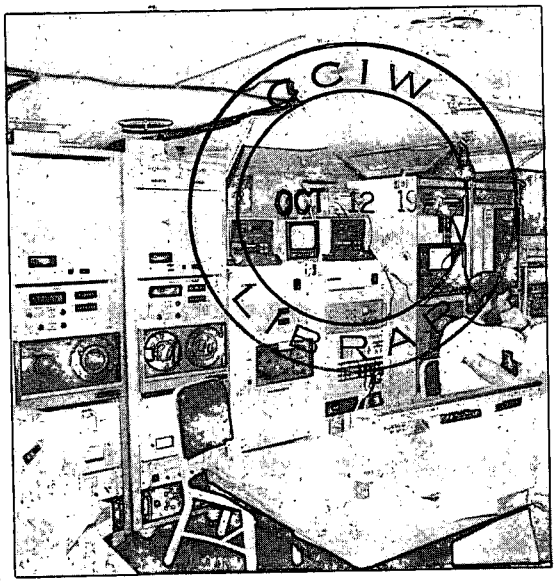
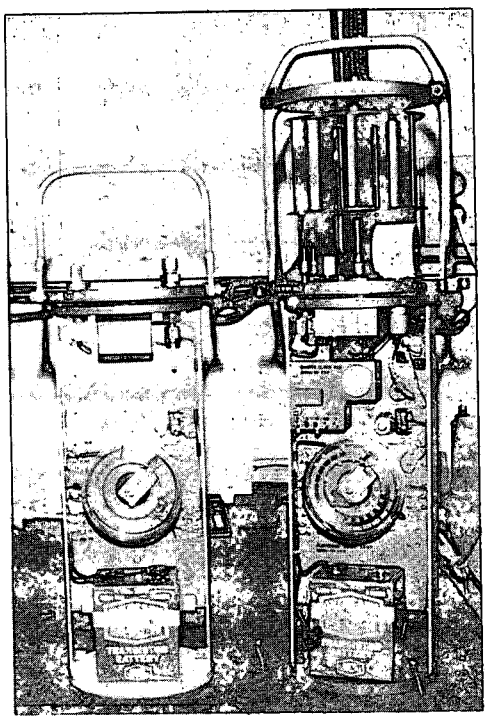
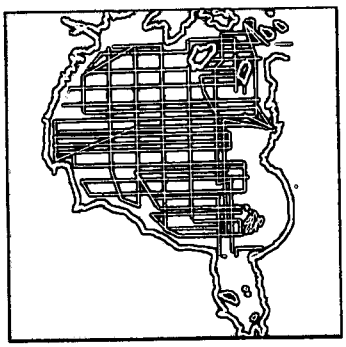
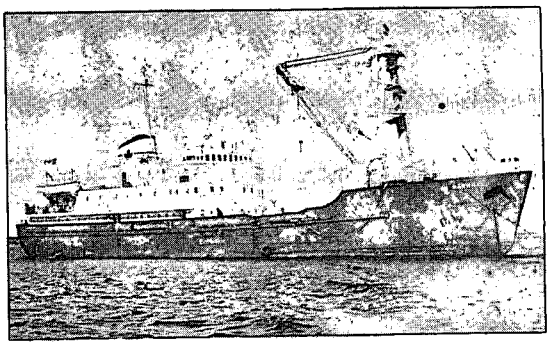
1975 ANNUAL REPORT









OCEAN AND AQUATIC SCIENCES
CENTRAL REGION
ENVIRONMENT CANADA
BURLINGTON, ONTARIO

1975 ANNUAL REPORT

CENTRAL REGION

OCEAN AND AQUATIC SCIENCES

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Mme. Jean Sauvé with the Crew of the CSS BAYFIELD

OCEAN & AQUATIC SCIENCES DIRECTORATE
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CENTRAL REGION

OVERVIEW

Central Region forms a part of the Fisheries and Marine Service reporting directly to the Assistant Deputy Minister of Ocean and Aquatic Sciences. It consists of four Divisions: Hydrography, Research and Development, Ships and Administration, operating within the approximate geographical boundaries from the Manitoba/Saskatchewan border in the west to the St. Lawrence estuary, and from the U.S. border north to the Arctic Islands.

During the past year Central Region has made some significant changes in direction and priorities in an effort to mount a major thrust towards increasing the level of programs in Arctic waters. This has been largely in response to an emerging government need to increase the level of hydrographic and oceanographic surveys in Arctic Waters and for marine environmental reconnaissance studies associated with resource exploitation initiative in the mid and high Arctic.

An important priority has been given to membership on two of the Regional Directors Boards. On the Ontario Regional Board a particular thrust was made to increase participation in RSCC; the lead was taken in the coordination of the Inter-Service Exhibit at the Toronto International Boat Show, and there was also continued involvement in the Canada/Ontario, Rideau, Trent, Severn (CORTS) study.

In the Western & Northern Region a common need for strenuous action in northern development has meant an increased input to this Board and in particular to increase coordination with our fellow-members from O & AS. Western Region on such bodies as the Arctic Environmental Steering Committee (AESC).

The Eastern Arctic Pipeline Study (EAPS) and anticipated Joint Studies with DINA of the oceanography of Sverdrup Basin, are being undertaken in concert with our Western Region colleagues.

Further major oceanographic programs are being carried out in the coming winter in James Bay, continuing throughout the summer of 1976 - a direct result of the recently negotiated James Bay Agreement. A baseline study of the Hudson Bay Lowlands will be expanded from the estuarine research program of 1975.

Cooperation in Joint Studies continued in such areas as the Policy, Development & Planning of the Canada/U.S. Water Quality Agreement, and support of surveillance activities under the Canada/Ontario Agreement. Participation also continued as a member of the Steering Committee and Working Group of the Strategic Planning of Ontario Fisheries (SPOOF). The final draft of joint management program negotiations in policy and strategy is now under review and scheduled for completion in early 1976.

The final Technical Report of the Canada/Ontario Great Lakes Damage Survey has been completed, resulting in recommendations on a number of management alternatives and follow-up programs being forwarded to the Canada/Ontario Consultative Committee on Water for consideration by the Minister of Environment Canada and the Ontario Minister of Natural Resources.

CANADIAN HYDROGRAPHIC SERVICE

INTRODUCTION

The Canadian Hydrographic Service's prime responsibility is the collection and initial processing of hydrographic data over an area reaching from the Saskatchewan-Manitoba border to the St. Lawrence estuary, and from the American border to the Arctic Islands.

The Hydrographic Division works closely with the Research and Development Division which directs its attention to hydrodynamic and oceanographic research. A particularly close liaison exists in the area of tidal studies and in the design and management of multi-paramater surveys in Arctic waters.

The Canadian Hydrographic Service is supported by a Ship Division which provides ship and launch support and an Administrative Division to provide the necessary back-up. The Canadian Hydrographic Service becomes involved in co-operative program with the various scientific groups studying the limnological properties of the Great Lakes. A particular function in this respect is the provision of navigational support to the scientific field operations.

During the past year, the Division has built up its staff to full strength and generally consolidated its various specialist sections. These section include the Field Surveys, Tidal, Tidal Instrument Development, Hydrographic Development, Cartography and Marine Information Centre.

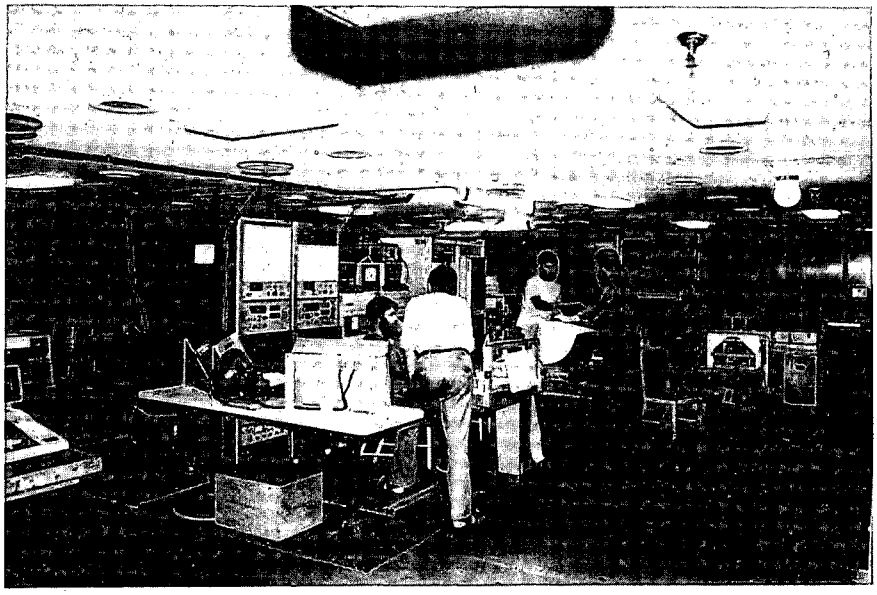
Several thrusts have been made during the past year. The most significant of these has been the launching of a major multi-parameter survey operation in Hudson Bay. A second thrust has been to generally increase the level of operations in Arctic waters. This has only been possible without detracting from the important ongoing southern activity by the successful development and utilization of automation. A third thrust, that is as yet in an embryo stage, has been to take on a modest load of chart compilation.

Significant ongoing activities include the maintenance of the cyclic program of revisory surveys, the letting of contracts to industry for hydrographic surveys and an exchange of staff with the U.S. National Ocean Surveys.

Several of the senior staff have been involved in various working groups established by international organizations, including the Federation Internationale de Geometres and the International Cartographic Association.

SURVEY PROJECTS - REVIEW

The most demanding field survey has been the multi-parameter operation that has been initiated in Hudson Bay using the Ministry of Transport's vessel NARWHAL. The survey has been arranged with a wide grid spacing covering the entire bay. It is planned that in subsequent years, the grid will be densified. This method of surveying has been facilitated by the use of a SatNav Doppler sonar positioning system. Parameters collected by the ship have included bathymetry, gravity, magnetics, physical oceanographic and biological properties.



NAVIGATION CONTROL ROOM ON BOARD CCGS NARWHAL
IN HUDSON BAY - THE SATNAV DOPPLER SONAR
POSITIONING SYSTEM IS FEATURED

Also, in Hudson Bay, a party has been located at Povungnituk. This survey has been mainly shore based but has made limited use of a small chartered vessel MV GC JEWEL and the Ministry of Transport icebreaker NORMAN MCLEOD ROGERS.

Two winter operations were conducted. One was the ongoing Arctic Island survey supported by the Polar Continental Shelf Project and the other was a new operation in James Bay. Both these operations involved considerable liaison with the Dominion Observatory of EM&R. The former operation completed a survey of Nares Strait. The latter was unfortunate in having some particularly poor ice conditions. A special evaluation was also made under a contract with a commercial firm of a tracked vehicle equipped with special equipment for sounding through ice.

A major block of the Lower St. Lawrence River was completed when the survey reached Quebec, an operation that started at Les Escoumins in 1969. This unit again worked from a shore base at Montmagny. The completion of these surveys will permit the commencement of a major re-charting in metric units.

A portion of Lac St. Jean, in the area of Alma, P.Q., was surveyed under contract as the start of a program to provide improved charts for recreational boating.

In the Great Lakes, a survey of Toronto Harbour was completed. In Lake Erie, the ongoing activity with the limnogeologists was carried out west from Point Pelee, and the survey was completed to the Detroit River. In Lake Huron, a very successful offshore program was carried out in the vicinity of Port Elgin and reached out to the United States Border. Later in the year, a co-operative operation was started on the U.S. side of the lake using the Canadian vessels CSS BAYFIELD and CSS ADVENT. Although some initial problems were experienced with the electronic positioning systems, the operation on the U.S. side was successful. Surveys of ports on the Canadian side were carried out in conjunction with the Lake Huron offshore work. Further west, a party en route to Lake Winnipeg completed the survey of Thunder Bay that had been initiated last year under contract.

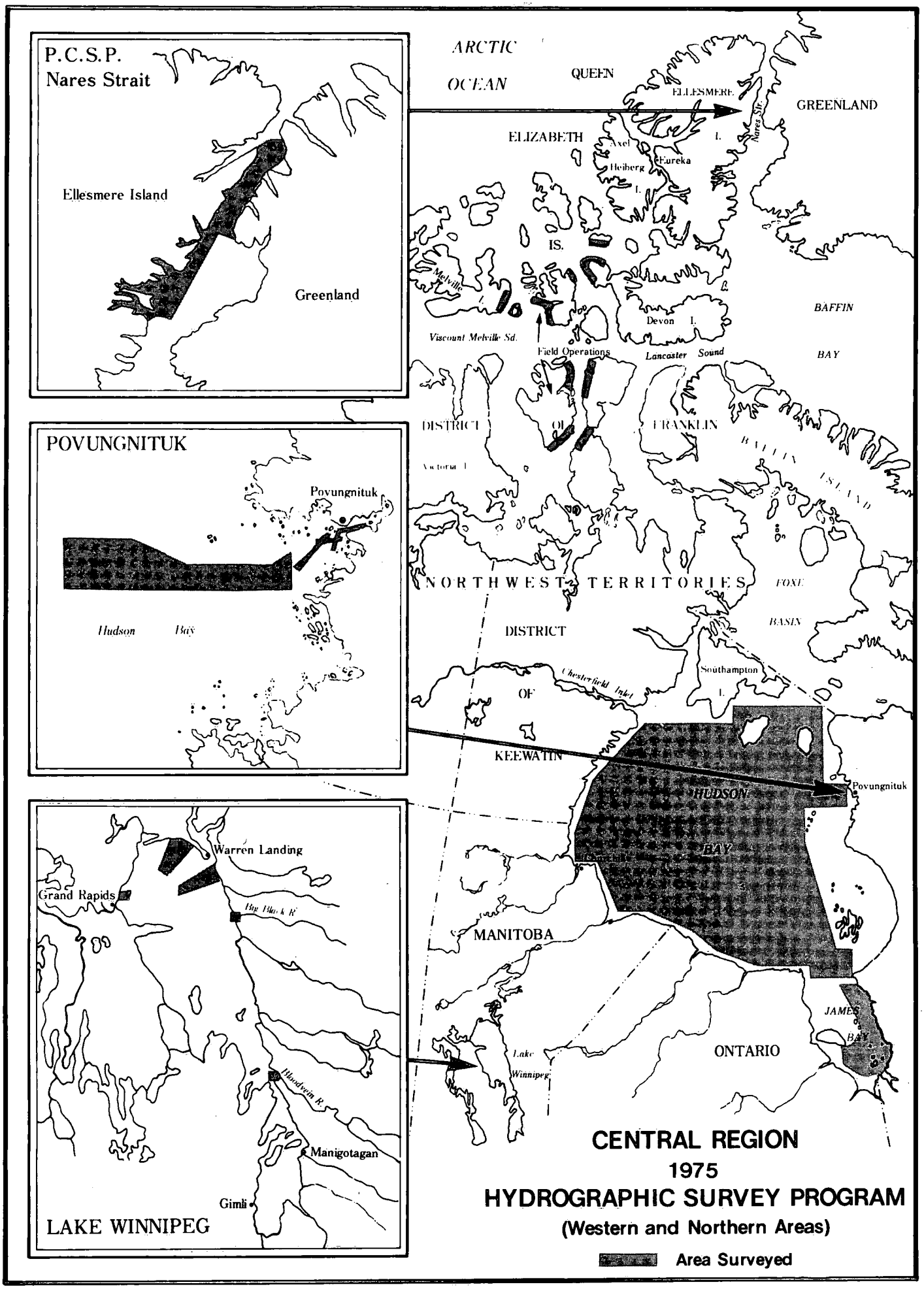
CSS ADVENT
FLYING THE FLAG OF HER HOST COUNTRY
ON THE LAKE HURON SURVEY

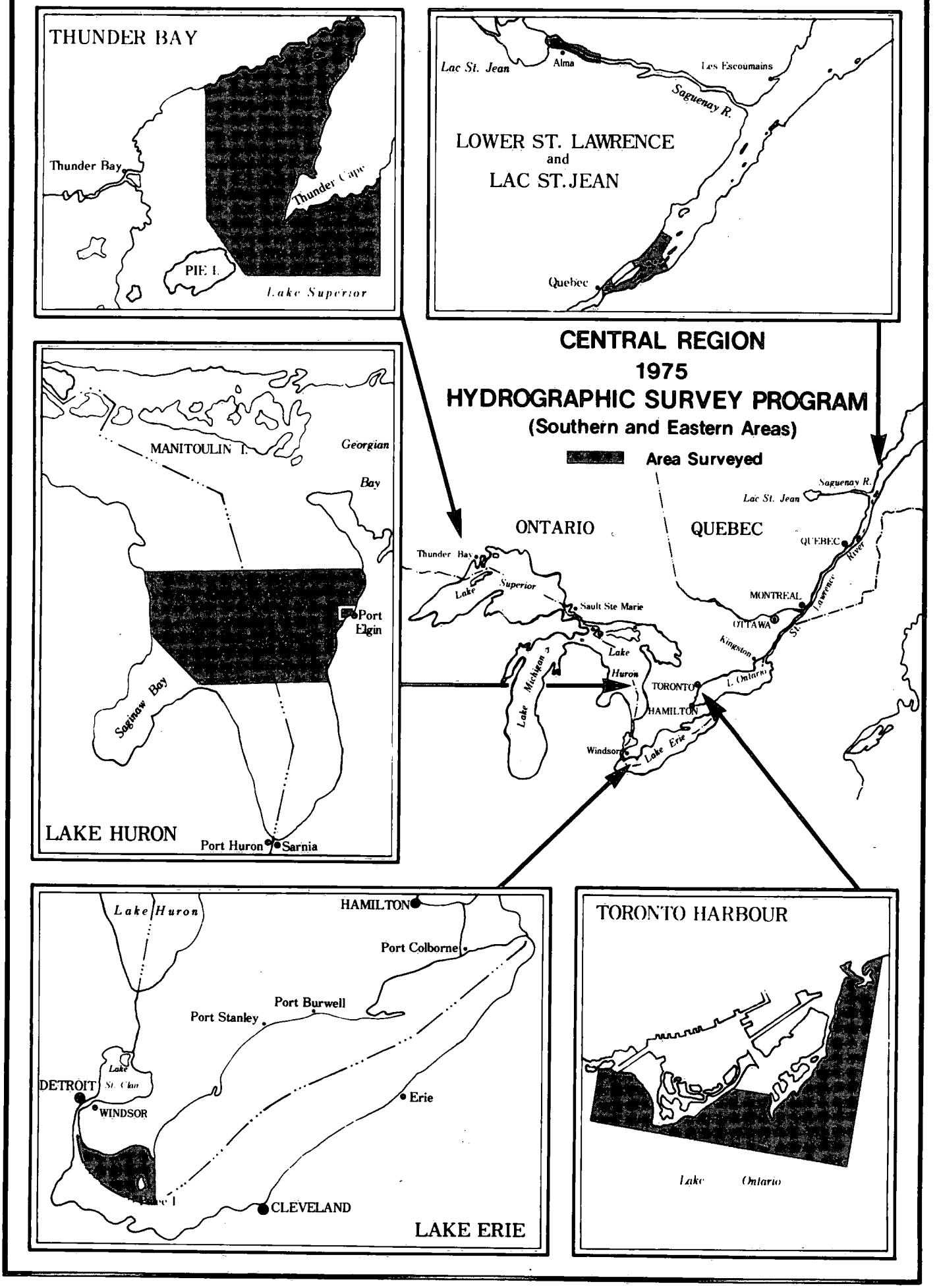
Once again there was a high level of activity in Lake Winnipeg. Two chartered vessels, the MV LADY CANADIAN and the MV LADY NORTHLAND, were employed on the offshore survey of the northern part of the lake. Both ships were equipped with the latest Integrated Navigation and Data Acquisition and Processing Systems (INDAPS). Unfortunately, due to several unforeseen circumstances, productivity was lower than anticipated. The Division was fortunate in obtaining the use of the large tug MV GRAND MARAIS from the Department of Public Works. This vessel was used to support a small unit surveying the harbours of Bloodvein and Black Rivers.

Further north, a survey of Churchill Harbour was arranged under contract, on behalf of the Department of Public Works. The contract for this successful operation was prepared and monitored by Central Region hydrographers.

The cyclic program of revisory surveys was conducted again. The large survey vessel CSL VEDETTE worked in Lake Erie, Lake Huron and Georgian Bay, and CSL VERITY worked in Lake Ontario and the Upper St. Lawrence River.

The Canadian Hydrographic Service again exchanged one hydrographer with the United States National Ocean Survey group. This hydrographer travelled to the various U.S. Hydrographic surveys while his U.S. counterpart was active with most of the C.H.S. surveys.


P.C.S.P.
Nares Strait
Ellesmere Island
Greenland
POVUNGNITUK
Povungnituk
Hudson Bay
LAKE WINNIPEG
Warren Landing
Grand Rapids
Big Black R.
Broadwein R.
Manigotagan
Gimli
ARCTIC OCEAN
QUEEN ELIZABETH IS.
ELLESMERE I.
GREENLAND
Nares Str.
Axel Heiberg I.
Eureka
Melville I.
Devon I.
Viscount Melville Sd.
Field Operations
Lancaster Sound
BAFFIN BAY
DISTRICT OF FRANKLIN
BAFFIN ISLAND
NORTHWEST TERRITORIES
FOXE BASIN
DISTRICT OF KEEWATIN
Southampton I.
Chesterfield Inlet
HUDSON BAY
Povungnituk
MANITOBA
ONTARIO
JAMES BAY
Lake Winnipeg
CENTRAL REGION
1975
HYDROGRAPHIC SURVEY PROGRAM
(Western and Northern Areas)
Area Surveyed


THUNDER BAY
Thunder Bay
Thunder Cape
PIE I.
Lake Superior
Lac St. Jean
Alma
Les Escoumains
Saguenay R.
LOWER ST. LAWRENCE
and
LAC ST. JEAN
Quebec
CENTRAL REGION
1975
HYDROGRAPHIC SURVEY PROGRAM
(Southern and Eastern Areas)
Area Surveyed
MANITOULIN I.
Georgian
Bay
Port
Elgin
Saginaw Bay
LAKE HURON
Port Huron
Sarnia
ONTARIO
QUEBEC
Thunder Bay
Lake Superior
Sault Ste Marie
Lake Michigan
Lake Huron
TORONTO
HAMILTON
Windsor
Lake Erie
L. Ontario
Kingston
OTTAWA
MONTREAL
St. Lawrence River
QUEBEC
Lac St. Jean
Saguenay R.
Lake Huron
HAMILTON
Port Colborne
Port Burwell
Port Stanley
Lake St. Clair
DETROIT
WINDSOR
Erie
CLEVELAND
LAKE ERIE
TORONTO HARBOUR
Lake Ontario

SUMMARY OF THE SURVEY PROGRAM AND SOME SIGNIFICANT EQUIPMENT USED

Survey Area	Vessels	Positioning System	Field Data Processing
Lower St. Lawrence	2 Hydros (25 ft.) 4 Botveds (22 ft.)	Mini-Ranger, Hydrodist	Manual and HAAPS
Lake Erie	1 Bertram (25 ft.)	R.P.S.	Manual
Lake Huron	ADVENT (77 ft.) NUCLEUS (34 ft.) BAYFIELD (103 ft.)	Mini-Fix	INDAPS
Toronto Harbour	1 Bertram (25 ft.)	Hydrodist, R.P.S.	Manual
Thunder Bay	2 Hydros (25 ft.)	R.P.S., Mini-Ranger	Manual
Lake Winnipeg Harbours	1 x 20 ft. GRAND MARAIS (90 ft.)	Mini-Ranger	Manual
Lake Winnipeg Offshore	LADY CANADIAN (87 ft.) LADY NORTHLAND (84 ft.)	Mini-Fix	INDAPS
Polar Shelf (Nares Strait)	3 x 206 Helicopters	R.P.S., Mini-Ranger	Manual
James Bay Winter	2 x 206 Helicopters	1 Decca Lambda 6f	Manual
Hudson Bay Offshore	NARWHAL (252 ft.)	Magnavox Satellite Doppler	HAAPS INTERDATA
Povungnituk	3 Monarks (20 ft.) JEWEL (88 ft.) NORMAN McLEOD ROGERS (295 ft.)	Mini-Ranger	Manual
Revisory I (Lake Erie, Georgian Bay)	VEDETTE (48 ft.)	Hydrodist	Manual
Revisory II (Lake Ontario, Upper St. Lawrence)	VERITY (37 ft.)	Hydrodist	Manual
Lac St. Jean	CONTRACT	-	-
Churchill Harbour	CONTRACT	-	-

TIDES, CURRENTS AND WATER LEVELS

During the year, a new Head has been recruited for the Tidal Section. This section produces the Monthly Water Level Bulletin and has recently introduced a bilingual and metric format. A field survey program has been conducted, measuring the currents in all the yachting harbours in Lake Ontario. In Hudson Bay, the section has worked in conjunction with the Research and Development Division in deploying a number of self-contained sea floor tide gauges. Further north, one of these gauges was successfully tested in ice covered waters in Nares Strait. Besides the above activities, the section provides a substantial level of support to the hydrographic field parties.

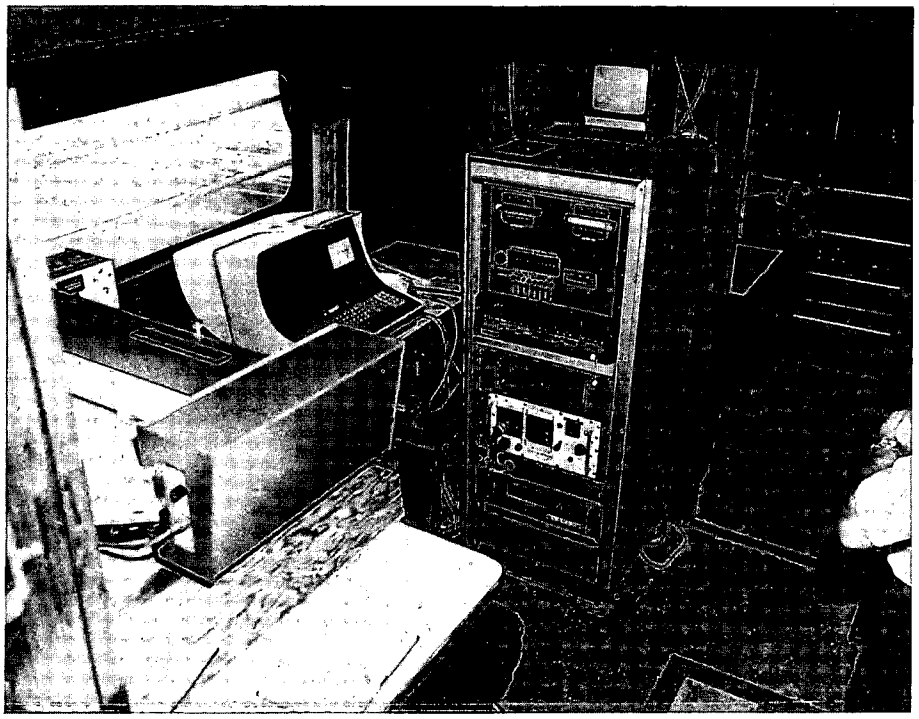
The Tidal Instrument Development Group has also built itself up to its full strength of four persons. This section is responsible for maintaining the telemetry system for the entire water level measuring network. This maintenance is provided through a commercial contract. A particular area of development by this group has been in the design of an automated water level data acquisition and telemetry system based on micro processors. Other work has included the continued evaluation of a satellite telemetry system on behalf of NASA and the evaluation of water level sensors.

AANDERAA TIDE GAUGE EQUIPMENT AT NARES STRAIT

SIGNIFICANT DEVELOPMENT PROJECTS

The INDAPS system has been modified and further developed to include a navigational capability. Additional systems were purchased and the system has been used effectively on two surveys.

A very heavy work load has been involved in developing instrumentation and evaluating navigational systems for the Hudson Bay program. Investigations were made into the use of a miniature Loran-C system but finally it was found that a Satellite Doppler Sonar Integrated Navigation System was able to meet specifications and its use was arranged. Software modifications were developed under contract. A main processing computer was purchased and programmed for the numerous data processing problems presented by the multi-parameter survey.



THE INDAPS EQUIPMENT
USED AT LAKE HURON

CARTOGRAPHIC ACTIVITIES

The two man cartographic unit continued to provide support in the preparation of graphics to all Ocean and Aquatic Sciences groups at C.C.I.W. However, the major development in this area has been the compilation of preliminary charts of Chesterfield Inlet. This activity marks the start of a plan to develop a chart production capability in the Regional Office. Associated with this development has been the exchange of field hydrographers with chart production staff for the transfer of knowledge.

PLANS FOR 1976

The survey of the Lower St. Lawrence will move to the area northeast of Ile du Bic. Surveys of Lac St. Jean will be continued under contract. In the Great Lakes, coastal surveys with the limnogeologists will move into Lake Huron. The shoal waters adjacent to Caribou and Michipicoten Islands in Lake Superior will be delineated. Revisory surveys will continue from Montreal to Pointe des Monts and the Trent and Lower Ottawa Waterways; a range survey will work in conjunction with one of the Revisory surveys.

Winter surveys will be carried out in the Belcher Channel, north of Devon Island and in James Bay. NARWHAL will again be used for the multi-parameter survey of Hudson Bay. The coastal operation will move to Eskimo Point and Whale Cove.

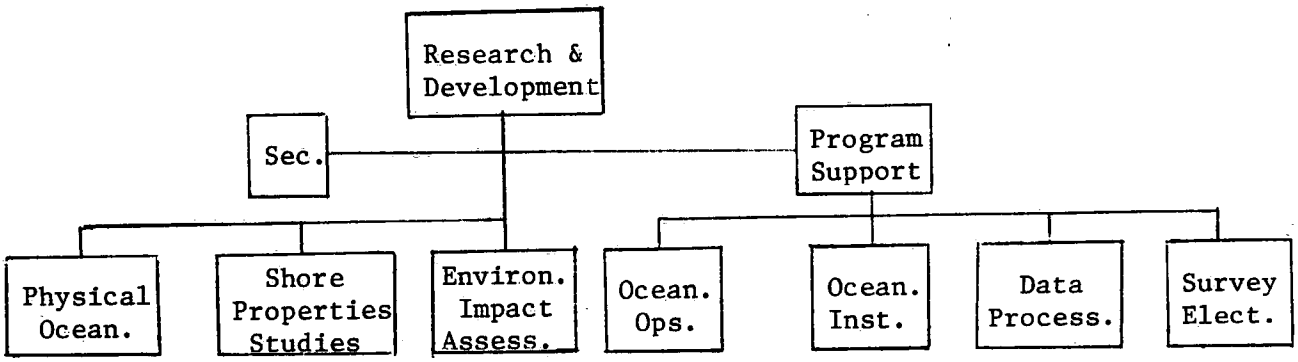
A survey of the offshore waters of Senegal and Gambia, West Africa, will be managed by Central Region. The operation, which is supported by funds from the Canadian International Development Agency (CIDA) will use CSS BAFFIN for two to three months in the spring.

RESEARCH AND DEVELOPMENT DIVISION

During 1975 the Research and Development Division underwent its first reorganization since its inception in December, 1972. Over the last few years a number of new programs have emerged, particularly the physical oceanography programs in Hudson and James Bay. A number of new support functions have also come into being, such as oceanographic operations and oceanographic instrumentation. This year it was decided to establish a management framework that was both definitive of these new functional relationships, and at the same time flexible enough to grow and change with new thrusts.

It was felt that this could be done most effectively by separating the scientific and operational roles, such that the daily operation of the Division is distinct from the longer term scientific program management. The program support function, including operations, instrumentation, data processing and administration, consists of key resource personnel who interface with the common user facilities of CCIW. Survey Electronics, as before, largely supports the field programs of Hydrography and other groups at CCIW. The scientific program consists of Physical Oceanography, Shore Properties Studies and Environmental Impact Assessment.

In recent years the scientific programs have gradually shifted from limnological to marine-oriented and from applied to process-oriented studies. This transition has created a need for an increased number of research scientists within all the scientific programs, as well as a requirement for further expansion of the scientific program to include under ice oceanography. Recent experience indicates that future program thrusts will largely be in response to an emerging government priority for marine environmental reconnaissance studies associated with resource exploitation initiatives in the mid and high Arctic.



PHYSICAL OCEANOGRAPHY OF HUDSON BAY

During the summer of 1975 a multi-disciplinary survey of Hudson Bay was co-ordinated by the Canadian Hydrographic Service. From the CCGS Narwhal the bay was surveyed for bathymetry, oceanography, marine biology, gravity and magnetics. The oceanographic part of the survey was to test and evaluate an underway towed body data collection system and to collect time-series data from moored arrays across the mouth of James Bay and within Hudson Bay itself.

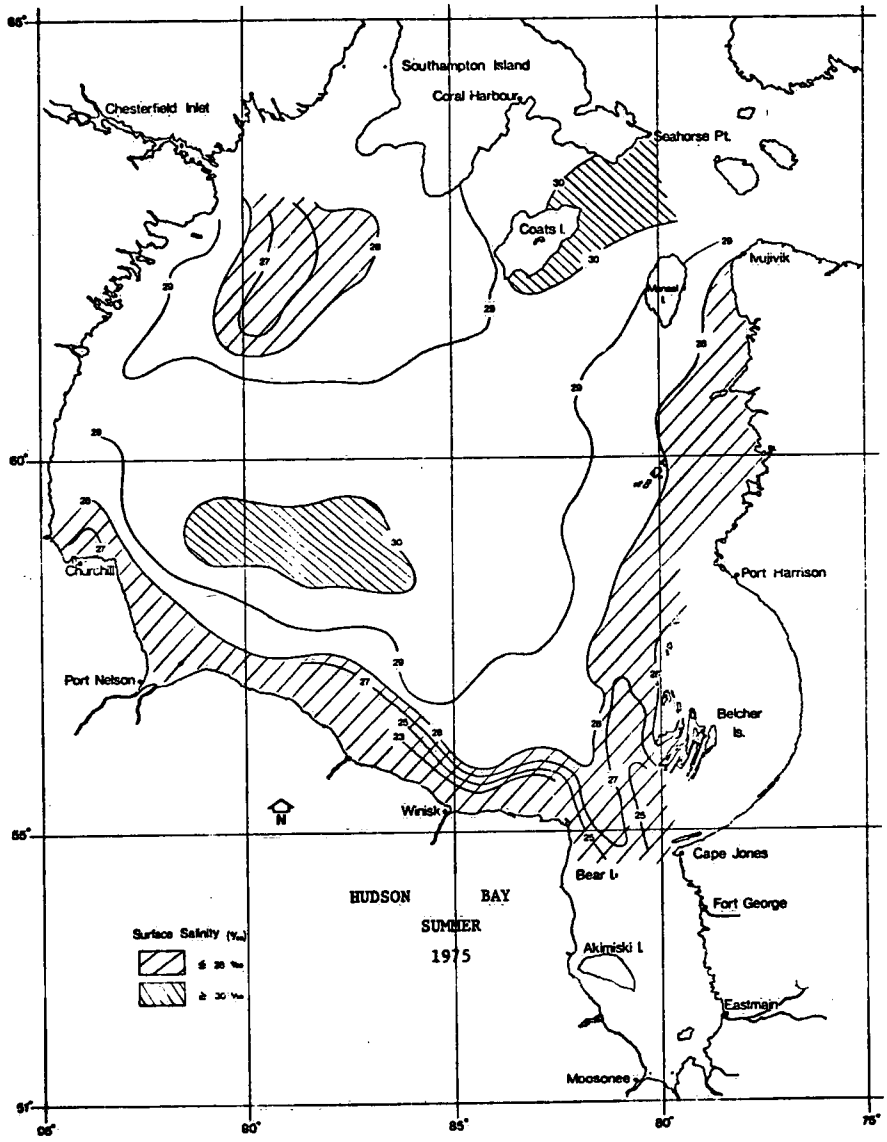
Although problems did arise with the underway data collection system they were resolved in the field. During the survey, the towed body was in the water for approximately 7,000 nautical miles and 238 salinity and temperature vertical profiles were taken. With the ship stopped at 85 stations, data was collected with either the E.B.T. system (plus bottle casts) or with the C.S.T.D. system in the latter part of the cruise. In total, 41 bottle casts as well as surface samples at each towed station were obtained to supplement as well as calibrate the profile data. All the profile data was recorded on tape and was changed to engineering units on board ship using the H.P. 2100 computer. The towed body system is an excellent means of obtaining oceanographic data over a large area and the system is now being redesigned to correct some of its shortcomings as experienced during the 1975 season. The three tide gauges and 16 current meters were all recovered and an 80% return of the current data is expected even though one array was down for part of time and had to be dragged for.

From an oceanographic standpoint, an excellent coverage of the Bay was obtained in the temperature field and a satisfactory coverage in the salinity field. Due to rapid changes in temperature and salinity caused by weather systems, the surface maps most likely will not represent the true surface distributions so that average salinity and temperature values over the total surface mixed layer have to be calculated and plotted. With only half of the total data plotted some features have emerged:

1) the influence of the fresh water plume of the Chesterfield inlet can be followed some 200 km as a southward bending tongue indicating a counter-clockwise surface circulation in this part of the Bay;
2) salinity and temperature gradients in the two northerly channels represent an inward motion over the total water column from the Strait into the Bay. No such gradients, nor even a suggestion of

opposite gradients are found in the southernmost channel indicating an outward flow;

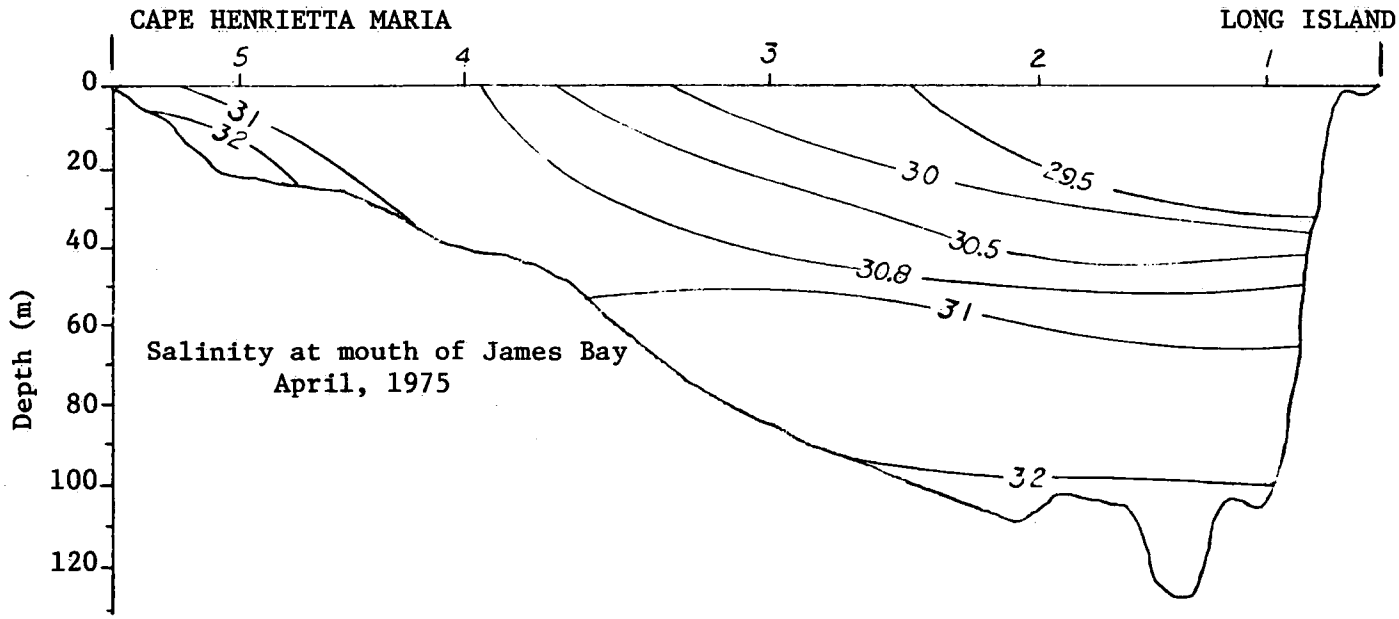
3) low salinity water cells are found on the southern shore and against the Belcher Islands. These are fed by the rivers on the southern coast but can only concentrate there in a counter-clockwise circulation when the Coriolis force holds it to the right hand shore. It is not clear from the data how much of the Belcher's low salinity water is made up of the outflow of James Bay and of the Hudson Bay surface water continuing to circulate on from the southern coast of Hudson Bay.



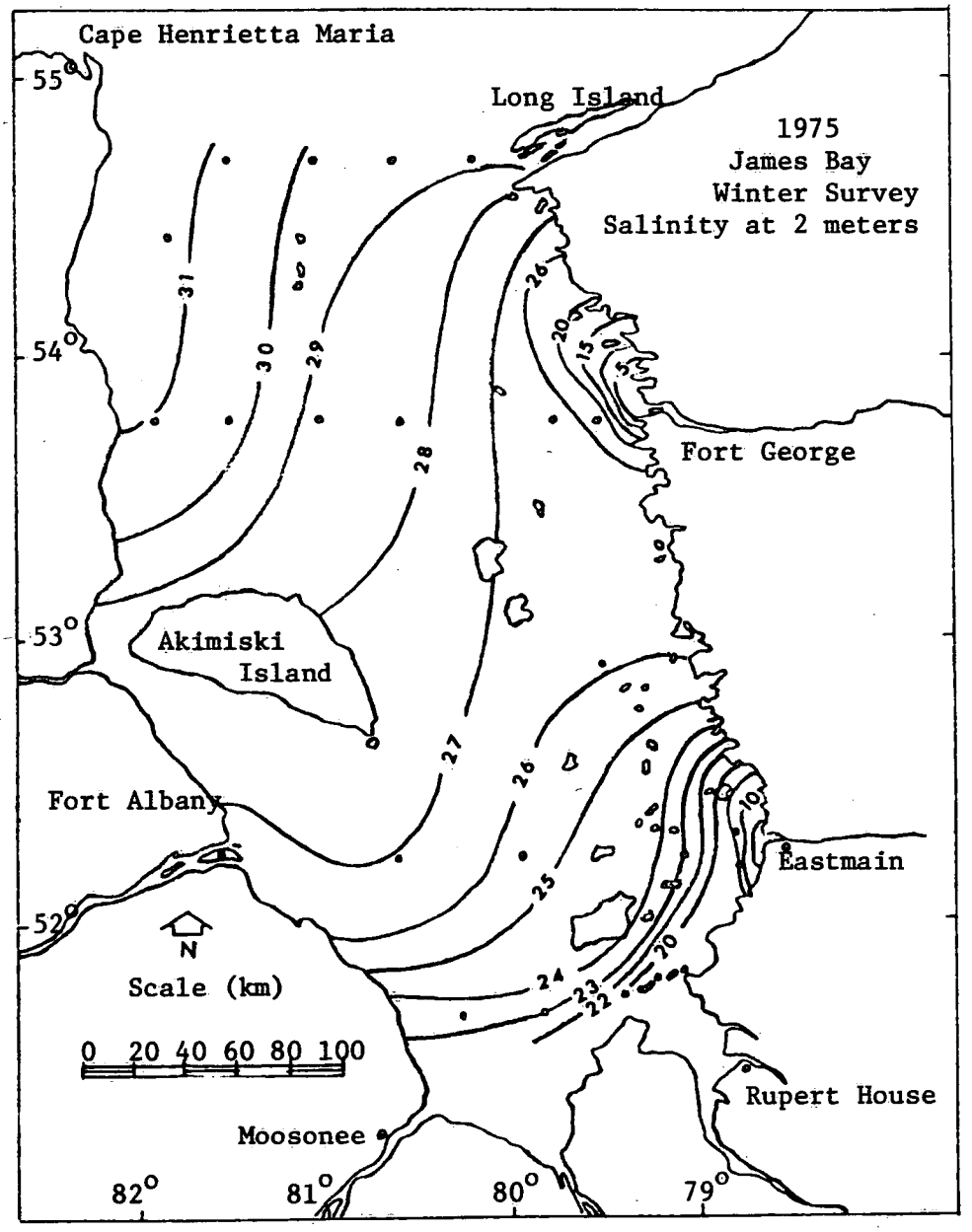
PHYSICAL OCEANOGRAPHY OF JAMES BAY

The objective of the winter program was to derive basic oceanographic features of the winter circulation regime of James Bay including the present influence of the Eastmain and La Grande Rivers. The summer program, limited to surveys in the Eastmain and La Grande estuaries, was designed to examine mixing of the river discharges with the saline water of James Bay and determine the extent of mixing.

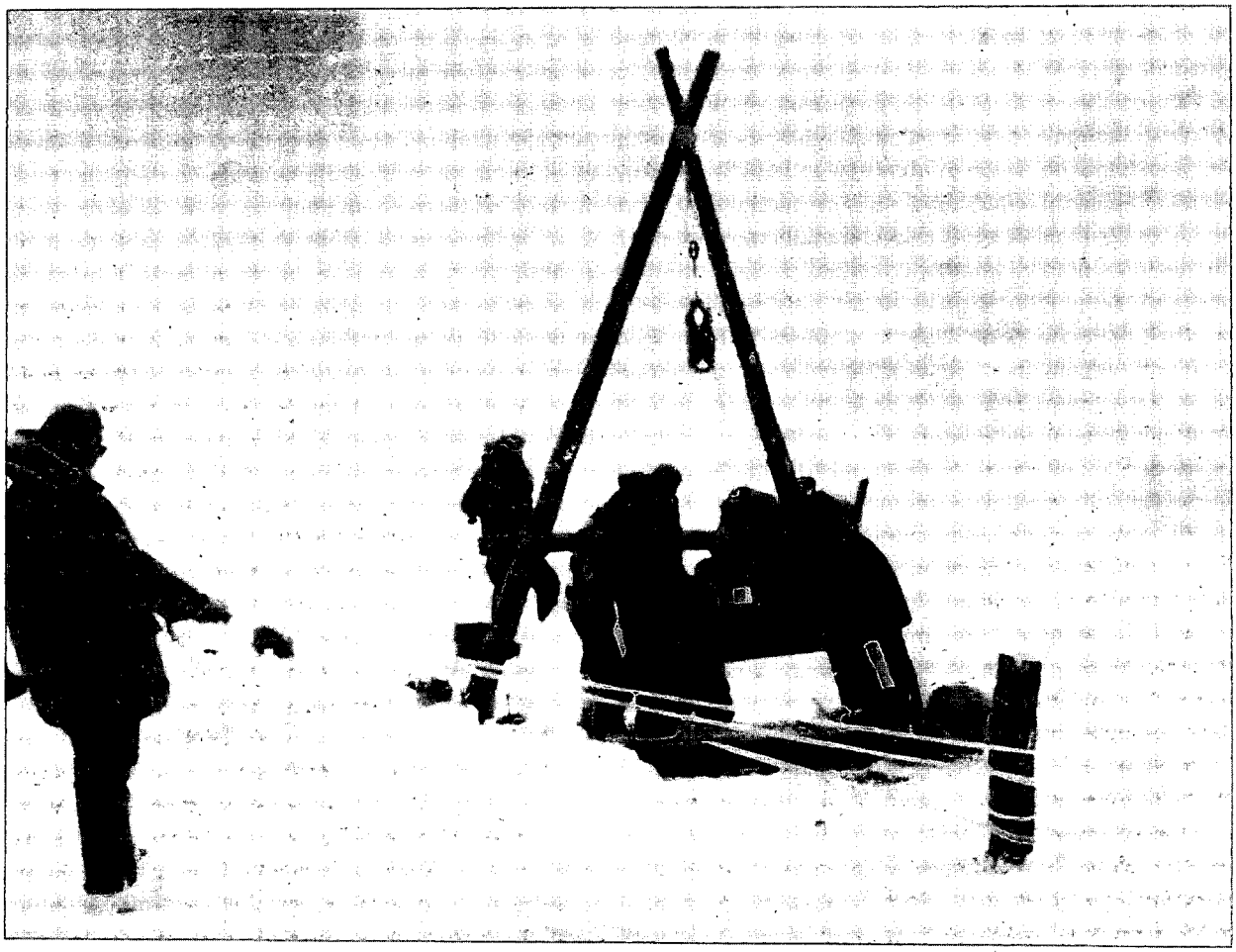
A CTD survey of James Bay was completed during the months of February, March and April, using a helicopter to provide the logistic support. Two experiments were carried out on the shore-fast ice in the La Grande estuary; the mooring of three in situ current meters, and the occupation of two stations simultaneously in the estuary, during which time salinity and temperature were measured at hourly intervals over a period of 13 hours. Owing to the combination of breakdowns and unfavourable weather during the summer project, only three 13 hour stations were completed in the Eastmain estuary before the field party was obliged to move. In the La Grande estuary complete sets of salinity and temperature data (13 hours) were obtained at seven stations, and two more stations were occupied over half a tidal cycle. The circulation pattern in James Bay is cyclonic, with high salinity water entering from Hudson Bay long the west coast and lower salinity water flowing out of James Bay along the east coast.



In the winter of 1975 the fresh water discharges of the Eastmain and La Grande Rivers were delineated as lenses of low salinity water extending over 12 and 20 miles respectively. The surface salinity distribution suggests fresh water from the rivers is being advected laterally by the jet, resulting in the sharp east-west surface salinity gradient. The time series data obtained from the three in situ current meters shows only slight variations in temperature and salinity and very low current speeds. The ice cover in James Bay is dynamic, being very responsive to changes in wind. During the field program leads along the east and west coasts of the bay closed and opened up to ten miles wide in a matter of a few days.



In the summer of 1975 the run-off of both the Eastmain and La Grande Rivers appeared to be much higher than normal for this time of year, making comparisons to the 1974 data in the La Grande estuary difficult. The high discharge of 1975 resulted in a spread of low salinity water in the surface layer of the estuary, extending further than the two previous years. One significant result is the absence of the passage of a slug of high salinity (23-24‰) water past station 131, which occurred in the fall of 1973 and '74. Presently, the 1974 and 1975 data are being assimilated to determine the extent of mixing within the estuary resulting from each of the processes of diffusion and entrainment. The work is complicated by changes in fresh water flow and variations in the local wind conditions.



James Bay Winter Current Mooring

ST. LAWRENCE CURRENT SURVEY, 1975

The prime objective of the St. Lawrence Estuary program is to study the circulation patterns in the Middle Estuary. This includes the delineation of the spatial and temporal variability of the astronomically induced tides and currents and the separation of the total circulation into tidal and non-tidal components. Baseline oceanographic measurements are taken to determine mixing, stratification and other non-tidal circulation parameters.

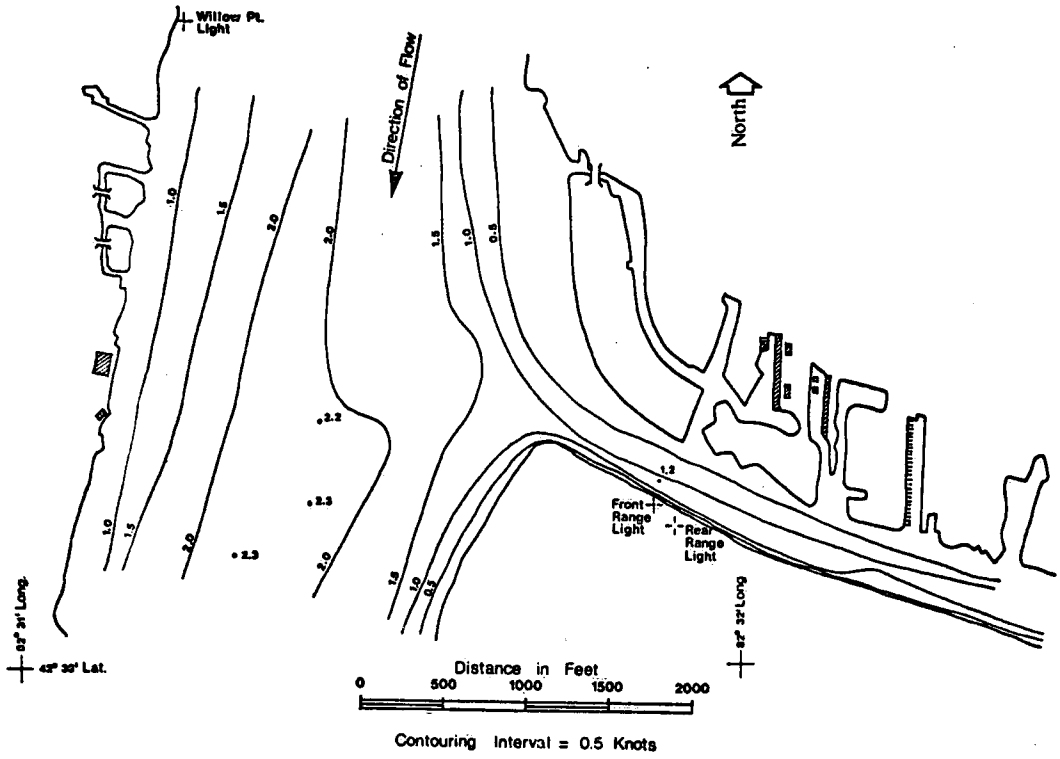
The field work in the Middle Estuary consisted of a one-month survey using Pte au Pic as a base. The C.S.S. Limnos was used to deploy and to recover 13 Plessey current meters distributed over four mooring strings. One of these mooring strings contained an Aanderaa in situ tide gauge. The C.S.S. Bayfield was used to occupy twenty five 13-hour stations. Current speed, direction, salinity and temperature were measured at each one-tenth of the depth using a Guildline CSTD and an Endeco current meter.

Data processing continued on the data collected in previous years as well as on the data collected in 1975. The data return from the Plessey current meters was about 75%. The 1973 Data Report was issued in the Fall, and all of the processing is complete for the 1974 Data Report. The data processing for the 1975 profile stations is well underway.

Cooperation with the Groupe Interuniversitaire de Recherches Oceanographiques du Quebec (GIROQ) was furthered in three instances. A paper was given at the GIROQ annual meeting at Laval University in January. Data from the 1973 and 1974 surveys was supplied to the Marine Sciences Centre, McGill University for the use of a graduate student studying internal gravity waves in the Pte au Pic area. A two-week survey was carried out in the Rimouski area using the C.S.S. Bayfield. The project leader for this survey was Dr. M. El-Sabh of the Universitaire du Quebec a Rimouski.

ST. CLAIR RIVER CURRENT STUDY

The R&D Division is supplying current data, derived from numerical modelling and field programs, to Operation Preparedness. Two field surveys were undertaken in conjunction with the E.P.S. oil boom evaluations. In July a one-week survey was carried out in the entrance to Chenal Ecarte and in August a one-week survey was undertaken in the Sombra area. A data report has been issued.



SURFACE CURRENT DISTRIBUTION AT CHENAL ECARTE

The development, testing and application of a one-dimensional numerical model has been completed. This model solves the complete, nonlinear shallow water equations of flow in any network of open channels. A manuscript report on the model has been written and will be published early in 1976. Some further work on storm surges in the Detroit River will be carried out early in 1976.

A two-dimensional implicit river model has been developed and tested in conjunction with the Departments of Civil Engineering and Systems Design at the University of Waterloo. This model was the subject of a paper presented to the American Society of Civil Engineers at the specialty conference, Modelling 75. This model is presently being applied to the junction of the St. Clair River and Chenal Ecarte.

CHESTERFIELD INLET HYDRODYNAMIC STUDY

A hydrodynamic study of Chesterfield Inlet has been undertaken to provide information on the nature of the tidal propagation there.

Should Chesterfield Inlet become a major supply route for moving materials required in the construction of the Eastern Arctic Pipeline, tidal current and water level predictions will be required for safe navigation. In addition, tidal current and water level information are required for the prediction of oil slick movement and in the design of any future deep water port for the inlet.

In this project the following aspects of the tidal propagation are to be investigated:

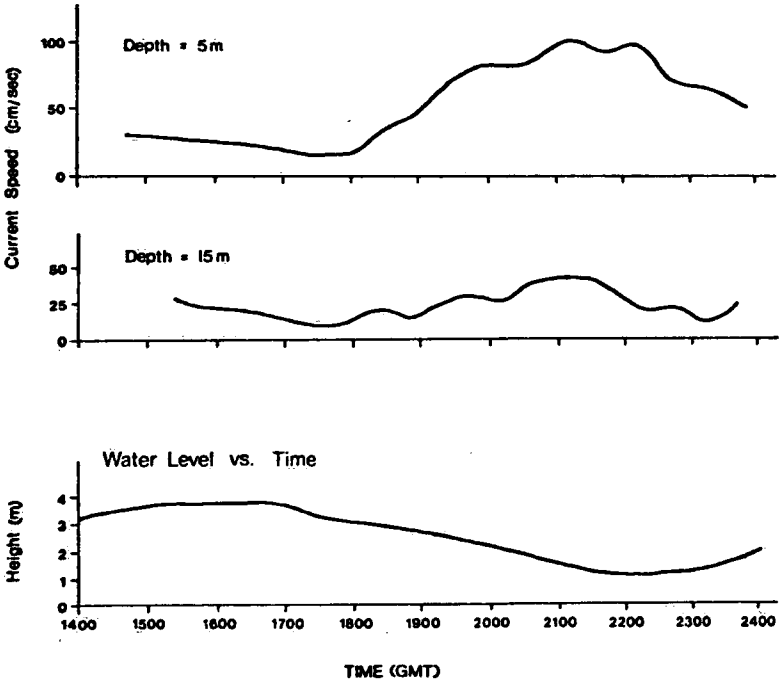
a) The phase shift and amplitude change in a tidal wave moving down the inlet.

b) Variation in the spatial current distribution in the inlet through the M_2 tidal cycle.

c) Variation in the magnitude of the currents with spring and neap tides, with the hydrologic cycle, and with wind induced storm surges at the mouth and at Baker Lake.

d) The nonlinear interaction of tidal constituents.

This study requires the analysis of existing data and the utilization of a one-dimensional numerical model. Analysis of the available field data is underway. Work is nearly completed on a one-dimensional model which uses sparse matrix techniques to obtain an implicit solution for the fully nonlinear St. Venant Equations.



CHESTERFIELD INLET
PROFILE STATION #2 (Poston Pt.)
12/8/74

CANADA/ONTARIO GREAT LAKES DAMAGE SURVEY

The Canada/Ontario Great Lakes Damage Survey involved a detailed compilation of data and a determination of priority areas but did not include any detailed planning studies. The nature and extent of the damages to riparian properties were surveyed and evaluated in the erodible portion of the Great Lakes from Port Severn on Georgian Bay to Gananoque on the easterly end of Lake Ontario. The ensuing final technical report, completed in October, 1975, contains the analyzed statistics and proposes a range of alternatives for the mitigation of erosion and inundation problems. These were examined generally but must be further assessed in relation to specific reaches of shoreline. Both the Technical Report and the Coastal Zone Atlas will be ready for release in March of 1976.

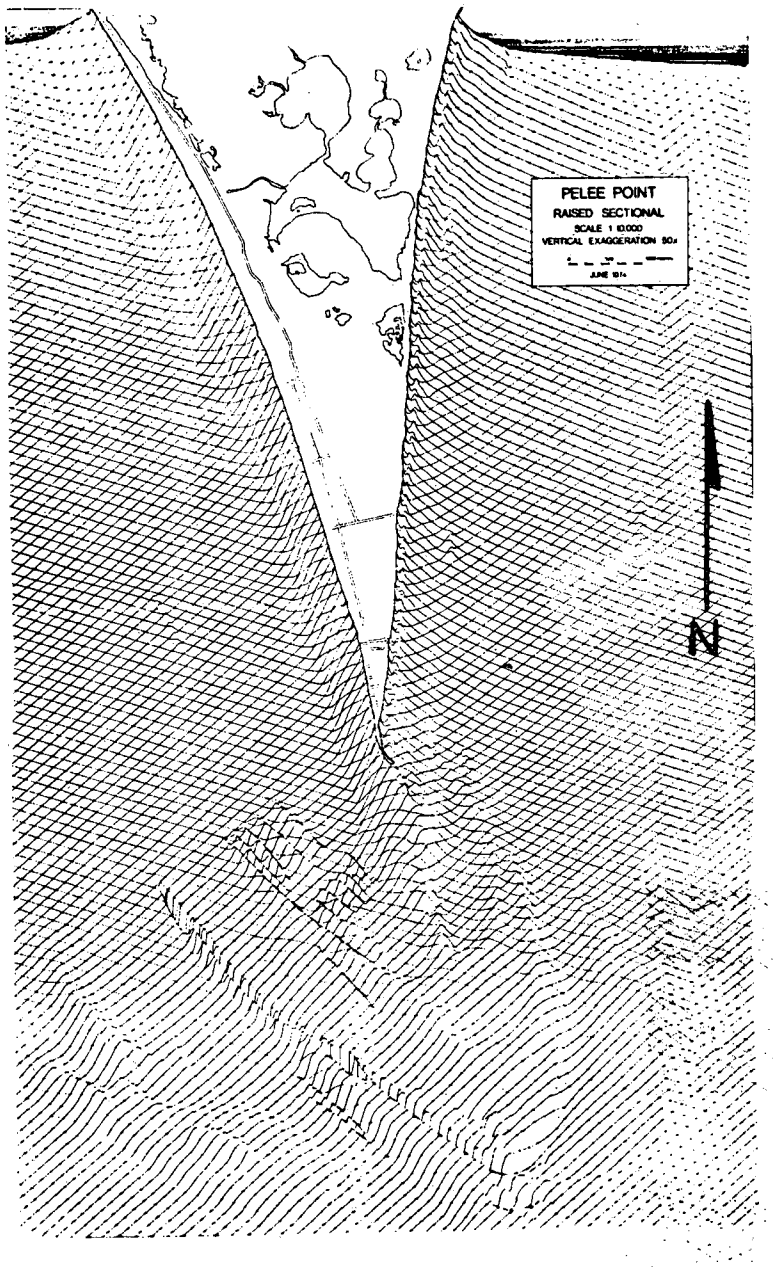
The Coastal Zone Atlas will be loose-leaf bound for simplicity of updating and ease of cross-reference. The 867 sheets of the atlas, including infra-red photomosaics at a scale of 1:20,000, cover an approximate shoreline length of 2,000 kilometres from Port Severn to Gananoque, excluding the Niagara River, the shoreline of which is neither susceptible to erosion nor inundation. The IR feature of the 1973 aerial photography was primarily used to delineate the interface of water and land at the time of peak water levels on the Great Lakes. The atlas includes a photogrammetric trace of the 1973 shoreline in relation to original township lot lines and a comparison of the positions of the top of the bluff, where applicable, between 1952-55 and 1973. Histograms of recession or accession rates, areas of damage due to erosion and inundation, shoreline land use, ownership, land value, shoreline physical characteristics, and the type of protective structures in damaged areas are also illustrated. The atlas will be available from Information Canada and Province of Ontario book stores at a price of $135.00.

Monitoring of the erosion stations established in 1972 continued in 1975 ensuring a reliable data base in the coastal zone. All data was adapted to a computer program for quick data analysis and retrieval. This feature proved useful in the evaluation of damages caused by the recent storm of November 10, 1975, in the eastern end of Lake Erie where damages of over 1 million dollars estimated by local authorities were scaled down to half a million using this methodology. Thus the program allows small and large scale assessment of the dynamics of the coastal zone in relation to physical and socio-economic parameters.

POINT PELEE EROSION STUDY

The study was initiated in 1974 by the Department of Indian and Northern Affairs (Parks Canada Directorate) and Environment Canada to determine if commercial dredging plays a significant role in the beach and nearshore dynamics of Point Pelee National Park. The removal of subaqueous aggregate deposits in the Pelee area dates back to 1917 and has been on a continuous basis since 1943. A temporary injunction was passed in 1973 which suspended dredging licenses in the area due to excessive beach erosion and thus provided the opportunity to monitor changes in the morphology of the Point under controlled conditions.

The network of profile stations established in 1974 was resurveyed on an approximate monthly basis from May through to November 1975. Along each profile, bottom samples were collected at three, six and eleven meter depths using the Shipek Grab Sampler. Nearshore current measurements were also taken during September and October at four locations using Marsh McBurney and EG&G current meters installed by the Mechanical Engineering Unit of CCIW.



The final report which is to be completed April 76 is to include a descriptive analysis of the morphology of the Point Pelee spit and shoal system as represented in the raised sectional format shown. Textural analysis of the bottom samples and current measurements will enable interpretation of sedimentary environments and sediment transport.

Volumetric and sweep zone analysis of the sequential profile data will indicate absolute and relative magnitudes of beach and nearshore response to such factors as wind, waves and currents.

The impact of commercial dredging on the sediment budget of the Point Pelee spit and shoal system will then be based on the distribution of sedimentary zones, beach recovery rates, current regime and proportionate comparison of the volumes of material identified as sources and sinks.

JAMES BAY EROSION STUDIES

During July and August the Shore Properties Studies Section began a research program in the La Grande and Eastmain estuaries to determine short term erosion rates. This study was designed to predict the response of shoreline stability to discharge modifications resulting from the James Bay Hydro Development. Using Canadian Hydrographic Service horizontal control, erosion stations were established at sensitive areas and profiled both onshore and offshore. Current measurements (Gurley) and soil samples (Shipek) were taken at each site at 6', 9' and 12' depths. In addition, the shoreline of each estuary was photographed using low altitude, sequential oblique colour slide photography. Reprofiling of these stations in future years will give a better indication of the erosion taking place and help identify those areas requiring some form of remedial action.

Bank Erosion Fort George, Quebec

ENVIRONMENTAL IMPACT ASSESSMENT

A cabinet decision of December 20, 1973 created the Federal Government's "Environmental Assessment and Review Process" or EARP. Through this process, all federally initiated, sponsored, or funded projects are subject to a screening process designed to identify those with potentially adverse environmental effects. With the subsequent appointment of Regional Screening and Coordinating Committees (RSCCs) and associated task forces, our participation increased, particularly with respect to the short term review of environmental impact statements. Membership on the Ontario RSCC was obtained to support our involvement in the power generation, coastal processes and dredging task forces.

In Quebec, we acquired observer status on the Regional Board to keep abreast of environmental matters relating to the James Bay hydro power development. We have a major responsibility to pull together the physical oceanographic studies to assess the oceanic impact of the discharge modifications of the La Grande River.

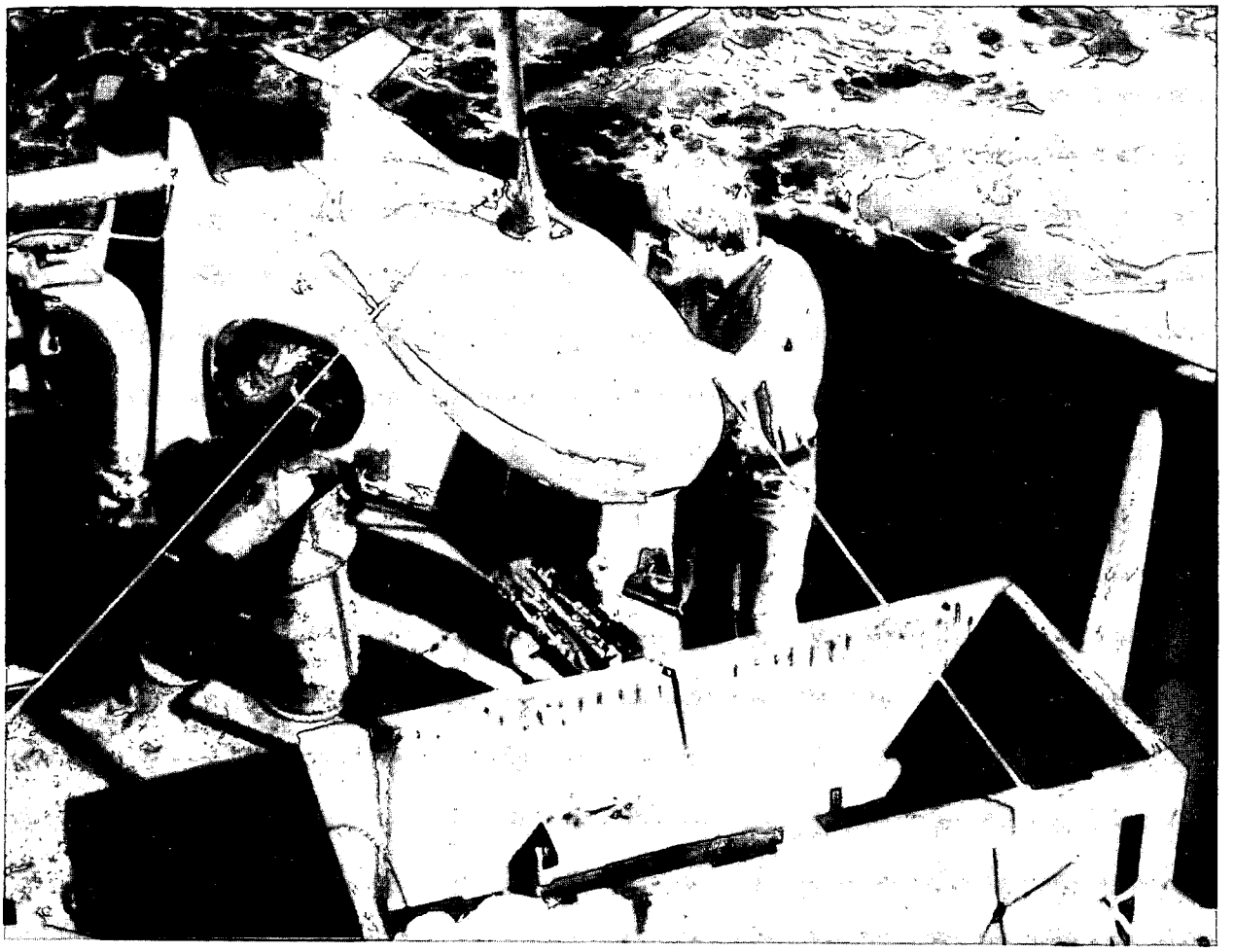
Work continues on generic guidelines for environmental assessments in such fields as oil and natural gas pipelines, nuclear and hydro-electric power generation and transmission corridors. Various proposals for baseline studies in support of EARP were brought forward in 1975, and a small program in the Hudson Bay Lowlands is planned for 1976. Environmental impact assessment is also gaining importance in Canada's Arctic, as the search for new energy reserves is requiring an increased level of activity in some of these relatively uncharted areas.

PROGRAM SUPPORT

With the reorganization of the Division, all support activities have now been grouped together. With the exception of Survey Electronics these support services are directed to divisional programs.

The Oceanographic Instrumentation group provided instrument support to the James Bay Winter, St. Lawrence River, James Bay Summer and Hudson Bay projects. For the latter project an extensive amount of developmental work was undertaken. An underway oceanographic system was designed, procured, assembled and tested. The system includes a Fathom winch, faired cable and towed fish assembly; a Guildline Mark III oceanographic probe and deck unit; a high speed data logging and recording system; and dual XYY analogue recorders. The system is unique in that it can be towed at high speed (12

knots) for extended periods of time. Similar systems either will not withstand extensive deployment or must be towed at low speed. In addition, the low drag towed body and faired cable permit maximum depth with minimum cable. The system was tested in the St. Lawrence and extensively used during the Narwhal Hudson Bay project with over three hundred underway oceanographic stations collected. During the year an Aanderaa current meter transcriber was purchased and modified to our needs. Additional developmental projects ongoing at year end include an automated bottle sampling system, a computerized CTD logging and processing system, and a time count module for the Aanderaa current meters.



Towed CTD System on Board 'Narwhal'

Early 1975 saw the establishment of the Oceanographic Operations unit with the staffing of a senior operations officer. The operations group supplied field support to the St. Lawrence River survey program, the James Bay Summer and Hudson Bay projects. Other activities during the year included the establishment of standard procedures, standardized logging forms, and investigations of moorings for high current areas. In addition, a compact lightweight winch for helicopter use was designed and constructed. The winch, of aluminum construction, utilizes the engine from the ice auger, an outboard motor gear box and can easily be disassembled for repair and replacement of parts.

All data processing activities for the Division are now centered in the Program Support group. This year has seen the continued development of programs for processing of oceanographic and hydrodynamic data. Current meter records have been processed for the St. Lawrence and James Bay Winter project and work continues on the Hudson Bay data. Late in the year a computer programmer was contracted to coordinate data processing activities and to develop scientific analysis programs. At year end work was proceeding on development of the data base, an abbreviated combined Aanderaa processing system and programs to handle profiled oceanographic data.

Survey Electronics continued its support to O&AS, to users at the Centre and to other external agencies. As usual, technicians were provided to remote field parties with the local parties drawing technical support from Burlington. During the "spring rush" the regular staff was supplemented by several contract technicians. This experiment worked well and will be repeated in the future. To cope with the proliferation of increasingly complex equipment, the program of in-service training was intensified and several technicians were sent on equipment courses offered by suppliers.

As in past years the section undertook developmental work directed toward improving existing equipment as well as toward the development of new service techniques. Additional work was carried out to improve the Mini-Fix system. A new high power transmitter was developed and brought into service. The unit worked well and proved to be much less expensive than the obsolete type it was designed to replace. Further antenna experiments were performed with a 150 foot tower being erected in ten foot increments and the performance at each height evaluated. The resulting field strength data will prove valuable for the design of improved Mini-Fix antenna systems. In addition, extensive field work was undertaken on propagation characteristics

of the Mini-Fix system and will assist in selection of site and optimum base line lengths. Work has continued on the refinement of Mini-Fix tuners and noise filters. This development and refinement of the Mini-Fix system has been carried on over a period of years and has produced a substantial improvement in system capabilities. Experience acquired during the development of Mini-Fix antenna systems has spilled over to the design of an antenna for a low frequency radio beacon for use in the Arctic.

One of the major problems encountered by the users of equipment with digital readouts is that bright sunlight makes the readouts illegible. The shop has begun a project aimed at investigating readouts for use under conditions of high ambient light.

SHIP DIVISION

CENTRAL REGION

In addition to departmentally owned vessels LIMNOS, BAYFIELD and ADVENT, which operated at fairly high capacity, six ship charters were negotiated in support of regional programs, and once again, the Canadian Coast Guard ship NARWHAL was made available for the Hudson Bay program.

Due, in part, to the number of chartered vessels in operation, launch activity was down somewhat from previous years, a not unwelcome development, since this helped soften the impact of a reduction in man/year allocation, both in operation and vessel maintenance, particularly winter refit.

OPERATIONS

CSS LIMNOS

The 1975 Navigation Season was off to an early start when the CSS LIMNOS sailed from Burlington to Port Weller on March 17. After ten days on dry dock for inspection and refit, the ship returned to Burlington and prepared for a busy schedule.

Although the LIMNOS encountered delays due to breakdowns and bad weather she recorded a total of 24 cruises, 182 working days and 16,538 miles, and actually provided greater support to the programs than during the previous season.

On the return trip from the last cruise on Lake Erie, the LIMNOS had the misfortune of drifting onto the canal bank resulting in a damaged propeller. After spending two days on dry dock at Whitby, the LIMNOS then completed the final cruise for the season on Lake Ontario and returned to Burlington for winter lay-up on December 10.

CSS BAYFIELD

Following minor modifications, CSS BAYFIELD embarked on her first full operational season, getting under way on May 12, when she sailed to the Lower St. Lawrence. A thirty-two day oceanographic program was successfully completed and on June 13, BAYFIELD sailed for Federicton, N.B. to participate in the C.I.S. Conference. She proved to be a very popular attraction during her extended visit.

After returning from Federicton, BAYFIELD accompanied by an oceanographic crew from Rimouski, Quebec, carried out a two week cruise in the Saguenay-Rimouski area.

The highlight of the season for the CSS BAYFIELD occurred when the Minister, Madame Sauve and her party boarded the vessel at Quebec for a fact finding cruise in the Gulf of the St. Lawrence. Ports of call during this cruise were Rimouski, Matane, Fox River and Gindstone, and from this port was to return to Quebec. However, heavy wind and seas forced the BAYFIELD to shelter at Summerside, P.E.I. where the Minister and her party disembarked and the BAYFIELD returned to Burlington.

From August 11 until the 18, BAYFIELD was again outfitted for Hydrographic Survey work on Lake Huron. The vessel worked the United States side of Lake Huron from Harbour Beach to Alpena, Michigan along with the CSS ADVENT which had at this time moved from the Canadian shores to Harbour Beach.

BAYFIELD returned to Burlington on October 23 where she remained on standby for Hydrographic equipment trials until November 28 when these were concluded and the ship laid up for the season.

With a total of 10,417 miles and 189 operational days, the season was considered a success for BAYFIELD in her maiden year.

Lake Surveillance Program

The NORTHERN SEAL, owned by H.C. Mullett Ltd., Lewisporte, Nfld. was chartered in April, 1975. After arrival at Burlington on April 22, the ship was outfitted for surveillance work, which, after some early mechanical and electronic problems, resulted in 19 cruises ranging from Kingston to the western end of Lake Erie.

After these cruises were completed, the NORTHERN SEAL was stripped of scientific equipment and sailed for Newfoundland on November 13.

Lower St. Lawrence

The Lower St. Lawrence Hydrographic Survey continued operating out of Montmagny this year working westward to Quebec. Four Botved launches which remained at Montmagny for the winter were overhauled by Ship Division personnel.

In addition, the launch support was increased with two Bertram launches, Hydro I and Hydro II equipped with new twin Volvo 170 engines.

Early September saw the end of the survey when field party with all boats and equipment returned to Burlington.

Revisory I

The Revisory I Survey was again supported by the CSL VEDETTE and a Boston Whaler. After C.S.I. inspection and outfitting at Burlington VEDETTE sailed on May 14 and continued with the Revisory Survey Party into Lake Huron, the North Channel and Georgian Bay. At the conclusion of the survey the VEDETTE returned to Burlington on August 15 and remained here until November when it was taken to Hamilton for winter storage.

Revisory II

Once again the CSL VERITY was assigned to support the Revisory II Field Party. Along with a Boston Whaler the Revisory party proceeded to Montreal; the VERITY departing Burlington on May 12.

This survey continued westward through the St. Lawrence River and into Lake Ontario. VERITY arrived back at Burlington on August 29 with the Revisory Survey completed for the 1975 season.

Tides and Water Levels

CSL SURF, assigned to this program, started working out of Burlington on May 20. This was the first year of operation for SURF which proved to be a very versatile launch. The work area for Tides and Water Levels ranged from Burlington to Kingston. During this time a water sampling program for I.W.D. out of Frenchman's Bay was also supported by SURF. This program continued until November 3 when the launch returned to Burlington, was taken out of the water and winterized.

Dive Unit

The Dive Unit was again supported by the CSL SHARK which operated on Lakes Erie and Ontario. During the season the pontoon barge GULL was used

extensively, and also the 21 ft. aluminum boat S.A.B. 1.

Over the season, the SHARK sailed a total distance of 3,337 miles experiencing a number of electrical problems, due largely to age. It has been determined that the SHARK is no longer capable of handling the increasing demands of the diving program and will need to be replaced by a larger vessel for the 1976 season.

James Bay Project

CSL STURDY was prepared and shipped to James Bay where the Oceanographic Survey started on July 15 at Moosonee and worked northward to Fort George where the STURDY was taken out of the water and winterized on September 9. All equipment was removed from the STURDY and stored at Fort George except the electronic equipment which has been returned to Burlington.

Quinte Project

The Quinte Project, which consisted of a sampling program to look at the effect of nutrient removal on Quinte Bay, was supported by the CSL SANDPIPER and one Boston Whaler.

The SANDPIPER was outfitted at Burlington and on May 2 departed for Picton. The sampling program ranged from Picton to Trenton and continued in this area until October 10, when the SANDPIPER returned to Burlington.

Lake Huron Survey

This Hydrographic Survey supported by the CSS ADVENT and the survey launch NUCLEUS, newly acquired principally for national evaluation purposes, got underway when the ADVENT sailed from Burlington on May 6 followed by NUCLEUS which departed on May 9.

The survey based at Port Elgin, Ontario continued until August 16 when the field party was moved to Harbour Beach, U.S.A. and was joined there by the CSS BAYFIELD.

The CSS ADVENT totalled 196 operational days and 8,133 miles for the 1975 season.

The NUCLEUS, although very wet in bad weather proved a qualified success running a total of 3,817 miles for the season. Unacceptably high noise levels in the launch present a problem which is being looked into and hopefully will be resolved before the coming season. The NUCLEUS no longer required on the U.S. portion of the Lake Huron Survey returned to Burlington where some modifications were undertaken before winter lay-up.

Douglas Point Waste Heat Project

The CSL AQUA departed Burlington on April 28 to support this program which operated out of Baie-du-Dore Research Station. Two, 21 ft. aluminum joe-boats were trailered to the Lake Huron Base to support this program.

With only a few hours work left to do to complete the program, AQUA during a gale took on water through the steering arm bearing, and was flooded on the night of October 16 while moored at Baie-du-Dore dock. The launch was lifted out of the water and returned to Burlington somewhat ignominiously by road transport. The remainder of the unfinished work was completed with the aluminum boats which were returned to Burlington later in the month.

Lake Erie Geolimnology Survey

This survey was supported by the CSL AGILE and a Bertram launch, operating out of Sturgeon Creek on Lake Erie.

The AGILE departed Burlington on April 28, arriving at Sturgeon Creek on May 1, running a total of 4,564 miles for the season and at the termination of the survey returned to Burlington on October 24.

The Bertram launch CSL BROCK, also supporting this program was used for servicing the positioning equipment. On the 16th of September, the BROCK developed a serious problem in the outdrive connection tearing away the boot from the transom. The crew were forced to abandon the launch when it filled with water and were taken ashore in a Boston Whaler which was working in the area. Fortunately the launch did not completely sink and eventually was towed ashore, lifted out of the water and trailered back to Burlington.

Another Bertram, the CSL BRONTE was taken to Sturgeon Creek to replace the BROCK until the survey terminated.

Local Surveys

This survey, operating in Toronto Harbour and surrounding areas, was supported by the CSL BRONTE and a Boston Whaler. This survey which started early in May was terminated on August 22 when all equipment and boats were returned to Burlington.

Hudson Bay Survey

The CCGS NARWHAL, again the support vessel for this survey, had another successful season in Hudson Bay, operating in this area from mid-July until October. Both the Hydrographic and Oceanographic surveys during this cruise have been reported a success.

The NARWHAL transported two, 21 ft. Monark boats to Povungnituk to support the shore based field party, along with another Monark which had been stored there during the previous year.

The G.C. JEWEL, a charter tug from Quebec, was sent to Povungnituk for the off-shore work. However, due to a variety of circumstances, JEWEL accomplished very little survey time before returning to Quebec leaving the launches to complete the work. When the Povungnituk Survey terminated the three Monark launches and a Boston Whaler from the G.C. JEWEL, were taken to Churchill by NARWHAL and stored there for the winter.

Lake Superior Survey

This Hydrographic Survey which was underway during the first week in May was supported by two Bertram launches HYDRO III and HYDRO IV. The Botved launch HUNT was transported from Grand Rapids, Manitoba to Thunder Bay where all three launches worked trouble free until the last week in June, when the survey was completed. The HUNT and HYDRO III were transported back to Burlington while HYDRO IV was brought to Sault Ste. Marie and used in the North Channel, running Side-Scan Trials for three weeks before returning to Burlington.

Lake Winnipeg Survey

The Lake Winnipeg Survey was divided into two surveys this year with two charter ships LADY NORTHLAND and LADY CANADIAN working in the north end of the lake.

For the Harbour Survey in the south, a D.P.W. tug GRAND MARAIS was chartered while launch support was provided with CSL WOODCOCK and a pontoon workshop GANDER. While the GRAND MARAIS was towing the GANDER from Matheson Island to Big Black River, the barge was towed under resulting in loss of the cabin and all the equipment on board. All that remained of the GANDER were the two pontoons which were taken back to Matheson Island.

The surveys on Lake Winnipeg were completed without further incident and at the conclusion of the season in October, the ships were taken off charter and the WOODCOCK and Boston Whaler were stored at Selkirk, Manitoba.

Local Launch Support

The CSL LEMOYNE carried out a fair share to scientific work from Lake Ontario to Lake Saint Clair. When the LEMOYNE was not employed on these programs, she was on standby at Burlington for short term projects which often occurred during the season.

Many scientific programs in the Province were supported with small aluminum boats and Boston Whalers and in some cases personnel to operate them.

ENGINEERING

1975 started as 1974 had ended, hectically, with requirements for new charters for both the Great Lakes and Lake Winnipeg surveys, plus a major Hudson Bay project involving hydrographic, oceanographic and scientific surveys to be carried out aboard CCGS NARWHAL. This involved major alterations and installations on the vessel to be carried out in cooperation with Canadian Coast Guard, Ottawa, Canadian Coast Guard, Dartmouth, N.S., and Ship Division, Burlington, necessitating the location and purchase of equipment, delivery to Dartmouth and design approval normally expected to take over a year in a short three month period, made a little more difficult by a postal strike necessitating the use of telephone, telex and telecopier.

Meanwhile in the Boatshop, in addition to the normal winter maintenance, all four "HYDRO" launches were being converted to twin screw volvo six cylinder inboard/outboard drives, which had proved so successful in tests in the latter part of 1974.

Two of the HYDROS performed admirably during service in Lake Superior, whereas the other two in the Lower St. Lawrence were plagued with engine failures due to operation in shallow muddy waters and localized over-heating problems due to intermittent operation in these waters during low tide. Modified cooling systems are now being designed to prevent a recurrence of these difficulties.

Based on the success of the newly repowered HYDROS, CSL BROCK was similarly modified following a serious accident involving the Mercruiser boat tearing free from the transom. Plans are underway to similarly modify CSL BRONTE. When all modifications are completed, spares for all vessels will be standardized thus reducing the necessity of carrying a large inventory of unmatched spares.

The outdrive damage problem previously experienced with CSL AQUA appears to have been solved with the installation of special aluminum propellers; however, another problem arose during the operational season--that is the fact that water could enter the vessel through steering arm opening when the vessel was unattended in exposed berths. This vessel will be modified to conventional drive to prevent recurrence of this problem.

June proved to be a more than usually hectic month. CSL SURGE, already prepared and outfitted for the James Bay oceanographic project, unavoidably had to be replaced by CSL STURDY at the last moment, requiring a fast transfer of gear and equipment for shipment to Moosonee--only to ground and sustain propeller damage on her workout trials in James Bay as a result of a grounding, in the many treacherous shallows.

Charter Vessels

The second charter vessel for the Lake Winnipeg Survey M.V. PLAYGREEN LAKE, following inspection and preparation of specifications for modification agreed by the department and owners, could not be made ready in time. A substitute vessel, LADY NORTHLAND, was supplied by the original contractors who also supplied the M.V. LADY CANADIAN.

Both vessels proved adequate. However, M.V. LADY CANADIAN grounded on her voyage to the survey area and had to return to dry dock prior to commencement of the survey. The other vessel was similarly delayed due to the necessity for certification, dry docking and the late arrival of survey instrumentation from Burlington. Both vessels, from a bad start, performed in an adequate fashion during the remainder of the season.

The D.P.W. tug GRAND MARAIS was bare-boat chartered in support of Lake Winnipeg Harbour Surveys and the operation of the vessel contracted to Perimeter Marine Limited. Ship time was shared with Canadian Coast Guard, who were desperately in need of a buoy tender. This arrangement proved most satisfactory to both departments.

Great Lakes Charter

Early May saw the arrival of the M.V. NORTHERN SEAL, delayed by ice in the Gulf of St. Lawrence on her passage from Newfoundland. The late arrival occasioned feverish efforts on the part of the Ship Division, contractors and Technical Operations staff to prepare the vessel for work. She proved to be a fairly adequate working platform, although too small for some of our requirements.

Povungnituk Charter

The tug G.C. JEWEL was chartered on a short term basis to carry out off-shore sounding work at the approaches to Povungnituk. Injuries sustained by crew members in heavy weather considerably shortened her usefull survey time so that her future usefulness in this area could not be properly evaluated.

MAJOR VESSELS

CSS ADVENT

The vessel again performed well in Lake Huron with only minor delays. However, homeward bound she threw a blade from a propeller and was forced to dry dock at Port Weller where a 5 year survey was carried out along with average repairs.

CSS BAYFIELD

Preparations for the departure of the vessel were delayed awaiting confirmation of stability data and recommendations relative to the amount of permanent ballast that would be required. However, despite a last minute rust, the vessel was outfitted complete with a portable lab fully serviced and furnished by Boatshop personnel.

Plans are afoot for the installation of a separate generator to be used solely for scientific and instrumentation purposes.

CSS LIMNOS

LIMNOS started the year with a visit to Port Weller Dry Dock for the purpose of changing a propeller damaged at the close of the 1974 season. Leakage from a propeller oil seal necessitated a further dry docking at Collingwood. Advantage of this opportunity was taken to recondition a propeller which had unexplainably deteriorated. Discussions were subsequently held with the manufacturers who recommended a change to phospher bronze propellers.

Leakage from a Harbormaster casing joint again necessitated dry docking, this time at Port Whitby. Conditions noted during the reconditioning and repair of the unit were such that it was deemed advisable to carry out a complete disassembly and overhaul of the other unit.

On her last downbound passage of the Welland Canal, due to traffic conditions and high winds, the vessel was unfortunate enough to touch the bank causing propeller and steering gear damage, necessitating a return to Port Whitby Dry Dock, where new phospher bronze propellers were installed for her final survey of the season. The Master reports that the high pitch whine and vibrations experienced with the nickel aluminum bronze propellers had all but disappeared.

At the close of the operating season an ambitous program was started in the Boatshop over and above normal maintenance to include the following.

CSL SHARK

Removal of the aft part of the superstructure, closing in the deck area inway, thereby providing approximately 2/3 more working deck space aft.

CSL AQUA

Completely stripping out wooden decks and floors, continuing present bulkheads down to the shell, repositioning engines, stiffening deck areas for hydraulic winches and trawl gear, redecking vessel in aluminum and converting her into a flush deck fishing boat with a frame and trawl gallows.

CSL AGILE

Completely removing main engines, rebuilding and reinstalling same increasing her fuel capacity for extended periods of operation.

CSS BAYFIELD

As the vessel has been somewhat limited in service due to inadequate holding capacity for sewage and a lack of treatment facilities for grey water waste, plans were drawn and specifications written for the modification of the present system. This will be achieved by the removal of the present sewage system and replacing same with the Mansfield vacuum low volume flush system and increasing considerably her holding capacity.

The present grey water waste system is to be modified so that all waste is gathered in a single treatment tank and held for a specific period of time for chlorination prior to discharge overboard.

Structural modifications are also planned, which will include complete removal of the present mainmast, instrumentation masts and towers presently atop wheelhouse and relocation of the foremast and the installation of single aluminum, streamlined mast atop the cabin faired so as to blend with contour of the funnel and so constructed as to be capable of carrying all the present instrumentation and navigation lights presently installed.

On the after deck, which will now be clear, a high 550 articulated crane is to be installed, hydraulically powered from a main engine driven pump.

The present boat deck ladder will be moved forward to provide space for the new grey water treatment tank and equipment compartment and the space deck presently installed at the port side of the aft deck will be relocated to an athwart ships position abaft and faired to the existing boat deck curtain plate.

On the boat deck itself, a permanent laboratory will be constructed, faired into the aft part of the Master's room and will be completely serviced with its own power supply, at sea by a separate generator and in port by a separate shore supply station.

Modifications to the Master's room will be carried out by staff personnel.

CSS ADVENT

Complete servicing of main engines and generators were completed immediately on her arrival back at base following dry dock where, as stated previously, a 5 year survey was carried out thus completing work on this vessel.

CSS LIMNOS

Minor modification and running repairs together with the engine overhaul mentioned previously will be carried out.

Tank cleaning was carried out this year by shore contractors as opposed to ships' crew who were laid-off early to ease the man/year situation.

ANNUAL REPORT

OCEAN & AQUATIC SCIENCES

ADMINISTRATIVE DIVISION

The month of May marked the departure of A.W. (Art) Appleby from the position of Regional Administrative Officer, Central Region. Having guided the Administrative organization since its formation at Burlington in 1970, Art accepted the position of "Chief of Staff Services", CCIW Branch. He was replaced by B.J.T. (Terry) O'Hagan who returned to Ocean & Aquatic Sciences after a one year sojourn with CCIW.

Personnel

Manyear reductions imposed during the month of August resulted in a general belt-tightening and increased emphasis on manyear accounting; however, the desired reductions managed to be achieved through attrition.

A total of 158.5 manyears accounted for 124 staffing actions as follows:

Employee Type	Quantity
FTC	31
Term	32
Seasonal	52
Career & Co-op Students	9

Peak staff level reached 211 employees during the summer of 1975. Seventy positions were submitted for classification action.

There were 31 promotions, 11 acting appointments and 18 employees were granted acting pay during the year.

Finance

As a result of increasing demands by managers for more timely and meaningful management information, a decision was made early in the year to convert to an automated financial reporting system employing an in-house minicomputer. Hardware and software specifications were developed and contractural documents initiated with a view to implementation of the system at the commencement of the 1976/77 fiscal year. At time of writing, the contract has been "let" however, delivery schedules are such that it appears unlikely a complete conversion to the automated system will be possible by 1 April, 1976; therefore, the existing manual system will be maintained in parallel for the first six months of operation.

Materiel Management

At the mid-point in the year the Marine Sciences (HQ) Stores organization was disbanded resulting in a change in many of the Stores accounting practices and reporting relationships. Some functions formerly performed on behalf of the Region by MSD HQ (i.e. Crown Assets Disposal) were made a local responsibility resulting in more autonomy, but also with increased responsibility and workload.

Activities carried out during the year are summarized as follows:

Requisitions processed	-	1789
Value of requisitions	-	$3,247,762.
Incoming and outgoing shipments	-	500 tons
Shipping costs	-	$40,000.
Crown Assets Disposal	-	$145,569.

Mobile Equipment

The Regional fleet consisting of 32 vehicles deployed in support of field party operations in Manitoba, Ontario, Quebec and the N.W.T. travelled 313,324 miles. Three accidents were recorded with total damages of $1,500. and resulting in a frequency rate of 1.04 accidents per 100,000 miles operated. This was a marked improvement over 1974 when the accident frequency rate was 2.75 and damage costs totalled $10,400.

In addition to the Departmental fleet, nine leased vehicles obtained during peak periods operated 50,000 miles accident free.

Safety

Safe working practices and conditions continue to be stressed by all concerned with the result that reportable industrial accidents were reduced from 17 to 14. Two of these "injury on duty" accidents resulted in considerable lost time and Workmen's Compensation Board claims. One of the two was of a disabling nature.