cabinet through the Minister of the Environment.

8. Charge the Minister of State for Science and Technology to continue the review of policy on ocean industry, science and technology as confirmed by Cabinet in its decision of September 21, 1972.

The study had the following objectives:

1. To bring to Cabinet's attention the strategic significance to Canada of the ocean and its resources.
2. To identify areas of marine science and technology where federal policies are or will be inadequate to meet Canada's increasing responsibilities, commitments, and opportunities.
3. To recommend specific policies for ocean science, technology, and industry which could be implemented immediately.
4. To recommend structures and instruments for the formulation, coordination, and implementation of Canada's policies for marine science and technology.

During the study, the Task Force reached the following conclusions, on which its recommendations were based.

1. There is a need for a Canadian centre for the discussion and formulation of advice on policies related to ocean science and technology.
2. There is also a need for a separate body responsible for the coordination of activities in marine science and technology.
3. The ecological system of the ocean is essential to the well-being of life. Modern technology is imposing dangerous loads upon the ocean and its ecosystem. Research is needed to understand the impact of pollutants, commonplace as well as exotic. Technology is needed to prevent pollution and to clean it up or combat its effects when it occurs.
4. There are excellent prospects for finding commercially valuable quantities of oil and gas in the offshore regions. However, unless

there is substantial Canadian content in the exploration and development activities, benefit to the Canadian economy is likely to be substantially less than it could be.

5. Canada faces the responsibility of managing the biological resources of a major world fishery and a large area of ocean on the continental margin. This imposes a requirement for both the scientific competence to understand, monitor, and manage this resource, and a surveillance capability to enforce management decisions.
6. A large portion of our coastline and our ocean waters is icebound during at least a significant portion of the year. The development of a capability to operate in these waters is essential for transportation, resource development, and defence.
7. Canada has a recognized competence and excellence in marine science and also has a generally high level of technical competence. Canadian ocean industry needs to be strengthened if it is to make use of Canadian scientific and technical capabilities.
8. To be successful in capturing a significant share of domestic and international markets, industry must establish a base of Canadian-developed ocean technology and engineering skills.
9. To establish this technological and engineering base, Canadian industry will require special government assistance, including elements such as:
   - Provisions for joint ventures between government and industry:
   - Grants, loans, loan guarantees, and equity

financing specifically oriented to the industry's particular requirements;
- Provisions for government-initiated shared programs to develop equipment and/or techniques, particularly for long term application;
- Mechanisms for participating with other governments in projects related to the development of equipment and techniques;
- Provisions for undertaking technology transfer projects such as the support of government or university scientists and technologists for temporary periods in industry;
- Establishment of a central point of contact for ocean industry that will make known opportunities in this field throughout Canada;
- Provision to direct development opportunities to the peripheral and disparate regions of the nation.

As the recommendations of the Task Force have been accepted, work is now progressing on how best to implement them. In particular, recommendations 3, 6, 7, and 8 are being actively pursued.

INTRODUCTION

In 1969, in response to an increasing awareness of the importance of the oceans to Canada's economy, the Science Council commissioned Drs. R.W. Stewart and L.M. Dickie to make a special study of marine science and technology. The study was published in 1971 as the Science Council's Special Study No. 16, Ad mare: Canada looks to the sea. At about the same time, the Science Council issued its Report No. 10, Canada, Science and the Oceans, based on Special Study No. 16, which contained a series of policy statements and recommendations in the area of ocean science and technology, for consideration and action by the federal government.

In September, 1972, Cabinet decided that Canada's ocean policies needed review with particular emphasis on ocean science, ocean technology, and the development of ocean industry. Cabinet further directed that the Ministry of State for Science and Technology and the Departments of Environment; Energy, Mines and Resources; and External Affairs, in consultation with other interested departments and agencies, should prepare for Cabinet consideration a set of national policies and guidelines for the understanding, use, and management of Canada's oceans.

A Task Force on Ocean Industry, Science and Technology, under the chairmanship of Dr. J.M. Harrison of the Department of Energy, Mines and Resources, was established shortly after this with the following objectives.

1. To bring Cabinet's attention the strategic significance to Canada of the ocean and its resources.
2. To identify areas of marine science and technology where federal policies are or will

be inadequate to meet Canada's increasing responsibilities, commitments, and opportunities.

3. To recommend specific policies for ocean science, technology, and industry which could be implemented immediately.
4. To recommend structures and instruments for the formulation, coordination, and implementation of Canada's policies for marine science and technology.

Dr. Harrison left Canada to take up a senior position in UNESCO, so early in 1973, Dr. A.E. Collin of the Department of the Environment assumed chairmanship and held it until the Task Force presented its findings to Cabinet. A complete list of the members of the Task Force is given in the Appendix.

As a corollary to the establishment of the Task Force, the Speech from the Throne of January 4, 1973, contained the following statement:

> "The Ministry of State for Science and Technology, in co-operation with the Department of the Environment and other interested departments, will recommend a national program of research and development in the field of Marine Science and Technology."

In early summer 1973, the committee prepared a memorandum to Cabinet based on a number of position papers and on discussions with departmental officials. On July 12, 1973, a National Oceans Policy was announced by the Minister of State for Science and Technology. The conclusions and recommendations of the Task Force as approved by Cabinet are given in the summary of this report. This series of policy statements was reached after close examination of the matrix

of Canadian policy issues involving ocean concerns in relation to existing legislation, and to positions that had already been taken by the federal government within the international community.

Since the announcement of the Oceans Policy, the Ministry of State for Science and Technology and an ad hoc interdepartmental advisory committee have been working towards rapid implementation of the recommendation concerning operational capability on and below ice-covered waters; it is planned that a report on this will be submitted to Cabinet in the fall of 1974.

The National oceans policy, as announced, emphasized the multi-disciplinary, multi-agency nature of ocean science and technology which requires the highest level of cooperation within and between governments, and between government and the other sectors of the national economy. This type of multi-purpose use and management of our renewable and nonrenewable ocean resources will assure their development for the maximum benefit to Canadians.

THE CONTINENTAL MARGINS

Canada has one of the longest coastlines in the world and is bordered by three oceans. Extending out from this coastline for varying distances is the continental margin which is the submerged extension of the continental land mass. The continental margin is made up of three components: the continental shelf, the continental slope, and the continental rise (Fig. 1).

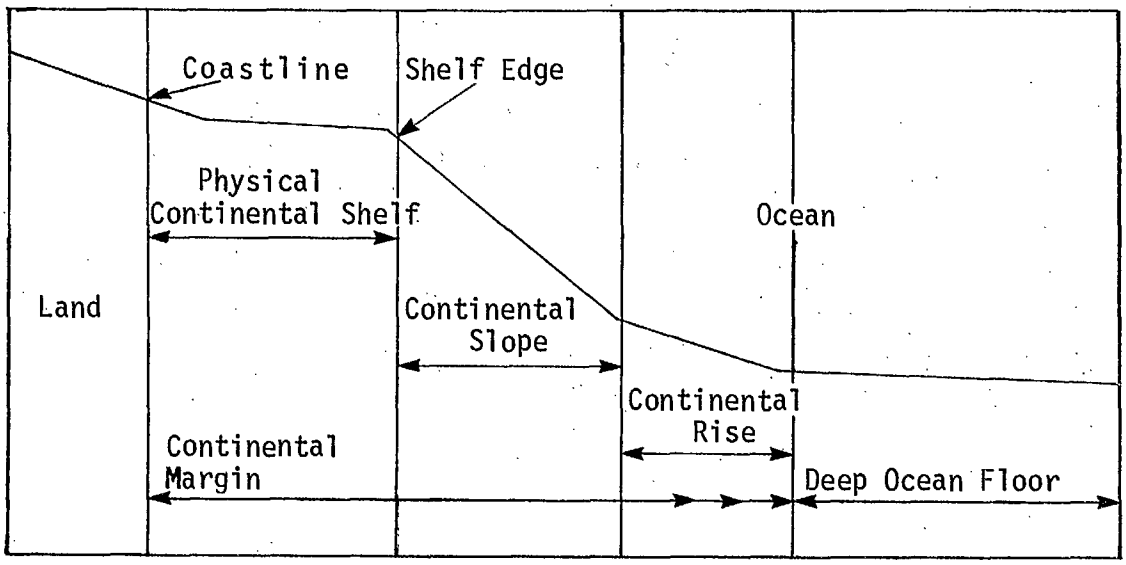


Fig. 1 Schematic Representation of the Continental Margin

The <u>continental shelf</u> is usually defined as that part of the continental margin extending outward from the coastline to 600 feet water depth. A more precise definition is that part of the continental margin extending out from the shoreline with an average slope of considerably less than 1^{o}.

The <u>continental slope</u> begins where the average slope changes abruptly to about 3^{o}. The water depth and distance from shore at which this change in slope occurs varies considerably, although the world averages are 400 feet and 45 miles.

The continental rise is the seaward extension of the continental slope but with a flatter slope (ca. 1^{o}). The continental rise, and thus the continental margin as a whole, ends when the average slope changes again to approximately 0^{o}. This generally occurs at water depths of 10,000 - 15,000 feet.

Off the Canadian coasts the continental margins vary enormously in width. On the east coast the continental margin, and in particular the continental shelf, is very wide, extending some hundreds of miles off the shore of Newfoundland, whereas off the Pacific coast it is relatively narrow, only a few tens of miles wide. In the Arctic there is an extensive continental shelf area within the Arctic Islands, although even here the inter-island channels may be relatively deep (e.g. a large part of the Northwest Passage has a water depth greater than 600 feet), but a relatively narrow shelf bordering the Beaufort Sea. However, for jurisdictional purposes, the whole area of the Arctic Archipelago, east of the Beaufort Sea, is considered to be an extension of the continental land mass regardless of the water depth in the channels.

The waters over the continental margin, and in particular those over the shelf, provide the bulk of Canadian fish landings. This is especially true off the east coast where the cold Labrador Current meets the relatively warm Gulf Stream creating a zone of unusually high nutrients. This situation creates its own peculiar problems also: the mixing of warm and cold waters causes extensive fog banks and the Labrador Current brings icebergs with it creating hazards to shipping and fishing boats.

The continental land mass making up the continental margin is largely composed of sedimentary rocks which are thought to have important reserves of natural gas and petroleum.

Indeed, present estimates are that they contain 20% of the Canadian petroleum and natural gas attainable with currently available technology and 60% of Canada's total hydrocarbons.

Canada's extensive continental margins and the waters above them with their large stores of renewable resources (fisheries) and anticipated reserves of nonrenewable resources (hydrocarbons) are therefore of great economic importance. The area of the continental shelf is about 30% of the total land area of Canada. If the rest of the continental margin is included, the proportion rised to over 50%.

To protect its jurisdiction in these offshore areas, Canada ratified the 1958 convention on the continental shelf, resulting from the Law of the Sea Conference, which gave Canada sovereign rights to all minerals within the shelf. However, there has been a growing realization that our other offshore and coastal interests require additional protection. Thus, Canada recently passed legislation to assume responsibility for pollution control in the Arctic for 100 miles out from the shoreline, and to extend our territorial waters from three to twelve miles out from the shoreline. Canada's position at the current Law of the Sea Conference will, in addition to the above, affirm that the coastal state must have sovereign rights to all nonrenewable resources beneath the continental margin adjacent to its coasts, and that it must be allowed to manage the renewable resources in the waters right out to the edge of the continental margin.

The marine environment plays a key role in the life and economy of Canada and will likely play an even more important part in the future. For example the oceans: they produce a significant amount of the oxygen we breathe, they have a major effect on Canada's climate, they are potential sources of energy (e.g. tidal power), many coastal communities are almost totally dependent on the sea (through fishing), ocean shipping is an important element in the country's overall transportation pattern, the sea is a vital factor in our national defence policy, the coastal zones are emerging in importance as recreational areas and recreation is the base of a significant and growing industry.

The water quality of the oceans, particularly that of the coastal zones, must be maintained and where necessary, improved. To do this requires considerable scientific research and surveying, not only in coastal waters but also in the deep ocean. Research in such fields as physical, chemical, and biological oceanography; coastal geomorphology; ocean engineering; and meteorology are needed to provide us with an adequate picture of the complex ocean system. The most important survey activity is bathymetric surveying, i.e. mapping the ocean floor, although many of the research activities also entail considerable scientific data gathering.

Within the federal government, the Fisheries and Marine Service of the Department of the Environment has the primary responsibility for much of the research and survey work mentioned above, although other agencies and departments are also involved, e.g. National Research Council, Defence Research Board, Energy, Mines and Resources. The Fisheries and Marine Service has a number of research stations and laboratories engaged in all aspects of ocean and aquatic

science spread across Canada from St. John's to Victoria. Much of this research activity is in support of the Canadian fishing industry, but there are also applications to ocean transportation and port development, offshore oil and gas operations and management, coastal zone management, and national defence.

One of the most pressing problems now is pollution of the ocean. Traditionally, many of the waste products produced by Man have ended up in the oceans. Until recently, this appeared reasonable as the oceans seemed capable of absorbing whatever we put into them. We can no longer accept this assumption without question because it is now known that the oceans have a finite tolerance to some of Man's wastes, and for some we may already be close to exceeding this tolerance.

Much emphasis recently has been placed on pollution control and abatement, both through international agreements and the application of science and technology. Canada, one of the leading countries at the 1972 U.N. Conference on the Human Environment in Stockholm, took a strong position at the 1973 International Marine Consultative Organization (IMCO) meeting in London, and has now taken a strong position at the 1974 Law of the Sea Conference in Caracas. In addition, the Canadian government will introduce legislation on ocean dumping (in connection with the recently concluded International Convention on Ocean Dumping) and on environmental contaminants. Considerable effort has been put into studying the toxicity to marine life of substances like oil and DDT, into determining the amounts of these substances in the oceans now (baseline studies), and into designing and developing new ways in which to handle potential pollution problems - all as part of an overall marine resource management program.

Although constitutionally the federal government has exclusive jurisdiction over the marine environment, the close cooperation of other levels of government is necessary to control pollution in the coastal zone and particularly, in the intertidal zone.

Ocean science is one of the most international of sciences. The waters of the oceans know no national boundaries, and the "high seas" have traditionally been considered international zones. Thus, many oceanographic programs, particularly in the deep ocean, are cooperative affairs in which scientists and ships of more than one country work together towards common goals. Through this pooling of resources, knowledge accrues more quickly than it would if only one country expended the same effort over a longer time period.

Canada is a member of the World Meteorological organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the International Council for the Exploration of the Sea (ICES), and the North Atlantic Treaty Organization (NATO). It takes part in international programs sponsored by these organizations such as the Global Atmospheric Research Program (GARP), International Decade of Ocean Exploration (IDOE), North Atlantic Overflow Experiment, and the Pilot Project on Coastal Pollution. In addition, Canada is an active participant in a number of other bilateral or multilateral programs, e.g. Arctic Ice Deformation Joint Experiment (AIDJEX) and the "Sea-Use" Program. Also, essentially national programs often have an international component, either through the participation of invited foreign scientists, or by working in non-Canadian waters as in the case of "Hudson 70", an 11-month (1969-70) oceanographic cruise by CSS Hudson that circumnavigated the Americas.

The Canadian Hydrographic Service is a member of the International Hydrographic Organization (IHO) which involves certain commitments and obligations, the most important of which are to assist in the development of international standards and criteria for the preparation of nautical charts and related documents, and to participate in the General Bathymetric Charts of the Ocean (GEBCO) program.

This emphasis on the international aspects is necessary if Canada is to maintain a position as a "coastal state." The implications of this on territorial waters, rights of coastal states, fishing limits, pollution control, and so on must be backed by internationally recognized scientific and technical expertise.

To meet Canada's objectives and potential commitments in the marine environment will require additional scientific research and technological development. Listed below are some of the areas where extra effort is needed.

1. Comprehensive, multi-disciplinary programs to to study in detail the environmental aspects of marine areas of special interest to Canada, e.g. Gulf of St. Lawrence, Strait of Georgia, Beaufort Sea.
2. Development of the capability for large-scale, year-round research in the Arctic (includes ships, aircraft, vehicles, equipment, instruments, etc.).
3. Development of new techniques for measuring biological parameters, such as primary productivity, to give us some of the additional knowledge necessary for rational fishery management.
4. Development of improved methods of monitoring and collecting baseline data (physical, chemical, biological) prior to any resource development.

5. Development of mathematical models for predicting such phenonena as tsunamis, waves, circulation patterns heat transfer etc.
6. Studies of the possible effects of large-scale extraction of energy, thermal or tidal (e.g. Bay of Fundy), from the ocean.
7. Development of improved equipment and techniques for underice or through-ice mapping, remote sensing, pollution control in rigorous environments, and accurate position finding.
8. Studies of the movement of ice and icebergs, and coastal engineering practices in the presence of ice.

These additional programs and developments will require a considerable expenditure of resources. Yet, they are necessary if Canada is to fulfill the responsibilities implicit in the position it has adopted in international negotiations as a coastal state. Indeed, without them, Canada will not be able to manage its marine resources adequately.

The future is expected to bring with it a food shortage growing more severe with time. Thus, there is now an accelerating search for alternative sources of protein, particularly in the world's oceans, which are important, not so much in terms of quantity, but for the protein variety that they can provide.

This makes the potential value of Canada's fishery larger than it is now, not only in monetary terms, but in its ability to supplement the world's supply of protein.

In 1972, the market value of fish caught in Canadian commercial fisheries operations approached $500,000,000 and provided about 80,000 jobs; exports accounted for about 70% of the market value. Thus, not only do the fisheries make a significant contribution to the national economy, but, more importantly, they provide employment to a relatively large number of people in areas where often there are few, if any, other job opportunities. It is estimated that sport and recreational fishing may in the future be of equal or greater dollar value than commercial fishing, at least in some areas. Future projections are that commercial fisheries will be worth 50% - 100% more in 1980 than in 1972.

The proper management of this resource not only presents Canada with a considerable responsibility, but also with a challenge and an opportunity to take creative and innovative action.

Through the BNA Act and the Fisheries Act, the federal government has always had exclusive jurisdication over all aspects of fisheries in the territorial seas and exclusive fishing zones, and over the regulation of the fishery in

internal waters (including licensing, setting of fishing seasons, pollution control, and so on) although the provinces "own" the actual fish. Thus, federal fishery authorities have always been concerned with the effects that any toxic substances might have on the fish, and the Act gives them the authority to prosecute anyone who damages fish in any way by doing this. This concern has been considerably heightened in the past few years by significant increases in the amounts of toxic substances in both salt and fresh waters. Thus, the government has passed additional legislation to prevent pollution at source, and to increase the limit of the territorial sea to twelve miles, e.g. the Canada Water Act, the Arctic Waters Pollution Prevention Act, etc. The Canada Water Act is particularly important in that it can be used to prevent pollution of fresh waters that discharge into coastal waters and hence help preserve the fragile coastal environment. New international ocean dumping regulations, which Canada has accepted, and the proposed environmental contaminants legislation are further evidence of Canada'a concern for its renewable resources.

The coastal waters overlying the continental shelf and slope are of critical importance to the Canadian fishery, since about 95% of the catch is taken from there. However, waters of this zone that are further offshore (e.g. the Grand Banks) are, to a large extent, being exploited by foreign fishing vessels. This has been aggravated by apparent over-fishing by the foreign vessels to the extent that some species (e.g. haddock) are seriously threatened. Canada now feels that it should have the exclusive right to manage the resources of its coastal waters.

In a first attempt to gain control of our coastal and offshore fisheries, the Territorial Sea and Fishing Zones Act was passed in 1974 and amended in 1970 to extend the territorial sea to the twelve-mile limit and to establish the Gulf of

St. Lawrence, Bay of Fundy, Dixon Entrance, Hecate Strait, and Queen Charlotte Sound as exclusive Canadian fishing zones. Phase-out agreements are now in effect with most countries that have had historical fishing rights in these waters. This Act is reinforced by the Coastal Fisheries Protection Act.

In addition to these unilateral actions, Canada is a party to several bilateral agreements, principally with the U.S.A. and the U.S.S.R., to regulate fishing, and ten conventions covering specific areas or species. Chief among these latter are the International Commission for Northwest Atlantic Fisheries (ICNAF) and the International North Pacific Fishery Commission. As an example of how these operate, ICNAF has recently set total quotas for certain stocks, and members have accepted national allocations on the basis of an "off-the-top" deduction for the coastal state, based on its requirements, with the balance being divided among other member states, based on their traditional performance in the fisheries.

However, the main thrust for the future protection of these renewable resources will stem from whatever success is attained from Canada's position at the current Law of the Sea Conference, the first session of which was held in December, 1973, and the second which is now underway in Caracas. Canada's main proposal is that coastal states should manage the living resources of the adjacent shelf and slope zones; although this stand implies a greatly increased level of responsibility, it also implies a preferential share of the resources. The cost of the research and protection for this is already high (e.g. 3.1 million dollars for fisheries protection alone in 1971) and will go higher when agreement about the above principle is effected; however, there will be greatly increased benefits from a larger, properly managed annual catch.

To manage the renewable resources properly, a significant amount of scientific research and technological development will continue to be needed. An obvious area of need is pollution control and abatement which is dealt with in another section of this report. A summary of other areas follows.

1. The fishing fleet, particularly on the east coast, must be made more efficient and brought up to date. However, this must be done in conjunction with an economic rationalization and the setting of quotas for catches.
2. There are significant resources off the Labrador coast which could be exploited by Canada. To do this, considerable research and development work is being undertaken to produce fishing vessels capable of working in the ice-infested water. Alternatively, administrative agreements might be arranged with other countries fishing in the area, or, again, it might be better to develop an in-shore fishery to exploit the resource when it is seasonally closer to shore.
3. Increased research effort is needed in such areas as population dynamics and biological productivity. The additional cost of this is estimated to be 5.3 million dollars per year.
4. Exploitation of currently underexploited species through the application of new research and technology.
5. Technological developments in echo-sounding and sonar; underwater visual observation (TV and submersibles); improved gear for direct sampling, particularly off-bottom gear; fleet surveillance and target identification (e.g. radar, photography, satellites).

Although the potential increase in benefits to Canada is

high, particularly to areas that offer few other opportunities, firm action must be taken now and continued into the future to ensure that Canada reaps these benefits.

Although the recent energy "crisis" has sharpened the focus and heightened public awareness, the experts had for some time realized that proven reserves of petroleum and natural gas were dwindling. About ten years ago the search for hydrocarbons turned to the "frontier" areas - the Arctic and offshore - and this trend has been accelerating ever since. In Canada, most of the major exploration activity is now in the frontier areas and especially in the offshore areas where it is hoped that significant potential reserves of hydrocarbons will be found.

Surprisingly enough, perhaps, the first offshore oil well in Canada was drilled during the second World War in Hillsborough, P.E.I. - without success. The first three wells of the current round of activity were drilled in 1965 on the Grand Banks. Since then, over one hundred have been drilled in all offshore areas, including the Arctic, but without much obvious success. Several have encountered oil- or natural- gas-bearing formations but, to date, these have not been of a large enough potential to warrant incurring the very high completion and production costs, to say nothing of the problems involved in getting the oil or gas to shore.

In addition to helping alleviate our future energy problems, a major hydrocarbon find, particularly off the east coast, would have a large impact on the economy and life-style of the adjacent coast. Such an impact would have potential for both good and harm as is currently the case on the North Sea

coast of the United Kingdom. Therefore, any development must be managed to obtain maximum benefits with minimum adverse effects on the local society. This will involve cooperative planning by all levels of government.

Canada's offshore hydrocarbon resources are managed by the federal government through the Oil and Gas Production and Conservation Act and the Canada Oil and Gas Land Regulations. They are administered by the department of Energy, Mines and Resources (EMR) in the areas off the east and west coast and in Hudson Bay and Strait, and by the Department of Indian and Northern Affairs (INA) in the Territories, including both the offshore and the onshore.

The Act allows three stages of activity, each subject to licence: a) exploration licences - allowing a company to carry out (on a nonexclusive basis) exploratory work; b) exploration permits - giving the company certain exclusive rights, e.g. authorization to drill an exploratory well within the permit area and the option of selecting oil and gas leases; c) oil and gas leases - allowing a company to undertake commercial hydrocarbon production from an area. At present, although there are about 580 million acres in the offshore area, including the Arctic, covered by exploration permits, there are no areas under lease.

The federal government's claim to exclusive jurisdiction over the management of mineral resources in the offshore areas has not gone unchallenged by the provinces who have jurisdiction over mineral rights within their boundaries. In 1969, the Supreme Court of Canada ruled in favour of the federal government over the British Columbia government in this matter. The relevance of this ruling to the question of jurisdiction on the east coast is still being debated; meanwhile, negotiations are in progress with the provinces concerning the details of how to divide present and future revenue.

There are also international complications since we have or have had problems concerning the definition of offshore boundaries with the U.S.A., France, and Denmark (Greenland). The dispute with Denmark was resolved in early 1974. In addition, there are unresolved problems about how far offshore the coastal state's sovereignty extends with respect to the nonrenewable resources of the sea-bid. The 1958 Geneva convention on the continental shelf, ratified by Canada in 1970, is the current international law regarding seabed resources. The Convention provides that the coastal state "...exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources, "and goes on to define the continental shelf as extending"...to a depth of 200 metres (about 600 feet) or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources...," and further provides that these sovereign rights are "exclusive" and "do not depend on occupation, effective or notional, or on any express proclamation." Since the above definition of judisdiction over seabed resources is not fixed, i.e. is tied to accelerating technological development, it has led to considerable debate (mainly in the United Nations) over where to fix the boundaries between the area to be covered by national jurisdiction and the area to be developed as an international regime for the benefit of all.

Canada's position on this question has been that coastal states should exercise sovereign rights to explore and exploit seabed resources out to the limit of their adjacent submerged continental margins - in Canada's case, to a water depth of about 10,000 feet. This position carries with it greatly increased responsibilities for the proper management of these resources, in that increased levels of scientific research, technological development, and enforcement will be necessary. This position has been put forward by Canada at the 1974 Law of the Sea Conference in Caracas.

Canada's long-term objective, with respect to its subsea hydrocarbon resources, is basically one of cautious development so that the maximum benefits will be derived for the Canadian people over the longest period with the minimum impact on the natural environment and quality of life. The federal government's shorter-term goals or commitments are:

1. To manage the allocation and administration of permits and leases.
2. To ensure an optimum return from the resources.
3. To prevent pollution.
4. To ensure safety.
5. To ensure conservation of resources.
6. To ensure that complete information is recorded, stored, and (as much as possible) made available to the public.
7. To provide geoscience data on offshore regions, as a comprehensive and sound information base on which to make policy decisions.
8. To establish and maintain the integrity of Canada's sovereign rights of exploration and exploitation in the offshore.

To achieve these goals and discharge these commitments will require technological developments and increased levels of scientific research and survey. Some examples of the challenges and opportunities facing Canada and Canadian industry follow:

1. Development of a geoscientific data base for the offshore, including the Arctic. This is basic to the entire activity, and implies increased levels of geoscience surveys.
2. Development and construction of drilling units and, eventually, production platforms for one of the most hostile environments on earth.

3. Development and manufacture of pipe for the sub-ocean transmission of oil and natural gas; this includes materials research because of the cold, saline nature of the water.
4. Design and construction of special vessels such as tugs, barges, and icebreakers.
5. Design and construction of oil spill control and cleanup equipment, especially for the Arctic.
6. Development of a capability for fully submerged drilling; this is particularly important with respect to the ice-covered waters.
7. Design and production of underwater installations such as research stations, production and separation facilities, and storage tanks.

In the longer term, the ever increasing demand for dwindling petroleum resources and the associated advances in technology will inevitably bring about production from wells which are in deeper water, further from shore, and may be under ice-covered northern waters. Canada, in accordance with its announced support of the concept that coastal states should be responsible for the management of offshore mineral resources which are acknowledged to be under its jurisdiction, will have to be prepared to manage offshore petroleum activities of increasing complexity and difficulty. This responsibility also includes managing the socio-economic impact that the activities would have on the adjacent coast, particularly in the event of a commercially exploitable find of hydrocarbons.

TRANSPORTATION

For several thousands of years the sea has been the most important and the cheapest medium for moving people and goods. Even now, with the advent of other modes of transport, shipping still remains the largest carrier in international trade. In 1970, international trade through Canadian ports accounted for 164 million tons of cargo and the coastal trade accounted for another 126 million tons. At the end of the Second World War, Canada had one of the world's largest merchant fleets. Although vessel numbers have declined overall, shipping in Canada is still significant and will likely grow in the future with the increasing use of super-tankers, container ships, and so on.

The Canadian east coast is particularly well-favoured for super-tankers and container vessels, being closer to Europe than the eastern United States, and having a number of sites suitable for deep-draft vessels. Container ports have been developed at Halifax and St. John, and facilities for super-tankers have been, or will be, developed in the Strait of Canso (N.S.), Come-by-Chance (Nfld.), Mispec Point (N.B.), and the lower St. Lawrence. On the west coast, Vancouver and nearby Roberts Bank are being developed as a container/super-tanker port system. There are, in addition, some 250 other ports of various sizes and capability.

The federal government has the primary responsibility for regulating all aspects of maritime trade through such acts as the Canada Shipping Act, National Harbours Board Act, Navigable Waters Protection Act, and the Arctic Waters Pollution Prevention Act. The Ministry of Transport (MOT) is the principal agent of the federal government in administering these responsibilities, although other federal departments and agencies (i.e. Environment and Public Works) have responsibilities.

The Ministry of Transport's main responsibilities are in the areas of harbour and terminal facility management, ice-breaking, safety, marine traffic control and navigational aids, pilotage, and marine pollution by ships.

All of the commercial and multi-purpose ports and harbours in Canada come under MOT's Canadian Marine Transportation Administration and are subdivided for administrative purposes into National Harbours Board Ports, Harbour Commission Ports, Public Harbours, and Government Wharves. The ten major multi-purpose ports in Canada fall into the first category, eleven fall into the second, and some hundreds of lesser harbours into the last two. The Department of the Environment administers all small-craft harbours (i.e. those used for fishing or recreation). In addition to port administration, MOT is responsible for providing port and terminal facilities, harbour installations, and for dredging of harbours, harbour approaches and some shipping lanes (e.g. St. Lawrence River and Seaway) where necessary.

Icebreaking is an important aspect of MOT's responsibilities because large parts of Canada's coastal waters are icebound for significant periods of each year. The Canadian Coast Guard looks after this and is particularly interested in the design of ships to operate in ice. The Coast Guard also carries out escort and resupply duties, rescue operations, ice surveys, and duties in support of scientific activities in the Arctic. Over the next four years the Coast Guard plans to add four large icebreakers to its fleet of 23, and to upgrade the capability of eight others.

The Canada Shipping Act covers all aspects of safety relating to ships (including pleasure craft) and shipping in Canadian Waters. Canada is also a party to several international and bilateral agreements such as the Safety of Life at Sea Convention, the International Load Line Convention,

and the Agreement for the Promotion of Safety on the Great Lakes by Means of Radio. In addition, Canada is actively working with IMCO currently on questions relating to maritime safety.

One of the more important aspects of maritime safety is marine traffic control and aids to navigation. MOT has been involved in aids to navigation for a number of years, first with lighthouses and buoys, and now with more sophisticated aids as well such as radio beacons and hyperbolic radio systems. In addition, MOT puts out a publication, Notices to Mariners, with information of a navigational nature. More recently, as an added safety measure, MOT has been working with considerable success on ways of controlling traffic in Canadian waters, and also, working with IMCO towards the same end in international waters (e.g. International Regulation for the Prevention of Collision at Sea).

Marine pollution has become a critical issue in the last ten years and Canada has been in the forefront of the efforts to control it. MOT, discharging regulatory responsibilities under the Canada Shipping Act and the Arctic Waters Pollution Prevention Act, has undertaken a program of surveillance, investigation, and enforcement involving several parts of the Department. The Department of National Defence supports this program by having its aircraft carry out pollution patrols of coastal waters as part of their normal duties. As well, Canada is active in developing international agreements, particularly through IMCO, to control pollution of the high seas from ships. MOT is developing contingency plans for spills of oil or other toxic substances in conjunction with other federal departments and other levels of government. As a part of these plans, some 4.5 million dollars worth of cleanup equipment has been deployed across the country.

Another aspect of the fight against marine pollution involved

setting up the Maritime Pollution Claims Fund in 1972 to provide a fund to settle claims arising from pollution damage that would otherwise be unsatisfied. The fund consists of a levy of 15 cents per ton of oil (on cargos over 1,000 tons) that is shipped by water to, from, or between points in Canada.

To meet its present and future national and international obligations and commitments, Canada must put additional effort into scientific research and data-gathering activities and technological developments aimed at marine transportation. The following are some examples of where additional thrusts are needed.

1. Hydrographic, meteorological, climatological, and ice-condition information and data.
2. Technological development in the areas of navigational aids and offshore positioning systems for marine traffic control and safety at sea.
3. Development of mooring and power supply systems for large multi-purpose buoys.
4. Studies on the physical and chemical properties of petroleum in seawater, and on the total and specific capacity of the oceans to assimilate petroleum and other toxic substances.
5. Research into hyperbaric medicine and undersea technology to improve a deep diving capacity for salvage.
6. Research on the design of ships' hulls, shipboard equipment, and port facilities for use in areas with extensive ice packs and ice cover. This would include detailed information on the physical properties of such ice cover.

This appears to be the minimum needed if ocean transportation is to continue its important contribution to Canada's overall national development.

NATIONAL SECURITY AND SOVEREIGNTY

In a country as large as Canada, which lays claim to territory in the remote Arctic and also claims responsibility for the management of resources in and under the sea for several hundred miles offshore, the maintenance of sovereignty is an important aspect of any national policy. Since the international community has not yet recognized our offshore claims, it is possible (although unlikely) that disputes involving force could arise.

The primary overall responsibility for maintaining Canada's security and sovereignty rests with the Canadian Armed Forces and the Department of National Defence (DND). Responsibility for some specific areas (i.e. fisheries protection, customs and excise regulation, marine pollution control, etc.) rests with other federal government departments.

In its statement on defence policy (April 3, 1969), the federal government established as the first of four roles assigned to the Canadian Armed Forces "...the surveillance of our own territory and coastlines, i.e. the protection of our sovereignty". The policy paper makes it clear that DND has "ultimate responsibility to ensure that overall an adequate Canadian surveillance and control capability exists for the protection of Canadian sovereignty and security." The paper goes on to state that "the Canadian Forces will carry out surveillance and exercise control in those areas not covered by civil departments, or in which the latter require assistance in discharging their responsibilities."

Problems relating to national security are two-fold: those of a military nature threatening the existence of the state, and those of a non-military nature threatening the economic or social well-being of the state.

Any real discussion of the first type is beyond the scope of this report but it seems clear that the main military threat of a maritime nature would come from submarines. To this end, and because of commitments to NATO and NORAD, there has been an emphasis on rese-rch related to antisubmarine activity. The expertise built up in this area could also be usefully applied to peaceful activities involving submersibles, e.g. for detection and containment of under-ice oil spills.

It is the second class of problem which is more relevant to the present discussion and which is reflected by the quotes from the policy paper. The Canadian Forces already provide limited support to other federal departments: search and rescue, ice surveillance flights in the Arctic, surveillance flights to assist in pollution control in coastal waters, occasional surveillance of foreign fishing fleets, etc. However, this support could be usefully expanded or extended; some examples follow.

1. Regular surveillance of foreign fishing fleets with additional support on a quick-response, short-term basis to relocate these fleets when they move from one area to another.
2. On-call support by naval vessels to deal with large scale incursions into Canadian waters by foreign ships seeking to exploit resources claimed by Canada.
3. Regular surveillance of offshore waters to detect and report seismic and other petroleum exploration activities.
4. Subsurface inspection and surveillance of underwater equipment, facilities, and installations concerned with exploitation of offshore hydrocarbon resources.
5. The use of submersibles operated by the Canadian Forces for scientific and other purposes.
6. Search and rescue operations.

7. Arrest, within territorial waters, of ships in breach of Canadian regulations respecting the discharge of pollutants.
8. Surveillance of territorial waters in support of the RCMP in carrying out their duties with respect to enforcing Canadian customs regulations.

In addition to the above, the Canadian Forces have a major responsibility as a result of Canada having signed and ratified the Seabed Disarmament Treaty. They must have the capability to police Canadian areas of responsibility under the treaty to ensure that it is properly complied with.

To meet the roles, obligations, and commitments outlined above, considerable technological development, selection, and design of future military equipment will be needed to reflect the broader role. Specific examples follow.

1. Remote sensing techniques.
2. Techniques for detecting and inspecting underwater and underice activity.
3. Diving technology.
4. Submersibles and underwater habitats.
5. Underwater and air-to-water communications, including signal processing and interpretation.
6. Pollution detection and control.
7. Ocean data acquisition systems.

It seems clear, with the additional responsibilities for ocean resource management that Canada wishes to take on, that the support of the Canadian Forces will be required on a broader basis than at present, and that they and other agencies of government will need the technological developments outlined.

OPPORTUNITY FOR CANADIAN INDUSTRY

The needs of those working in the marine field have already caused a modest growth in Canadian industry to serve them. Of course, the oldest of these is the ship-building industry which, although it had declined in relative importance in the last 100 years, still makes a significant contribution to the economy. Indeed, it is experiencing a resurgence, particularly on the East Coast, due mainly to a number of multimillion dollar contracts for large, semisubmersible drilling rigs; a Halifax shipyard has contracts for five of these and has developed a reputation and expertise in the field. As offshore oil exploration shows no sign of slackening, it is likely that contracts for these rigs and later for production platforms will increase. Other companies are active in the marine field developing products from electronic components to research submersibles. Companies that once specialized in other fields, e.g. aerospace, are now turning to the marine area.

In addition to a market for equipment and supplies for those operating in the marine environment, there is also a demand for shore-based facilities and ancillary services. If there were a major offshore hydrocarbon find, the demand for this type of service industry would have a very significant impact on the economy of the adjacent coastline.

However, Canadian industry is responding only in a limited way, and there are many potential opportunities waiting to be picked up as a result of the technological developments that will be needed. These developments include such areas as: shipbuilding and vessel design, marine electronics, communications, ocean engineering, mapping, and surveying. The following are some examples of technology that need to be developed (or further developed) and equipment that will come from it.

1. Shore structures (wharves, terminal facilities, etc.) to withstand Arctic ice and climatic conditions.
2. Vessels to work in ice-infested or ice-covered waters (icebreakers, ice-reinforced trawlers, supply vessels, freighters, tankers, etc.).
3. Undersea pipelines in ice-infested, cold, saline water.
4. Communications equipment for underwater, through-ice, or water-to-aid communication.
5. Oil well drilling, completion, and production (rigs, platforms) equipment to operate fully or partially submerged in ice-infested, cold, saline water.
6. Navigational and position finding equipment, especially for use in the Arctic.
7. Remote sensing equipment.
8. Submersibles.
9. Underwater research stations, particularly in Arctic waters.
10. Cleanup equipment for pollution, particularly oil spills, especially those in Arctic waters.
11. Electronics for all of the above.
12. Materials for all of the above, especially those which can be used in the Arctic.

As can be seen, the greatest need is for new technology and equipment for use in the Arctic. All too often, the Arctic has been treated as a special case of the temperate zone so that equipment has been adapted for use there, not properly designed for it. With the obvious and increasing emphasis on northern activity, this tendency will have to change.

At present, Canada does not have an ocean industry capable of large diversified projects. Components of existing industries which can be directed toward ocean-related work are capable

and innovative but they are dispersed, and often are small and financially weak. There is a need for encouragement, direction, and assistance to put them into a competitive position in both domestic and international markets. If Canada is to reap the maximum benefits from exploitation of its adjacent oceans, it must develop the necessary high technology and associated secondary industry itself, not only to satisfy its own needs but also to secure a fair share of the rapidly expanding foreign markets for offshore equipment and services. To achieve maximum local benefit, such industry should be based in our maritime areas.

LOOKING TO THE FUTURE

Now that the Task Force's conclusions and recommendations have been submitted and accepted by Cabinet, the next phase is to develop programs to implement the recommendations; this phase is already under way.

The Ministry of State for Science and Technology (MOSST) is reviewing ocean science and technology and is taking the lead position in developing additional policy in this area. MOSST, in association with other departments, is developing strategies to attain a capability for operating on and below ice-covered waters. A report outlining alternative strategies will be submitted to Cabinet in the Fall of 1974.

The Department of Industry, Trade and Commerce is working on ways and means to stimulate Canadian ocean industry. For example, it made a grant of $525,000 over three years to the British Columbia Research Council for an ocean engineering centre. The "Make or Buy" policy, a policy whereby more government activity will be contracted out to private industry, recently announced by the federal government will also help in this regard.

The Canadian Committee on Oceanography, a national committee which coordinates all ocean science activity, has been given expanded terms of reference to enable it to fulfill its new responsibilities under the recommendations.

New legislation is proposed on environmental contaminants and on a strengthening of the Canada Shipping Act with respect to pollution control so that the marine environment may be better protected. New standards, with regard to allowable amounts of pollutants and their toxicity, will also have to be established.

Major oceanographic research programs (biological, geological, physical, and chemical) are being planned to take place over the next five years in the Beaufort Sea, Georgia Strait, and the Gulf of St. Lawrence. These programs are designed to provide basic oceanographic data, including baseline data, that can be used in meteorological research, pollution control, resource management, and coastal zone management. Three areas of particular importance that these programs will support are: a coastal zone management program currently being developed, the proposed environmental contaminants legislation, and essential assessments of the environmental impact caused by hydrocarbon exploration and exploitation, especially in the Arctic.

The cost of the additional ocean science and technology activity outlined in this report would be of two types: a) programs directly in support of ocean industry, and b) research, by both the private sector and government agencies. The Science Council in its Report No. 10 estimated that the cost of developing ocean industry might reach $50 million annually by 1980. Additional research by government will require a substantial level of funding of government departments already engaged in ocean science activity; however, it is expected that the increased costs will be at least partially offset by the increased level of activity of the Canadian economy resulting from this stimulus.

In any event, the position that Canada has chosen regarding the management of her marine resources requires the steps and costs outlined in this report. Without them we will not be able to carry through with our resolve.

APPENDIX: Members of the Task Force

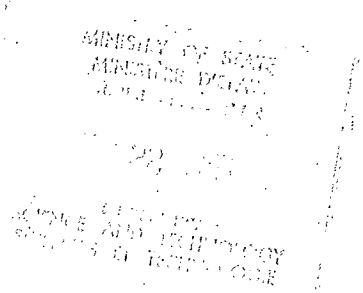
Chairman

Dr. J.M. Harrison (to January 24, 1973)	Senior Assistant Deputy Minister Department of Energy, Mines and Resources
Dr. A.E. Collin (from January 25, 1973)	Director General Marine Sciences Directorate Department of Environment

Members

Dr. P. Bourgault	Assistant Secretary, Planning Ministry of State for Science and Technology
Mr. G.F. Bruce	Director Scientific Relations and Environmental Problems Division Department of External Affairs
Mr. A.D. Crerar	Manager Atlantic Region Planning Department of Regional Economic Expansion
Dr. D.J. Crosby	Director Resource Management and Conservation Branch Department of Energy, Mines and Resources

Dr. L.A.E. Doe	Senior Officer, Planning Department of Energy, Mines and Resources
Dr. S.Z. Mack	Scientific Planning Officer Defence Research Board Department of National Defence
Dr. W.R. Martin	Director General, Program Development and Integration Fisheries Service Department of the Environment
Mr. G.W. Rowley	Scientific Adviser Department of Indian and Northern Affairs
Dr. C.H. Smith	Assistant Deputy Minister Science and Technology Department of Energy, Mines and Resources
Mr. H. Leslie Smith	Senior Oceans Consultant Ministry of State for Science and Technology
Mr. R.H. Smith	Acting Chief, Waterways Development Marine Services Ministry of Transport
Mr. A.L. Strange	Senior Policy Adviser Ministry of State for Science and Technology



Dr. S. Wagner	General Director, Office of Science and Technology Department of Industry, Trade and Commerce