

AVAILABLE SOURCES OF CURRENT DATA

WITHIN CENTRAL REGION

1974

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Regional Tidal Office
Central Region

ACKNOWLEDGEMENT

I WOULD LIKE TO THANK THE STAFF OF THE DESCRIPTIVE
LIMNOLOGY SECTION FOR THEIR ASSISTANCE IN PROVIDING
CURRENT STATION LOCATION MAPS FOR USE IN THIS REPORT.

TABLE OF CONTENTS

BACKGROUND	PAGE 1
INTRODUCTION	PAGE 2
GENERAL	PAGE 3
TABLE I	PAGE 5
TABLE II	PAGE 6
SUMMARY TABLE III	PAGE 7
CONCLUSIONS AND RECOMMENDATIONS	PAGE 8
FIGURE I	PAGE 9
FIGURE 2A-2J	PAGE 10-19
FIGURE 3	PAGE 20
FIGURE 4	PAGE 21
FIGURE 5A-5E	PAGE 22-26
FIGURE 6	PAGE 27
FIGURE 7A-7B	PAGE 28-29
FIGURE 8A-8F	PAGE 30-35
FIGURE 9	PAGE 36
FIGURE 10	PAGE 37
FIGURE 11	PAGE 38
FIGURE 12	PAGE 39
FIGURE 13A-13B	PAGE 40-41
FIGURE 14	PAGE 42
FIGURE 15	PAGE 43
FIGURE 16	PAGE 44
W.S.C. REFERENCE	PAGE 45-46

BACKGROUND

During the past five years, there has been an increasing role played by the container ships and "super tankers" in the shipping industry and a breath-taking increase of recreational boating on the Great Lakes system. These changing trends have necessitated a further consideration of information provided to these new customers by the Canadian Hydrographic Service through its navigation charts and numerous publications.

Upon further study it was felt that one aspect where improvement might be attained is through the provision of more detailed information concerning currents and tidal streams on hydrographic charts. The importance of surface currents to small craft is well known to any "Sunday Sailor" while the effect of deep subsurface currents on ships drawing 60 to 90 feet of water is virtually unknown.

It was for these reasons that it was decided that an inventory of existing current data should be undertaken as a first step to improving the situation.

INTRODUCTION

Initially an inventory of all the various aspects related to current measurements was envisioned. At present, however, such a study is unfeasible in the time allotted due to incongruities of data format, originators survey purpose and the many differing field procedures. With these restraints it became obvious that first, the location and nature of the current work that had been done in the past would be necessary. This would not only yield a general picture of past concentrations of activity and priorities but would also provide a link to the actual field data when future investigation is warranted.

No inventory such as this can be deemed complete when so many government bodies, institutions, and private companies are involved but those agencies with major commitments were determined. The information provided was obtained through literature searches of several libraries and marine information centres and by personal contact and correspondence with interested personnel within and outside the Canada Centre for Inland Waters. This report provides a record of field programs only, as opposed to any theoretical or interpolatory approaches. The geographical limits are those of Central Region as seen in Figure 1 and does not contain a record of similar work within United States waters.

GENERAL

The collected information is exhibited by use of tables and maps and is broken down geographically into major bodies of water or drainage basin, with exact locations shown by appropriate "figures". Although there are many sources of information the following provides a brief insight to four of the major government bodies involved:

1. The Canadian Hydrographic Service, Central Region, has performed some current metering over the years on an impromptu basis to provide a "feel" for the water movement as part of standard hydrographic surveys. A record of this information is presented in Table I but none of it was placed on hydrographic charts.

Table II gives a list of existing charts that bear standard current symbols. As can be seen, these locations almost entirely in the St. Lawrence River are the result of concentrated study done by the Tides and Water Levels from 1959 to 1961.

In addition, current work has been done in liaison with other agencies as part of scientific programs and are noted in Table III.

2. The Descriptive Limnology Section of Lakes Research Division at the Canada Centre for Inland Waters is carrying out an ongoing program of current metering. This information is, in addition to other scientific data, gathered as a part of their scientific studies throughout the Great Lakes. The station locations are provided through a series of large scale maps while detailed information is stored at present by the above section but will be available in the future from the Data Management Section.

3. The Water Survey of Canada publishes "Surface Water Data" on a yearly basis. This text provides discharges for most rivers in Canada and has approximately 200 river gauging stations in Ontario alone. Although this is discharge data, their usual method of determining discharge is the "velocity times cross-sectional area technique". The regional offices at Guelph, Montreal and Winnipeg have on record velocities corresponding to each discharge value published. A sample of source data available from "Surface Water Data, Reference Index, 1972", is shown for example purposes only.
4. The Research and Development Group within Marine Sciences have done current studies in the St. Lawrence River and in the James Bay area. A James Bay 1973 data report is now available while data from the 1973 and 1974 field programs in the St. Lawrence are expected to be available early next year.

CANADIAN HYDROGRAPHIC SERVICE CURRENT MEASUREMENTS

TABLE I

GENERAL LOCATION	FIELD SHEET	FIELD SHEET LOCATION	FILE	YEAR	MISCELLANEOUS
Ottawa River	3500	Chats Dam to Kennedy Is.	161009	1967	Scaled arrows
	3503	Madawaska River and Approaches	161009	1967	Scaled arrows
	3646	Pointe a Valors to Ile aux Tourtes	70132	1970	Near Dorion
	3647	Lake of Two Mountains	70132	1970	
	3572	Bryson Dam to Hog Island	70024-M	1968	Current symbols
Lake Erie	3413-D	Pt. Pelee to S.E. Shoal	10098	1964	Drift poles
	3414-C	Pointe Pelee	10098	1964	Drift poles
Niagara River	303	Niagara-on-the-Lake	303	1914	Scaled arrows
Lake-of-the-Woods	3522-B	Kenora Approaches	70040	1967	Currents negligible
	3564	French Portage Narrows	70040	1968	
	3565	Ash Rapids	70040	1968	
	3566	Whitefish Narrows	70076	1969	
Playgreen Lake	3772	Duck Point to Kettle Island	70402	1972	Less than 1 knot
	3773	Whitefish Island to Langlois Island	70402	1972	Less than 1 knot
MacKenzie River	3746	Mission Island to Norway House	70402	1972	Less than 1 knot
	3779	Hudson's Bay Co. Wharf	70402	1972	Less than 1 knot
Sverdrup Island	3021	Beaver Lake	14076	1960-61	Buoy fixes
Eastern Arctic	3358	Hell Gate	B10-5100-6		Sailing Directions see file 2395
	3416	Cumberland Sound - South			Local observations
Baffin Island	3477	Milne Inlet		1966	Wharf site investigation

CANADIAN HYDROGRAPHIC SERVICE - CENTRAL REGION
 ST. LAWRENCE RIVER CHARTS WITH CURRENT DATA

TABLE II

CHART NUMBER

NAVIGATION CHART NAME

1201	ILE VERTE TO CAP AUX OIES
1204	ILE DU BIC TO ISLE VERTE
1207	GOOSE CAPE TO GROSSE ILE
1208	GROSSE ILE TO QUEBEC
1210	RIVIERE BETSIAMITES TO ILE DU BIC
1214	BAIE DES SEPT-ILES
1217	PLANS IN THE VICINITY OF POINTE DES MONTS
1225	POINTE DES MONTS TO RIVIERE SAGUENAY
1321	QUEBEC HARBOUR
1325	RIVIERE RICHELIEU, SOREL TO BOLEIL BRIDGE
1333	QUEBEC TO NEUVILLE
1334	NEUVILLE TO LECLERCVILLE
1335	LECLERCVILLE TO CHAMPLAIN
1336	CHAMPLAIN TO LAC SAINT-PIERRE
1337	LAC SAINT PIERRE
1338	LAC SAINT PIERRE TO LAVALTRIE
1339	LAVALTRIE TO LONGUE-POINTE
1340	MONTREAL HARBOUR
1352	VARENNES TO LONGUE-POINTE
5596	CHURCHILL HARBOUR

SUMMARY TABLE III

CURRENT STATION LOCATION		AGENCY	YEAR	PURPOSE	REFERENCE
GENERAL	SPECIFIC				
St. Lawrence River	Coverage	Canadian Hydrographic Service	1959-61	Navigation	Table 11
Lake Ontario	Coverage Coverage Wesleyville	Canada Centre for Inland Waters Inland Waters Directorate Ontario Hydro	1967-73 1967 1970	Scientific Surface currents Generating Station	Figure 2A-2J Figure 3 Figure 4
Lake Erie	Coverage Nanticoke West End	Canada Centre for Inland Waters Ontario Water Resources Commission Ohio State University	1967-71 1968 1950	Scientific Pollution Dispersion Surface currents	Figure 5A-5E Figure 6 Figure 7A-7B
Lake Huron	Coverage Bruce G.S.	Canada Centre for Inland Waters Ontario Hydro	1967-73 1969-70	Scientific Nuclear Station	Figure 8A-8F Figure 9
Georgian Bay	Coverage Little Current	Canada Centre for Inland Waters Canadian Hydrographic Service	1974 1961	Scientific Navigation	Figure 10 Figure 11
Lake Superior	Coverage	Canada Centre for Inland Waters	1973	Scientific	Figure 12
James Bay	Moose River La Grande Riviere	Canadian Hydrographic Service Marine Sciences Directorate	1963 1973	Scientific Oceanographic	Figure 13 Figure 14
Hudson Bay	Hudson Strait Chesterfield Inlet	Canadian Hydrographic Service Canadian Hydrographic Service	1959 1974	Navigation Navigation	Figure 15
Arctic	Eureka Sound Lincoln Sea Kane Basin Robeson Channel	Polar Continental Shelf Project Arctic Institute of North America Arctic Institute of North America Defence Research Board	1961 1967 1969	Oceanographic Oceanographic Oceanographic unknown	Figure 16 Figure 16 Figure 16 Figure 16
Central Region	General General	Canadian Hydrographic Service Water Survey of Canada	Yearly	varied Stream gauging	Table 1-11 Page 45-46

CONCLUSIONS AND RECOMMENDATIONS

As would be expected, much of the available data was gathered only as a part of a larger scientific program. Because of the wide diversity of the equipment used, logistics, and reliability of data, close scrutiny is mandatory before its applicability for Hydrographic purposes is determined.

At present, it can be said that currents on the Great Lakes proper are of negligible concern to most users in calm weather. In rough weather, the effect of wind on any watercraft itself, overshadows with a few exceptions any resultant current due to wind set up. It is these exceptions that should be determined and described.

It is a general "rule of thumb" that currents acting between the water surface and the horizontal plane at mid-draught of the ship are those most likely to affect navigation, however, this rule might be questioned with the advent of ships drawing up to 90 feet of water.

Knowledge of currents in Canada's North will become more important in the future not only as an aid to navigation in the conventional sense but as an aid in avoiding icebergs trapped by arctic currents.

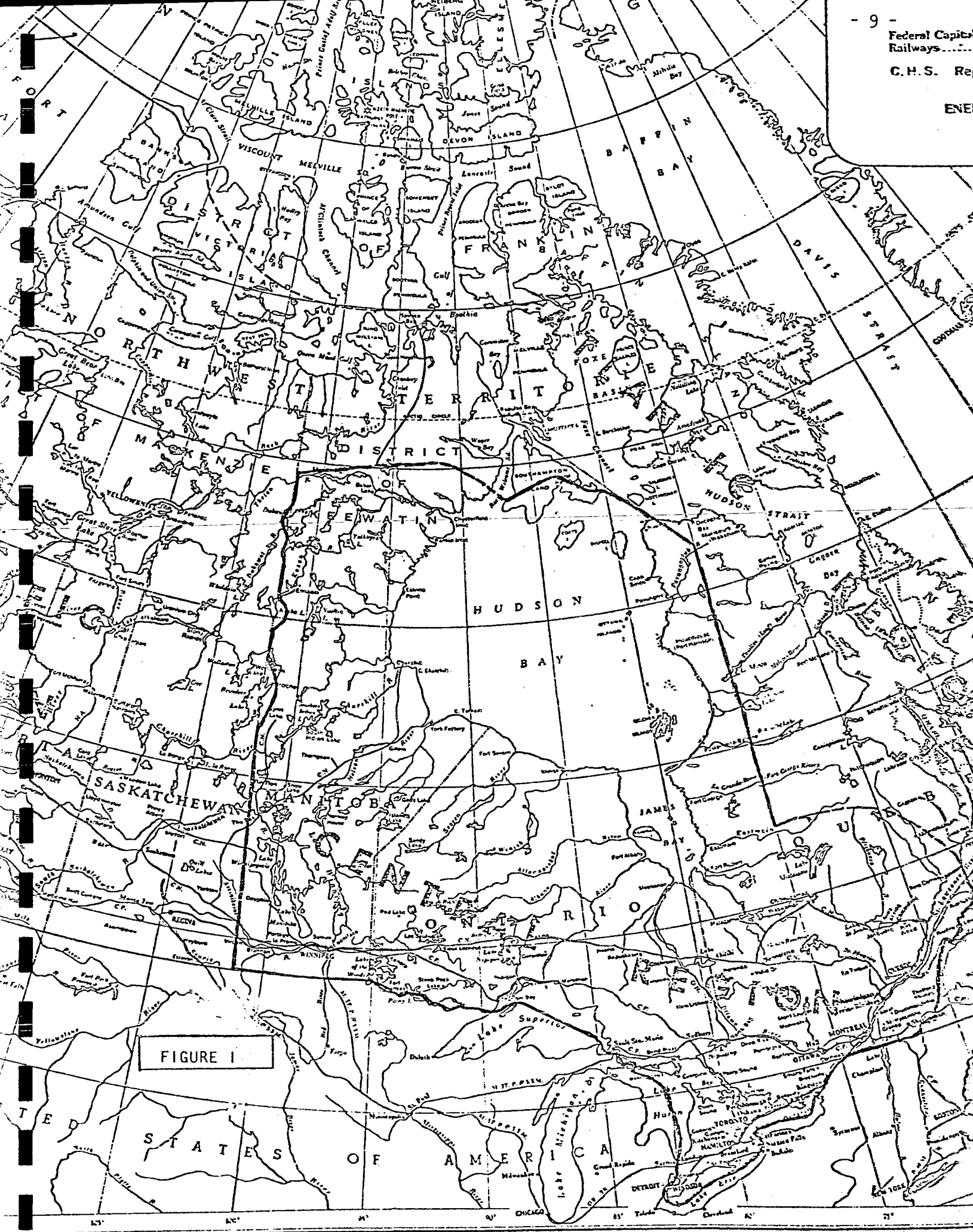
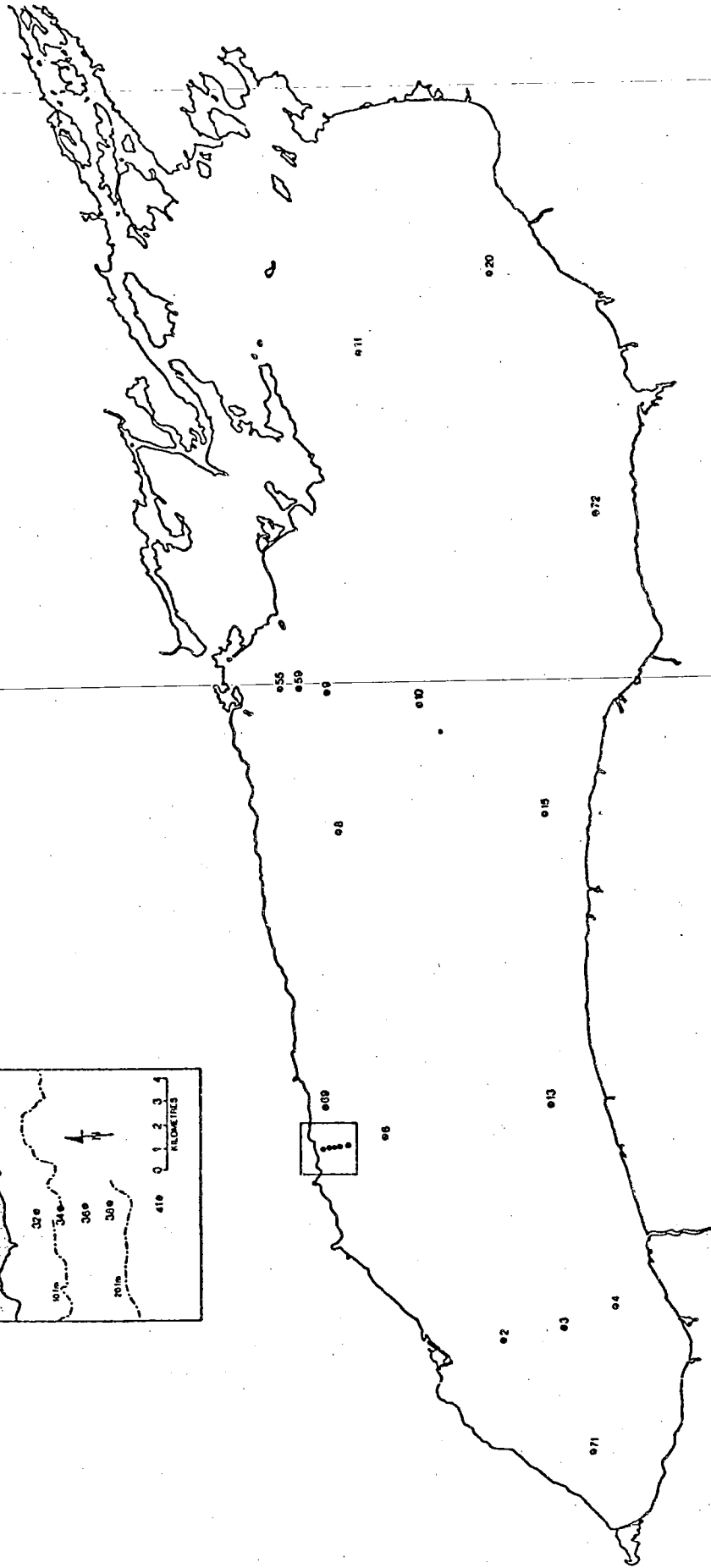
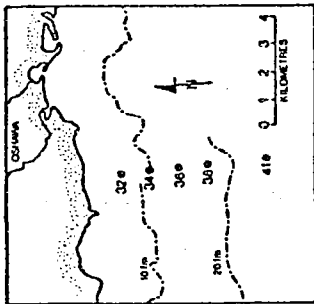


FIGURE I

CCIW IFYGL lake current observations (Lake Ontario 1972/73)
• Location and designation of current meter stations.



FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

FIGURE 2 A

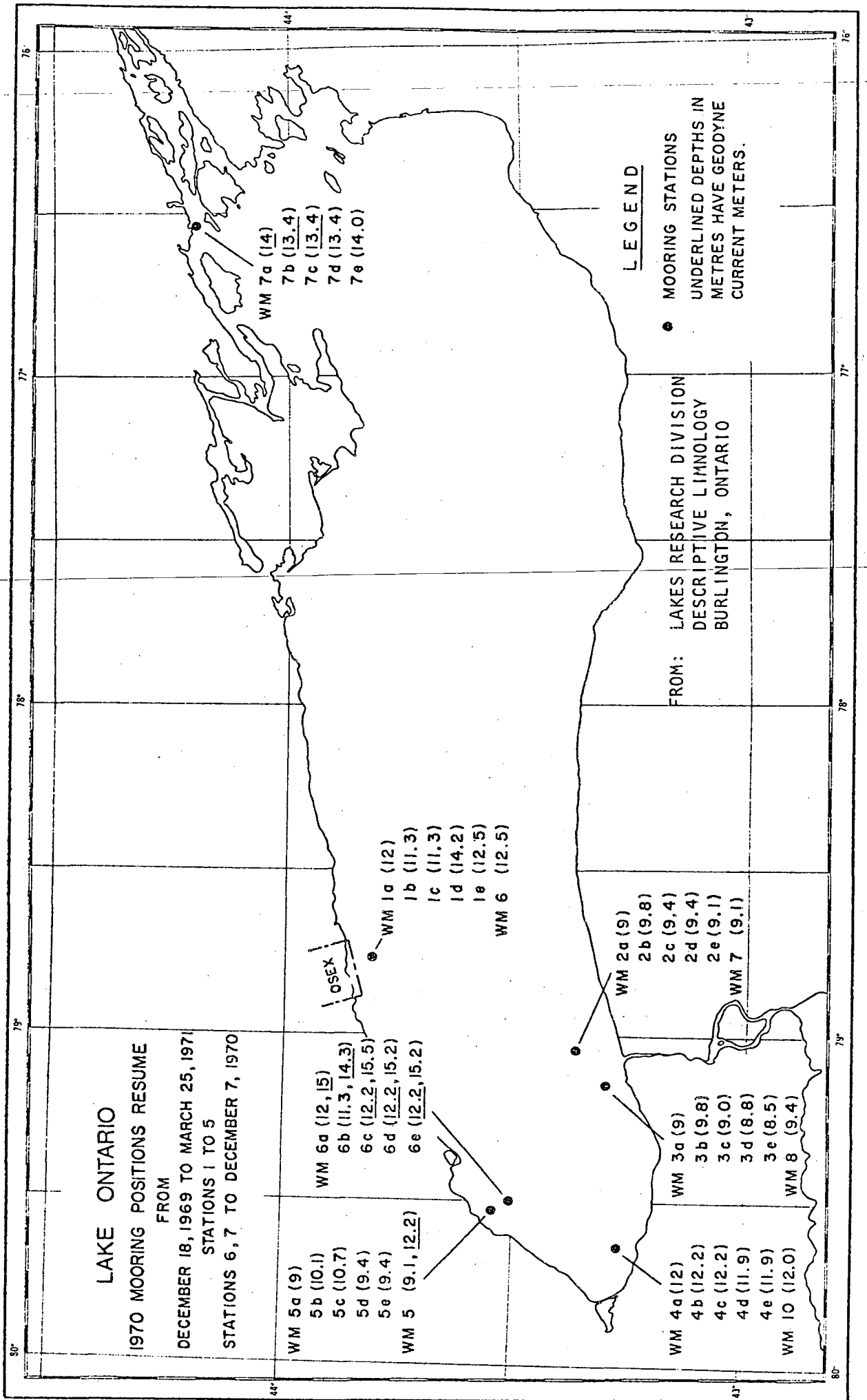
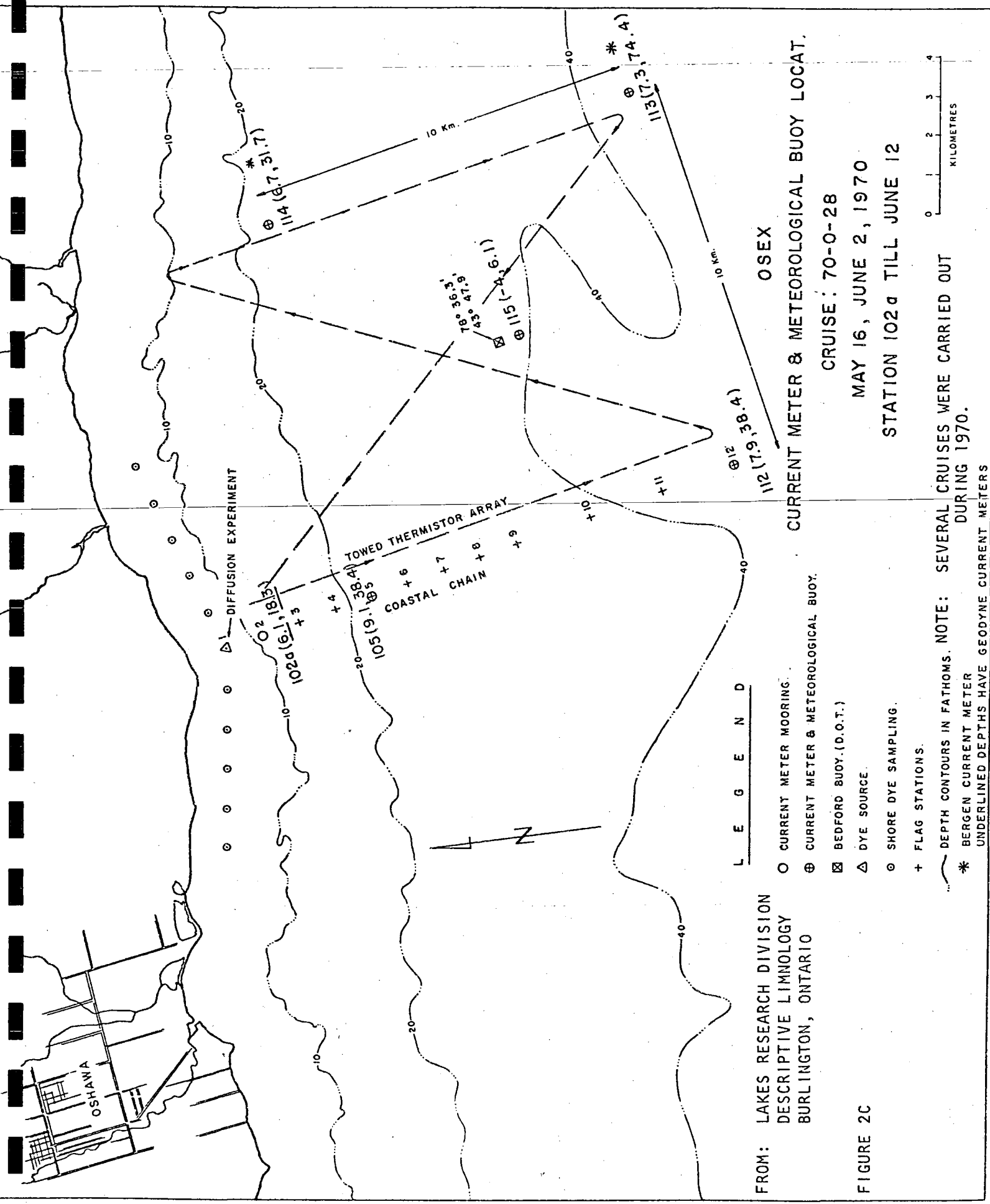


FIGURE 2B



FROM: LAKES RESEARCH DIVISION
 DESCRIPTIVE LIMNOLOGY
 BURLINGTON, ONTARIO

OLEGEND

○ CURRENT METER MOORING.
 ⊕ CURRENT METER & METEOROLOGICAL BUOY.
 ⊠ BEDFORD BUOY. (D.O.T.)
 △ DYE SOURCE.
 ⊙ SHORE DYE SAMPLING.
 + FLAG STATIONS.

○ DIFFUSION EXPERIMENT

⊠ TOWED THERMISTOR ARRAY

⊠ COASTAL CHAIN

⊠ 102 (6.1, 18.3)
 ⊠ 105 (9.1, 38.4)
 ⊠ 114 (8.7, 31.7)
 ⊠ 115 (4.6, 11)
 ⊠ 112 (7.9, 38.4)

18° 36.3', 43° 47.9'

10 KM

10 KM

OSEX

CURRENT METER & METEOROLOGICAL BUOY LOCAT.

CRUISE: 70-0-28

MAY 16, JUNE 2, 1970

STATION 102a TILL JUNE 12

0 1 2 3 4
 KILOMETRES

* DEPTH CONTOURS IN FATHOMS. NOTE: SEVERAL CRUISES WERE CARRIED OUT DURING 1970.

UNDERLINED DEPTHS HAVE GEODYNE CURRENT METERS

FIGURE 2C

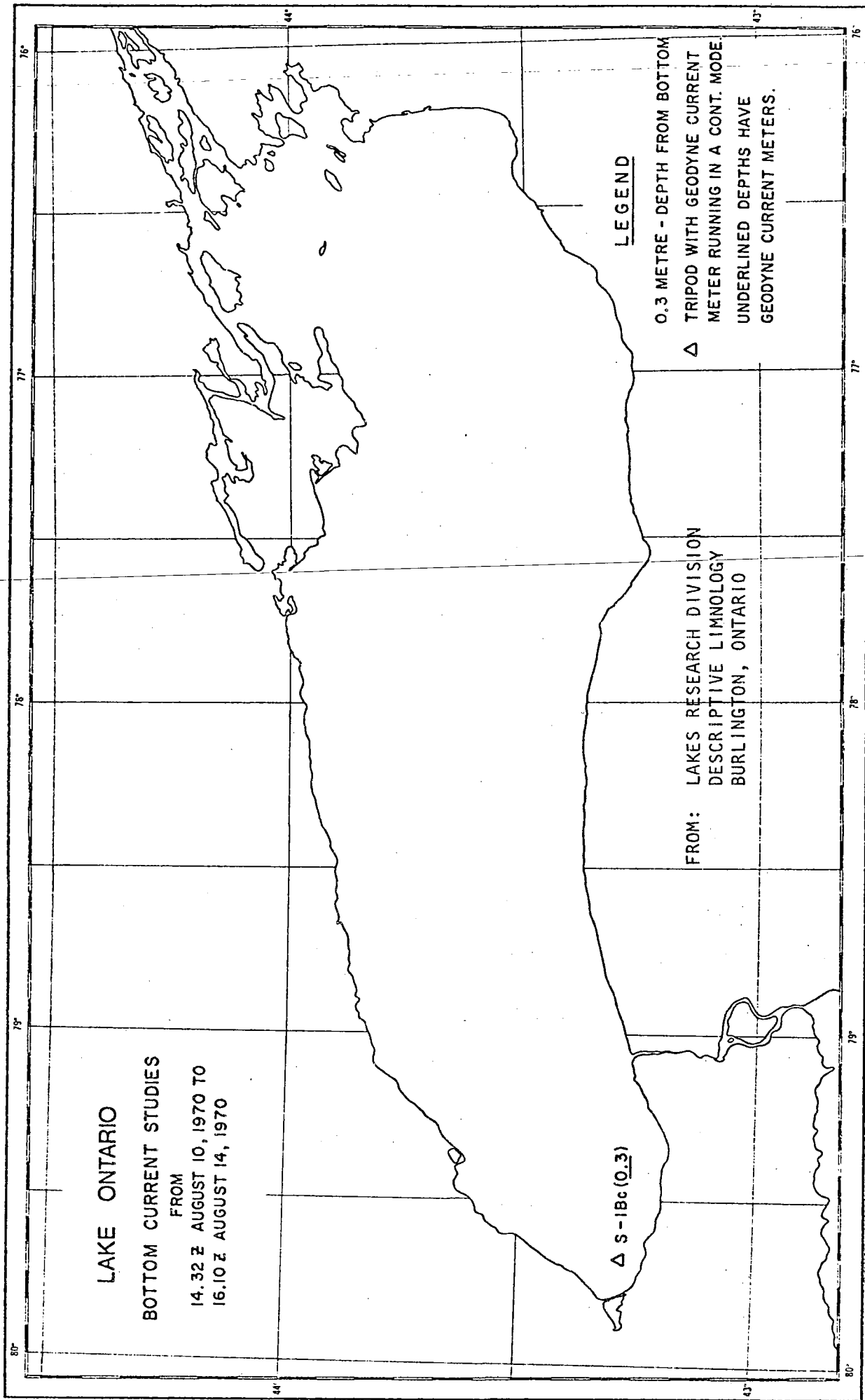


figure 2D

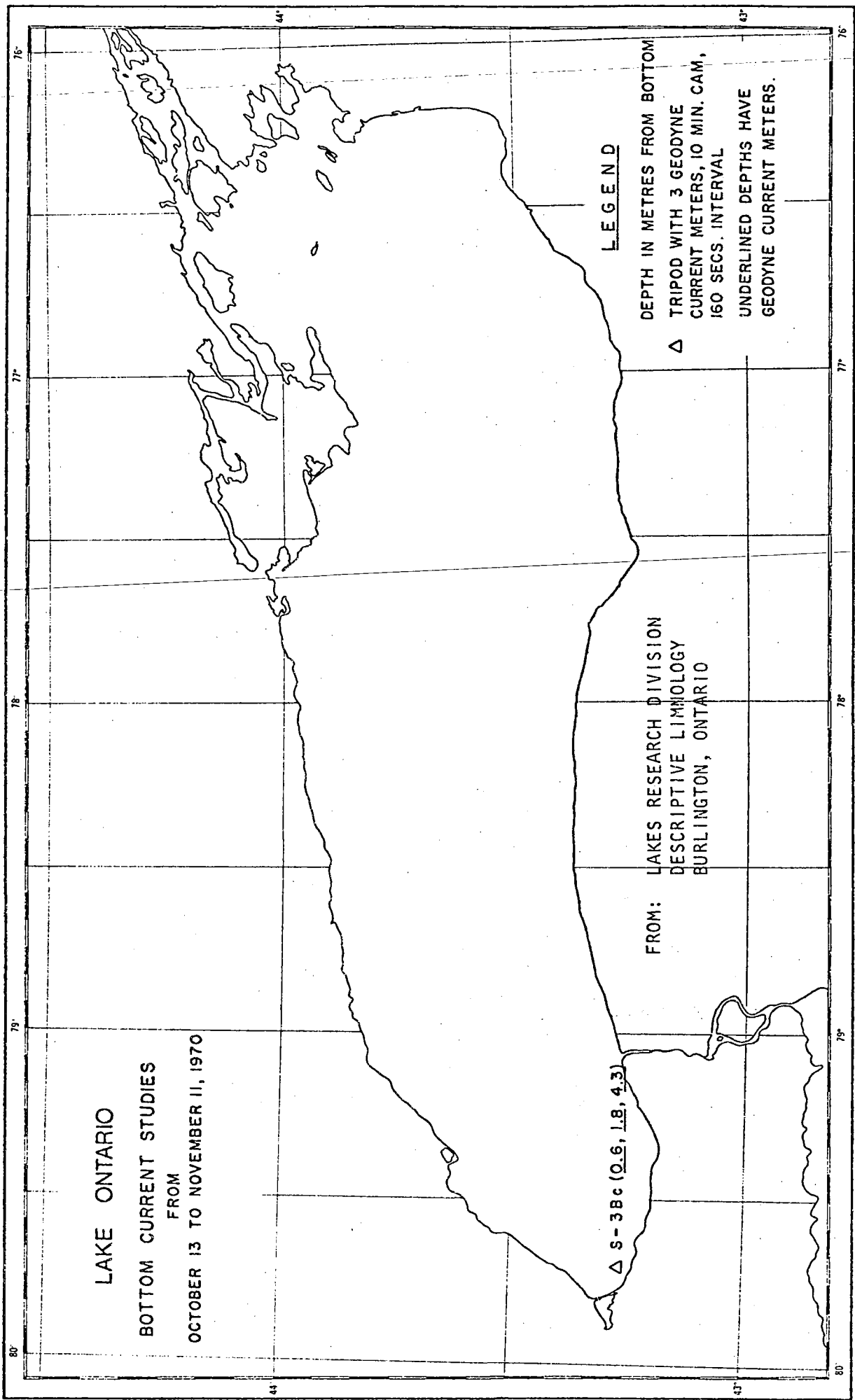


FIGURE 2E

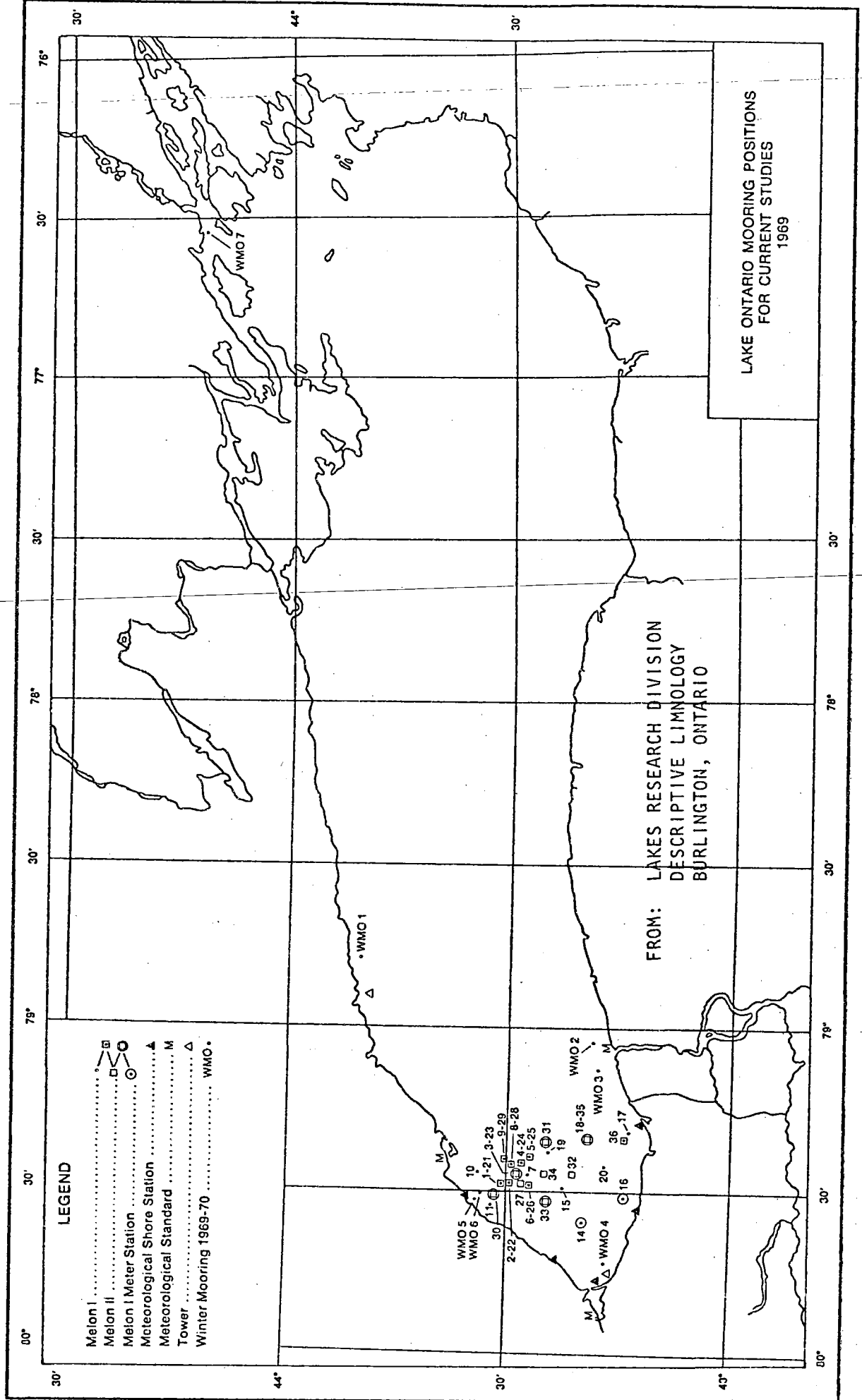


FIGURE 2F

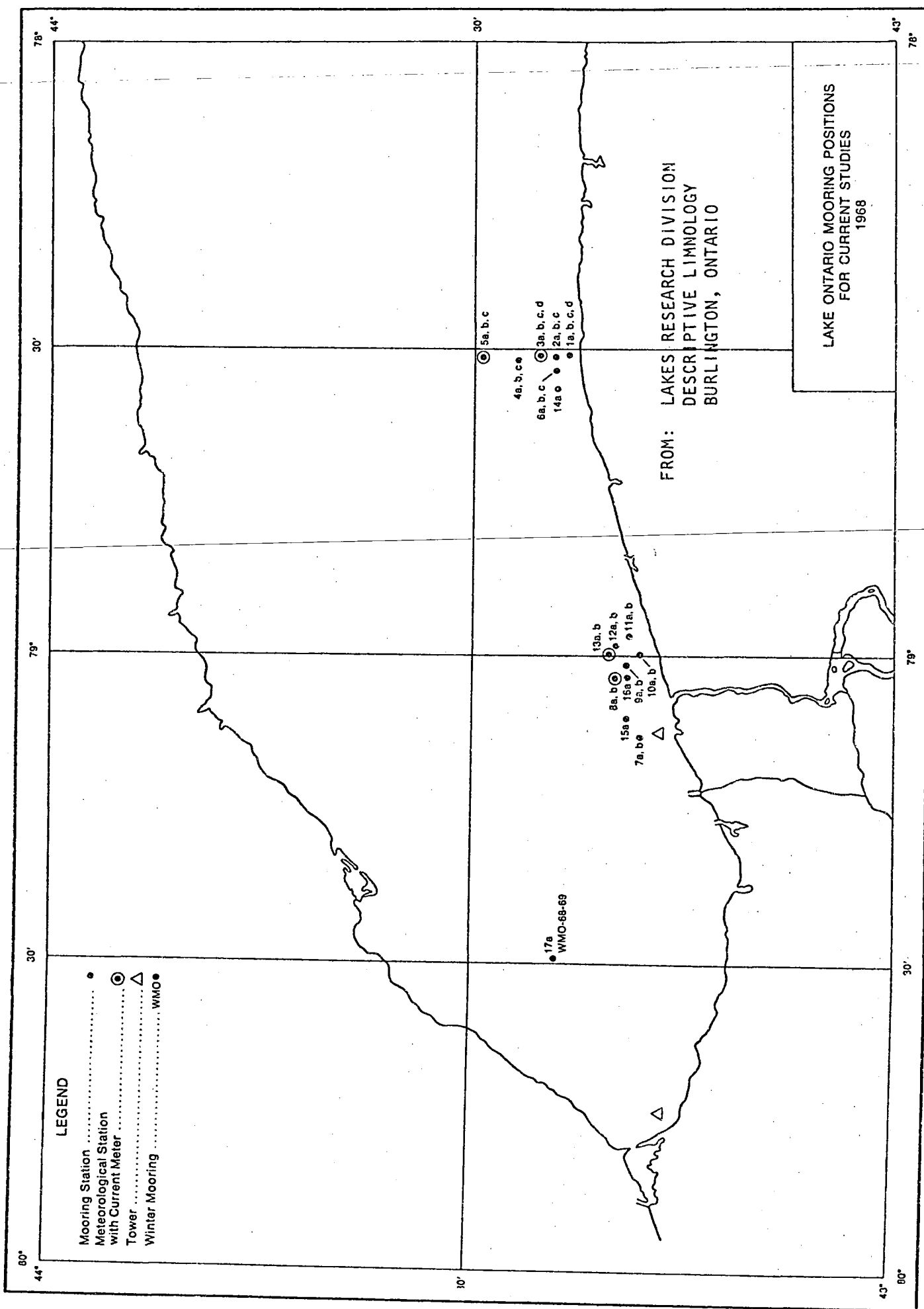


FIGURE 2G

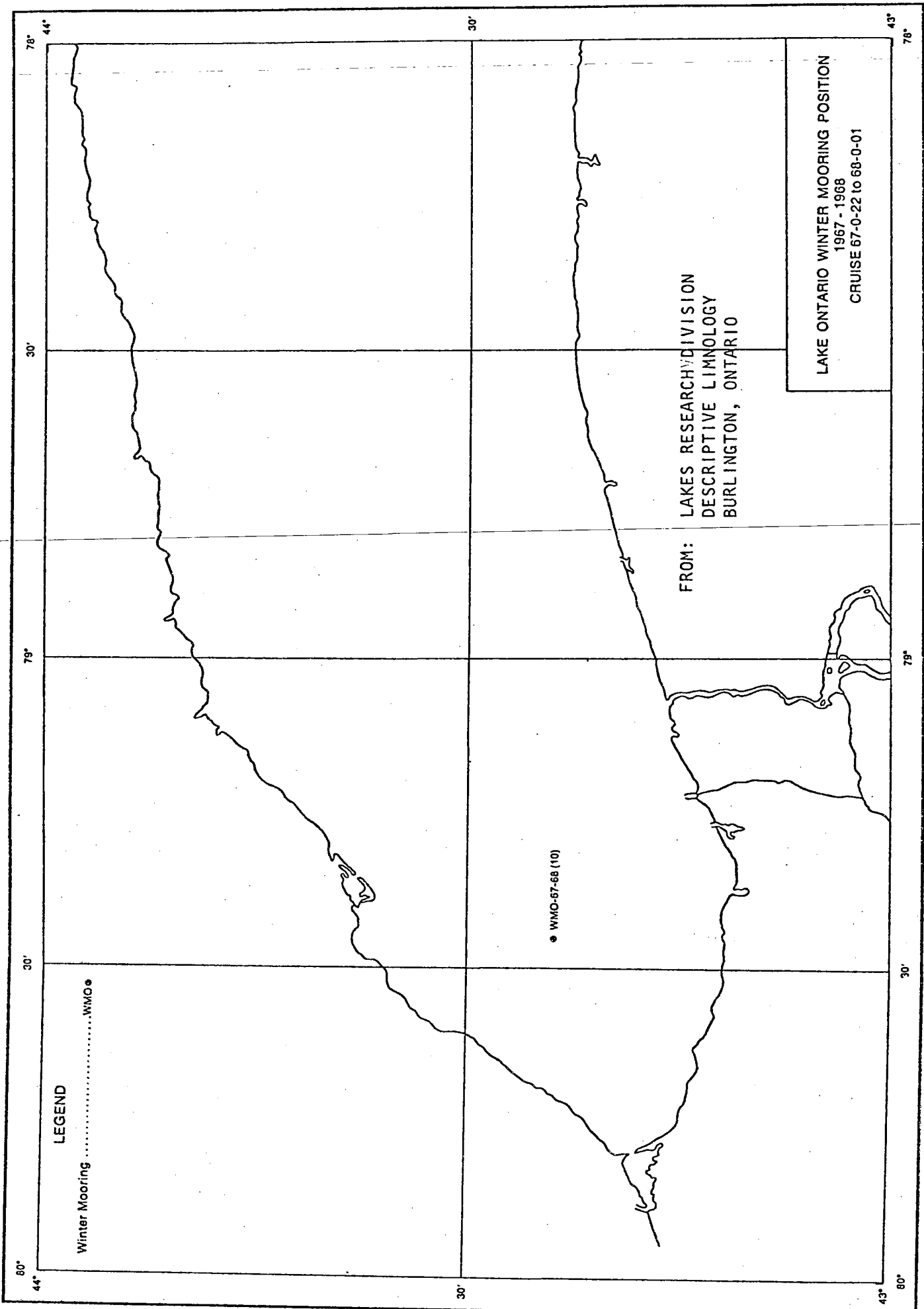


FIGURE 2H

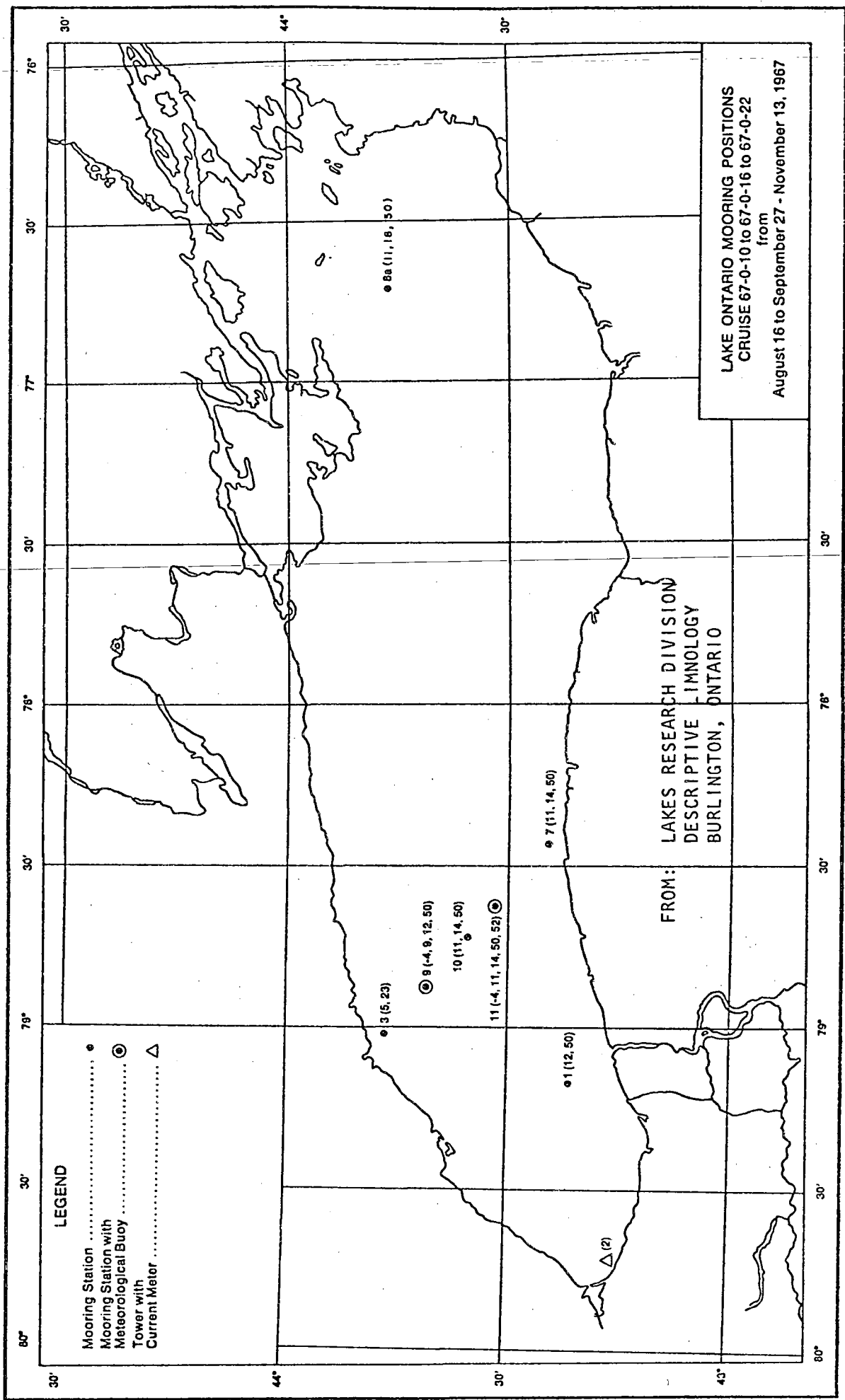


FIGURE 21

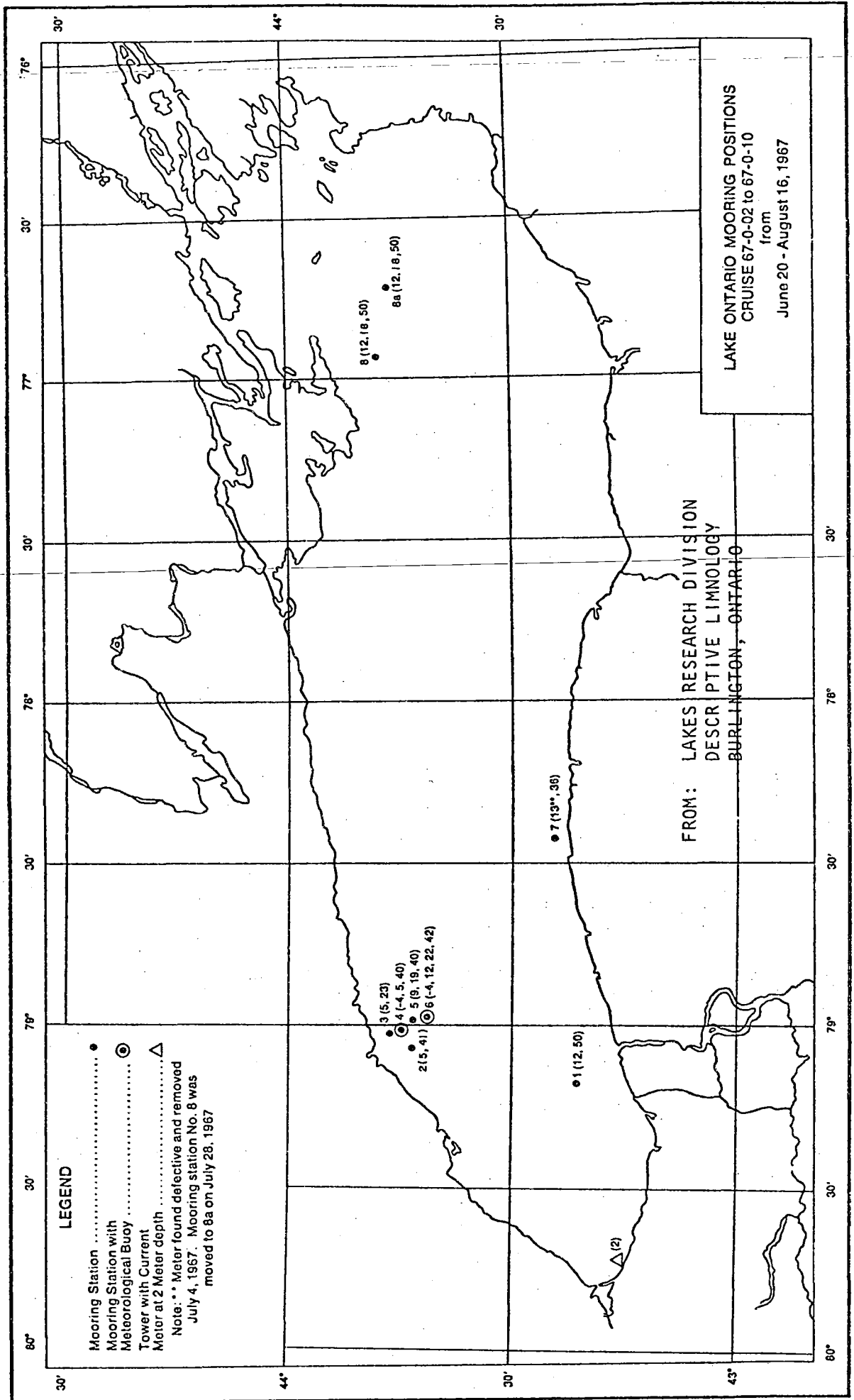
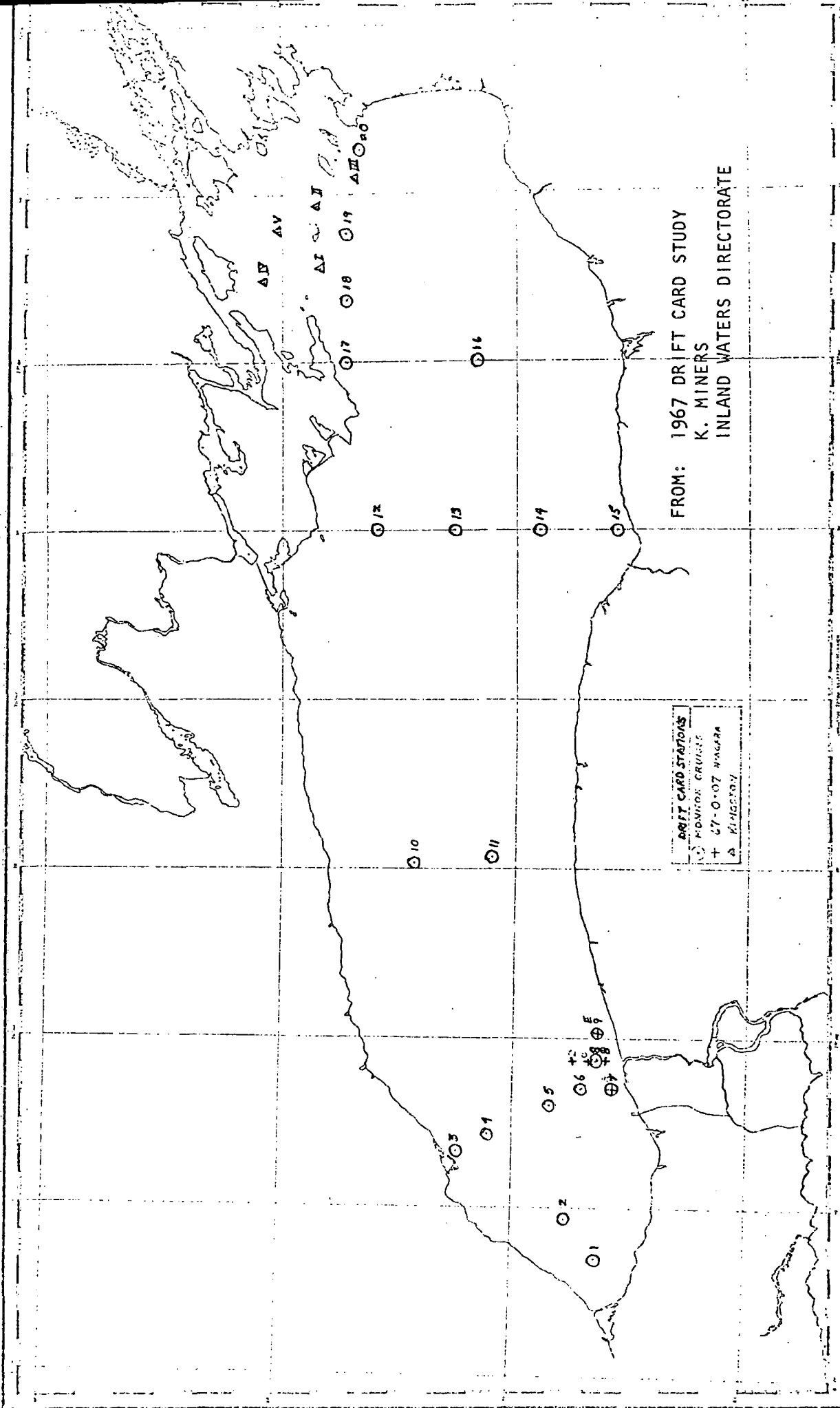


FIGURE 2J

LAKE ONTARIO DRIFT CARD STATIONS 1967



Published by the Canadian Hydrographic Service, Ottawa, Ontario, Canada.
Reproduction of this map by other than the Government of Canada is prohibited.

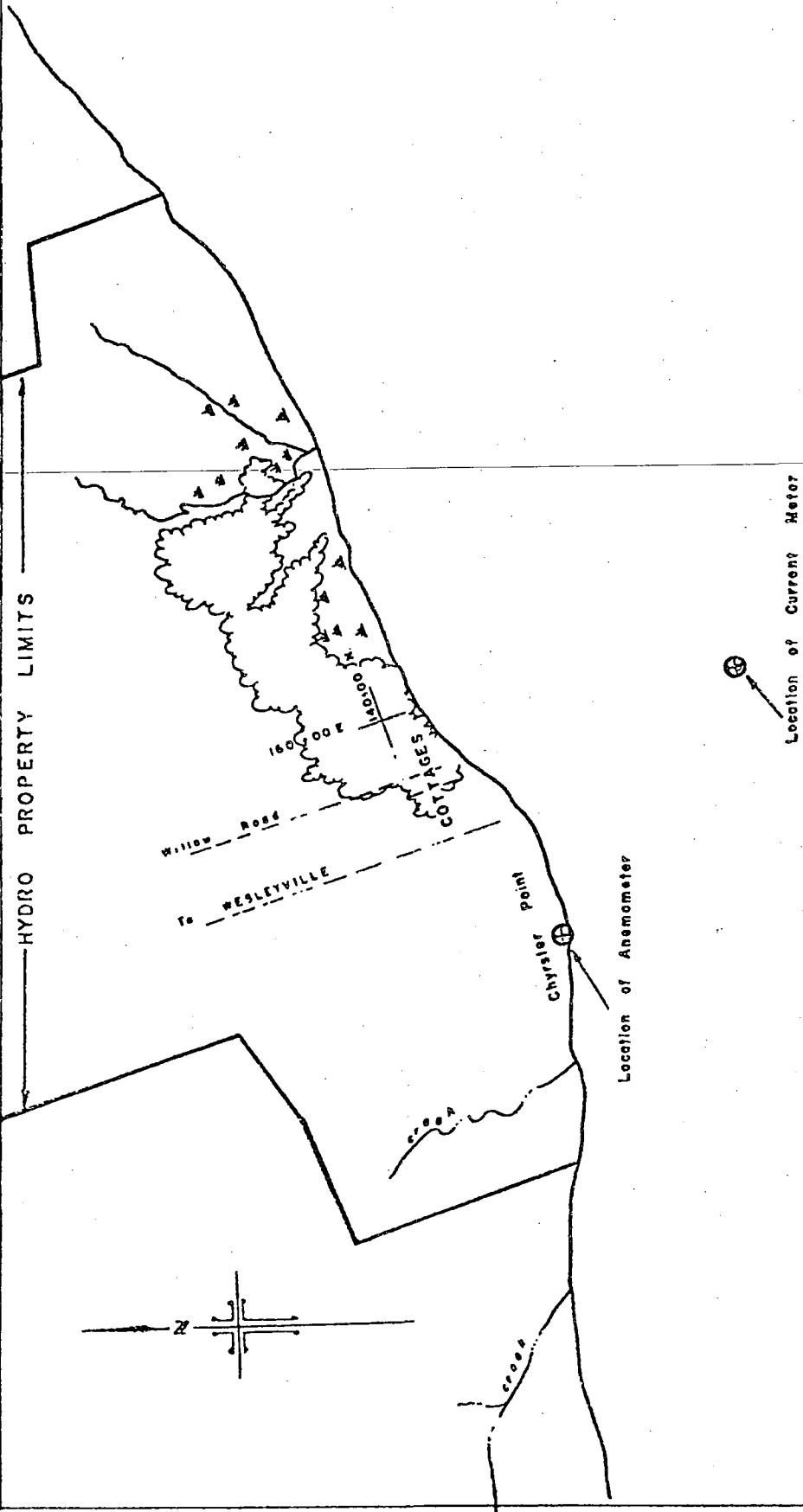
FIGURE 3 I

LAKE ONTARIO
 WESLEYVILLE G. S.

LOCATION of
RECORDING INSTRUMENTS

ONTARIO HYDRO
 HYDRAULIC STUDIES DEPARTMENT
 SCALE 1 INCH = 2000 FEET

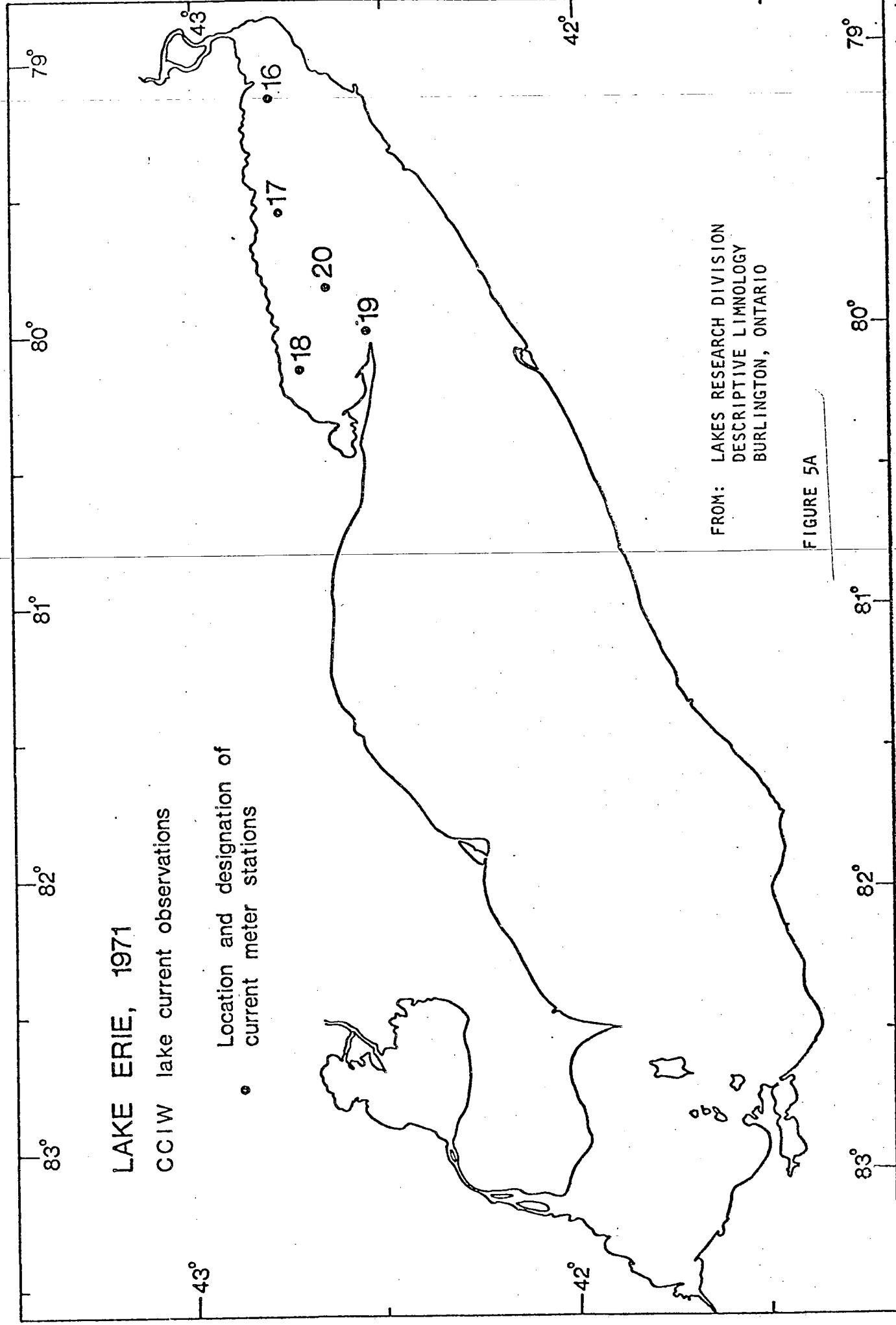
LAKE ONTARIO



FROM: HYDROLOGICAL INVESTIGATIONS
 LAKE ONTARIO, 1970

REPORT ON NEARSHORE CURRENTS AT WESLEYVILLE G.S. SITE

FIGURE 4



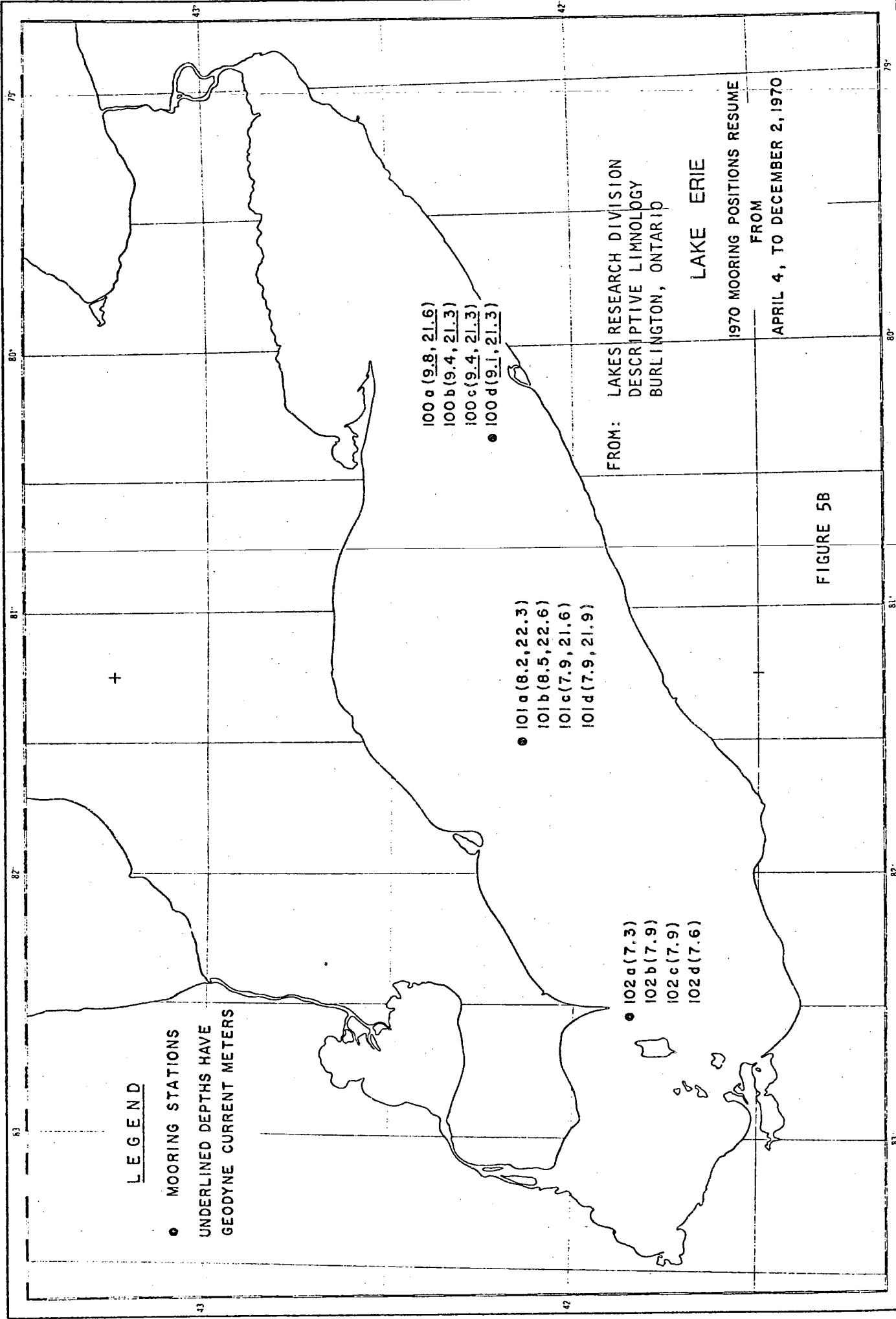
LAKE ERIE, 1971

CCIW lake current observations

• Location and designation of current meter stations

FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

FIGURE 5A



LEGEND

- MOORING STATIONS
- UNDERLINED DEPTHS HAVE GEODYNE CURRENT METERS

● 100 a (9.8, 21.6)
 ● 100 b (9.4, 21.3)
 ● 100 c (9.4, 21.3)
 ● 100 d (9.1, 21.3)

● 101 a (8.2, 22.3)
 ● 101 b (8.5, 22.6)
 ● 101 c (7.9, 21.6)
 ● 101 d (7.9, 21.9)

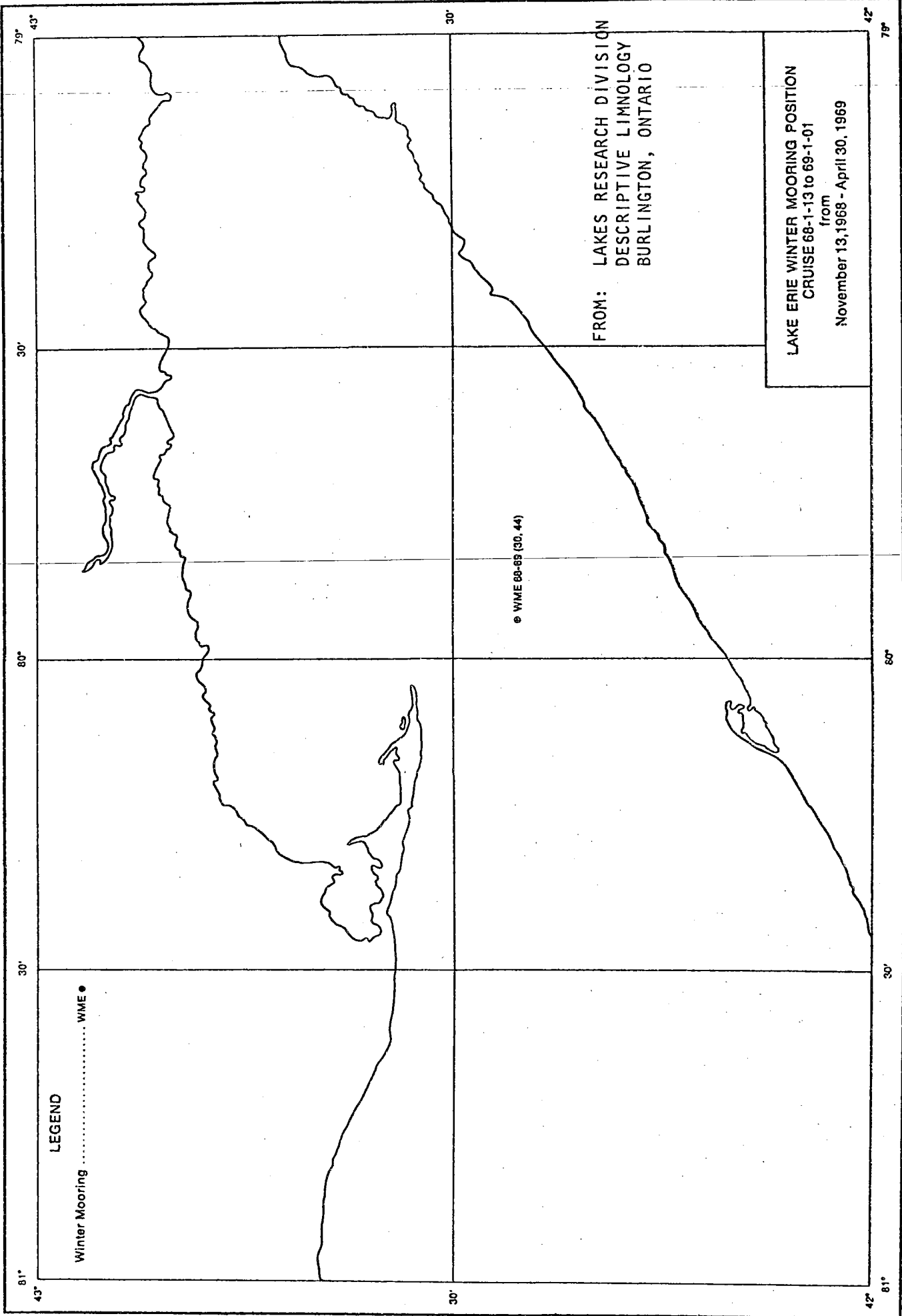
● 102 a (7.3)
 ● 102 b (7.9)
 ● 102 c (7.9)
 ● 102 d (7.6)

FROM: LAKES RESEARCH DIVISION
 DESCRIPTIVE LIMNOLOGY
 BURLINGTON, ONTARIO

LAKE ERIE

1970 MOORING POSITIONS RESUME
 FROM
 APRIL 4, TO DECEMBER 2, 1970

FIGURE 5B



LEGEND

Winter Mooring WME ●

● WME 68-69 (30, 44)

FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

LAKE ERIE WINTER MOORING POSITION
CRUISE 68-1-13 to 69-1-01
from
November 13, 1968 - April 30, 1969

FIGURE 5C

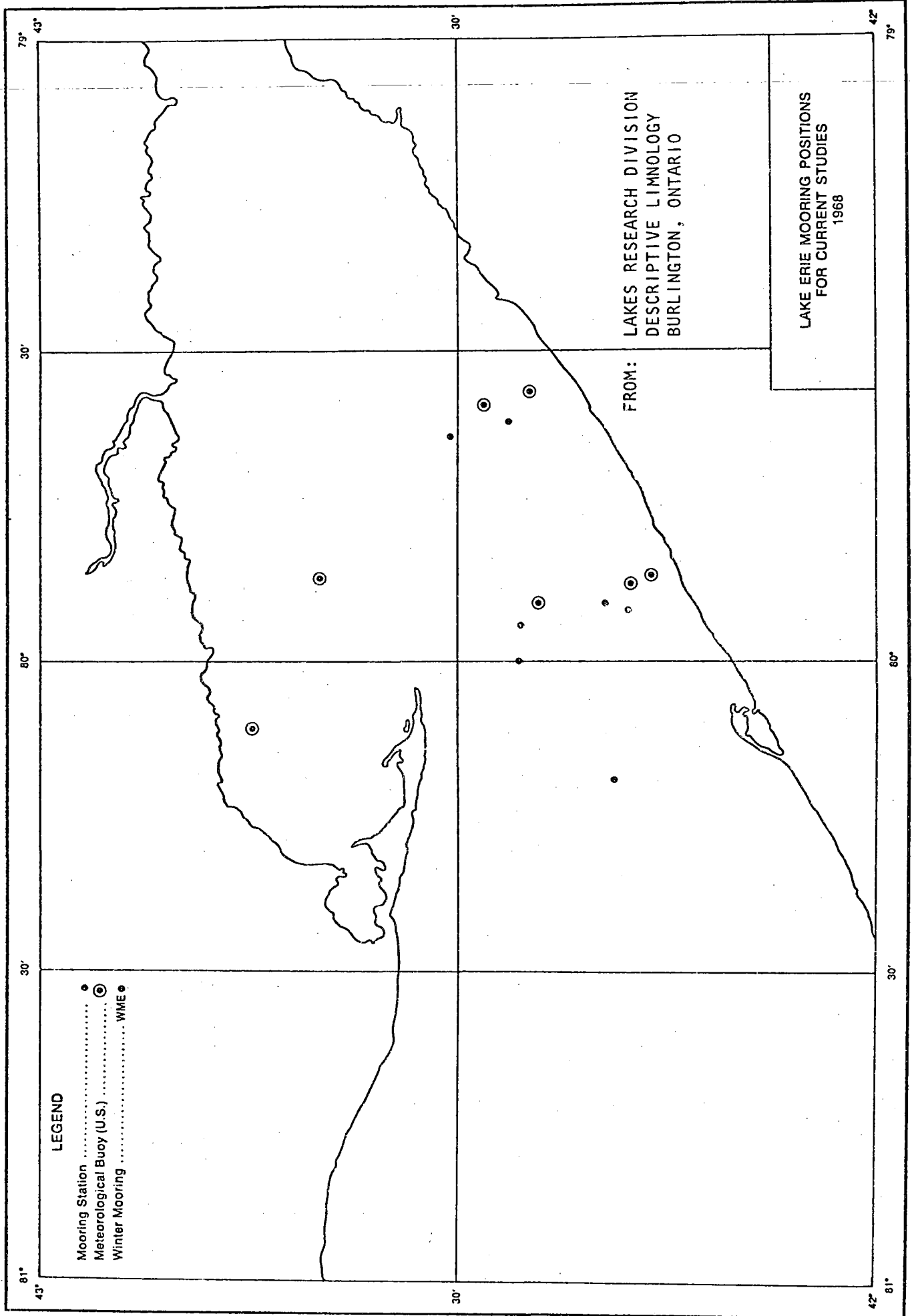


FIGURE 5D

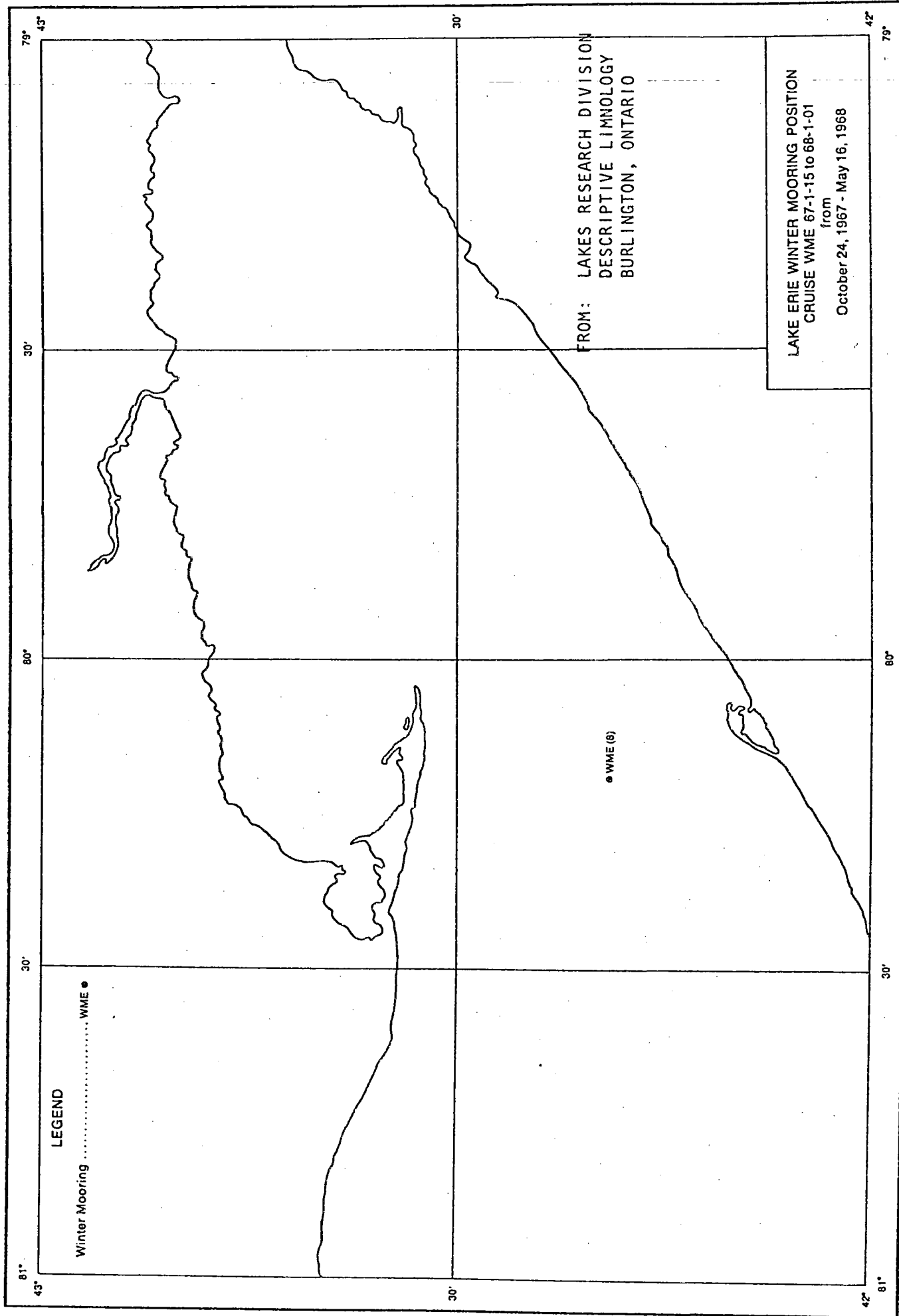



FIGURE 5E

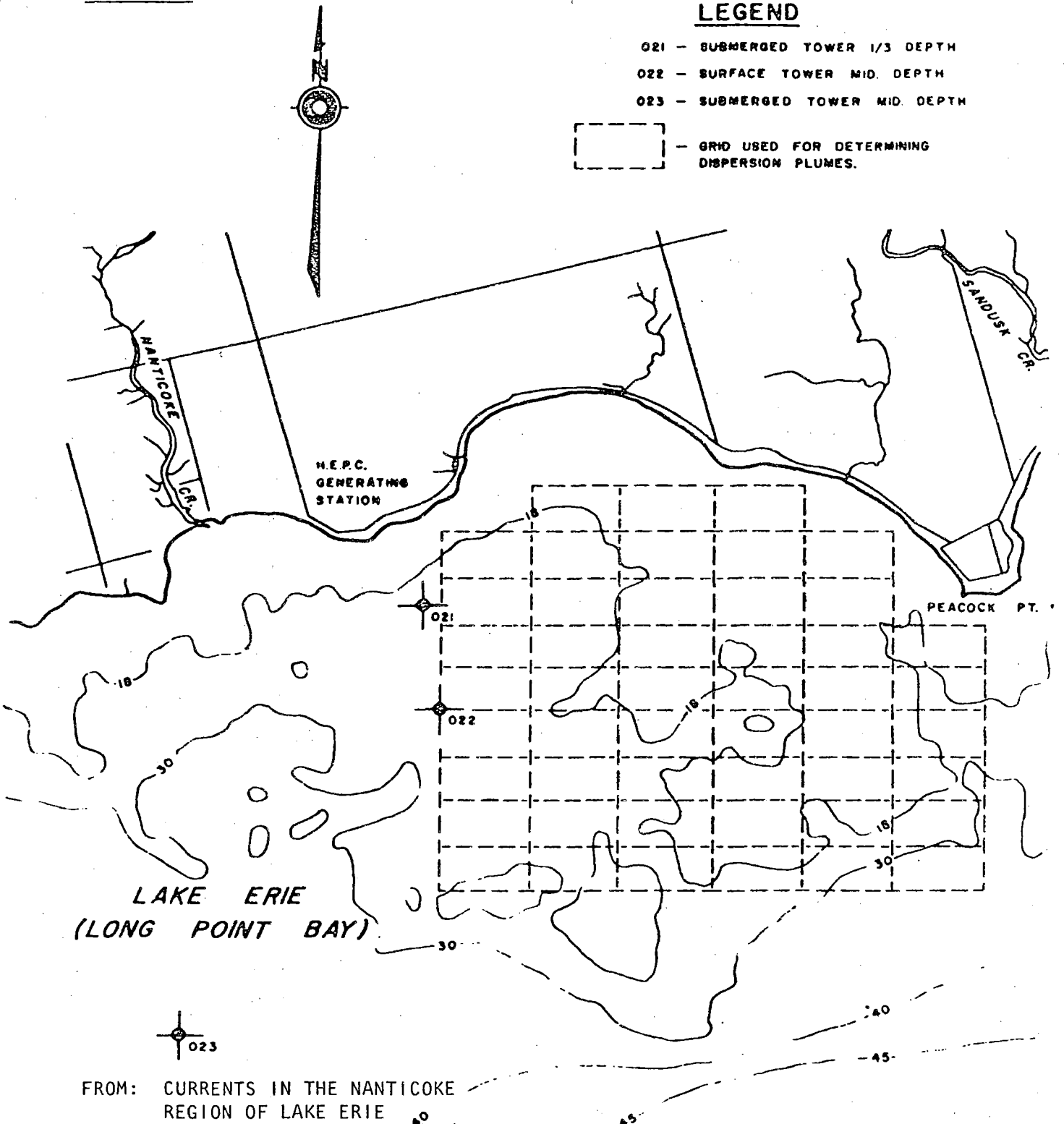
NANTICOKE

FIGURE 6

LEGEND

- 021 - SUBMERGED TOWER 1/3 DEPTH
- 022 - SURFACE TOWER MID. DEPTH
- 023 - SUBMERGED TOWER MID. DEPTH

 - GRID USED FOR DETERMINING DISPERSION PLUMES.




LAKE ERIE
(LONG POINT BAY)

FROM: CURRENTS IN THE NANTICOKE
REGION OF LAKE ERIE

FIG. 5

ONTARIO WATER RESOURCES COMMISSION

**CURRENT METER
LOCATIONS, 1968**

SCALE  MILES

DRAWN BY ARS DATE JAN, 1969

CHECKED BY _____ DRAWING NO. 60-5-01

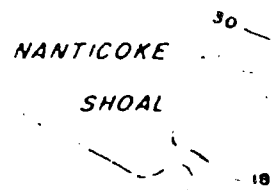
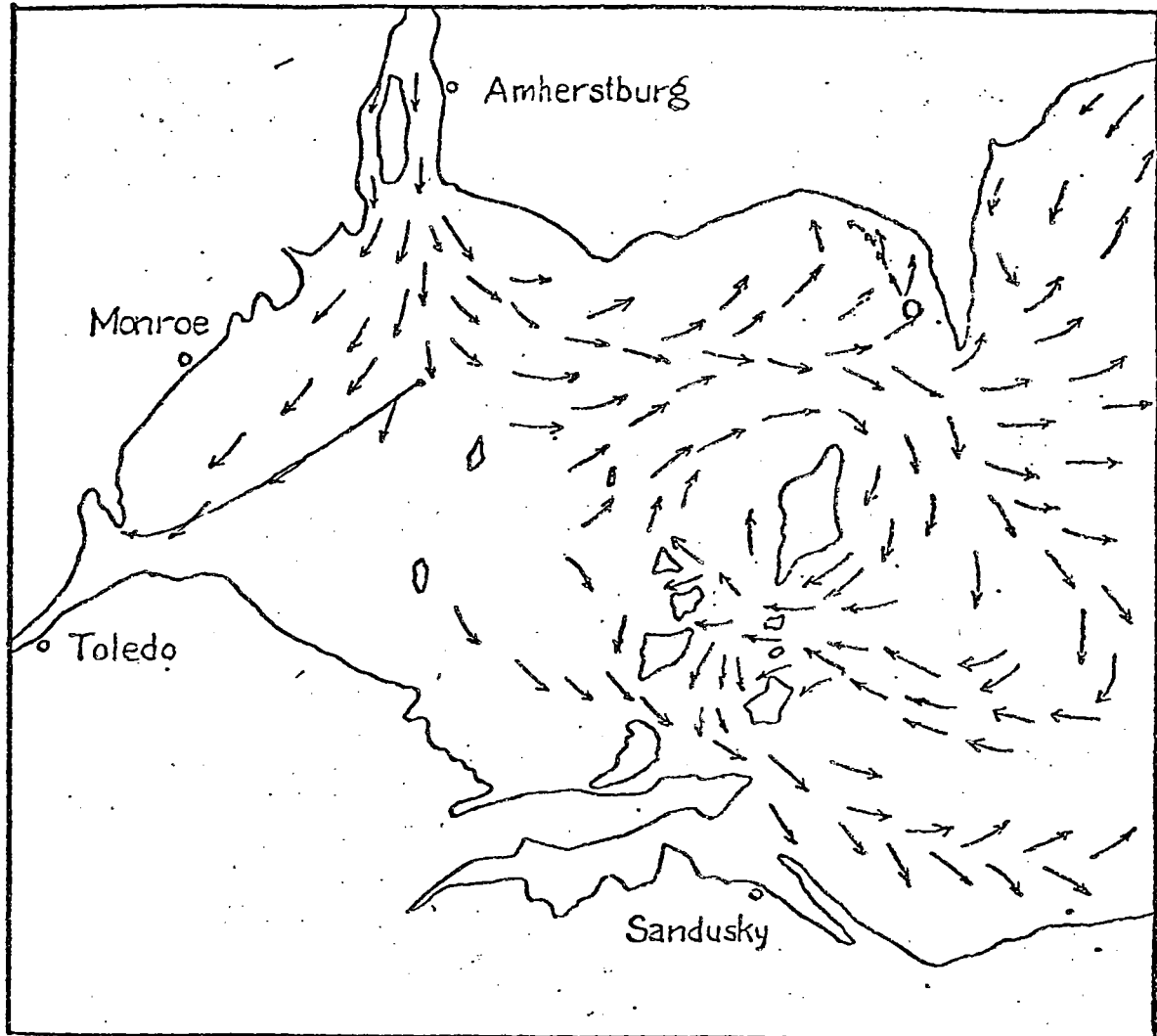
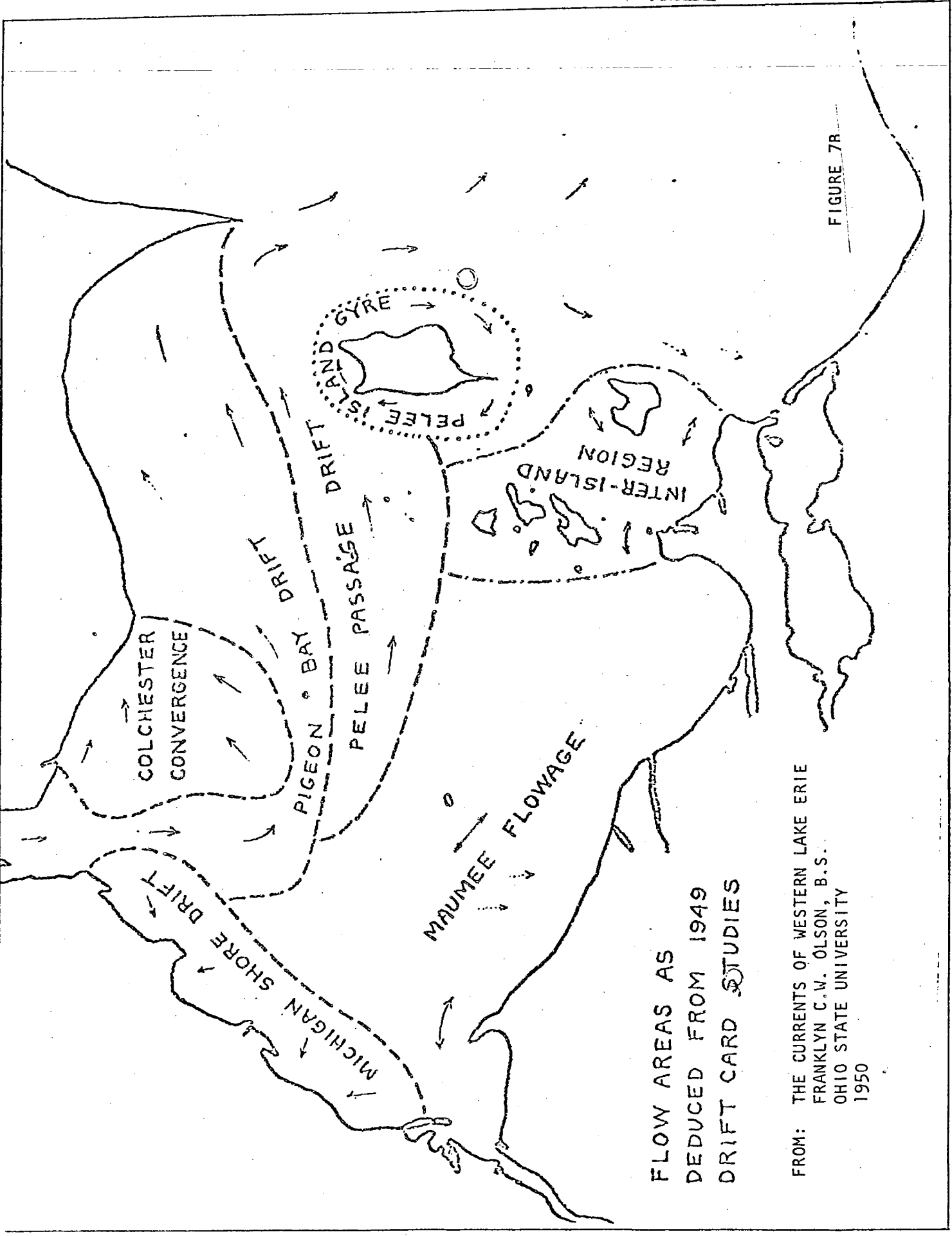


FIGURE 7A



Surface currents of western Lake Erie as deduced by Harrington. The long arrow leading to Maumee Bay is the course of his bottle #56. The circle and short arrows west of Point Pelee is the path of the barrel from the wreck of the schooner David Vance.

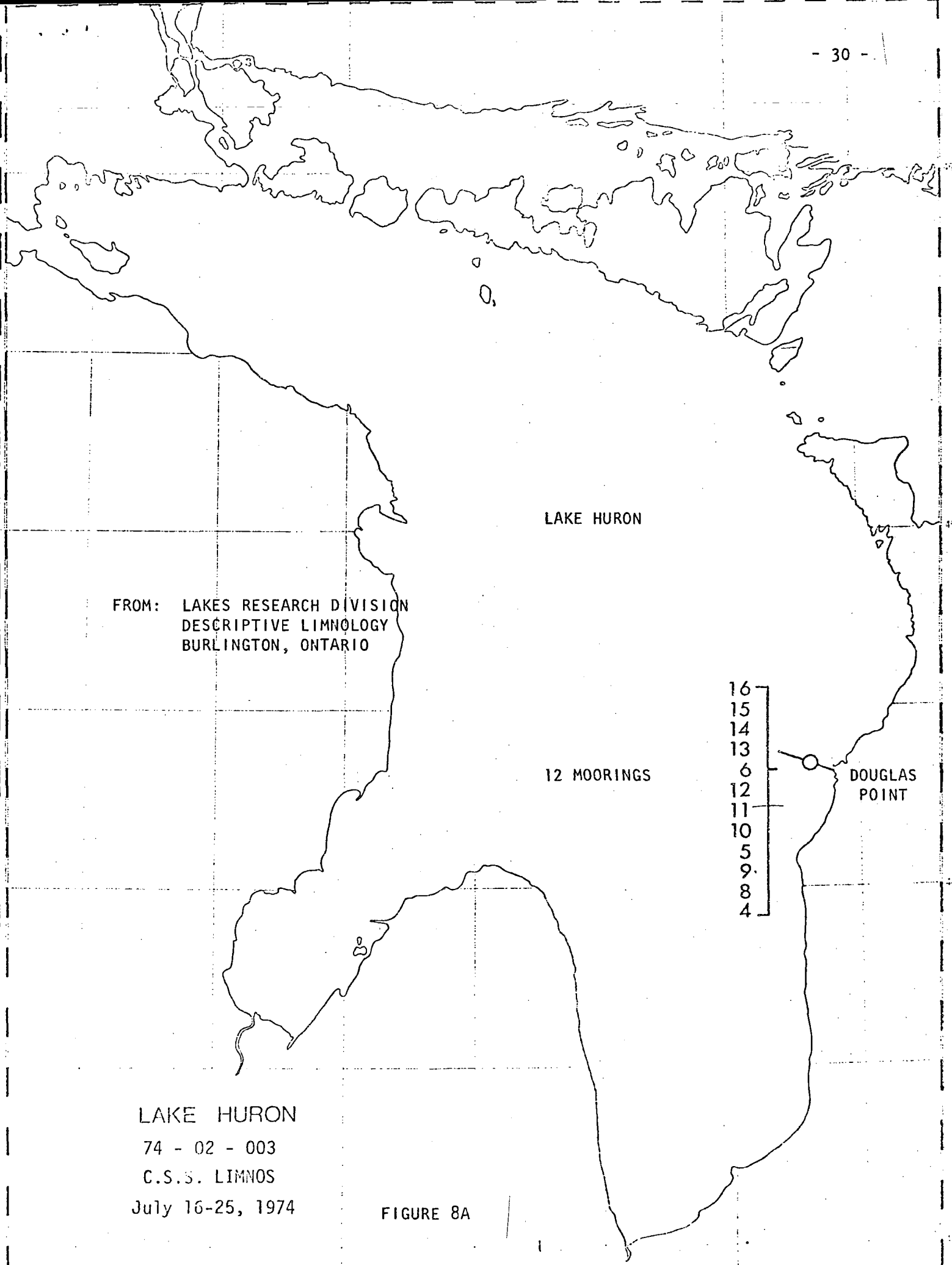
FROM: THE CURRENTS OF WESTERN LAKE ERIE
FRANKLYN C.W. OLSON, B.S.
OHIO STATE UNIVERSITY
1950



FLOW AREAS AS
DEDUCED FROM 1949
DRIFT CARD STUDIES

FROM: THE CURRENTS OF WESTERN LAKE ERIE
FRANKLYN C.W. OLSON, B.S.
OHIO STATE UNIVERSITY
1950

FIGURE 7R



FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

LAKE HURON

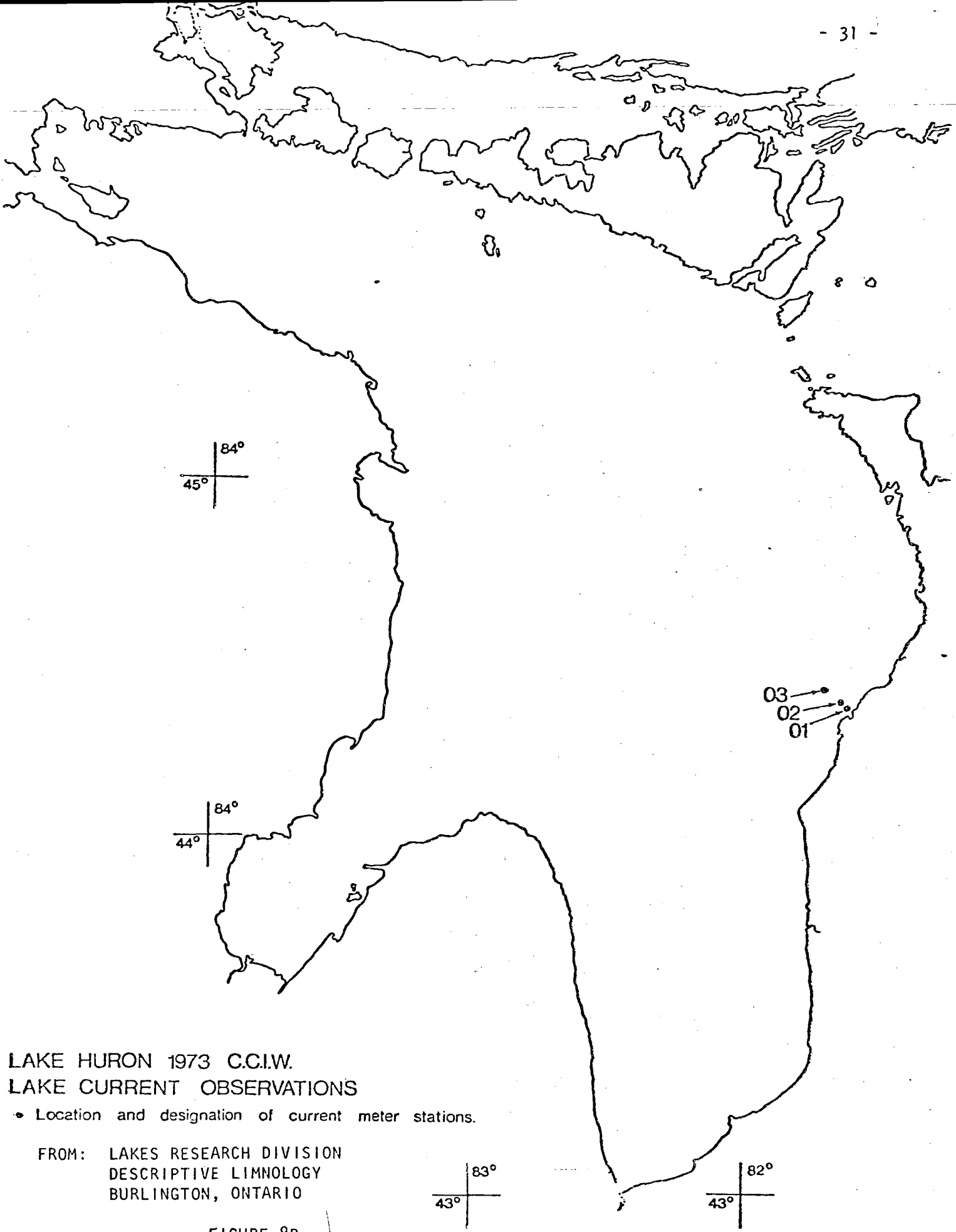
12 MOORINGS

DOUGLAS
POINT

16
15
14
13
6
12
11
10
5
9
8
4

LAKE HURON
74 - 02 - 003
C.S.S. LIMNOS
July 16-25, 1974

FIGURE 8A



LAKE HURON 1973 C.C.I.W.
LAKE CURRENT OBSERVATIONS

• Location and designation of current meter stations.

FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

FIGURE 8B

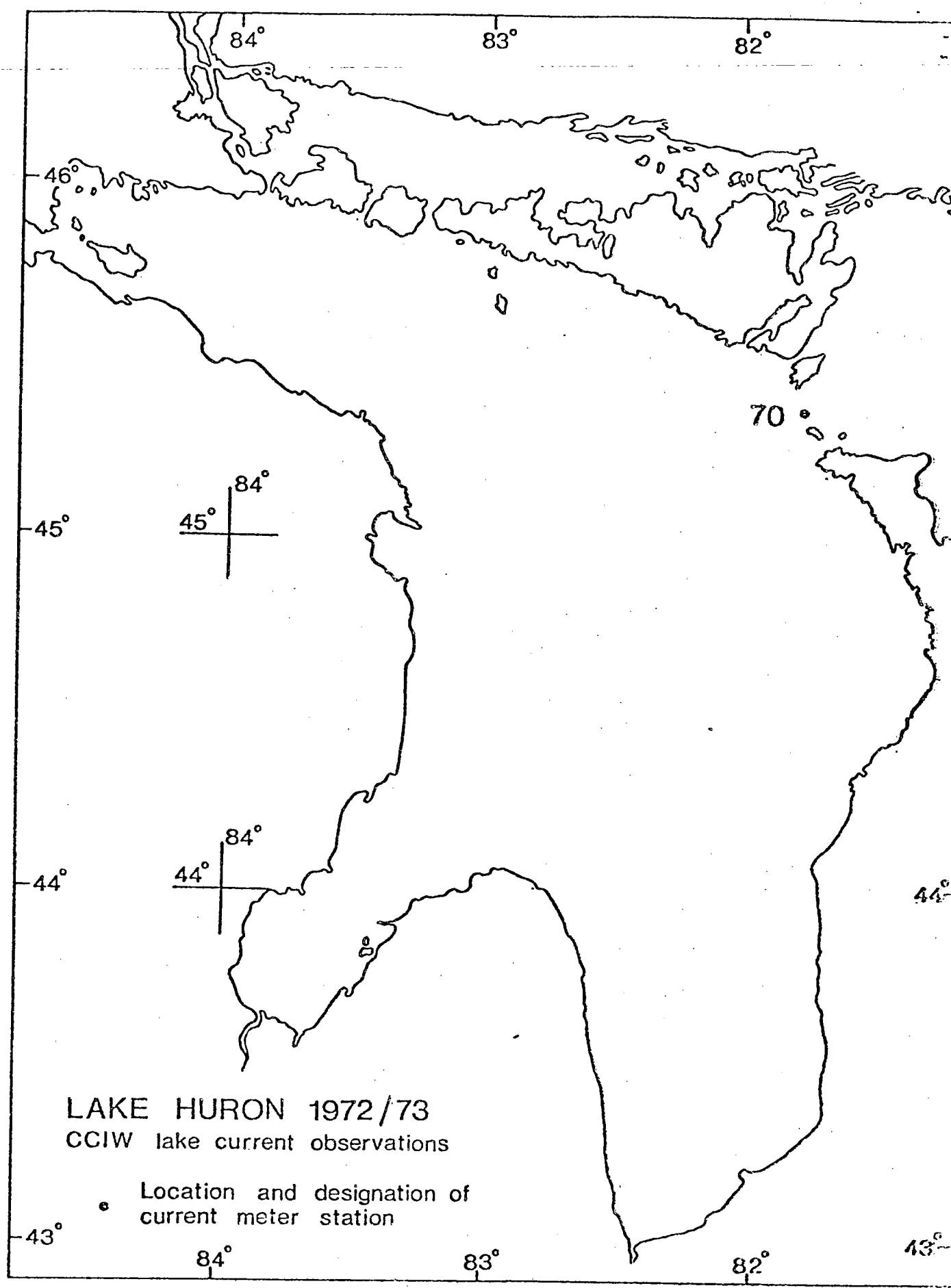


FIGURE 8C

FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

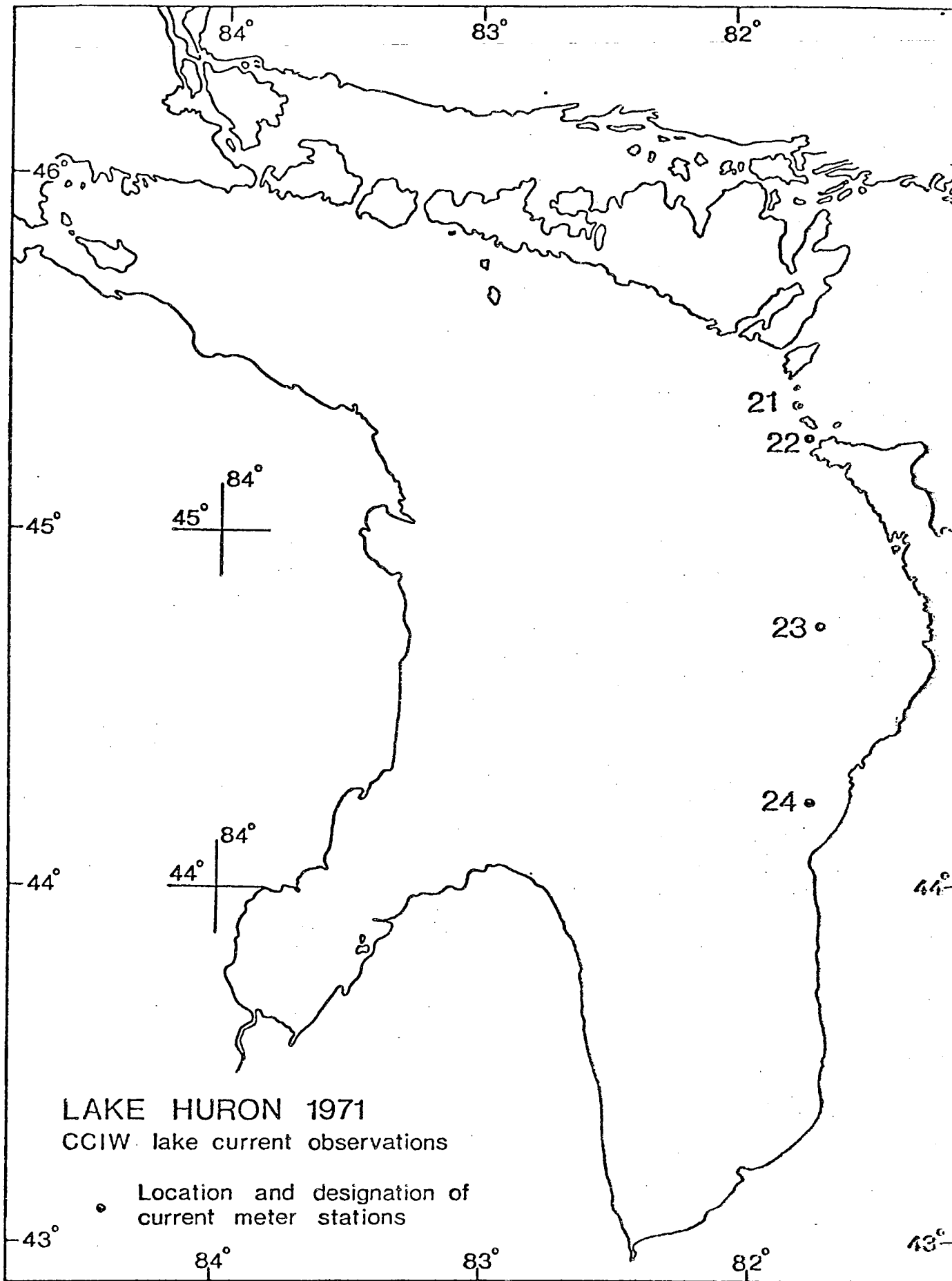
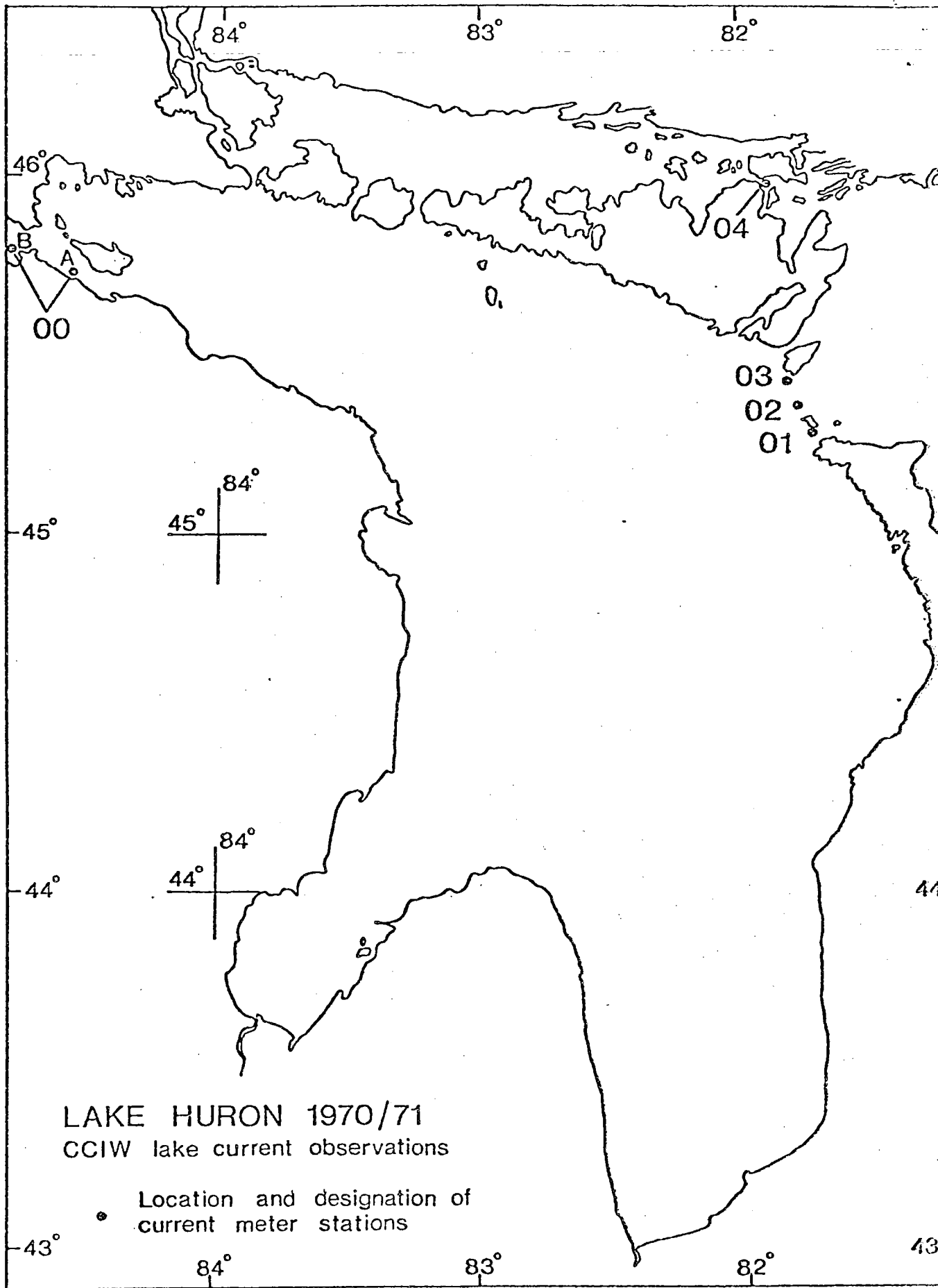


FIGURE 8D

FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

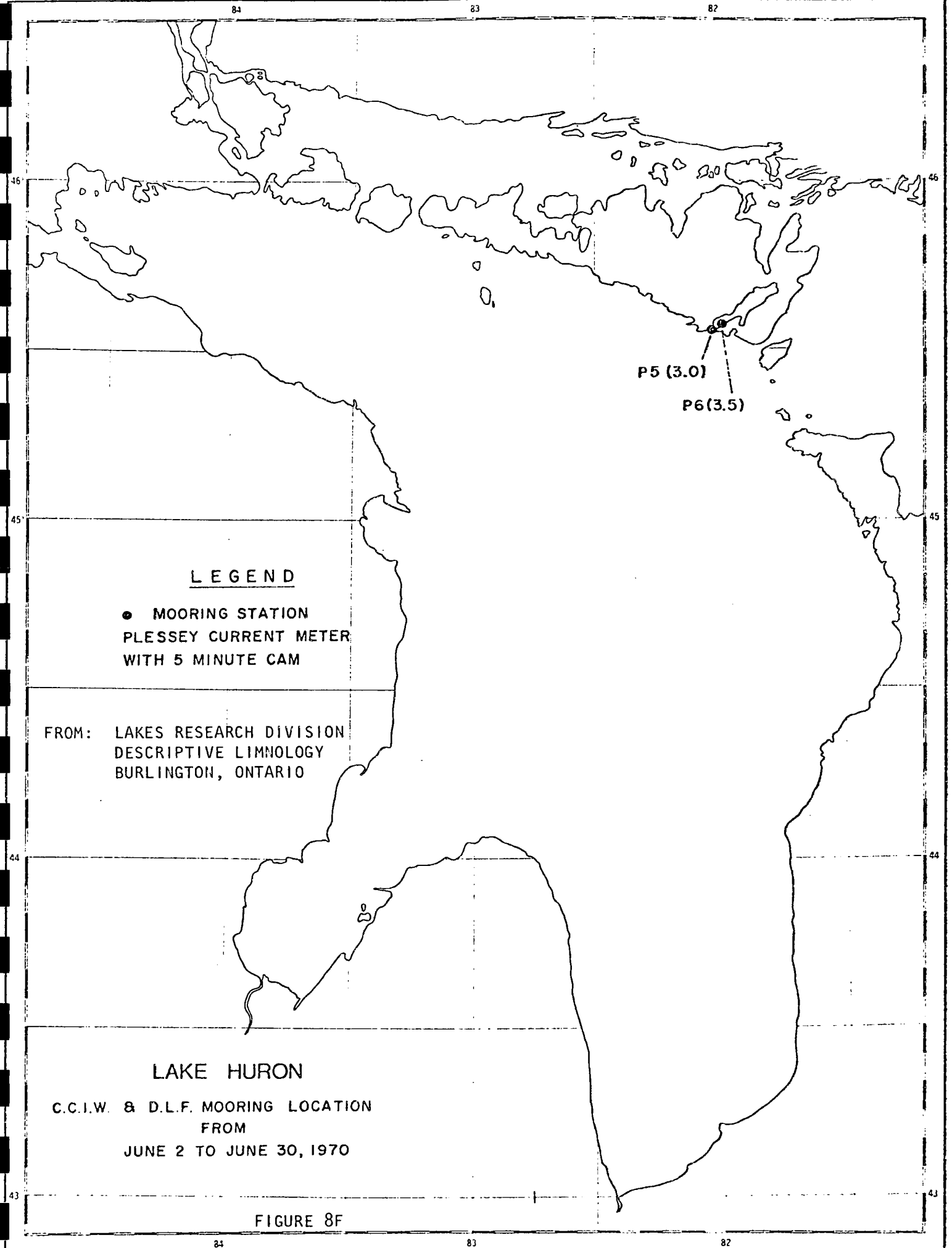


LAKE HURON 1970/71
CCIW lake current observations

● Location and designation of
current meter stations

FIGURE 8E

FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO



LEGEND

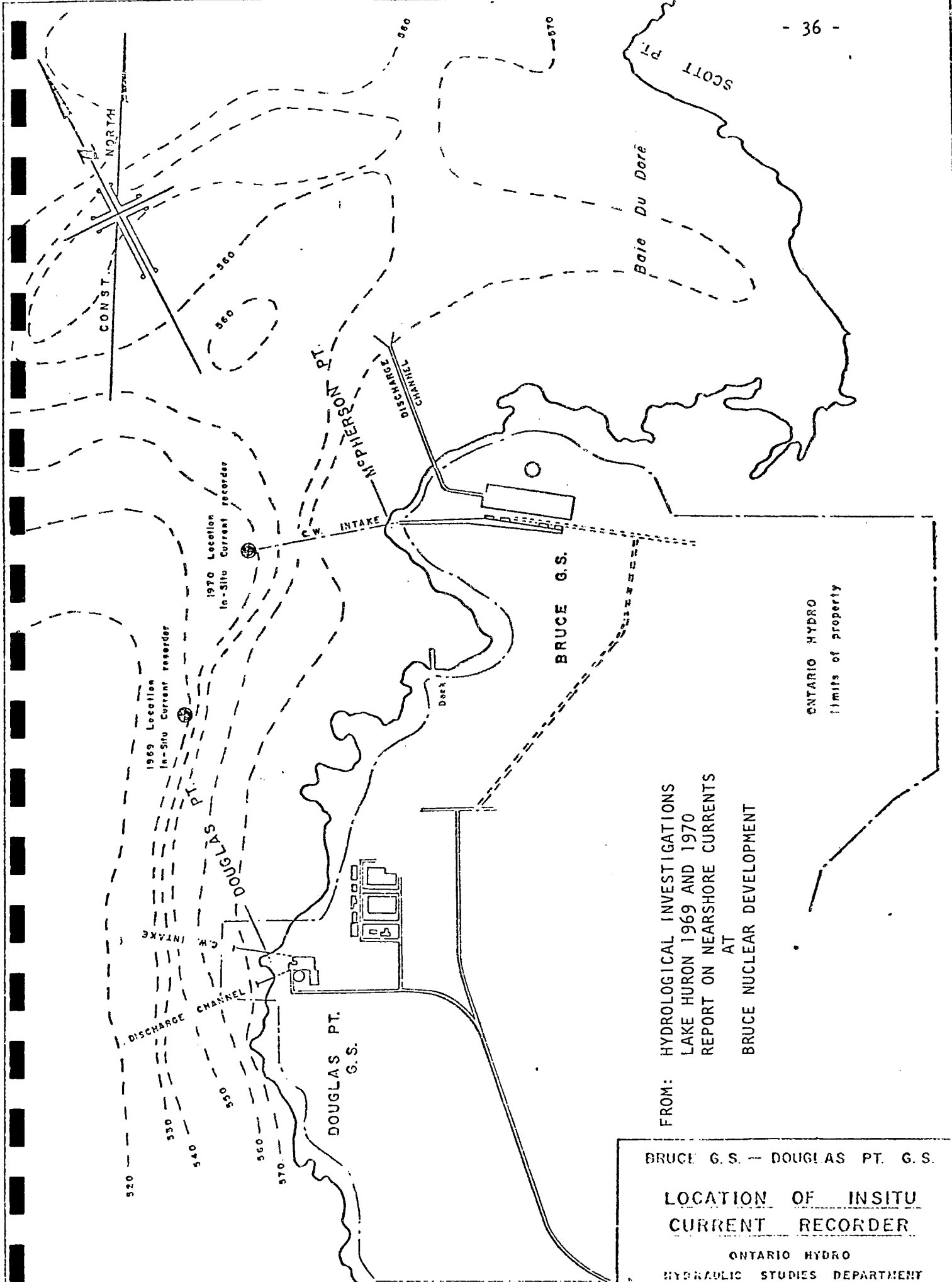
● MOORING STATION
● PLESSEY CURRENT METER
WITH 5 MINUTE CAM

FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

LAKE HURON

C.C.I.W. & D.L.F. MOORING LOCATION
FROM
JUNE 2 TO JUNE 30, 1970

FIGURE 8F



FROM: HYDROLOGICAL INVESTIGATIONS
 LAKE HURON 1969 AND 1970
 REPORT ON NEARSHORE CURRENTS
 AT
 BRUCE NUCLEAR DEVELOPMENT

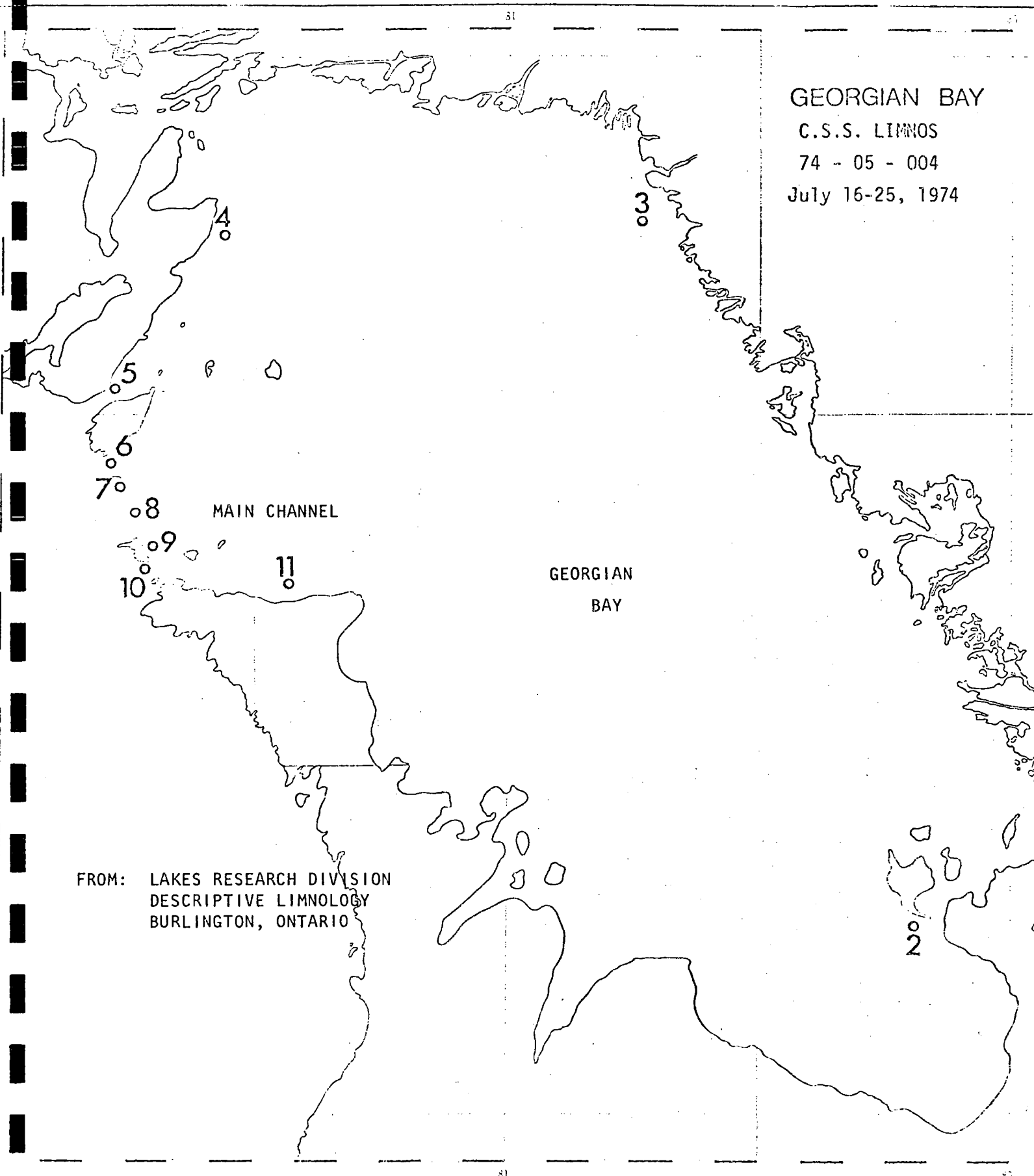
BRUCE G.S. -- DOUGLAS PT. G.S.

LOCATION OF INSITU
CURRENT RECORDER

ONTARIO HYDRO
 HYDRAULIC STUDIES DEPARTMENT

SCALE 1 INCH = 2000 FEET PLATE 1

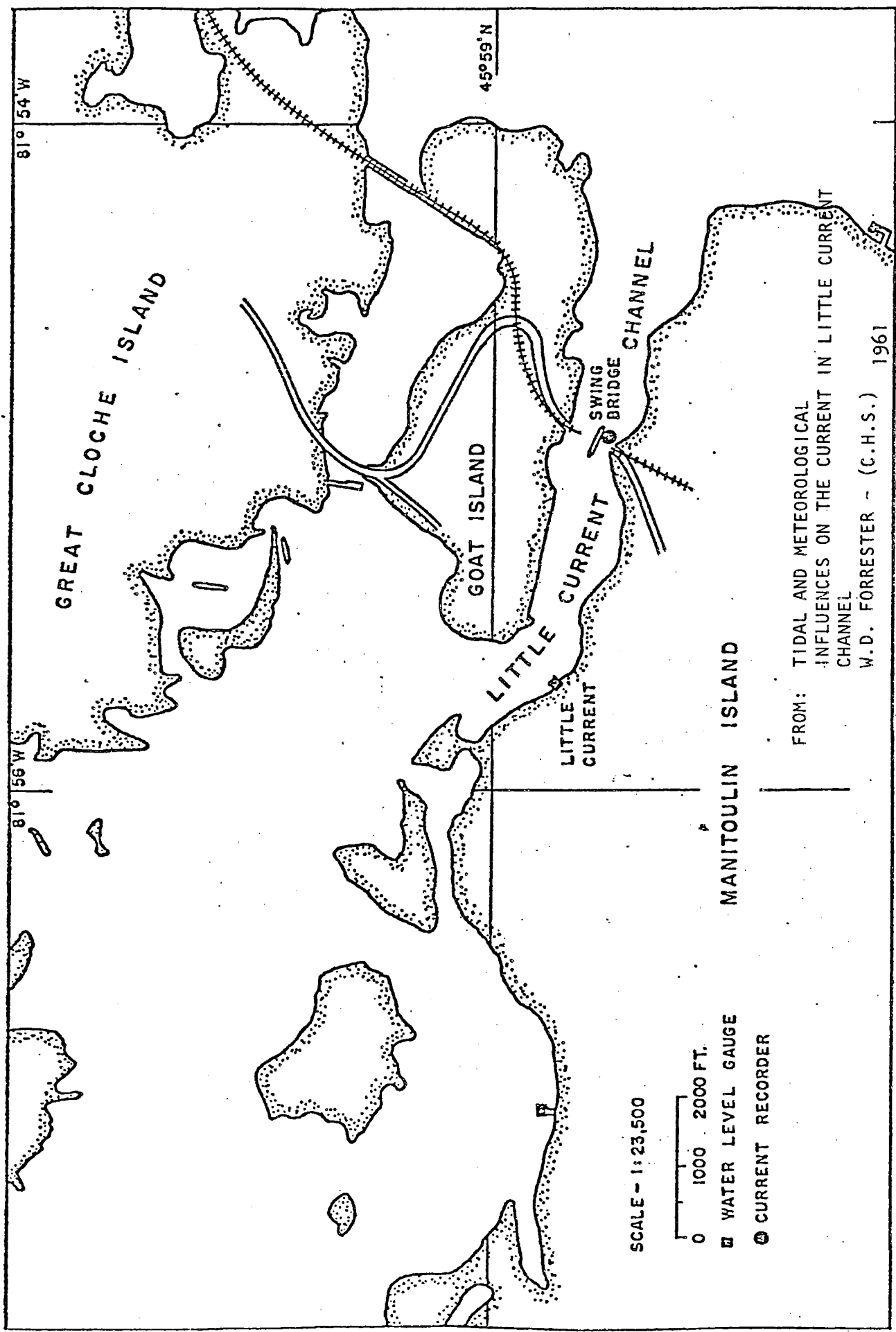
FIGURE 9



GEORGIAN BAY
C.S.S. LIMNOS
74 - 05 - 004
July 16-25, 1974

FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

FIGURE 10

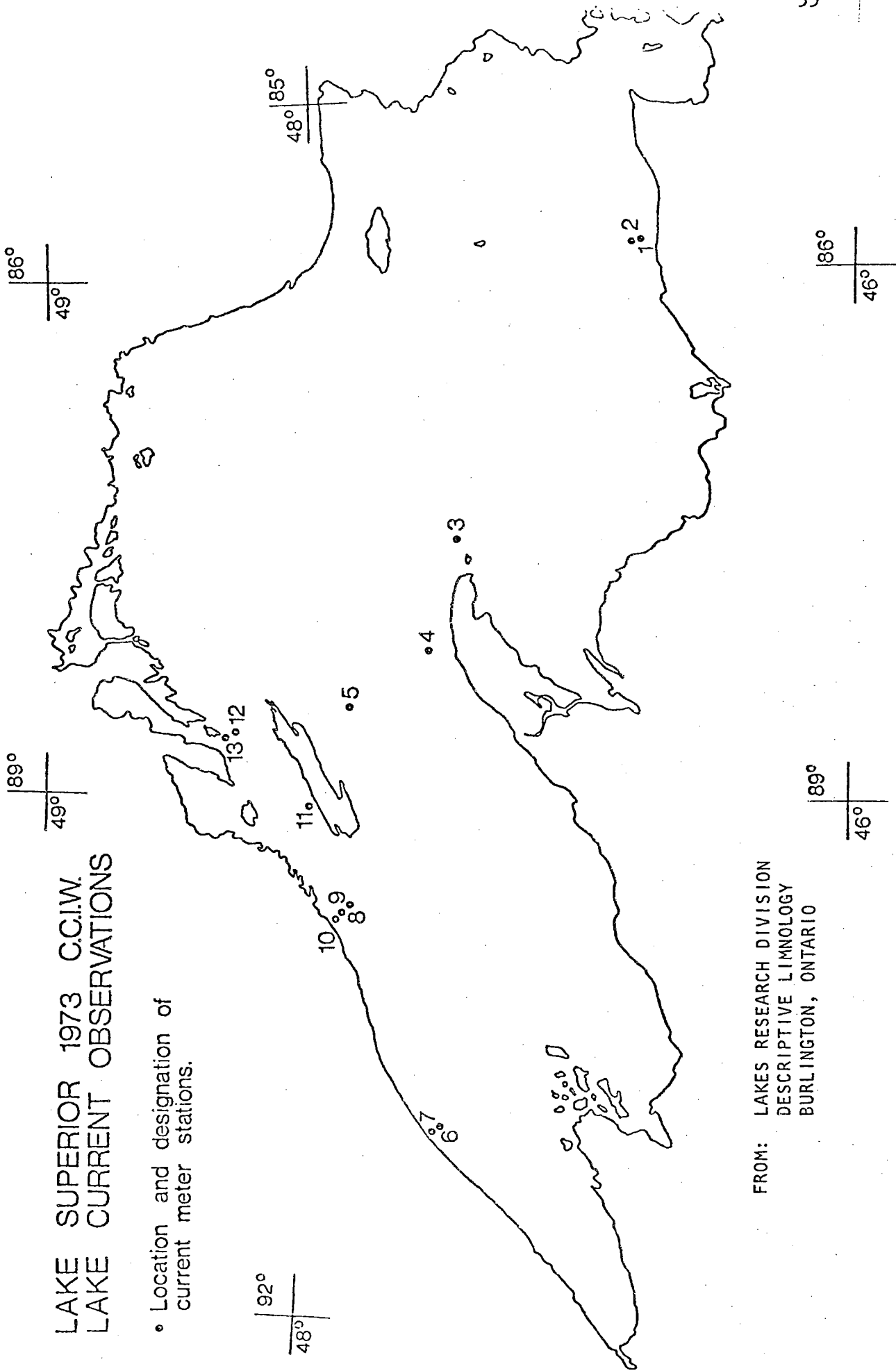


Observation stations on and near Little Current Channel.

FIGURE 11

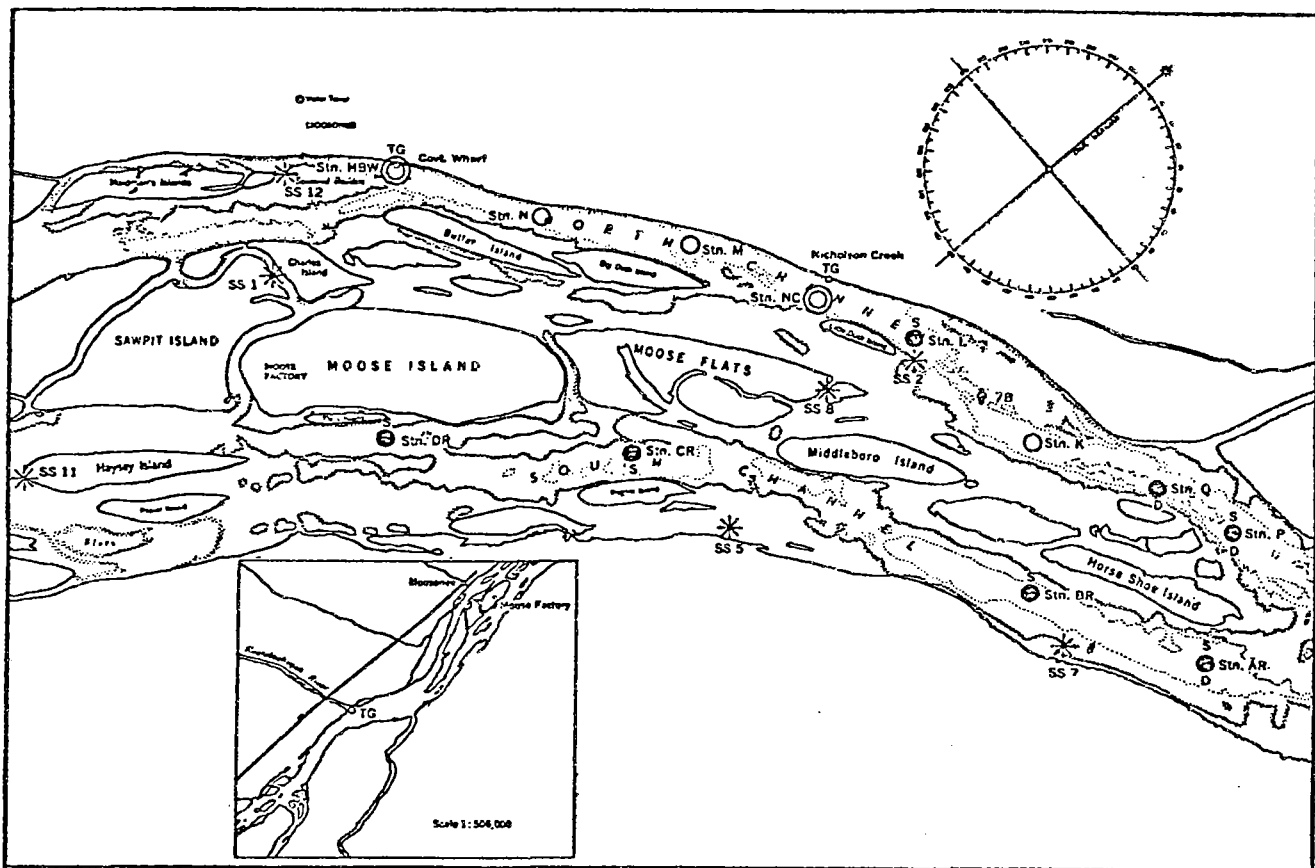
LAKE SUPERIOR 1973 C.C.I.W. LAKE CURRENT OBSERVATIONS

• Location and designation of
current meter stations.



FROM: LAKES RESEARCH DIVISION
DESCRIPTIVE LIMNOLOGY
BURLINGTON, ONTARIO

FIGURE 12



METER STATIONS, CORE AND SOIL SAMPLE LOCATIONS

FROM: MOOSE RIVER AND APPROACHES
SURVEY OF TIDES, CURRENTS, DENSITY AND SILT
C.J. LANGFORD 1963

FIGURE 13A

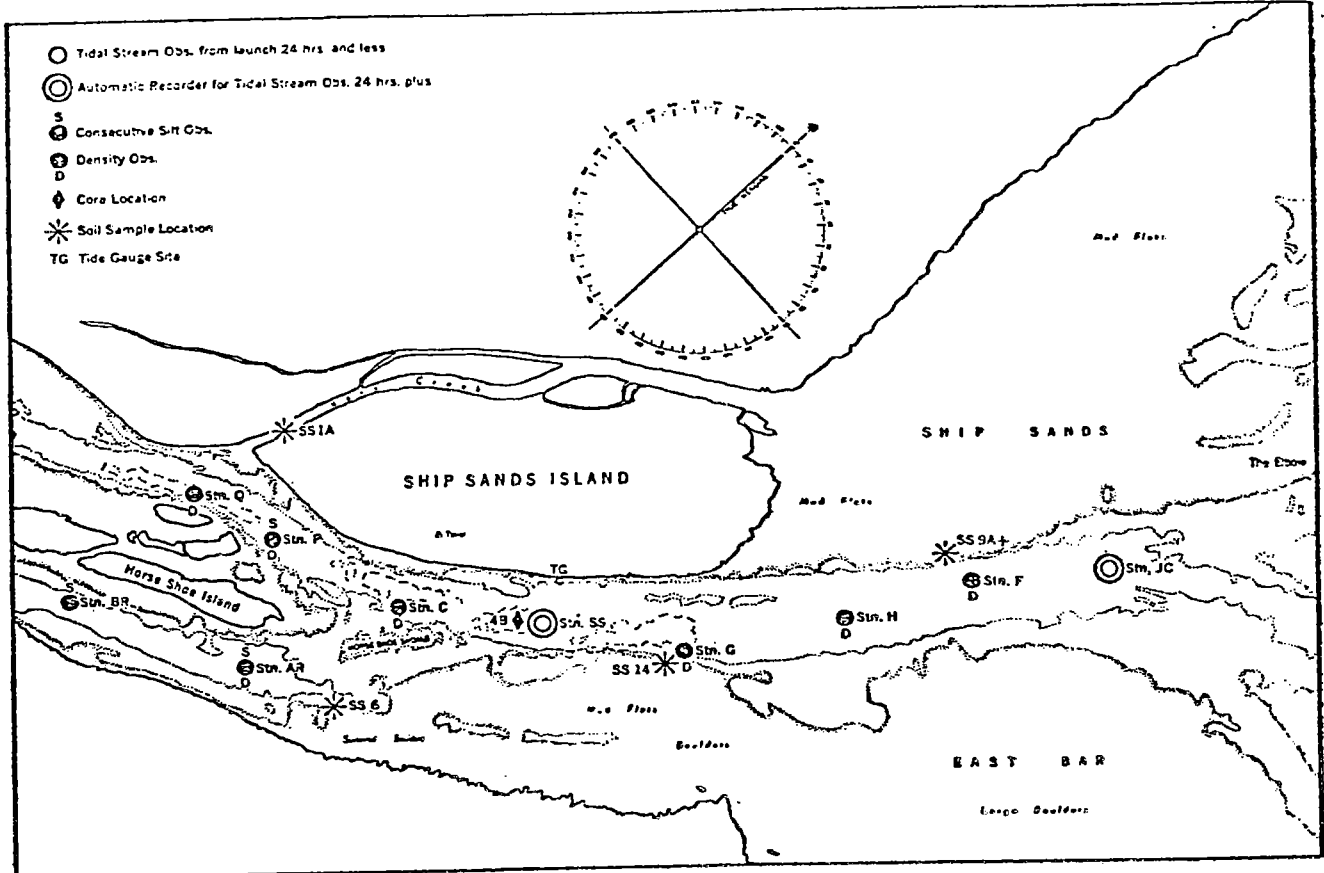


Figure 2 METER STATIONS, CORE AND SOIL SAMPLE LOCATIONS

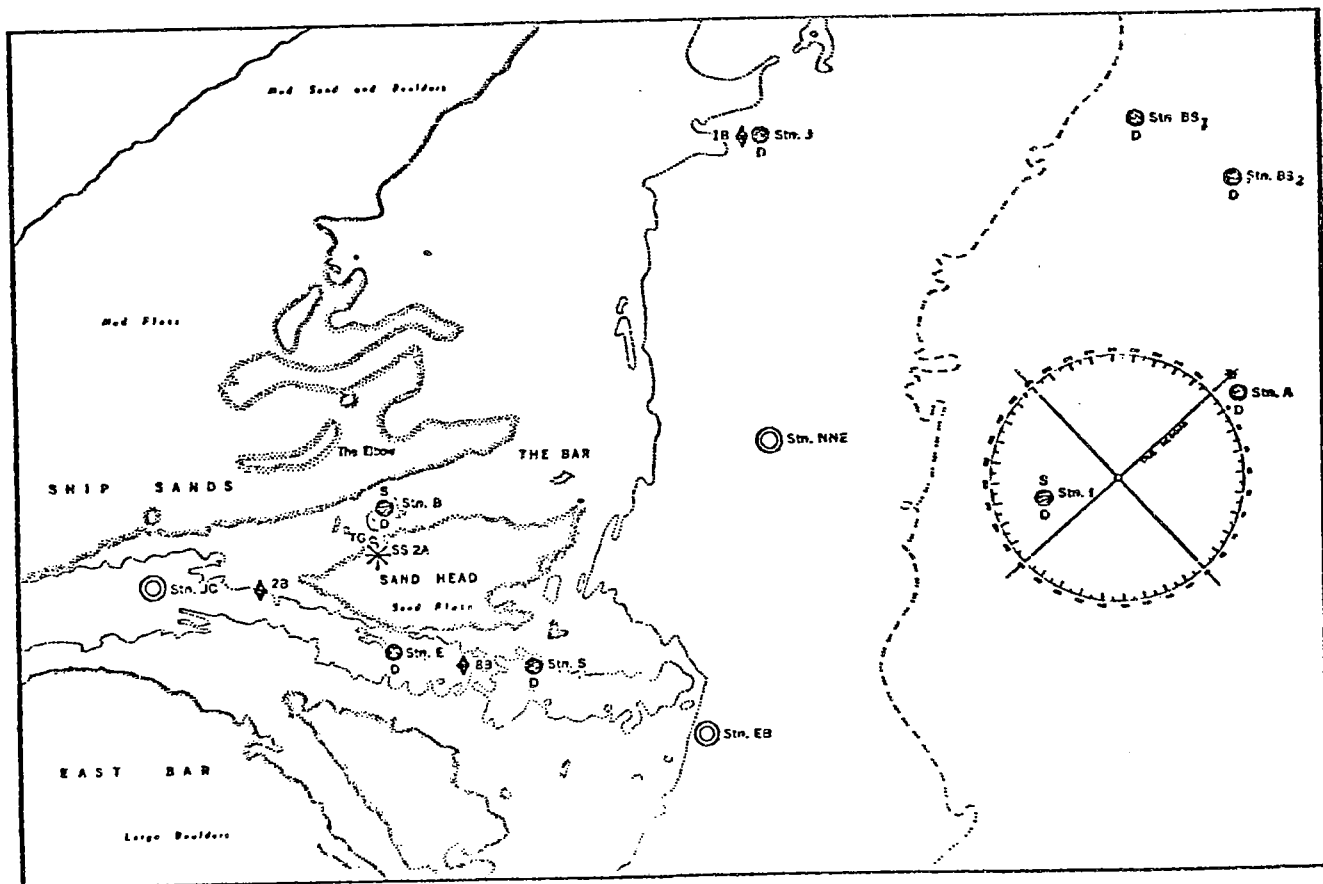
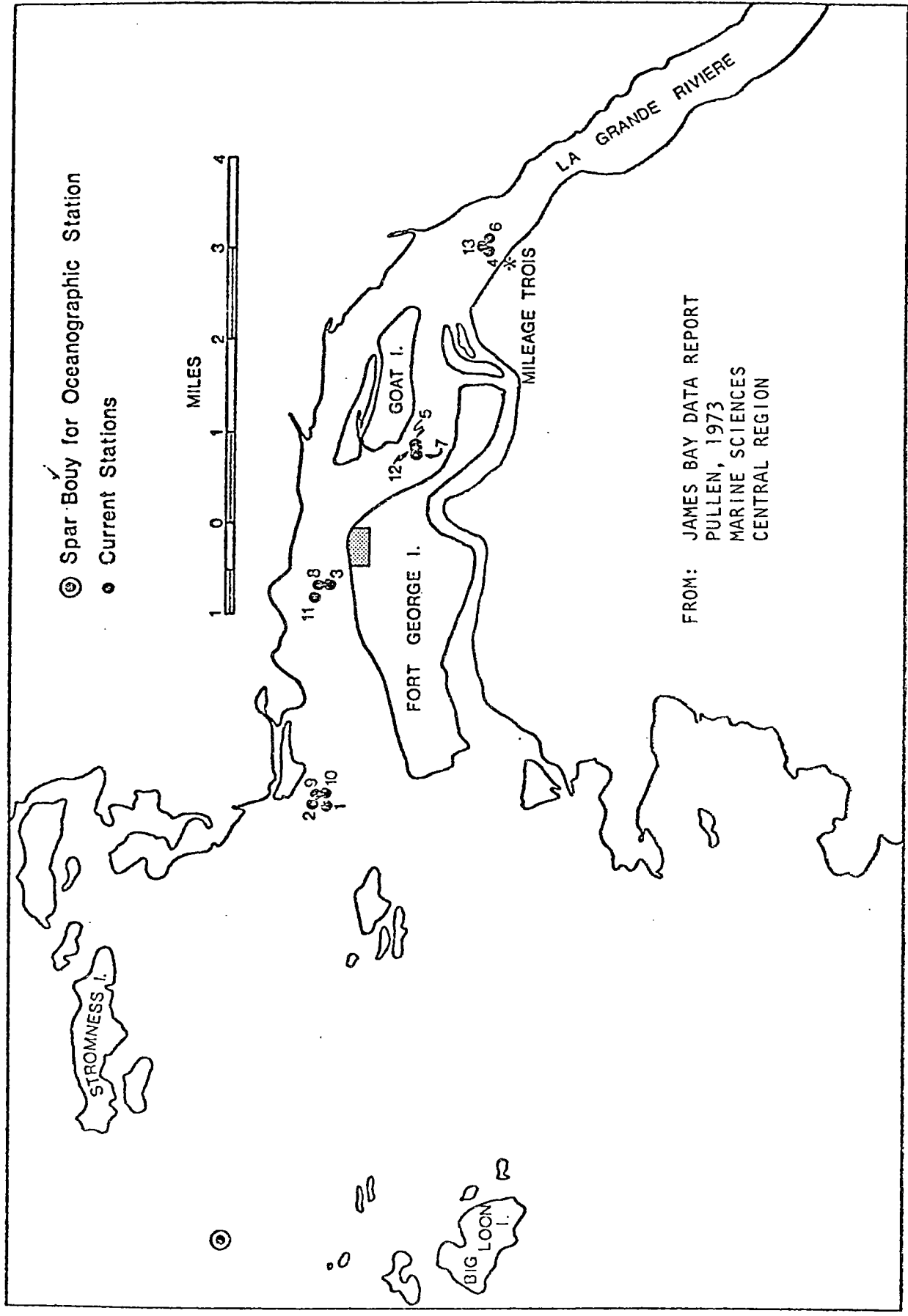


Figure 3 METER STATIONS, CORE AND SOIL SAMPLE LOCATIONS FROM: MOOSE RIVER AND APPROACHES



FROM: JAMES BAY DATA REPORT
PULLEN, 1973
MARINE SCIENCES
CENTRAL REGION

Position of Current Stations

FIGURE 14

FROM: TIDAL AND OCEANOGRAPHIC SURVEY
HUDSON STRAIT - DATA RECORD
W.D. FORRESTER, 1959

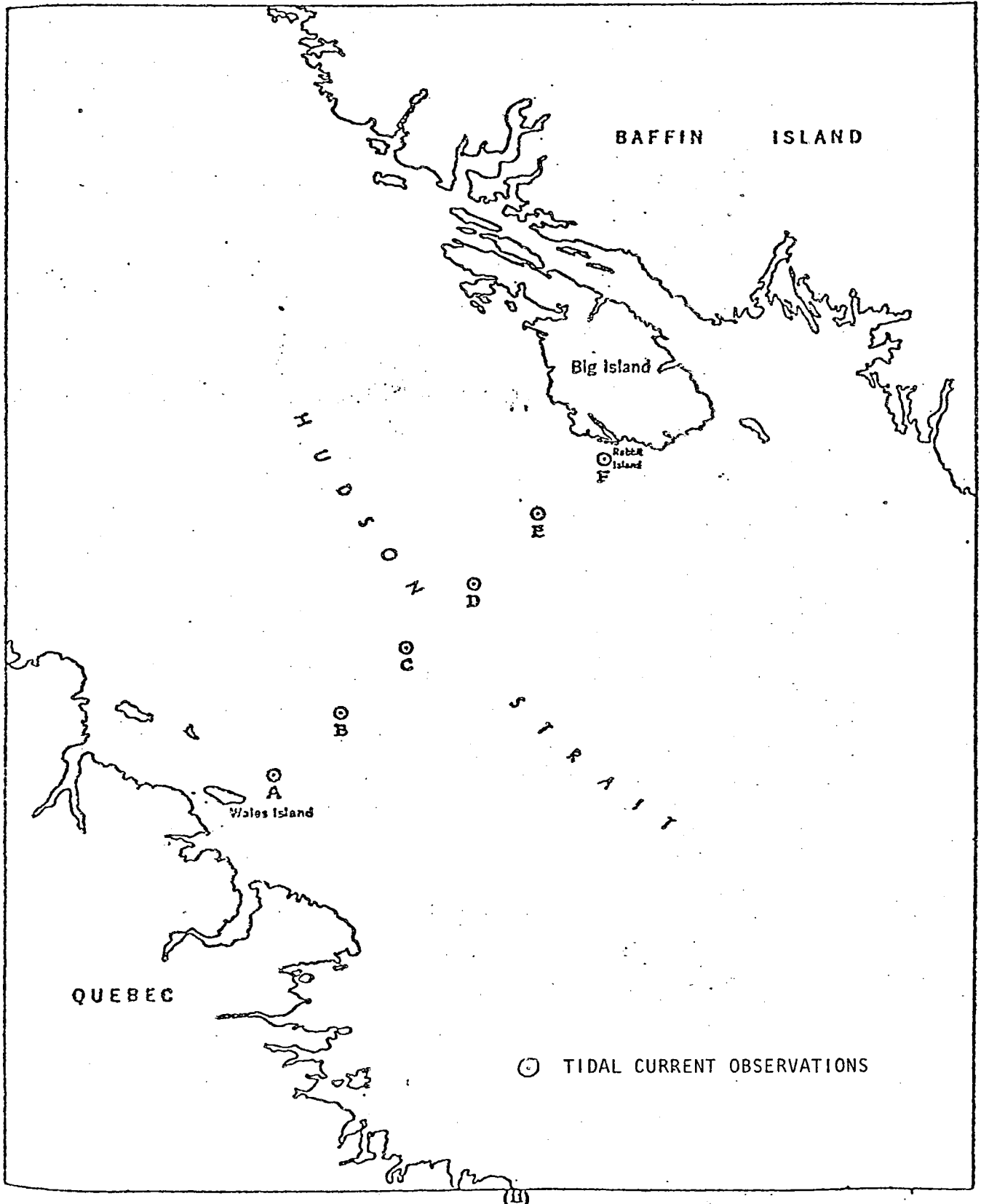
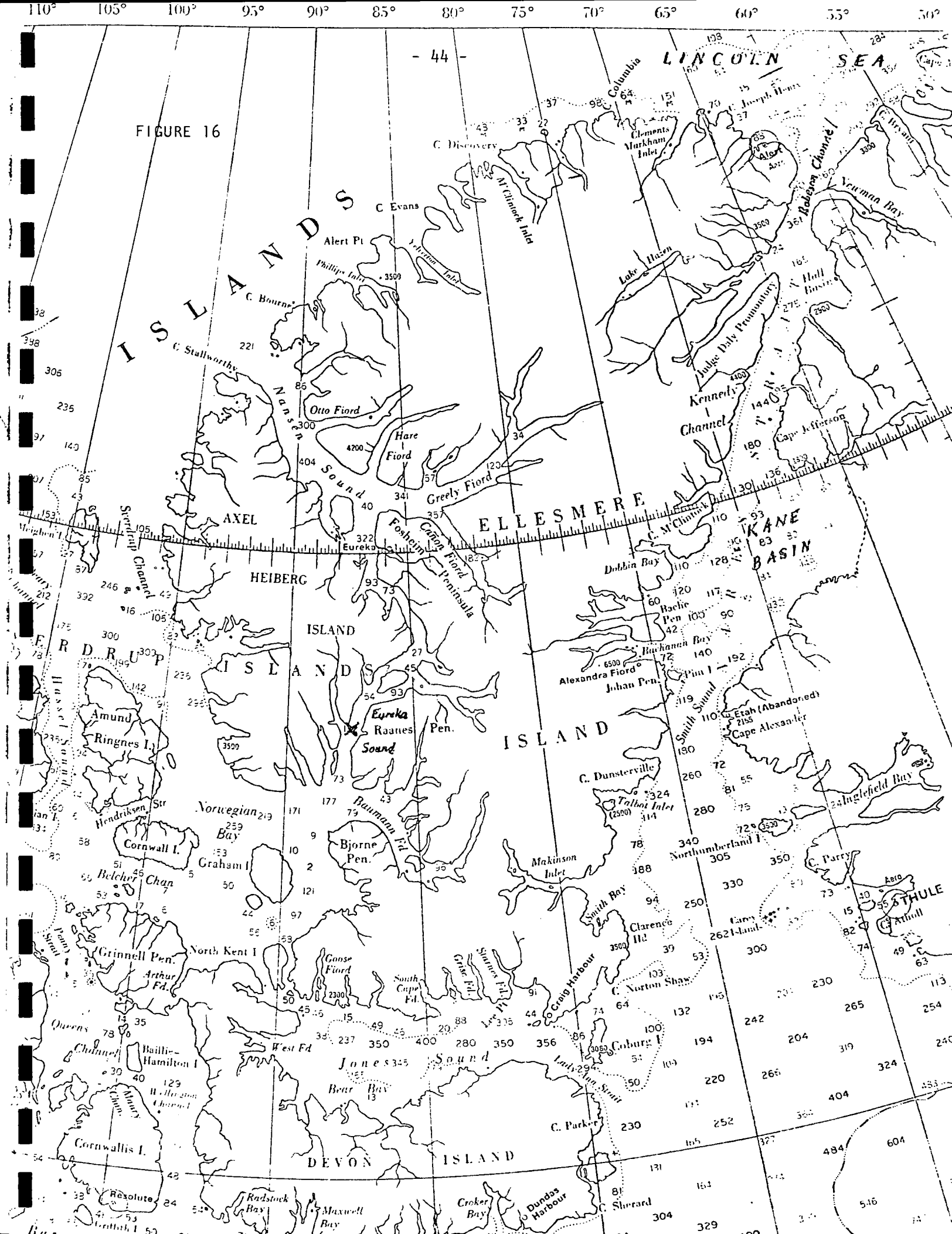
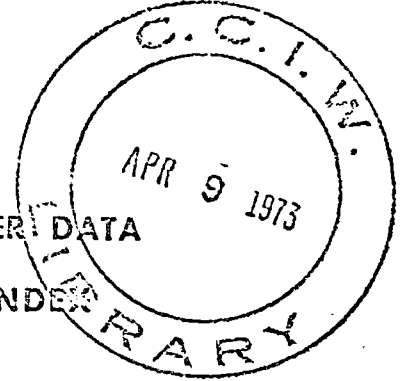


FIGURE 15

FIGURE 16



1972



SURFACE WATER DATA
REFERENCE INDEX

CANADA

WATER SURVEY OF CANADA

WATER SURVEY OF CANADA
 1100 COLLEGE STREET
 OTTAWA, ONTARIO K1P 6Y6

Station No.	Name	Drainage Area (Sq. Mi.)	Gauge Location	Discharge Records (Stage Only ?) (Misc. Meas. ?)	Type of Gauge	Operation	Magnetic Tape	Note
	Winnipeg River: Lake of the Woods:							
05PC013	Rainy River at Little Fork		48° 32' 00" 93° 32' 00"	14-26*	M	S	No	
05PC012	Rainy River at Big Fork		48° 51' 00" 93° 42' 00"	11-26*	M	S	No	
05PC008	Rainy River at Emo		48° 37' 30" 93° 50' 00"	12-14# 06-13*, 21-26* 14-20*	M M	S C	No	
05PC018	Rainy River at Manitou Rapids	19,400	48° 38' 00" 93° 54' 47"	28-72	R	C	Yes	1,2
05PC006	Rainy River at Boucherville		48° 30' 00" 94° 11' 00"	11-27*, 33*	M	S	No	
05PC015	Rainy River at Pinewood		48° 42' 30" 94° 18' 00"	14-22*	M	S	No	
05PC007	Rainy River at Rainy River		48° 43' 00" 94° 35' 00"	12-27*, 32-35*	M	C	No	
05PB007	Rainy Lake near Fort Frances		48° 38' 30" 93° 20' 00"	11-49* 50-72*	M R	C C	No	2,3
05PR008	Rainy Lake below Kettle Falls		48° 30' 10" 92° 37' 30"	13-14*, 35-35*	M	C	No	
05PB004	Footprint River at Rainy Lake Falls	420	48° 51' 30" 93° 34' 30"	12# 14-16 59-70*	M M	C C	Yes	4
05PB005	Manitou River above Devil's Cascade	525	48° 58' 30" 93° 20' 30"	12#, 16#, 35# 14-15	M	C	Yes	4
	Turtle River:							
05PB002	Little Turtle Lake near Mine Centre (formerly Turtle River)		48° 46' 20" 92° 36' 30"	14-67*	M	C	No	5
05PB014	Turtle River near Mine Centre	1,880	48° 51' 00" 92° 43' 30"	14-57 58-72	M R	C C	Yes	
05PB013	Seine River below Dam, Lac des Mille Lacs		48° 58' 45" 90° 43' 50"	54* 55-72	M R	C C	No	4,6
05PB011	Seine River at Raft Lake Dam, Outlet Moose Lake (Marmion Lake)		48° 55' 00" 91° 32' 40"	44-50* 51-72	M M	C C	No	4,6
05PB010	Seine River at Calm Lake Power Plant	2,225	48° 47' 40" 92° 09' 15"	28-72	P	C	No	4,6

M - Manual gauge
R - Recording gauge
P - Power plant rating
C - Continuous operation
S - Seasonal operation

1 - International Gauging Station, located in Minnesota, and formerly published under Station No. 5PC-0-1.
2 - Telemetering device installed.
3 - International Gauging Station formerly published under Station No. 5PB-5.
4 - Data not published.
5 - Data prior to 1957 not published.
6 - Data supplied by Hydro-Electric Power Commission of Ontario.