Environment Canada

Environnement Canada

National Water Research Institute

Institut National de Recherche sur les Eaux

1984

ACTIVITY SUMMARY

TECHNICAL OPERATIONS DIVISION

NATIONAL WATER RESEARCH INSTITUTE

1984

ACTIVITY SUMMARY

TECHNICAL OPERATIONS DIVISION

NATIONAL WATER RESEARCH INSTITUTE

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INTRODUCTION

Technical Operations Division is a scientific support group which gives technical assistance to the scientific community on a national basis. From its headquarters at the National Water Research Institute in Burlington, Ontario, the Division lends its logistical and technical support to several government departments and agencies, universities and other organizations.

While the Division continues to support the Open Lakes Surveillance Program by monitoring various water quality and eutrophication parameters and assists many other scientific projects on the Great Lakes through sample and data collection from major ships, the demand for field support in areas all across the country is ever-increasing.

The Underwater Operations Unit maintains a high level of competence among the Institute's divers by conducting annual Diver Certification and Training programs. It provides a high level of expertise and up-to-date technology in its support of many scientific projects.

Field parties depend heavily on the assistance of the Rigging Shop for equipment transport, maintenance and emergency repair, the upkeep of the NWRI fleet of vehicles, trailers and campers, and operation of the Field Equipment Stores.

The Limnological Instrumentation Section prepares and maintains the Division's electronic data acquisition equipment and has taken on the task of developing a computerized data logging system to streamline shipboard operations.

The Division has also assumed responsibility for the setup and scheduling of the Video Studio as well as the issue of video equipment to field parties.

This report summarizes in part the field activities of this Division during the 1984 field season.

STAFF LIST

Chief - Mr. H.B. Macdonald
Secretary - Mrs. S.R. Mitchell
Admin. Officer - Mrs. C. Kennedy

SHIP SURVEY SECTION

Head - Mr. P.M. Healey

Sr. Technologists:
Mr. B.H. Moore - OIC LIMNOS, Yukon, Newfoundland
Mr. S.B. Smith - OIC LIMNOS, Cobourg, Yukon
Mr. P.R. Youakim - CSS LIMNOS Science Cruises
Mr. E.H. Walker - OIC BAYFIELD, T.L. Runoff, Moose River

Technologists:
Mr. Y. Desjardins - Elmira, Ottawa
Mr. R.J. Hess - LIMNOS, North Saskatchewan River
Mr. G.G. LaHaie - CSS ADVENT, Lake Erie, Lake St. Clair
Mr. J.A. Kraft - Moose River, Turkey Lakes Runoff, British Columbia, Ottawa River
Miss C. Bisutti - Nova Scotia, 50 Mile Point

FIELD SURVEYS SECTION

Head - Mr. W.B. Taylor

Field Operations Unit

Head - Mr. M.R. Mawhinney, British Columbia, Yellowknife

Sr. Technologists:
Mr. L.E. Benner - CWS, CSS BAYFIELD
Mr. T.J. Carew - Turkey Lakes, CSS LIMNOS

Technologists:
Mr. G.D. Bruce - 50 Mile Point, Owen Sound
Mr. J.E. Tozer - Elmira, Nova Scotia
Mr. K.J. Hill - Sudbury, 50 Mile Point

Rigging Unit

Foreman - Mr. L.J. Lomas

Mr. H.E. Greencorn
Mr. G.M. Perigo

Field Stores

Mr. W.D. Hunt

Underwater Operations Unit

Head - Mr. F.H. Don, Sudbury, 50 Mile Point, Nova Scotia

LIMNOLOGICAL INSTRUMENTATION SECTION

Head - Mr. J.A. Diaz

Current Meters and Data Abstraction Unit

Head - Mr. J.A. Tyler

Field Instruments and MET Systems Unit

Head - Mr. E.G. Smith

STUDENTS

Mr. J.P. Haynes - CSS LIMNOS
Mr. A.K. Szitas - CSS LIMNOS
Mr. R.C. Ferguson - Shore Projects
Mr. P.D. Delorme - Shore Projects
Mr. K.V. Brown - Shore Projects
Mr. P.B. Del Bel Belluz - Shore Projects

ENVIRONMENT 2000

Mr. D. Keyes - CSS ADVENT
Mr. P. White - Shore Projects
Mr. T. Corkum - Shore Projects

FREDY PROGRAM

Ms. M. Douglas - Office
Mr. J. Kennedy - Rigging Shop
Mr. R. Mitchell - Rigging Shop
Mr. K. Montgomery - Shore Projects
Mr. R. Paul - Shore Projects
Mr. G. McKeil - Shore Projects

Mr. A.C. Kular - Secondment from Water Survey, Guelph

STUDY LIST

NUMBER	LEADER	LOCATION/SUPPORT
DIRECTOR'S OFFICE		
109	Sly	Spawning Research
161	Pharo	Support to P&Y Region
170	Ongley	Support to W&N Region
ENVIRONMENTAL CONTAMINANTS DIVISION		
210	Kaiser	Organic Contaminants
211	Oliver	Nearshore Ontario Bioavailability
220	Fox	Niagara River Plume
221	Nagy	Kawartha
223	Metcalfe	Effects on Biota
224	Strachan	Rain Samplers/Superior
225	Carey	Canagague Creek
230	Chau	Organic Lead
231	Jeffries	LRTAP
233	Maguire	Toronto Harbour
234	Lum	Track Metals
235	Jeffries	Runoff Turkey Lakes
236	Mudroch	Nova Scotia, N.W.T. and Ship
241	Platford	Port Granby
242	Joshi	Piggyback LIMNOS
243	Joshi	North Saskatchewan
HYDRAULICS DIVISION		
321	Skafel	Littoral Zone/Shore P.E.I./St. Lawrence
322	Rukavina	Subaqueous Erosion
340	Tsang	Frazil Ice in Rivers
345	Beltaos	Ice Jams and Flooding
352	Roy	Frazil Ice Engineering
353	Roy	SEDWG

NUMBER	LEADER	LOCATION/SUPPORT
AQUATIC ECOLOGY DIVISION		
405	Nriagu	Peepers, Sediment Traps, Nova Scotia, Turkey Lakes, Sudbury
406	Delorme	Coring Lakes Southern Ontario
412	Nriagu	Coring and Samples, Lake Superior
413	Nriagu	Turkey Lakes
419	Bourbonniere	Biogeochemical Process
420	Rosa	Lake Erie Resuspension
423	Kalas	Lakes Ontario/Erie Sediment
425	Charlton	Sediment Trap Retrieval
428	Manning	Bioavailability
432	Brownlee	Dynamics of Nutrients and Organic Substances
437	Murphy	Lake Restoration/Winter Help
438	Lean	Lake St. George
477	Painter	Buckhorn Lake, Milfoil
478	Painter	Limnocorral, Rondeau Bay
494	Lean	LONAS
497	Charlton	O_2 Profiling, Lake Erie
AQUATIC PHYSICS & SYSTEMS DIVISION		
510	Boyce/Bull	Instrument Intercomparison
512	Boyce	DPDX Experiment (Co-op Lean)
514	Murthy	Niagara River Study (See 220)
515	Hamblin	Current Under Ice
540	Bukata	Spectro-Optical Modelling
ANALYTICAL METHODS DIVISION		
603	Sekerka	O_2 Profiler
610	Onuska	Fish Sampling, Lake Ontario
622	Dutka	Legionella
626	Rao	Microbiology, Lake Erie
627	Rao	Acidification & Heavy Metals
641	Chau	Quality Control & Methods
650	Aspila	Qaulity Assurance
TECHNICAL OPERATIONS DIVISION		
801	Macdonald	Management and Administration
802	Taylor	Logistic Support to NWRI
803	Healey	Open Lakes Surveillance
804	Taylor	Common-User Equipment Maintenance
805	Macdonald	Support to External Agencies
806	Diaz	Limnological & MET Instrumentation
807	Taylor	Underwater Operations and Remote Areas Working Group

ADDITIONAL SUPPORT

As a result of study requirement reductions, additional help in the form of summer students, changes in timing of studies allowing the redeployment of technical staff and the effective utilization of O&M and overtime resources, this Division provided the additional resources required to support these new tasks and studies submitted after the 1984/1985 Work Plans were approved.

This support, as approved by the Director, NWRI, is extended to all divisions of NWRI, other federal and provincial agencies, and universities.

The following summarized additional resources were requested and acted on:

Canadian Wildlife Service

805	Dauphine	Loan of boat - Long Point
805	Karasek	Diver cores, Kejimkujik Lake

Energy Mines and Resources

805	Good	Loan V-fin to GSC, Ottawa

Ontario Ministry of Natural Resources

805	Kolenosky	Loan of Boston Whaler at Picton

Ontario Region

805	Ferguson	Loan of Boat, Oshawa

Department of Fisheries & Oceans

803	Scott	Bayfield Samples for Dalhousie University
803	Whittle	Additional Shipboard Sampling
805	Corkum	Tow Vessel for Ship Division
805	Michell	Vehicle Loan GLFRB for LIMNOS
805	Munawar	Extra staff for Lake St. Clair
805	Nicholson	Transport 5-ton
805	Scruton	Lightweight Coring, Newfoundland

805	St. Jacques	Loan of Wood's Hole Drags
805	Thomas	Support to Dalhousie University

Hydraulics Division

330	Voros	Transport equipment to Kingston
330	Voros	Diver help in Hydraulics Lab
341	Marsalek	Additional Vehicle

Staff Services Division

901	Smit	Cranetruck for A/C pumps
901	Smit	Cranetruck for lift station
904	Mellon	Transport to Crown Assets

Aquatic Ecology Division

413	Nriagu	Sediment samples, Trout Lake, Quebec
417	Delorme	Coring in Prairies
428	Manning	Coring at Qu'Appelle Lake, Saskatchewan
438	Lean	Solar Station at Jack Lake
477	Painter	Dive support, Buckhorn Lake

Environmental Protection Service

805	Dobson	Transport equipment from Hull to CCIW
805	Wilson	Loan equipment, Yellowknife
806	Sutherland	Coring at Yellowknife, N.W.T.

Environmental Contaminants Division

224	Strachan	Pack samplers for Moncton
224	Strachan	Pack samplers for Regina

Ministry of the Environment

805	Dillon	Coring Bowland Lake

Ministry of Agriculture

805	Lauro	Grape Coring, Vineland

Small Craft Harbours

806	Sneed	Unloading in compound

Water Survey of Canada

805	Camp	Dive support, Burlington Pier

Universities

805	Green	Loan of boat, Western University
805	Vaillancourt	Display transport, University of Quebec

805	Sievering	Use of Tower, Governors State University
805	Kramer	Turkey Lake Sampling, McMaster University
805	Pugsley	Loan of Sounder, University of Windsor

Industry

805	Sims	Loan of sampling equipment

SHIP PROGRAMS

LIFE RAFT DRILL FROM CSS LIMNOS

CSS LIMNOS
1984

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
JAN	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	1	2	3	4
FEB	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	1	2	3
MAR	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19 LAKE	20 ONTARIO	21 SURVEILLANCE	22 LAKE	23 ONTARIO	24 CCIW
	25 CCIW	26 CCIW	27 CCIW	28 CCIW	29 CCIW	30 CCIW	31 CCIW
APR	1 CCIW	2 LAKE	3 ONTARIO	4 SURVEILLANCE	5 LAKE	6 ONTARIO	7 CCIW
	8 CCIW	9 CCIW	10 CCIW	11 CCIW	12 CCIW	13 CCIW	14 CCIW
	15 CCIW	16 LAKE ONTARIO	17 SEDIMENT TRAP	18 MOORINGS	19 CCIW	20 CCIW	21 CCIW
	22 CCIW	23 CCIW	24 CCIW	25 CCIW	26 CCIW	27 CCIW	28 CCIW
	29 CCIW	30 LAKE HURON	1 GEORGIAN BAY	2 SURVEILLANCE	3 LAKE HURON	4 GEORGIAN BAY	5 SURVEILLANCE
MAY	6 CCIW	7 LAKE HURON	8 GEORGIAN BAY	9 SURVEILLANCE	10 LAKE HURON	11 GEORGIAN BAY	12 SURVEILLANCE
	13 CCIW	14 LAKE ERIE DETROIT RIVER	15 CHEMICAL FORMS	16 AND AVAILABILITY	17 OF TRACE METALS	18 LAKE ERIE DETROIT RIVER	19 CCIW
	20 CCIW	21 CCIW	22 CCIW	23 LAKE ONTARIO NIAGARA RIVER	24 PLUME MOORINGS	25 CCIW	26 CCIW
	27 CCIW	28 LAKE ONTARIO	29 CONTAMINANTS	30 INVERTEBRATE AND	31 SEDIMENT HOMOGENEITY	1 LAKE ONTARIO	2 CCIW
JUN	3 CCIW	4 LAKE ONTARIO	5 MOORINGS	6 LAKE ONTARIO	7 CCIW	8 CCIW	9 CCIW
	10 CCIW	11 LAKE	12 ERIE	13 SEDIMENT AND	14 PHOSPHORUS RESUSPENSION	15 LAKE	16 ERIE
	17 CCIW	18 LAKE	19 ONTARIO	20 LONAS	21 LAKE	22 ONTARIO	23 CCIW
	24 CCIW	25 LAKE ERIE	26 SURVEILLANCE CONTINUITY	27 LAKE ERIE	28 SEDIMENT AND	29 PHOSPHORUS RESUSPENSION	30 LAKE ERIE
JUL	1 CCIW	2 CCIW	3 LAKE ONTARIO	4 CHEMICAL FORMS AND	5 AVAILABILITY OF TRACE METALS	6 LAKE ONTARIO	7 CCIW
	8 CCIW	9 LAKE	10 ONTARIO	11 LONAS	12 LAKE	13 ONTARIO	14 CCIW
	15 CCIW	16 LAKE ONTARIO	17 PERSISTENT ORGANIC	18 CONTAMINATION	19 LAKE ONTARIO	20 CCIW	21 CCIW
	22 CCIW	23 LAKE ONTARIO	24 NUTRIENT	25 ASSESSMENT STUDY	26 LAKE ONTARIO	27 CCIW	28 CCIW
	29 CCIW	30 LAKE ONTARIO	31 DIURNAL RHYTHMS OF	1 PLANKTONIC	2 INTERACTIONS	3 LAKE ONTARIO	4 CCIW
AUG	5 CCIW	6 CCIW	7 CCIW	8 CCIW	9 CCIW	10 CCIW	11 CCIW
	12 CCIW	13 LAKE ONTARIO	14 NUTRIENT	15 ASSESSMENT	16 STUDY	17 LAKE ONTARIO	18 CCIW
	19 CCIW	20 LAKE ONTARIO LAKE ERIE	21 CHEMICAL FORMS AND	22 AVAILABILITY OF	23 TRACE METALS	24 LAKE ST. CLAIR DETROIT RIVER	25 CCIW
	26 CCIW	27 LAKE	28 ERIE	29 SEDIMENT AND	30 PHOSOMORUS RESUSPENSION	31 LAKE	1 ERIE
SEP	2 CCIW	3 CCIW	4 LAKE ONTARIO	5 MOORINGS	6 LAKE ONTARIO	7 CCIW	8 CCIW
	9 CCIW	10 LAKE ERIE	11 SEDIMENT AND	12 PHOSPHORUS	13 RESUSPENSION	14 LAKE ERIE	15 CCIW
	16 CCIW	17 LAKE ONTARIO	18 NUTRIENT	19 ASSESSMENT	20 STUDY	21 LAKE ONTARIO	22 CCIW
	23 CCIW	24 LAKE ONTARIO	25 PERSISTENT	26 ORGANIC	27 CONTAMINATION	28 LAKE ONTARIO	29 CCIW
	30 CCIW	1 CCIW	2 CCIW	3 CCIW	4 CCIW	5 CCIW	6 CCIW
OCT	7 CCIW	8 CCIW	9 LAKE ONTARIO L.T.B.I.M.	10 L.T.B.I.M. LAKE ONTARIO	11 CCIW	12 CCIW	13 CCIW
	14 CCIW	15 CCIW	16 CCIW	17 CCIW	18 CCIW	19 CCIW	20 CCIW
	21 CCIW	22 LAKE ONTARIO	23 L.T.B.I.M. AND SEDIMENT	24 METEROGENEITY STUDY	25 LAKE ONTARIO	26 CCIW	27 CCIW
	28 CCIW	29 CCIW	30 CCIW	31 CCIW	1 CCIW	2 CCIW	3 CCIW
NOV	4 CCIW	5 LAKE ONTARIO L.T.B.I.M.	6 L.T.B.I.M. LAKE ONTARIO	7 CCIW	8 CCIW	9 CCIW	10 CCIW
	11 CCIW	12 CCIW	13 LAKE	14 ONTARIO	15 MOORINGS	16 LAKE	17 ONTARIO
	18 CCIW	19 MOORINGS	20 LAKE	21 ONTARIO	22	23	24
	25	26	27	28	29	30	1
DEC	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					

CSS LIMNOS

Thirty-two cruises were completed by the major research vessel, CSS LIMNOS on lakes Ontario, Erie, St. Clair and Huron plus Georgian Bay and the Detroit River. These multi-disciplinary cruises consisted of:

LAKE ONTARIO

5 - Nutrient Assessment Study

5 - Lake Ontario Moorings

3 - Long Term Biological Index Monitoring Program

3 - Persistent Organic Contamination

2 - Chemical Forms and Availability of Trace Metals

2 - Open Lake Surveillance

1 - Diurnal Rhythms of Plantonic Interactions in Lake Ontario

1 - Sediment Trap Moorings

1 - Sediment Homogeneity

LAKE ERIE

4 - Sediment and Phosphorus Resuspension

2 - Chemical Forms and Availability of Trace Metals

1 - Surveillance Continuity

LAKE ST. CLAIR

1 - Chemical Forms and Availability of Trace Metals

LAKE HURON/GEORGIAN BAY

1 - Open Lake Surveillance

DETROIT RIVER

2 - Chemical Forms and Availability of Trace Metals

NUTRIENT ASSESSMENT STUDY

LAKE ONTARIO, AED STUDY NO. 494, DR. D.R.S. LEAN

The purpose of this Study was to establish correlations between the dynamics and thermodynamics of water masses and the structure of the plankton community related to phosphorus concentrations. Experiments were also carried out on phosphorus availability related to the upwelling of water along the North shore of Lake Ontario.

Field support to this Study consisted of five cruises during the months from June to September aboard CSS LIMNOS. Five transects in the Central and Western basins of the lake were sampled each cruise. Sampling of the stations on these transects included: temperature profiles, transmissometer profiles, water samples for water chemistry analysis, fluorescence, phytoplankton and chlorophyll a. Sampling depths for all stations were: 1 m, 5 m, 10 m, 15 m, 25 m, 50 m and 75 m. If station depth was less than 75 m, bottom -2 m was sampled. Nearshore stations were sampled from a Boston Whaler using a portable electronic bathythermograph and Van Dorn sampling bottle.

Additional tasks performed on these cruises included:

Retrieval of Meteorological Buoy, TOD 805

Sampling for Long Term Biological Index Monitoring Program, TOD 803

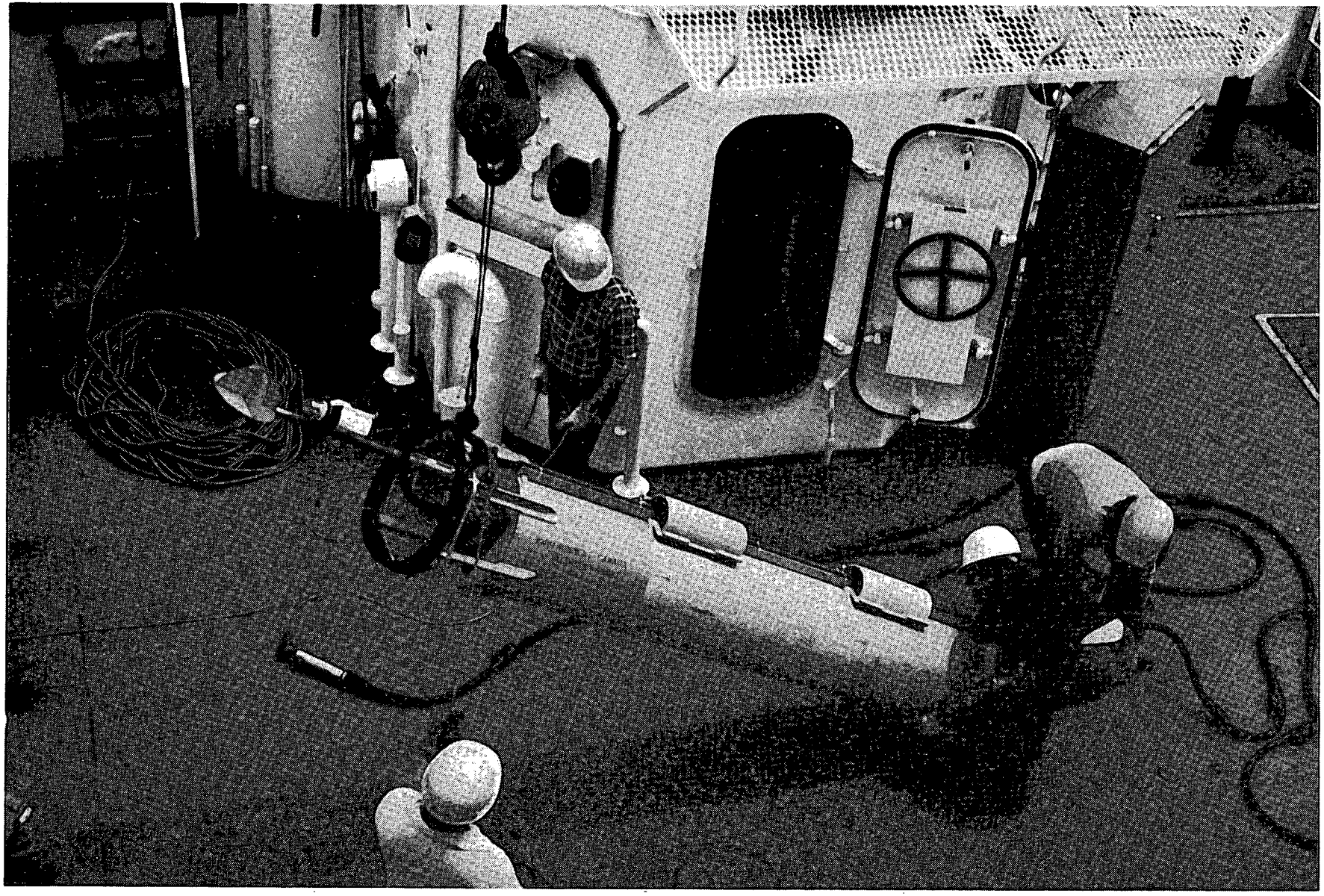
Test of Loran C Drogue, APSD 514

Monitor and Refurbishment of FTP Moorings, APSD 512

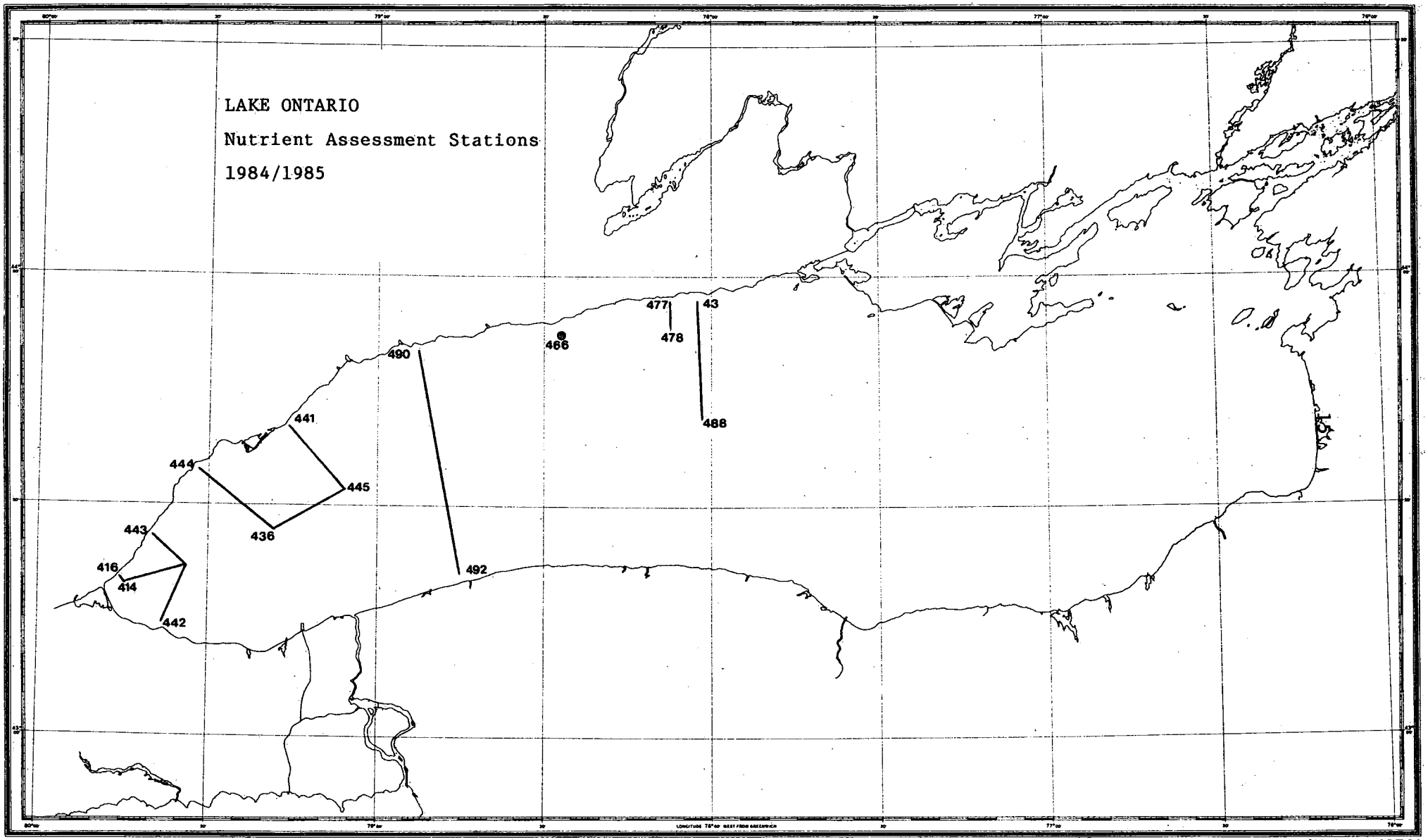
LAKE ONTARIO MOORINGS

APSD STUDY NO. 510, F.M. BOYCE AND J.A. BULL

The support to Study 510 consisted of 5 cruises on Lake Ontario each consisting of one week duration in May, June, September, October and November. The cruises consisted of the launching and retrieval of seven FTP, nineteen current meter, five MET, two CATS and two water



FIXED TEMPERATURE PROFILER - CSS LIMNOS


LAKE ONTARIO
Nutrient Assessment Stations
1984/1985
477
43
478
466
490
488
441
444
445
436
443
416
414
492
442
LONGITUDE 78° WEST FROM GREENWICH
Published by the Canadian Hydrographic Service, Marine Sciences Branch,
DEPARTMENT OF MINES AND TECHNICAL SURVEYS, OTTAWA
Ontario
LAKE ONTARIO
10501

NUTRIENT ASSESSMENT STUDY

STATION POSITIONS

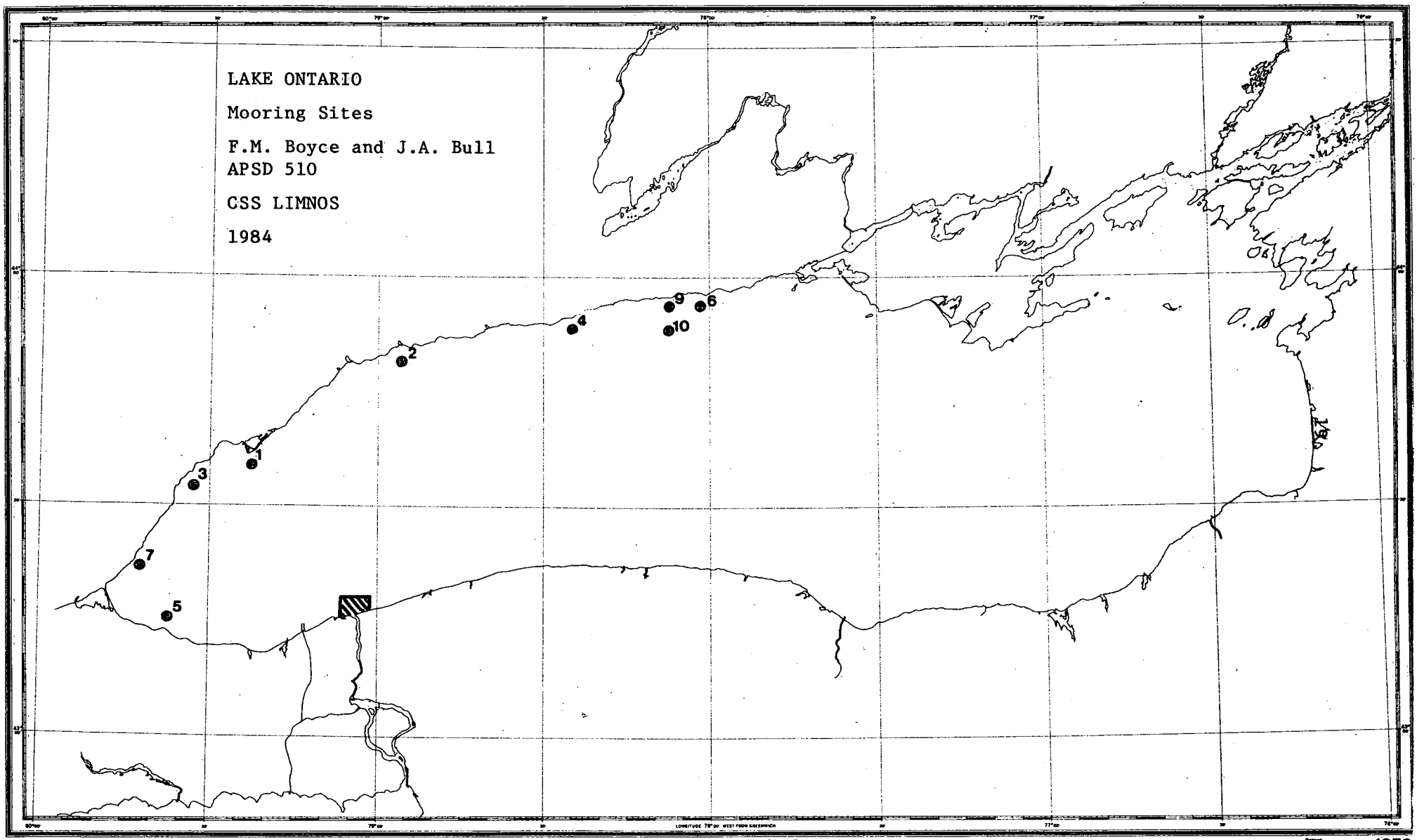
LAKE ONTARIO

1984/1985

STATION NUMBER	LATITUDE N.	LONGITUDE W.
3	43° 16' 08"	79° 37' 11"
5	43° 25' 27"	79° 39' 29"
7	43° 32' 50"	79° 29' 16"
10	43° 40' 01"	79° 16' 00"
29	43° 49' 48"	78° 52' 12"
43	43° 57' 00"	78° 02' 59"
411	43° 19' 50"	79° 44' 53"
412	43° 19' 09"	79° 43' 52"
413	43° 19' 42"	79° 42' 36"
414	43° 19' 53"	79° 45' 39"
415	43° 20' 22"	79° 40' 04"
416	43° 20' 12"	79° 45' 55"
417	43° 21' 13"	79° 37' 20"
418	43° 30' 41"	79° 08' 27"
419	43° 22' 00"	79° 34' 26"
420	43° 24' 49"	79° 38' 27"
421	43° 23' 59"	79° 37' 23"
422	43° 23' 28"	79° 36' 25"
423	43° 22' 45"	79° 35' 20"
424	43° 15' 08"	79° 37' 37"
425	43° 17' 05"	79° 36' 42"
426	43° 17' 58"	79° 36' 16"
427	43° 18' 54"	79° 35' 51"
428	43° 19' 50"	79° 35' 23"
429	43° 20' 49"	79° 35' 00"
430	43° 34' 05"	79° 31' 24"
431	43° 33' 22"	79° 30' 28"
432	43° 32' 11"	79° 28' 15"
433	43° 31' 35"	79° 27' 05"
434	43° 27' 57"	79° 20' 16"
435	43° 30' 30"	79° 24' 58"
436	43° 26' 57"	79° 18' 13"
437	43° 29' 18"	79° 22' 39"
438	43° 29' 58"	79° 10' 53"
439	43° 28' 43"	79° 13' 19"

STATION NUMBER	LATITUDE N.	LONGITUDE W.
440	43° 27' 50"	79° 15' 44"
441	43° 40' 23"	79° 16' 18"
442	43° 14' 16"	79° 38' 09"
443	43° 25' 49"	79° 40' 03"
444	43° 34' 09"	79° 31' 58"
445	43° 31' 41"	79° 06' 00"
446	43° 33' 15"	79° 07' 45"
447	43° 34' 36"	79° 09' 31"
448	43° 36' 07"	79° 11' 19"
449	43° 37' 02"	79° 12' 16"
450	43° 37' 47"	79° 13' 08"
451	43° 38' 30"	79° 14' 12"
452	43° 39' 18"	79° 15' 06"
454	43° 48' 48"	78° 51' 40"
455	43° 47' 46"	78° 51' 40"
456	43° 46' 46"	78° 51' 21"
457	43° 44' 51"	78° 50' 56"
458	43° 42' 46"	78° 50' 20"
459	43° 40' 54"	78° 49' 54"
460	43° 38' 55"	78° 49' 30"
461	43° 36' 55"	78° 48' 55"
462	43° 34' 54"	78° 48' 26"
466	43° 52' 13"	78° 27' 24"
467	43° 33' 03"	78° 47' 48"
468	43° 31' 07"	78° 47' 20"
469	43° 29' 14"	78° 46' 39"
470	43° 27' 13"	78° 46' 10"
471	43° 26' 11"	78° 45' 49"
472	43° 25' 14"	78° 45' 34"
473	43° 24' 16"	78° 45' 15"
474	43° 23' 16"	78° 44' 56"
475	43° 22' 18"	78° 44' 40"
476	43° 56' 36"	78° 08' 28"
477	43° 55' 01"	78° 08' 01"
478	43° 53' 27"	78° 07' 53"
480	43° 55' 56"	78° 02' 54"
481	43° 54' 56"	78° 02' 48"
482	43° 53' 58"	78° 02' 46"
483	43° 51' 55"	78° 02' 32"
484	43° 49' 53"	78° 02' 15"

STATION NUMBER	LATITUDE N.	LONGITUDE W.
485	43° 47' 56"	78° 01' 58"
486	43° 45' 49"	78° 01' 56"
487	43° 43' 52"	78° 01' 40"
488	43° 41' 55"	78° 01' 29"
489	43° 57' 48"	78° 02' 18"
490	43° 50' 20"	78° 52' 20"
491	43° 21' 22"	78° 44' 27"
492	43° 20' 51"	78° 44' 24"



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DEPARTMENT OF MINES AND TECHNICAL SURVEYS, OTTAWA

Ontario
LAKE ONTARIO

1050

MOORING POSITIONS

LAKE ONTARIO

1984/1985

STATION NUMBER	MOORING NUMBER	LATITUDE N.	LONGITUDE W.
1	84-00T-28A	43° 37' 58"	79° 16' 43"
2	84-00T-29A	43° 48' 42"	78° 51' 49"
3	84-00T-30A	43° 33' 15"	79° 30' 16"
3A	84-00M-03A	43° 24' 29"	78° 56' 52"
4	84-00T-31A	43° 52' 14"	78° 27' 10"
	84-00C-23A	43° 52' 14"	78° 26' 55"
	84-00P-38A	43° 55' 16"	78° 14' 55"
5	84-00T-32A	43° 16' 03"	79° 37' 28"
6	84-00T-33A	43° 55' 56"	78° 02' 50"
7	84-00T-34A	43° 24' 44"	79° 38' 21"
8	84-00C-24A	43° 56' 39"	78° 09' 18"
	84-00C-25A	43° 56' 35"	78° 08' 48"
9	84-00C-26A	43° 55' 06"	78° 08' 24"
	84-00M-35A	43° 55' 09"	78° 08' 06"
	84-00P-39A	43° 56' 18"	78° 08' 08"
	84-00M-36A	43° 55' 00"	78° 11' 24"
	84-00M-37A	43° 55' 10"	78° 05' 40"
	84-00S-40A	43° 56' 54"	78° 08' 54"
	84-00C-41A	43° 54' 44"	78° 10' 26"
10	84-00C-27A	43° 53' 32"	78° 08' 07"
	84-00C-42A	43° 53' 05"	78° 08' 52"

MOORING POSITIONS

NIAGARA RIVER PLUME

1984/1985

MOORING NUMBER	LATITUDE N.	LONGITUDE W.	TYPE/DEPTH
84-00C-14A	43° 20' 19"	79° 09' 43"	G/10
84-00C-15A	43° 18' 14"	79° 08' 42"	G/10, G/15
84-00C-16A	43° 16' 23"	79° 07' 56"	G/10
84-00C-17A	43° 20' 56"	79° 06' 07"	G/10, G/15, G/30
84-00C-18A	43° 18' 59"	79° 05' 20"	G/10
84-00C-19A	43° 21' 44"	79° 01' 53"	G/10
84-00C-20A	43° 19' 31"	79° 01' 30"	G/10, G/15
84-00C-21A	43° 17' 45"	79° 01' 08"	G/10
84-00M-02A	43° 24' 25"	78° 08' 47"	MET
84-00M-03A	43° 24' 29"	78° 56' 52"	MET

G - Geodyne Current Meter

Numeral - Depth at which meter was moored

MET - Meteorological Buoy

level moorings. The purpose of these cruises was to determine how physical processes relate to the transport of materials through coastal zones and to bio-chemical processes.

As an additional task, seven of the nineteen current meter moorings were placed off the Niagara Bar in support of APSD Study No. 514 and ECD Study No. 220. These studies were conducted to help understand the processes by which contaminants would be reactive in the lake and are vital to a management program.

PERSISTENT ORGANIC CONTAMINATION

ECD STUDY NO. 220, M.E. FOX

The Niagara River Survey was conducted to determine the seasonal characteristics of the Niagara River Plume in support of toxic contaminants and other related biochemical studies. The survey consisted of defining the plume extent by temperature and transmission profiles and by tracking drogues to determine the movement, speed and direction of the plume. This Study was a continuation of the 1983/84 Niagara River Survey.

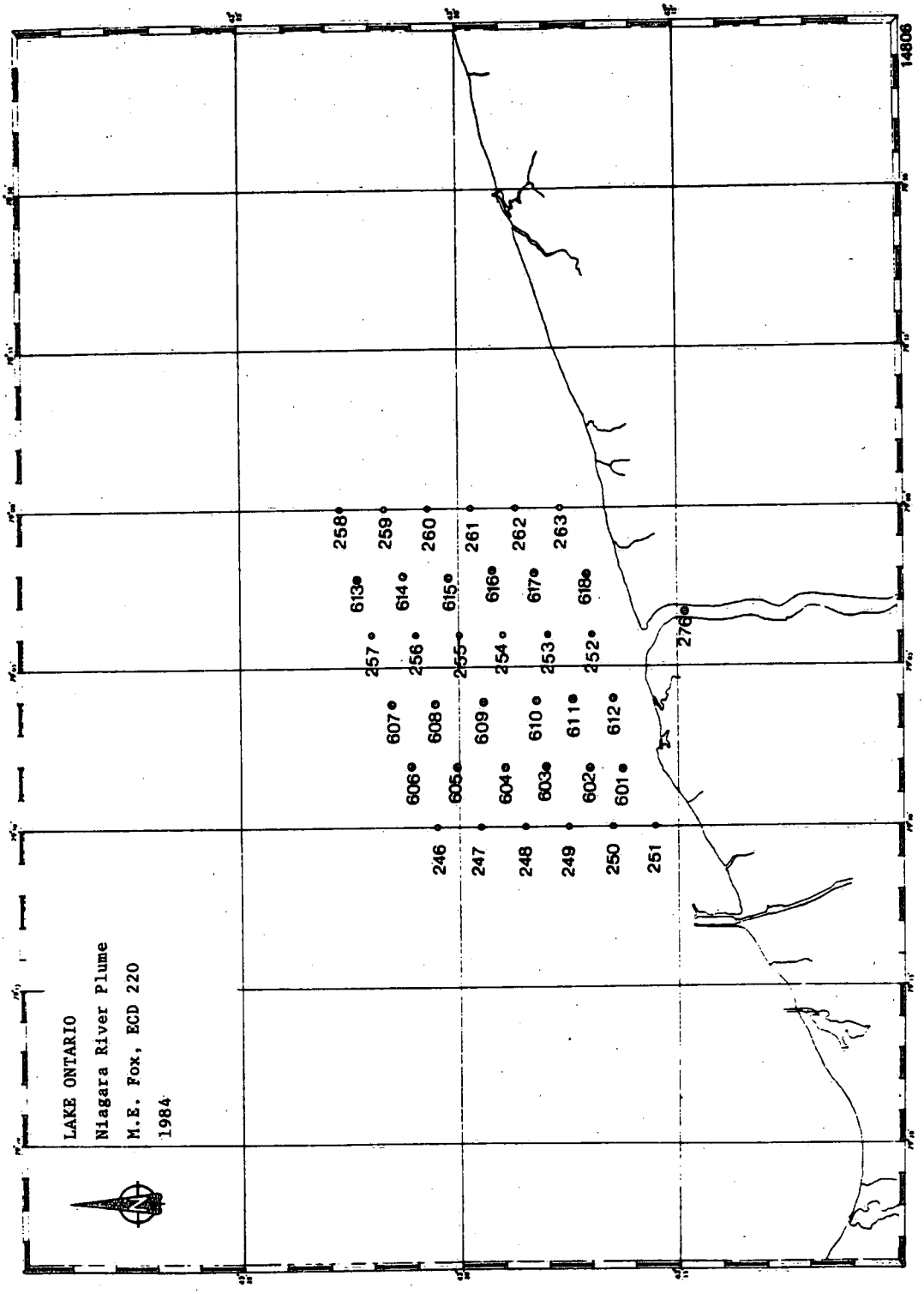
Three surveys were completed on the Niagara River--May 28 - 30, July 16 - 20, September 24 - 28.

Sampling this season was similar to that of the 1983/84 program. Daily, drogues were tracked during daylight hours and retrieved prior to dusk. Simultaneously, CSS LIMNOS was utilized to collect temperature and transmission profiles at all grid stations as well as collect water samples from selected sites and depths.

CHEMICAL FORMS AND AVAILABILITY OF TRACE METALS

ECD STUDY NO. 234, DR. K.R. LUM

Support to this Study consisted of three cruises--one in May on Lake Erie and the Detroit River, one in July on Lake Ontario and a combined cruise in August on Lake Ontario, Lake Erie, the Detroit River and Lake St. Clair. The purpose of these cruises was to study the particle mediated processes affecting the chemical form and availability of elements of environmental importance in order to


LAKE ONTARIO
Niagara River Plume
M.E. Fox, ECD 220
1984
14806
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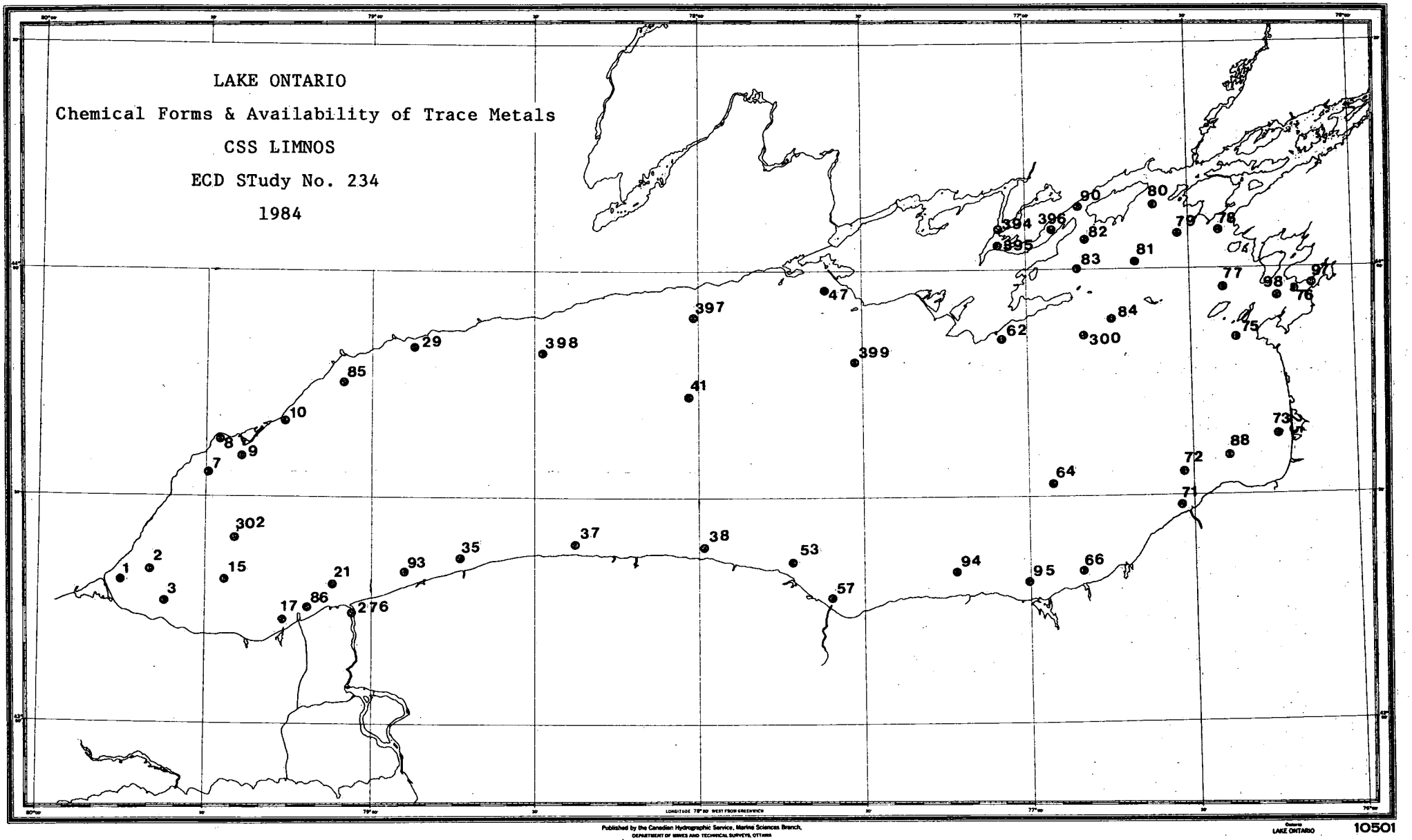
250
251

STATION POSITIONS

NIAGARA RIVER GRID

ECD STUDY NO. 220

STATION NUMBER	LATITUDE N.	LONGITUDE W.
246	43° 20' 31"	79° 10' 00"
247	43° 19' 32"	79° 10' 00"
248	43° 18' 34"	79° 10' 01"
249	43° 17' 32"	79° 10' 03"
250	43° 16' 32"	79° 10' 02"
251	43° 15' 31"	79° 10' 01"
252	43° 17' 00"	79° 04' 01"
253	43° 18' 02"	79° 04' 00"
254	43° 19' 00"	79° 03' 58"
255	43° 20' 02"	79° 03' 58"
256	43° 21' 01"	79° 03' 58"
257	43° 22' 00"	79° 03' 55"
258	43° 22' 38"	79° 00' 00"
259	43° 21' 42"	79° 00' 00"
260	43° 20' 40"	79° 00' 00"
261	43° 19' 40"	79° 00' 00"
262	43° 18' 40"	79° 00' 00"
263	43° 17' 40"	79° 00' 02"
276	43° 15' 07"	79° 03' 19"
601	43° 16' 00"	79° 08' 03"
602	43° 16' 55"	79° 08' 02"
603	43° 17' 58"	79° 08' 02"
604	43° 18' 59"	79° 08' 08"
605	43° 19' 55"	79° 08' 01"
606	43° 21' 05"	79° 07' 54"
607	43° 21' 33"	79° 05' 58"
608	43° 20' 33"	79° 06' 00"
609	43° 19' 32"	79° 06' 02"
610	43° 18' 35"	79° 06' 02"
611	43° 17' 36"	79° 06' 01"
612	43° 16' 32"	79° 06' 08"
613	43° 22' 18"	79° 02' 00"
614	43° 21' 19"	79° 01' 58"
615	43° 20' 20"	79° 02' 00"
616	43° 19' 20"	79° 02' 01"
617	43° 18' 22"	79° 02' 04"
618	43° 17' 19"	79° 01' 57"


LAKE ONTARIO
Chemical Forms & Availability of Trace Metals
CSS LIMNOS
ECD STudy No. 234
1984
90
80
394
396
82
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62
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398
300
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85
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64
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302
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94
95
66
21
93
3
57
17
86
276
LONGITUDE 78° 00' WEST FROM GREENWICH
Published by the Canadian Hydrographic Service, Marine Sciences Branch,
DEPARTMENT OF MINES AND TECHNICAL SURVEYS, OTTAWA
LAKE ONTARIO
10501

CHEMICAL FORMS AND AVAILABILITY OF TRACE METALS STUDY

STATION POSITIONS

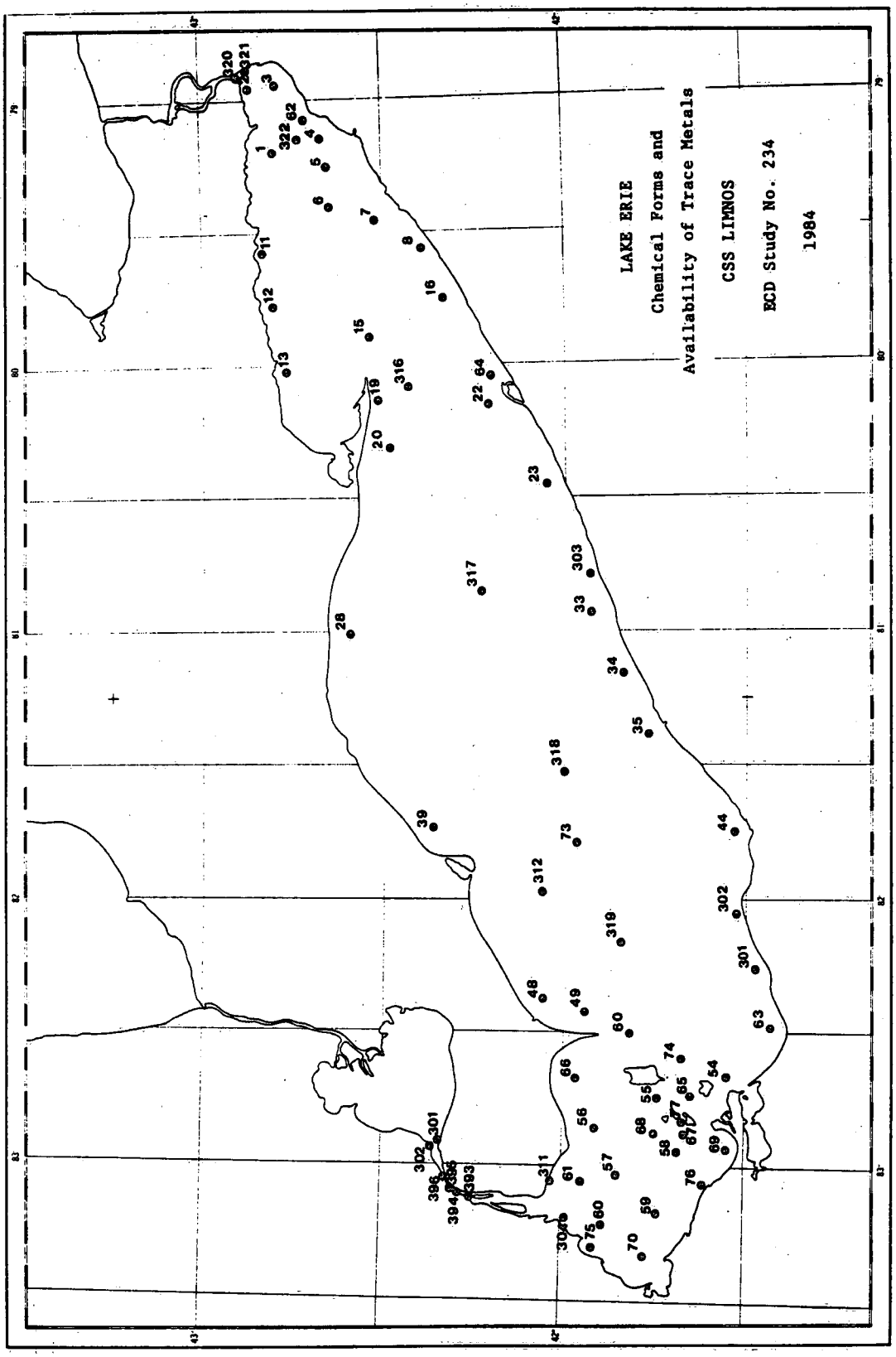
LAKE ONTARIO

1984/1985

STATION NUMBER	LATITUDE N.	LONGITUDE W.
1	43° 18' 46"	79° 45' 02"
2	43° 20' 23"	79° 39' 48"
3	43° 16' 03"	79° 37' 11"
7	43° 32' 50"	79° 29' 18"
8	43° 37' 26"	79° 27' 15"
9	43° 35' 12"	79° 23' 42"
10	43° 40' 05"	79° 15' 58"
15	43° 19' 02"	79° 26' 36"
17	43° 13' 30"	79° 16' 18"
21	43° 17' 57"	79° 07' 11"
29	43° 49' 47"	78° 52' 11"
35	43° 21' 31"	78° 43' 49"
37	43° 23' 32"	78° 22' 10"
38	43° 23' 00"	77° 59' 28"
41	43° 43' 00"	78° 01' 36"
47	43° 57' 05"	77° 35' 14"
53	43° 21' 03"	77° 42' 42"
57	43° 16' 34"	77° 35' 19"
62	43° 52' 51"	77° 00' 00"
64	43° 31' 31"	76° 55' 41"
66	43° 19' 56"	76° 50' 22"
71	43° 28' 37"	76° 31' 35"
72	43° 33' 00"	76° 31' 30"
73	43° 37' 58"	76° 17' 14"
75	43° 50' 38"	76° 21' 27"
76	43° 57' 00"	76° 10' 27"
77	43° 57' 22"	76° 24' 33"
78	44° 05' 00"	76° 24' 18"
79	44° 04' 26"	76° 31' 18"
80	44° 08' 34"	76° 36' 34"
81	44° 00' 59"	76° 40' 17"
82	44° 04' 00"	76° 48' 36"
83	44° 00' 00"	76° 50' 42"
84	43° 53' 12"	76° 43' 56"
85	43° 44' 58"	79° 04' 57"

STATION NUMBER	LATITUDE N.	LONGITUDE W.
86	43° 15' 18"	79° 11' 45"
88	43° 35' 16"	76° 25' 06"
90	44° 08' 10"	76° 49' 22"
93	43° 19' 37"	78° 52' 04"
94	43° 19' 30"	77° 13' 04"
95	43° 18' 46"	77° 00' 00"
97	43° 57' 43"	76° 07' 13"
98	43° 56' 04"	76° 13' 51"
251	43° 16' 26"	79° 10' 15"
252	43° 17' 00"	79° 03' 58"
266	43° 17' 54"	78° 59' 57"
276	43° 15' 12"	79° 03' 24"
300	43° 52' 29"	76° 49' 50"
302	43° 24' 11"	79° 24' 43"
308	43° 13' 49"	79° 15' 26"
310	43° 13' 37"	79° 14' 39"
311	43° 15' 35"	79° 12' 55"
314	43° 15' 06"	79° 10' 43"
316	43° 16' 40"	79° 07' 42"
318	43° 18' 33"	79° 05' 04"
319	43° 18' 02"	79° 03' 30"
320	43° 17' 55"	79° 02' 11"
329	43° 17' 02"	79° 01' 33"
337	43° 13' 08"	79° 17' 36"
338	43° 13' 43"	79° 17' 00"
339	43° 14' 15"	79° 16' 08"
349	43° 14' 22"	79° 15' 13"
350	43° 14' 10"	79° 14' 25"
388	43° 16' 05"	79° 13' 44"
389	43° 16' 28"	79° 12' 58"
390	43° 16' 06"	79° 12' 24"
391	43° 16' 01"	79° 11' 52"
392	43° 15' 42"	79° 10' 50"
393	43° 15' 24"	79° 09' 57"
394	44° 05' 25"	77° 04' 37"
395	44° 03' 14"	77° 05' 02"
396	44° 05' 38"	76° 54' 11"
397	43° 53' 52"	78° 01' 42"
398	43° 50' 18"	78° 28' 16"
399	43° 48' 25"	77° 31' 34"

STATION NUMBER	LATITUDE N.	LONGITUDE W.
601	43° 16' 00"	79° 07' 51"
612	43° 16' 30"	79° 06' 01"
618	43° 17' 20"	79° 01' 57"
PM-1	43° 20' 00"	79° 21' 51"
PM-2	43° 20' 00"	79° 24' 56"
PM-3	43° 19' 57"	79° 26' 54"
PM-4	43° 20' 02"	79° 31' 51"


LAKE ERIE
Chemical Forms and
Availability of Trace Metals
CSS LIMNOS
ECD Study No. 234
1984

CHEMICAL FORMS AND AVAILABILITY OF TRACE METALS STUDY

STATION POSITIONS

LAKE ERIE

1984/1985

STATION NUMBER	LATITUDE N.	LONGITUDE W.
1	42° 47' 23"	79° 12' 10"
2	42° 50' 39"	78° 57' 29"
3	42° 46' 56"	78° 57' 28"
4	42° 39' 06"	79° 07' 54"
5	42° 38' 32"	79° 16' 13"
6	42° 37' 54"	79° 24' 00"
7	42° 30' 53"	79° 28' 39"
8	42° 23' 53"	79° 32' 46"
11	42° 48' 12"	79° 33' 27"
12	42° 46' 13"	79° 47' 23"
13	42° 45' 13"	80° 00' 45"
15	42° 31' 04"	79° 53' 41"
16	42° 20' 03"	79° 45' 23"
19	42° 30' 53"	80° 09' 09"
20	42° 29' 11"	80° 18' 20"
22	42° 12' 48"	80° 07' 37"
23	42° 02' 48"	80° 27' 02"
28	42° 35' 29"	81° 00' 59"
33	41° 55' 56"	80° 54' 57"
34	41° 50' 02"	81° 08' 49"
35	41° 45' 45"	81° 22' 59"
39	42° 21' 32"	81° 42' 23"
44	41° 31' 50"	81° 42' 38"
48	42° 02' 24"	82° 21' 55"
49	41° 55' 51"	82° 24' 31"
50	41° 48' 47"	82° 30' 07"
53	41° 25' 11"	82° 30' 10"
54	41° 33' 56"	82° 41' 46"
55	41° 44' 23"	82° 44' 13"
56	41° 54' 19"	82° 50' 20"
57	41° 49' 56"	83° 01' 08"
58	41° 41' 10"	82° 56' 06"
59	41° 43' 39"	83° 08' 54"
60	41° 53' 30"	83° 11' 56"
61	41° 56' 48"	83° 02' 42"

STATION NUMBER	LATITUDE N.	LONGITUDE W.
62	42° 41' 27"	79° 04' 27"
64	42° 11' 59"	80° 02' 55"
65	41° 39' 00"	82° 44' 13"
66	41° 58' 04"	82° 39' 59"
67	41° 40' 06"	82° 52' 02"
68	41° 44' 58"	82° 51' 03"
69	41° 34' 08"	82° 54' 56"
70	41° 46' 19"	83° 19' 46"
73	41° 58' 45"	81° 45' 30"
74	41° 40' 00"	82° 35' 04"
75	41° 54' 03"	83° 17' 54"
76	41° 37' 32"	82° 59' 34"
77	41° 39' 58"	82° 49' 00"
301	41° 26' 52"	82° 20' 56"
302	41° 29' 51"	82° 10' 48"
303	41° 58' 43"	80° 42' 24"
304	41° 58' 39"	83° 12' 24"
305	41° 57' 47"	83° 11' 00"
306	41° 56' 58"	83° 09' 51"
307	41° 57' 12"	83° 08' 21"
308	41° 58' 14"	83° 06' 49"
309	41° 58' 43"	83° 05' 49"
310	41° 59' 47"	83° 05' 04"
311	42° 00' 46"	83° 04' 24"
312	42° 04' 41"	81° 58' 33"
316	42° 27' 49"	80° 06' 35"
317	42° 13' 56"	80° 52' 30"
318	42° 01' 18"	81° 30' 23"
319	41° 52' 51"	82° 10' 53"
320	42° 53' 05"	78° 55' 16"
321	42° 52' 45"	78° 54' 27"
322	42° 44' 42"	79° 09' 30"

CHEMICAL FORMS AND AVAILABILITY OF TRACE METALS STUDY

STATION POSITIONS

DETROIT RIVER

1984/1985

STATION NUMBER	LATITUDE N.	LONGITUDE W.
393	42° 17' 41"	83° 05' 48"
394	42° 16' 32"	83° 06' 31"
395	42° 16' 33"	83° 06' 35
396	42° 14' 40"	83° 07' 49"

LAKE ST. CLAIR

1984/1985

STATION NUMBER	LATITUDE N.	LONGITUDE W.
301	42° 20' 31"	82° 55' 52"
302	42° 21' 22"	82° 55' 53"

provide input into the Canada/U.S. Great Lakes Water Quality Agreement (annexes 7, 11 and 12).

During all cruises, sampling was done for temperature and transmission profiles; water sampling from discrete depths for water chemistry parameters and trace metals; and the collection and centrifuging of large volume water samples (up to 1200L) for trace metal analysis, nutrient and particle mediated processes.

During the May and June cruises, benthos cores were collected from Lake Ontario and Lake Erie for trace metal speciation and the determination of depositional zones. Shipek samples were also obtained from Lake Ontario during the July cruise for trace metal speciation and the comparison of depositional zones.

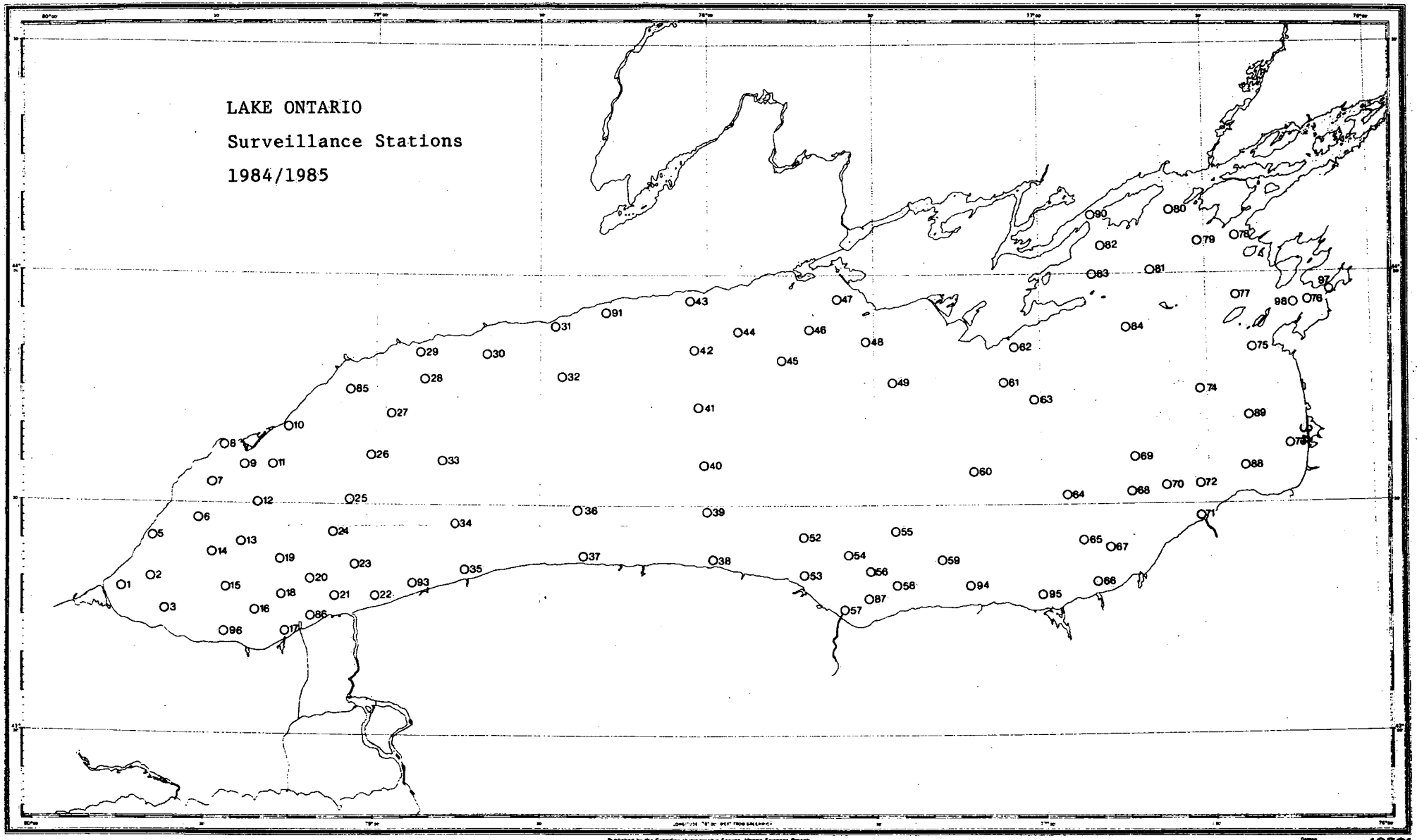
OPEN LAKES SURVEILLANCE

LAKE ONTARIO, TOD STUDY NO. 803, R. STEVENS

The Lake Ontario Open Lakes Surveillance Program was designed to provide a continuing report and long-term trend information on water quality and eutrophication parameters in the Lower Great Lakes by Canada/U.S. Agreement as input to the Water Quality Board Annual Report to the International Joint Commission.

Two cruises were conducted on Lake Ontario during the months of March and April in support of this Program. Both cruises were supported by Technical Operations Division staff and were conducted from CSS LIMNOS operated by Bayfield Laboratories for Marine Science & Surveys, DFO. The vessel was equipped with electronic bathythermograph, rosette/EBT water sampler, transmissometer, radar, Loran C positioning system and a variety of winches used for chemical and biological water sampling.

The parameters sampled during both Surveillance cruises were: temperature profile, transmissometer profile, dissolved oxygen, specific conductance, pH, chlorophyll a, particulate organic carbon, particulate organic nitrogen, total phosphorus (filtered and unfiltered), soluble reactive phosphorus, total filtered nitrogen,


LAKE ONTARIO
Surveillance Stations
1984/1985
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 93 94 95 96 97 98
Published by the Canadian Hydrographic Service, Marine Sciences Branch,
DEPARTMENT OF ENERGY, MINES AND RESOURCES, OTTAWA
LAKE ONTARIO
10501

SURVEILLANCE STATIONS

LAKE ONTARIO

1984/85

STATION NUMBER	LATITUDE N.	LONGITUDE W.
1	43° 18' 48"	79° 45' 06"
2	43° 20' 24"	79° 39' 54"
3	43° 16' 06"	79° 37' 12"
5	43° 25' 30"	79° 39' 30"
6	43° 28' 00"	79° 31' 48"
7	43° 32' 48"	79° 29' 18"
8	43° 37' 24"	79° 27' 12"
9	43° 35' 12"	79° 23' 42"
10	43° 40' 06"	79° 16' 00"
11	43° 35' 06"	79° 18' 42"
12	43° 30' 12"	79° 21' 12"
13	43° 25' 00"	79° 24' 00"
14	43° 23' 36"	79° 29' 12"
15	43° 19' 00"	79° 26' 36"
16	43° 16' 18"	79° 21' 36"
17	43° 13' 30"	79° 16' 18"
18	43° 18' 12"	79° 16' 42"
19	43° 23' 00"	79° 17' 06"
20	43° 20' 18"	79° 11' 48"
21	43° 18' 00"	79° 07' 12"
22	43° 17' 48"	79° 00' 18"
23	43° 22' 12"	79° 04' 00"
24	43° 26' 24"	79° 07' 42"
25	43° 31' 00"	79° 04' 48"
26	43° 36' 30"	79° 01' 00"
27	43° 42' 12"	78° 57' 24"
28	43° 46' 30"	78° 51' 18"
29	43° 49' 48"	78° 52' 12"
30	43° 49' 48"	78° 39' 42"
31	43° 53' 12"	78° 27' 36"
32	43° 47' 00"	78° 26' 18"
33	43° 35' 48"	78° 48' 06"
34	43° 27' 42"	78° 45' 36"
35	43° 21' 36"	78° 43' 48"
36	43° 29' 30"	78° 23' 12"

STATION NUMBER	LATITUDE N.	LONGITUDE W.
37	43° 23' 30"	78° 22' 12"
38	43° 23' 00"	77° 59' 24"
39	43° 29' 12"	78° 00' 00"
40	43° 35' 24"	78° 00' 42"
41	43° 43' 00"	78° 01' 36"
42	43° 50' 24"	78° 02' 18"
43	43° 57' 00"	78° 03' 00"
44	43° 52' 54"	77° 54' 30"
45	43° 49' 12"	77° 47' 00"
46	43° 53' 06"	77° 41' 24"
47	43° 57' 06"	77° 35' 18"
48	43° 51' 42"	77° 31' 30"
49	43° 46' 18"	77° 26' 18"
52	43° 26' 00"	77° 42' 42"
53	43° 21' 00"	77° 42' 42"
54	43° 24' 48"	77° 34' 30"
55	43° 26' 36"	77° 26' 18"
56	43° 21' 36"	77° 30' 54"
57	43° 16' 30"	77° 35' 30"
58	43° 19' 42"	77° 26' 18"
59	43° 22' 54"	77° 17' 54"
60	43° 34' 48"	77° 12' 00"
61	43° 47' 12"	77° 09' 30"
62	43° 52' 48"	77° 00' 00"
63	43° 43' 54"	77° 01' 00"
64	43° 31' 30"	76° 55' 36"
65	43° 25' 24"	76° 53' 00"
66	43° 20' 00"	76° 50' 24"
67	43° 24' 30"	76° 47' 42"
68	43° 31' 48"	76° 43' 54"
69	43° 36' 24"	76° 42' 48"
70	43° 32' 30"	76° 37' 06"
71	43° 28' 36"	76° 31' 36"
72	43° 33' 00"	76° 31' 30"
73	43° 38' 00"	76° 17' 18"
74	43° 45' 00"	76° 31' 06"
75	43° 50' 36"	76° 21' 18"
76	43° 57' 00"	76° 10' 30"
77	43° 57' 24"	76° 24' 30"
78	44° 05' 00"	76° 24' 24"

STATION NUMBER	LATITUDE N.	LONGITUDE W.
79	44° 04' 30"	76° 31' 18"
80	44° 08' 30"	76° 36' 36"
81	44° 01' 00"	76° 40' 18"
82	44° 04' 00"	76° 48' 42"
83	44° 00' 00"	76° 50' 36"
84	43° 53' 12"	76° 44' 00"
85	43° 45' 00"	79° 05' 00"
86	43° 15' 18"	79° 11' 42"
87	43° 17' 54"	77° 31' 06"
88	43° 35' 18"	76° 25' 00"
89	43° 41' 54"	76° 25' 00"
90	44° 08' 11"	76° 49' 30"
91	43° 55' 12"	78° 18' 24"
93	43° 19' 36"	78° 52' 06"
94	43° 19' 30"	77° 13' 00"
95	43° 18' 48"	77° 00' 00"
96	43° 13' 24"	79° 26' 48"
97	43° 57' 42"	76° 07' 18"
98	43° 56' 06"	76° 13' 54"

nitrate and nitrite, ammonia, reactive silicate, dissolved organic carbon, major ions, alkalinity, meteorological observation and Secchi disc (30 cm) observation during daylight hours.

Sampling depths for all samples collected were the same for both cruises. When the water column was unstratified, sampling depths were 1 m, 10 m, 25 m, bottom -10 m and bottom -2 m. When station depths were less than 25 m, only three depths were sampled (1 m, 10 m, bottom -2 m). When station depth was 50 m or less, only four depths were sampled (1 m, 10 m, 25 m and bottom -2 m).

During stratified conditions in the water column, sampling depths were: 1 m, 1 m above the thermocline, 1 m below thermocline, bottom -10 m and bottom -2 m.

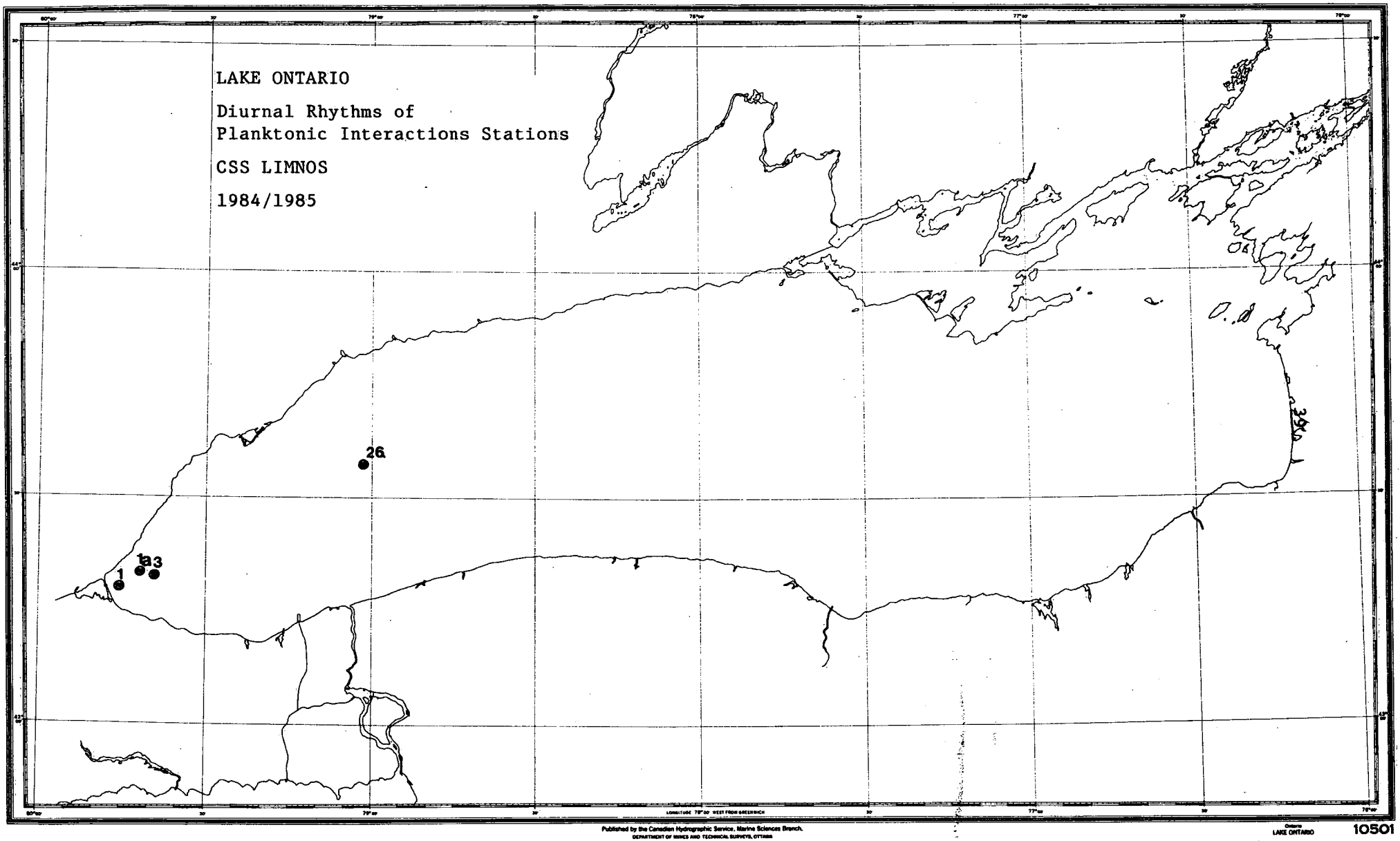
On both Surveillance cruises, the Long Term Biological Index Monitoring Program in support of Great Lakes Fisheries Research Branch, PFF was piggybacked. Additional samples were collected in support of this program for: specific conductance, pH, total phosphorus (filtered and unfiltered), soluble reactive phosphorus, ammonia, nitrate and nitrite, total Kjeldahl nitrogen, silica, chloride, alkalinity, particulate organic carbon, particulate organic nitrogen, chlorophyll a, phytoplankton, zooplankton and ash-free weight determinations.

The additional tasks supported during the Surveillance Program were: bulk water sampling in support of ECD Study No. 211 and water sampling from discrete depths in support of ECD Study No. 234.

DIURNAL RHYTHMS OF PLANKTONIC INTERACTIONS IN LAKE ONTARIO

TOD STUDY NO. 805, DR. M. MUNAWAR, GLFRB

This cruise was used by a group of international scientists to gain an essential knowledge of environmental and biological variability in order to understand the planktonic interactions which serve as the basis of the aquatic food chain. Furthermore, diurnal rhythms would provide insight into developing realistic production models used in the management of the Great Lakes.


LAKE ONTARIO
Diurnal Rhythms of
Planktonic Interactions Stations
CSS LIMNOS
1984/1985
26
1a
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DEPARTMENT OF MINES AND TECHNICAL SURVEYS, OTTAWA
LAKE ONTARIO
10501

Only two areas of the lake were occupied--a nearshore area off Burlington where stations 1, 1A and 3 were monitored and the offshore station which was Surveillance station 26. At all stations during both stratified and unstratified conditions, sampling depths were: 1, 2, 7, 25, 45 metres and the maximum chlorophyll peak.

The following parameters were observed on this cruise: temperature profile, percent transmission profile, dissolved oxygen (Winkler and profiler), specific conductance, pH, chlorophyll a, trace metals, nutrients, major ions, total phosphorus (TPF and TPUF), AS/Sc, particulate organic carbon (< 20 μ and > 20 μ filtered), zooplankton grazing and C^{14} primary production experiments.

STATION POSITIONS

LAKE ONTARIO

STATION NUMBER	LATITUDE N.	LONGITUDE W.
1	43° 18' 44"	79° 45' 09"
1A	43° 20' 11"	79° 41' 06"
26	43° 36' 44"	79° 00' 59"
3	43° 20' 37"	79° 39' 52"

SEDIMENT TRAP MOORINGS

LAKE ONTARIO, AED STUDY NO. 425, M.N. CHARLTON

The purpose of this Study was to investigate the particle trapping and retention capability of sediment traps in relation to the particle size distribution in nature to clarify the applicability of sediment trap techniques for determining the movement of contaminants and nutrients.

Support to this Study consisted of the refurbishment of three sediment trap moorings during the months of April and October. These moorings remain in position year round. During each refurbishment period, temperature profiles, transmission profiles and water samples for water chemistry analysis were collected from the mooring sites.

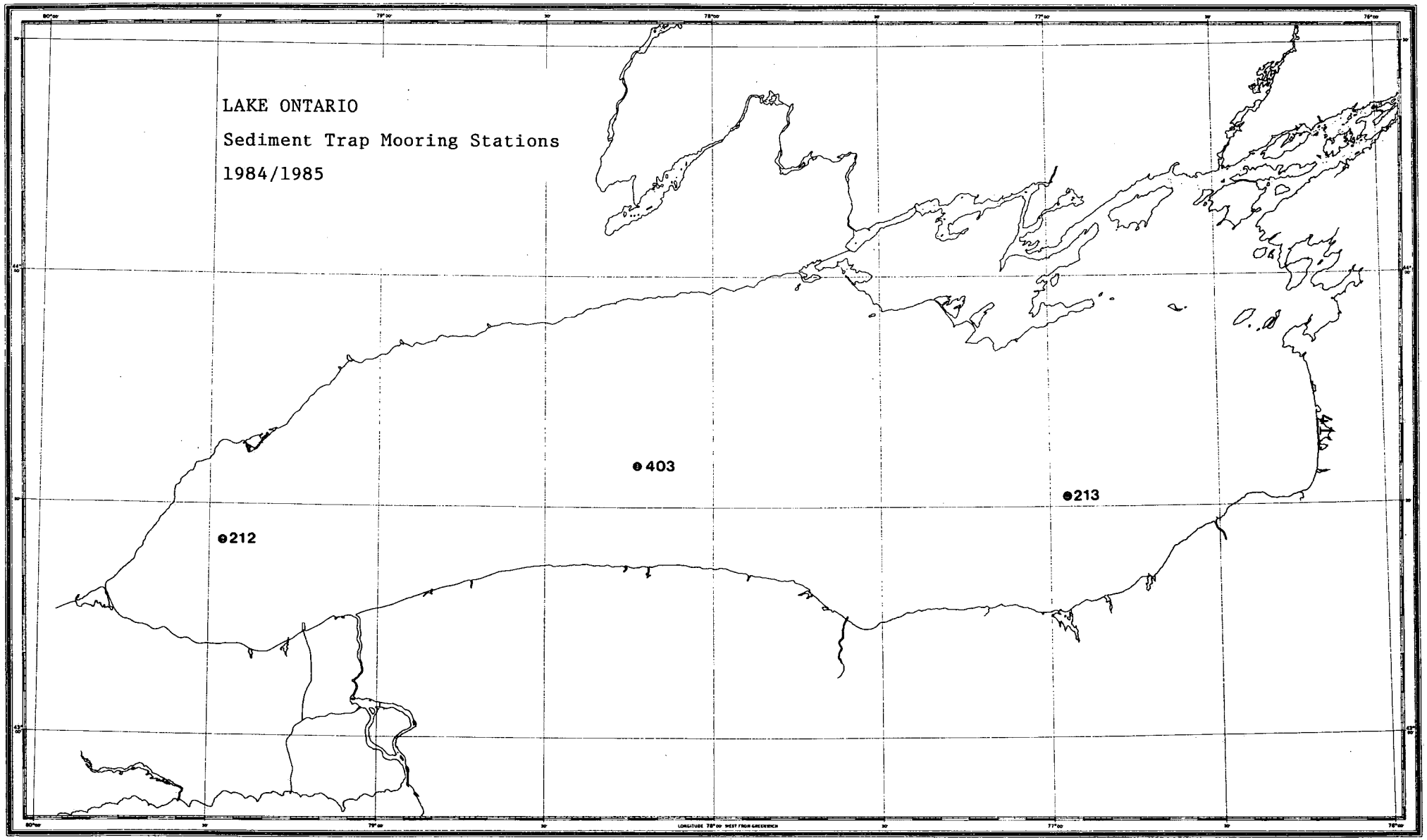

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Chart No. LAKE ONTARIO 10501

STATION POSITIONS

STATION NUMBER	LATITUDE N.	LONGITUDE W.
212	43° 23' 56"	79° 25' 18"
213	43° 32' 32"	76° 55' 49"
403	43° 36' 00"	78° 13' 31"

SEDIMENT HOMOGENEITY

ECD STUDY NO. 236, MRS. A. MUDROCH

The support to this Study consisted of the collection of ten box cores from the Western Basin and 23 from the Eastern Basin. The box cores were subsampled onboard using lightweight core tubes. These cores were subsectioned in 1 cm intervals to 15 cm by Mrs. A. Mudroch and Technical Operations personnel. The remaining top 3 cm of the box core was removed and stored for analysis at CCIW.

LAKE ONTARIO BENTHOS COLLECTION

AED STUDY NO. 423, DR. L.L. KALAS

The purpose of this project was to collect data on the small scale distribution of benthic organisms, including Oligochaeta, Crustacea, Insecta and Mollusca in Western Lake Ontario. The measurement of biological parameters will help clarify the affect of the Niagara River on these organisms. Diagnosis of the spatial pattern and temporal ecological changes seen in the lake biota along with water quality information will complement current studies taking place in the vicinity of the Niagara River mouth.

Samples were collected from the Niagara River Grid stations on two occasions from the CSS LIMNOS. One Ponar grab and one benthos core were obtained from each of stations 240 - 276 on Cruise 84-00-005 and eighty-one box cores were collected from 31 grid stations on Cruise 84-00-017 during the week of September 24.

GREAT LAKES BIOAVAILABILITY OF PHOSPHORUS

AED STUDY NO. 428, DR. P.G. MANNING

This project was to advance knowledge of the phosphorus-iron relationship in abatement of eutrophication through studies on the bioavailability of phosphorus using selected sites in Lake Ontario and Lake Erie.

Sample collection took place as additional tasks on the Lake Erie and Lake Ontario cruises throughout the year. Several cores were collected and delivered within four hours to pre-arranged shore rendezvous sites to be immediately extruded in a nitrogen filled glovebox. In addition to cores, seven stations off Port Bruce in Lake Erie were sampled for suspended and resuspended sediments. This was done by centrifuging 600 litre bulk water samples.

This is an ongoing Study with an expected completion date of September 1985.

SEDIMENT PHOSPHORUS REGENERATION AND RESUSPENSION IN LAKE ERIE

AED STUDY NO. 420, F. ROSA

Four Lake Erie cruises were carried out onboard CSS LIMNOS (June 11 - 16, June 25 - 30, August 27 - September 1 and September 10 - 14) in support of this project.

The following tasks were successfully carried out:

1. Minor meteorological observations every 3 hours.
2. Benthos cores were collected and subsampled onboard at 1 cm intervals to a depth of 5 cm.
3. Water chemistry profiles were completed every six hours collecting:
   (a) An EBT profile to the bottom
   (b) Surface temperature
   (c) Secchi disk observation
   (d) Transmissometer profile to the bottom
   (e) Integrated water samples from 10 m and 20 m for chlorophyll a, POC, particulate phosphorus and seston weight

(f) Water samples were collected from the rosette for: dissolved oxygen, conductivity, pH, chlorophyll a POC, seston weight, total phosphorus (filtered and unfiltered), soluble reactive phosphorus, nitrate and nitrite, ammonia, reactive silicate and chlorides

(g) Near-bottom water samples were collected twice daily using the tripod water sampler (TWS) for: total phosphorus nutrients and seston weight

(h) Mid-thermocline water samples were collected using the TWS for: chlorophyl a, total phosphorus and nutrients

The following tasks were completed as well:

1. Three sediment trap moorings were installed and refurbished during the cruises
2. The resuspension sediment sampler (RSS) was installed and refurbished daily. It was installed for a two-week duration on June 14 and August 30
3. Peepers were installed and retrieved by TOD divers
4. Hand-cores were collected by TOD divers
5. TOD divers documented all underwater operations using u/w photography
6. Peeper placer trials were undertaken to evaluate system deployment from a large vessel
7. TOD divers collected floculent material from the sediment/water interface

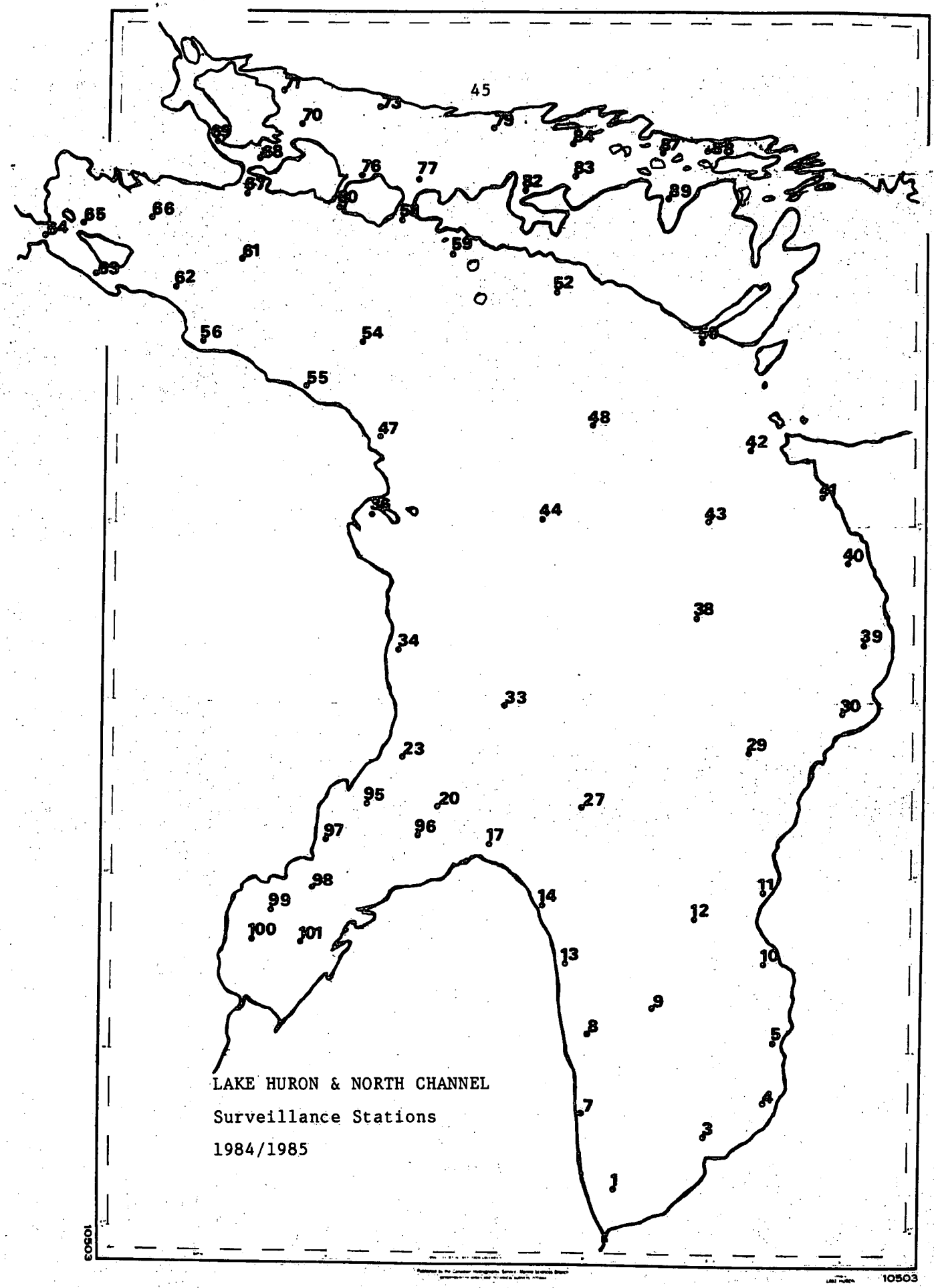
All diving operations were completed safely and effectively using four TOD divers in rotation to minimize time spent at depth. Most of the cruise time was spent anchored on station 84 (41° 55' 50" N., 81° 39' 30" W.).

LAKE HURON, NORTH CHANNEL, GEORGIAN BAY

OPEN LAKE SURVEILLANCE

TOD STUDY NO. 803, R. STEVENS, IWD-OR

This Open Lakes Surveillance Program was conducted to determine the amount of degradation and to identify any emerging problems in the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LAKE HURON & NORTH CHANNEL
Surveillance Stations
1984/1985
10503
10503

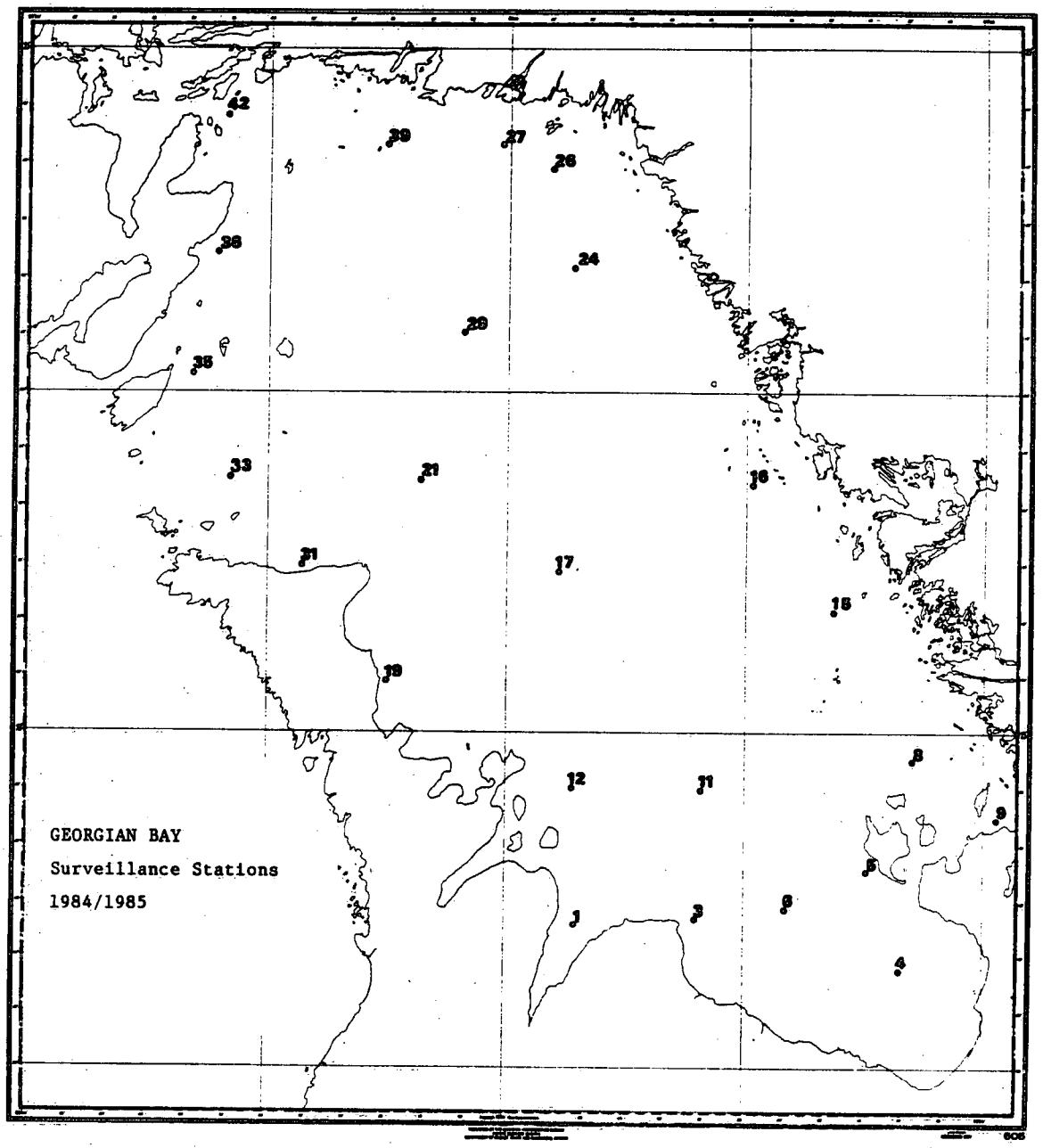
STATION POSITIONS

LAKE HURON

1984/1985

STATION NUMBER	LATITUDE N.	LONGITUDE W.
1	43° 05' 24"	82° 23' 33"
3	43° 15' 24"	82° 02' 17"
4	43° 19' 32"	81° 47' 17"
5	43° 32' 54"	81° 44' 38"
7	43° 20' 32"	82° 30' 22"
8	43° 34' 01"	82° 29' 05"
9	43° 37' 59"	82° 13' 06"
10	43° 45' 18"	81° 46' 56"
11	43° 57' 29"	81° 47' 10"
12	43° 53' 28"	82° 03' 26"
13	43° 45' 14"	82° 34' 08"
14	43° 56' 34"	82° 40' 02"
17	44° 06' 02"	82° 52' 02"
20	44° 13' 01"	83° 05' 00"
23	44° 20' 01"	83° 17' 57"
27	44° 11' 50"	82° 30' 14"
29	44° 21' 29"	81° 49' 57"
30	44° 28' 09"	81° 26' 54"
33	44° 30' 00"	82° 49' 57"
34	44° 38' 26"	83° 14' 00"
36	45° 02' 08"	83° 22' 42"
38	44° 44' 26"	82° 03' 39"
39	44° 39' 26"	81° 22' 35"
40	44° 53' 52"	81° 26' 13"
41	45° 04' 59"	81° 32' 19"
42	45° 13' 19"	81° 49' 15"
43	45° 00' 51"	82° 00' 29"
44	45° 00' 55"	82° 41' 08"
47	45° 15' 21"	83° 20' 51"
48	45° 16' 39"	82° 27' 02"
50	45° 32' 06"	82° 02' 48"
52	45° 39' 06"	82° 39' 06"
54	45° 31' 01"	83° 24' 54"
55	45° 23' 32"	83° 39' 10"
56	45° 31' 13"	84° 05' 00"

STATION NUMBER		LATITUDE N.	LONGITUDE W.
58		45° 52' 04"	83° 16' 00"
59		45° 46' 00"	83° 01' 43"
60		45° 54' 00"	83° 31' 07"
61		45° 45' 03"	83° 54' 58"
62		45° 40' 34"	84° 11' 12"
63		45° 42' 14"	84° 30' 37"
64		45° 48' 30"	84° 45' 36"
65		45° 50' 48"	84° 34' 00"
66		45° 51' 50"	84° 17' 42"
67		45° 51' 06"	83° 54' 00"
68		46° 02' 28"	83° 51' 11"
69		46° 04' 43"	84° 01' 42"
70		46° 08' 10"	83° 40' 15"
71		46° 13' 58"	83° 44' 44"
73		46° 11' 18"	83° 21' 12"
76		45° 59' 00"	83° 26' 17"
77		45° 58' 07"	83° 11' 57"
79		46° 07' 24"	82° 53' 09"
82		45° 56' 20"	82° 45' 30"
83		46° 00' 01"	82° 32' 48"
84		46° 05' 31"	82° 33' 26"
87		46° 03' 36"	82° 10' 42"
88		46° 03' 23"	81° 59' 45"
89		45° 55' 00"	82° 09' 45"
95)		44° 12' 46"	83° 22' 13"
96)		44° 07' 36"	83° 10' 20"
97)		44° 06' 58"	83° 31' 46"
98)		43° 58' 34"	83° 34' 30"
99)	Saginaw Bay	43° 54' 30"	83° 44' 28"
)			
100)		43° 49' 27"	83° 49' 03"
101)		43° 49' 18"	83° 37' 28"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GEORGIAN BAY
Surveillance Stations
1984/1985

STATION POSITIONS

GEORGIAN BAY

1984/1985

STATION NUMBER	LATITUDE N.	LONGITUDE W.
1	44° 42' 56"	80° 51' 26"
3	44° 43' 34"	80° 36' 49"
4	44° 38' 43"	80° 09' 53"
5	44° 47' 48"	80° 14' 33"
6	44° 44' 16"	80° 26' 08"
8	44° 57' 15"	80° 08' 03"
9	44° 52' 19"	79° 57' 58"
11	44° 55' 10"	80° 36' 16"
12	44° 55' 12"	80° 52' 30"
15	45° 10' 00"	80° 17' 53"
16	45° 21' 12"	80° 29' 03"
17	45° 14' 40"	80° 52' 24"
19	45° 03' 59"	81° 15' 12"
21	45° 21' 50"	81° 11' 16"
24	45° 40' 45"	80° 50' 21"
26	45° 49' 56"	80° 53' 53"
27	45° 51' 53"	80° 59' 53"
29	45° 34' 59"	81° 05' 06"
31	45° 14' 20"	81° 26' 30"
33	45° 22' 13"	81° 35' 06"
35	45° 31' 39"	81° 40' 12"
36	45° 42' 36"	81° 37' 15"
39	45° 52' 27"	81° 15' 30"
42	45° 54' 50"	81° 35' 42"

open waters of Lake Huron, Georgian Bay and the North Channel by determining the ambient levels of nutrient, major ions and contaminant levels in the water along with changes in the aquatic community. This was the first cruise conducted in this area since 1980. Only one cruise was conducted in the region with 52 stations being occupied in Lake Huron, 14 in the North Channel and 24 in Georgian Bay. Sample results from stations will be used as input to the Canada-U.S. Agreement for the Water Quality Board Annual Report to the International Joint Commission. The cruise was supported by Technical Operations Division staff and was conducted from CSS LIMNOS. The ship was equipped with the usual scientific equipment; i.e., electronic bathythermograph, rosette/EBT sampler, transmissometer, radar, Loran C and various winches used in chemical and biological sampling.

The Surveillance Program for the Upper Lakes was similar to that of Lake Ontario. The parameters observed on the cruise were: temperature profile, percent transmission profile, dissolved oxygen, specific conductance, pH, chlorophyll a, particulate organic carbon, total phosphorus (TPF and TPUF), soluble reactive phosphorus, ammonia, nitrate and nitrite, total Kjeldahl nitrogen, reactive silicate, dissolved organic carbons, major ions, alkalinity, meteorological observations and Secchi disc observations during daylight hours.

Sampling depths collected during unstratified conditions were: 1 metre, mid-water column when the depth was greater than 50 metres, bottom -10 and bottom -2 metres.

During stratified conditions the sampling depths were: 1 metre, 2 metres above the thermocline, mid-thermocline, 2 metres below the thermocline, bottom -10 and bottom -2 metres.

During the cruise, some additional tasks were performed. These included: the installation of three current meter moorings in Lake Erie in support of AED Study No. 420; collection of two-litre surface samples supporting AMD Study No. 622, bulk water sample (1200 L) collected for Dr. K.R. Lum supporting ECD Study No. 234, reflectance radiometer observations for APSD Study No. 540 and benthos cores collected for Adis Zilans of the Earth Sciences Department of the University of Waterloo.

CSS BAYFIELD

Twenty-two cruises were completed by the research vessel, CSS BAYFIELD on Lake Ontario. All cruises were in support of the Long Term Biological Index Monitoring Program.

22 - Long Term Biological Index Monitoring Program

LONG TERM BIOLOGICAL INDEX MONITORING

TOD STUDY NO. 803, D.M. WHITTLE AND DR. O. JOHANNSSON, GLFRB

The purpose of the Program was to collect chemical and biological data simultaneously at selected stations on Lake Ontario on a weekly basis. The Long Term Biological Index Monitoring of Lake Ontario has been a yearly Program since 1981.

Since temporal variability is of much greater significance than spatial variability for most areas of concern, it is important to establish more precisely the seasonal trends of those parameters. GLFRB initiated this Long Term Study to investigate this situation with the objective of determining an optimum sampling strategy for future data collection programs.

There was a total of 31 Bioindex cruises on Lake Ontario during the 1984 field season. CSS BAYFIELD was utilized for 22 of these cruises and CSS LIMNOS for the remainder.

The four major Bioindex stations: 12, 41, 81 and 93, were sampled for biological and chemical data. The biological work included the collection of integrated water samples and of temperature-related specified depth samples for phytoplankton, chlorophyll a, particulate organic carbon, particulate organic nitrogen, ash-free weight and the collection of a zooplankton net haul from every station. The chemical parameters included the basic manual lab work of dissolved oxygen measurement, pH and conductivity

determination and the processing of water samples for water quality analyses. Water samples were processed for major ions, nutrients and total phosphorus (filtered and unfiltered).

ADDITIONAL WORK

On several of the earlier Bioindex cruises, additional GLFRB staff were onboard to process water samples for picoplankton analysis. Other additional tasks such as collecting benthos cores and recovering beached drogues were occasionally carried out for other CCIW scientists.

CSS BAYFIELD
1984

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
JAN	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	1	2	3	4
FEB	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	1	2	3
MAR	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
APR	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15 CCIW	16 LAKE ONTARIO LONG TERM	17 BIOLOGICAL INDEX	18 MONITORING LAKE ONTARIO	19 CCIW	20 CCIW	21 CCIW
	22 CCIW	23 CCIW	24 LAKE ONTARIO	25 L.T.B.I.M.	26 LAKE ONTARIO	27 CCIW	28 CCIW
	29 CCIW	30 CCIW	1 CCIW	2 LAKE ONTARIO	3 L.T.B.I.M.	4 LAKE ONTARIO	5 CCIW
MAY	6 CCIW	7 LAKE ONTARIO	8 L.T.B.I.M.	9 LAKE ONTARIO	10 CCIW	11 CCIW	12 CCIW
	13 CCIW	14 LAKE ONTARIO	15 L.T.B.I.M.	16 LAKE ONTARIO	17 CCIW	18 CCIW	19 CCIW
	20 CCIW	21 CCIW	22 LAKE ONTARIO	23 L.T.B.I.M.	24 LAKE ONTARIO	25 CCIW	26 CCIW
	27 CCIW	28 LAKE ONTARIO	29 L.T.B.I.M.	30 LAKE ONTARIO	31 CCIW	1 CCIW	2 CCIW
JUN	3 CCIW	4 LAKE ONTARIO	5 L.T.B.I.M.	6 LAKE ONTARIO	7 CCIW	8 CCIW	9 CCIW
	10 CCIW	11 CCIW	12 LAKE ONTARIO L.T.B.I.M.	13 LAKE ONTARIO	14 CCIW	15 CCIW	16 CCIW
	17 CCIW	18 LAKE ONTARIO	19 L.T.B.I.M.	20 LAKE ONTARIO	21 CCIW	22 CCIW	23 CCIW
	24 CCIW	25 LAKE ONTARIO	26 L.T.B.I.M.	27 LAKE ONTARIO	28 CCIW	29 CCIW	30 CCIW
JUL	1 CCIW	2 CCIW	3 LAKE ONTARIO	4 L.T.B.I.M.	5 L.T.B.I.M.	6 LAKE ONTARIO	7 CCIW
	8 CCIW	9 LAKE ONTARIO	10 L.T.B.I.M.	11 LAKE ONTARIO	12 CCIW	13 CCIW	14 CCIW
	15 CCIW	16 LAKE ONTARIO	17 L.T.B.I.M.	18 LAKE ONTARIO	19 CCIW	20 CCIW	21 CCIW
	22 CCIW	23 LAKE ONTARIO	24 L.T.B.I.M.	25 LAKE ONTARIO	26 CCIW	27 CCIW	28 CCIW
	29 CCIW	30 LAKE ONTARIO	31 L.T.B.I.M.	1 LAKE ONTARIO	2 CCIW	3 CCIW	4 CCIW
AUG	5 CCIW	6 CCIW	7 LAKE ONTARIO	8 L.T.B.I.M.	9 LAKE ONTARIO	10 CCIW	11 CCIW
	12 CCIW	13 LAKE ONTARIO	14 L.T.B.I.M.	15 LAKE ONTARIO	16 CCIW	17 CCIW	18 CCIW
	19 CCIW	20 LAKE ONTARIO	21 L.T.B.I.M.	22 LAKE ONTARIO	23 CCIW	24 CCIW	25 CCIW
	26 CCIW	27 LAKE ONTARIO	28 L.T.B.I.M.	29 LAKE ONTARIO	30 CCIW	31 CCIW	1 CCIW
SEP	2 CCIW	3 CCIW	4 CCIW	5 CCIW	6 CCIW	7 CCIW	8 CCIW
	9 CCIW	10 LAKE ONTARIO	11 L.T.B.I.M.	12 LAKE ONTARIO	13 CCIW	14 CCIW	15 CCIW
	16 CCIW	17 CCIW	18 CCIW	19 CCIW	20 CCIW	21 CCIW	22 CCIW
	23 CCIW	24 LAKE ONTARIO	25 L.T.B.I.M.	26 LAKE ONTARIO	27	28	29
	30	1	2	3	4	5	6
OCT	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	1	2	3
NOV	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	1
DEC	2	3	4	5	6	7	8
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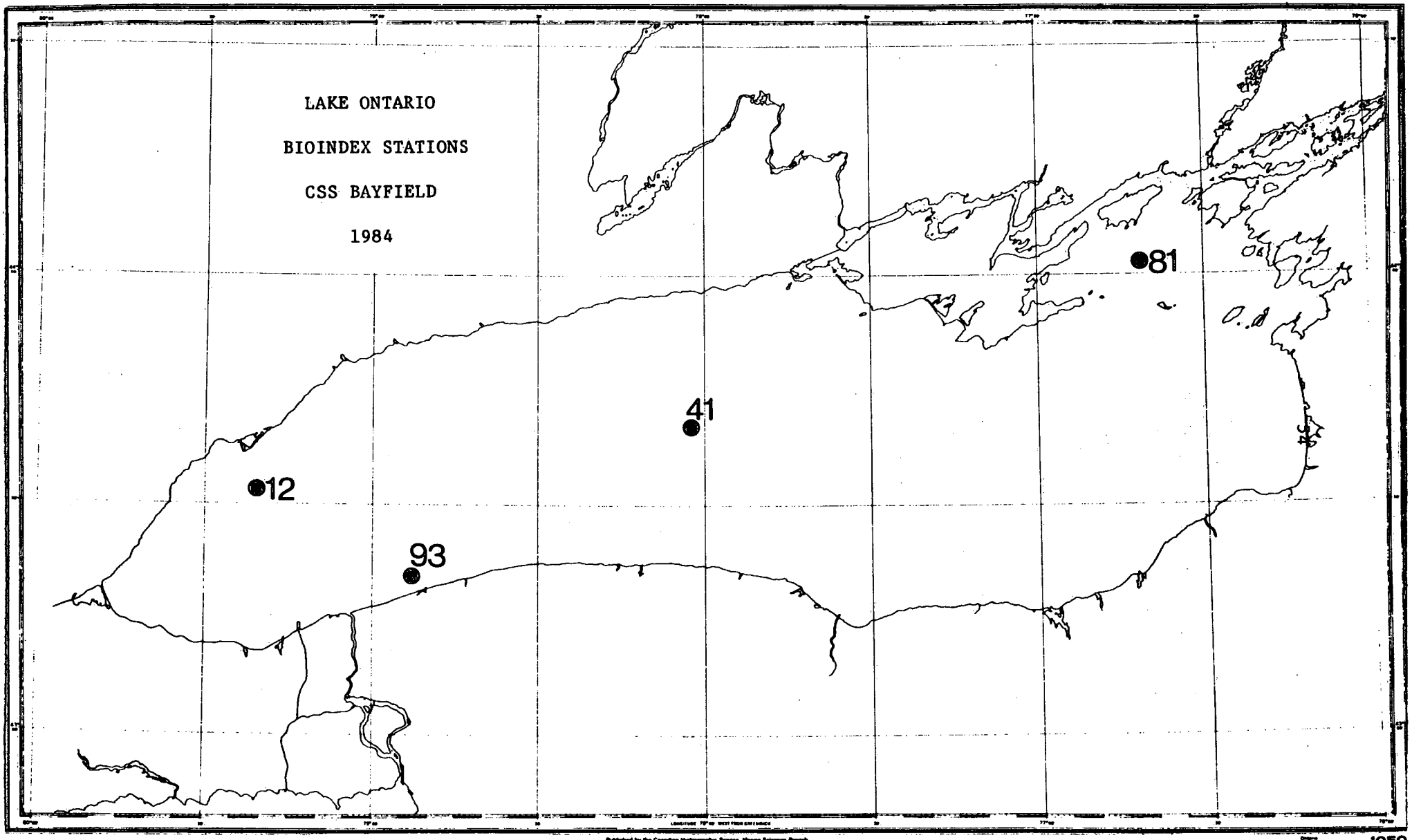
	23	24	25	26	27	28	29
	30	31					



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LAKE ONTARIO

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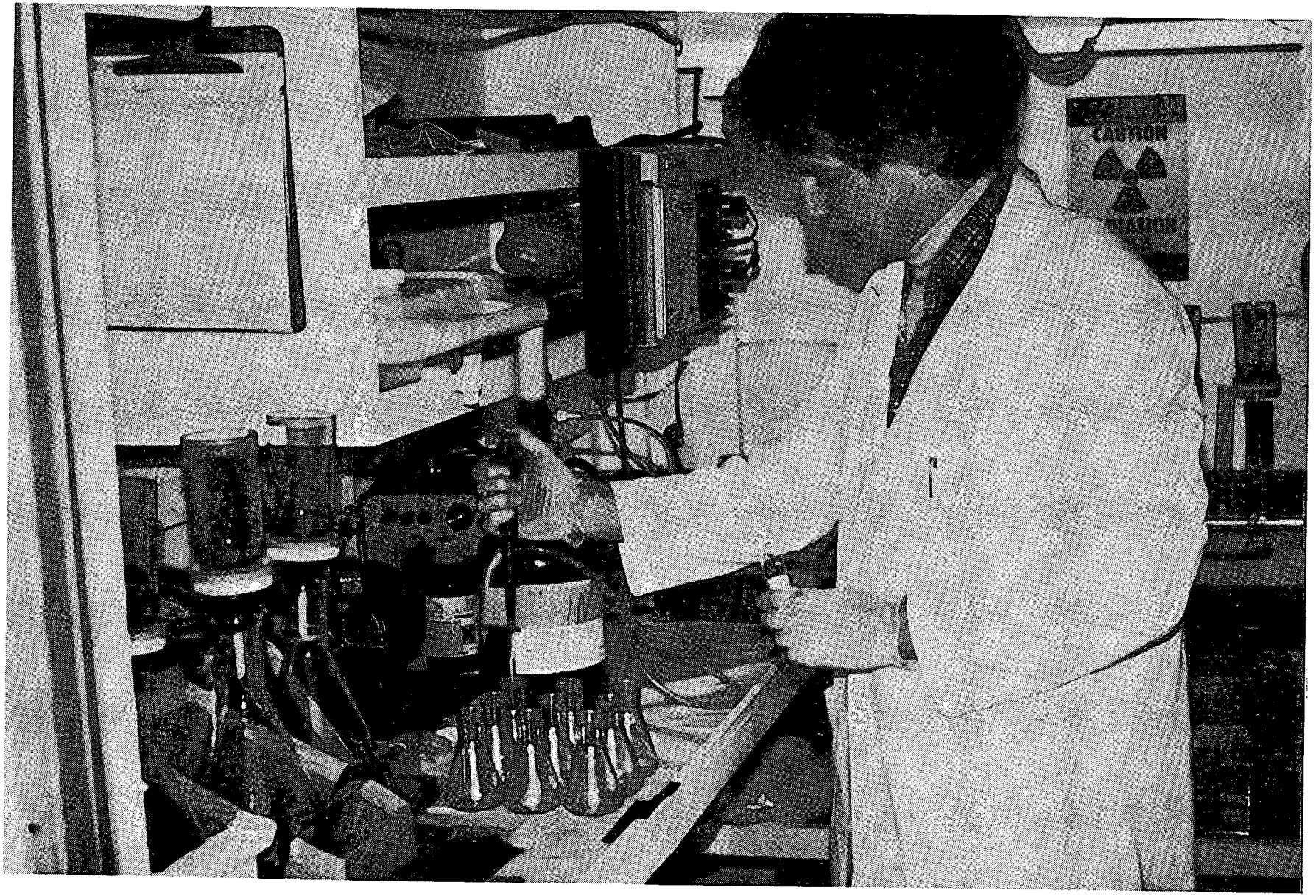


BIOINDEX - CSS BAYFIELD

CSS ADVENT
1984

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
JAN	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	1	2	3	4
FEB	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	1	2	3
MAR	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
APR	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	1	2	3	4	5
MAY	6	7	8	9	10	11	12
	13	14	15 L. ST.CLAIR PLANKTON	16 DYNAMICS L. ST. CLAIR	17	18	19
	20	21	22	23	24	25	26
	27	28	29 L. ST. CLAIR PLANKTON	30 DYNAMICS L. ST. CLAIR	31	1	2
JUN	3 LAKE ERIE	4 SURVEILLANCE CONTINUITY	5 LAKE ERIE	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27 LAKE ERIE	28 SURVEILLANCE	29 CONTINUITY	30 LAKE ERIE
JUL	1	2	3	4	5	6	7
	8	9	10 LAKE ST. CLAIR	11 PLANKTON DYNAMICS	12 LAKE ST. CLAIR	13	14
	15	16 LAKE	17 ERIE	18 SURVEILLANCE	19 CONTINUITY	20 LAKE	21 ERIE
	22	23	24 LAKE ST. CLAIR	25 PLANKTON DYNAMICS	26 LAKE ST. CLAIR	27	28
	29	30	31	1	2	3	4
AUG	5	6	7	8 LAKE ERIE	9 SURVEILLANCE	10 CONTINUITY	11 LAKE ERIE
	12	13	14 LAKE ST. CLAIR	15 PLANKTON	16 DYNAMICS	17 LAKE ST. CLAIR	18
	19	20	21 LAKE ST. CLAIR	22 PLANKTON	23 DYNAMICS	24 LAKE ST. CLAIR	25
	26	27 LAKE ERIE	28 SURVEILLANCE	29 CONTINUITY	30 LAKE ERIE	31	1
SEP	2	3	4 LAKE ST. CLAIR	5 PLANKTON DYNAMICS	6 LAKE ST. CLAIR	7 LAKE	8 ERIE
	9 SURVEILLANCE	10 CONTINUITY	11 LAKE ERIE	12 SURVEILLANCE	13 CONTINUITY	14 LAKE	15 ERIE
	16	17	18 L. ST. CLAIR LAKE ERIE	19 SHIPEK SAMPLING	20 PLANKTON DYNAMICS	21 L. ST. CLAIR LAKE ERIE	22
	23	24 LAKE ERIE	25 PHOSPHORUS AND	26 SEDIMENT RESUSPENSION	27 LAKE	28 ERIE	29
	30	1	2	3	4	5	6
OCT	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	1	2	3
NOV	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	1
DEC	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					

Sixteen stations were occupied during each of the cruises. The Surveillance parameters recorded were: dissolved oxygen and temperature profiles, pH, conductivity, particulate organic carbon, chlorophyll, suspended solids, total phosphorus (filtered and unfiltered), nutrients, percent transmission and Secchi disc observations.

A dissolved oxygen profiling system was operated onboard CSS ADVENT again this year to log corrected temperature and oxygen data. This data was compared with results from EBT profiles and Winkler titration results. The system worked well this year. However, some problems had to be ironed out with the water bath. Problems occurred with the bath at the beginning of the season in obtaining constant water bath temperatures. The problem was corrected and a more efficient water bath will be developed in the coming year.

During the Surveillance Continuity cruises, much "piggyback" work was scheduled and completed. During two cruises, a sediment trap mooring was serviced each time in support of AED Study No. 420 and one week was set aside in September to retrieve current meter and sediment trap moorings in support of this same project.

In the months of August and September, arrangements were made to accommodate GLFRB personnel who conducted primary production and phytoplankton analyses at depths where the lowest and highest oxygen saturation values occurred. This was done at selected sites in the Eastern and Central basins.

In addition, a wave-rider buoy was deployed in support of a project by NOAA.

Cruise dates:

May 31 - June 5

June 25 - June 30

July 16 - July 21

August 7 - August 11

August 27 - August 31

September 10 - September 15

September 24 - September 28 (Sediment and Phosphorus Resuspension)

MICROBIOLOGY

AMD STUDY NO. 626, DR. S.S. RAO

Microbiological samples were obtained from each of the sixteen stations during the regular Surveillance Continuity cruises. At each station, samples were obtained from a Van Dorn bottle cast at 5-metre and bottom -1-metre depths.

After collection, a 10 ml sample was pipetted into a pretreated test tube. The test tubes were then incubated in the dark at room temperature for a period of 20 minutes. After the incubation period, 0.1 ml of 37% formaldehyde was added and the samples were well shaken. All the prepared samples were then refrigerated and delivered to the Microbiology Laboratories, CCIW, at the completion of each cruise.

LAKE ST. CLAIR

PLANKTON DYNAMICS STUDY

TOD STUDY NO. 805, DR. M. MUNAWAR

Eight cruises were done on Lake St. Clair by CSS ADVENT from May to September. Three additional cruises were completed by the LAB IV (MonArk) during the periods the ADVENT was committed to other studies.

PURPOSE

1. To study the plankton ecology and dynamics of Lake St. Clair, about which very little is known
2. To study the impact of contaminants on nannoplankton and picoplankton dynamics

RELEVANCE

Application of standard taxonomic identification and enumeration techniques has generated a consistent data base for the Great Lakes and has important relevance to the following:

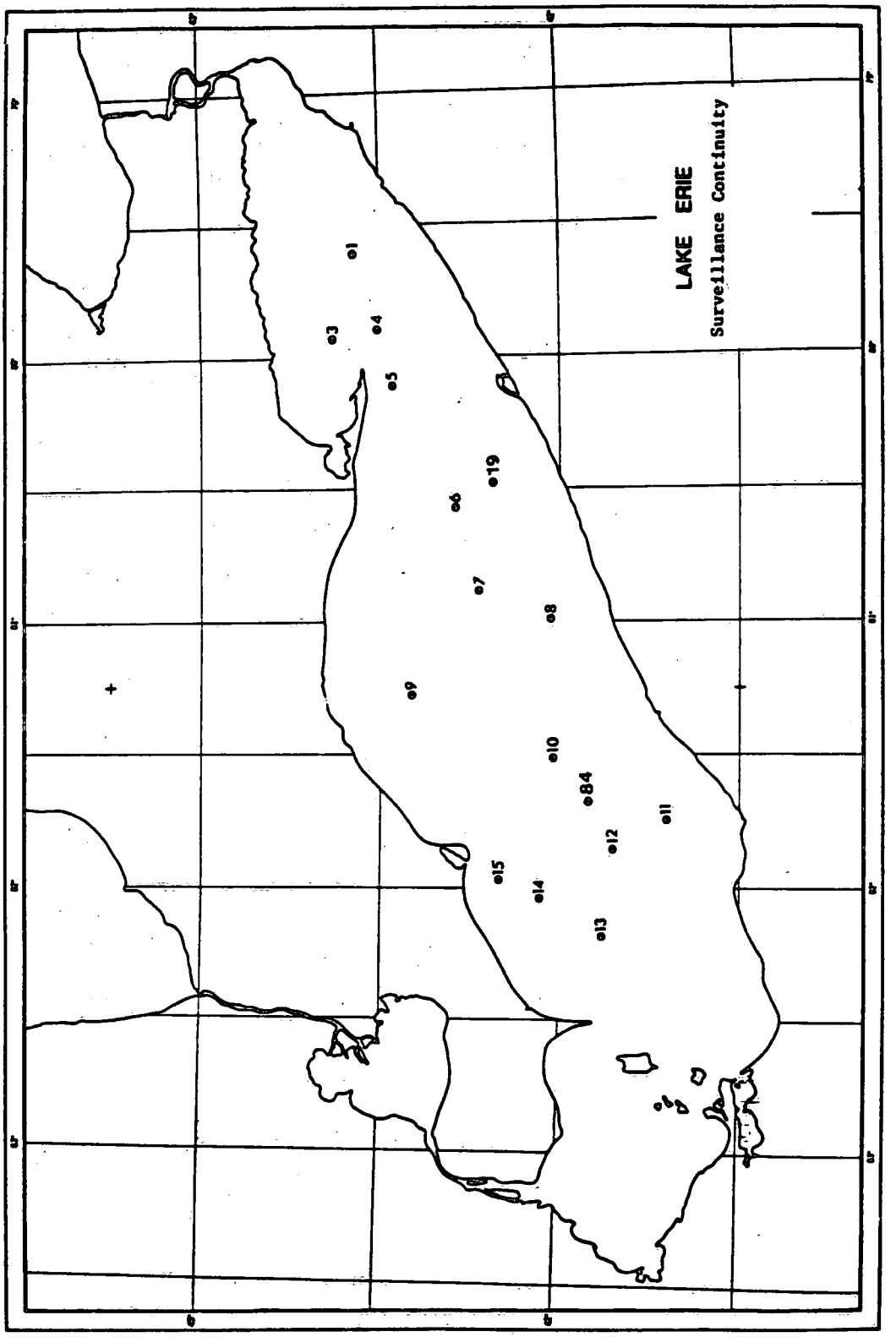
1. Great Lakes Water Quality Agreement concerning the nutrient control strategies and management of the Great Lakes
2. Eutrophication issues group objectives of the Great Lakes Water Quality Program

3. Great Lakes International Surveillance Plan
4. Ecosystem health has been listed as a sub-issue by the Great Lakes Toxic Chemical Committee under the priority issue. The GLTCC report has mentioned this area of research as an area of concern since it has so far received only piecemeal investigation

Ten stations were occupied during each cruise with additional sites added during July and August. The following observations and analyses were conducted: temperature profiles, transmission profiles, Secchi disc observations, zooplankton net hauls, phytoplankton, nutrient and metal analyses, chlorophyll a picoplankton and plankton size fractionation and primary production analyses (in situ and incubator). The in situ primary production stations were carried out at the shallowest and deepest station locations, using moorings with samples placed at selected depths. On the remaining sample locations, incubator experiments were conducted.

One week during the period was utilized collecting sediment samples from Lake St. Clair, the Detroit River and St. Clair River. During this period, a small Boston Whaler was used to access very shallow water sites in the small tributaries to the St. Clair River.

In addition to the bi-weekly monitoring cruises, two dissolved oxygen profiles in conjunction with primary productivity experiments were completed on lakes Huron and St. Clair.


LAKE ERIE
Surveillance Continuity
1
3
4
5
19
6
7
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9
10
84
11
12
15
14
13

CSS ADVENT

Seventeen cruises were completed by the research vessel, CSS ADVENT on lakes Erie, St. Clair and Huron in support of NWRI and GLFRB studies. These multi-disciplinary cruises consisted of:

LAKE ERIE

6 - Surveillance Continuity

1 - Sediment and Phosphorus Resuspension

1 - Phosphorus Bioavailability Study

LAKE ST. CLAIR

7 - Plankton Dynamics Study

1 - Sediment Sampling, Lake St. Clair, Detroit River, St. Clair River

LAKE HURON

1 - Plankton Dynamics Study

LAKE SUPERIOR

1 - Canadian Hydrographic Survey

LAKE ERIE

SURVEILLANCE CONTINUITY

AED STUDY NO. 497, M.N. CHARLTON

CSS ADVENT conducted 5 cruises on Lake Erie from June to September. One cruise scheduled for the ADVENT had to be completed by CSS LIMNOS while the ADVENT was committed to CHS on Lake Superior. The main goal was to provide historical data suitable for the detection of important emerging pattern changes in Lake Erie.

SURVEILLANCE CONTINUITY

STATION POSITIONS

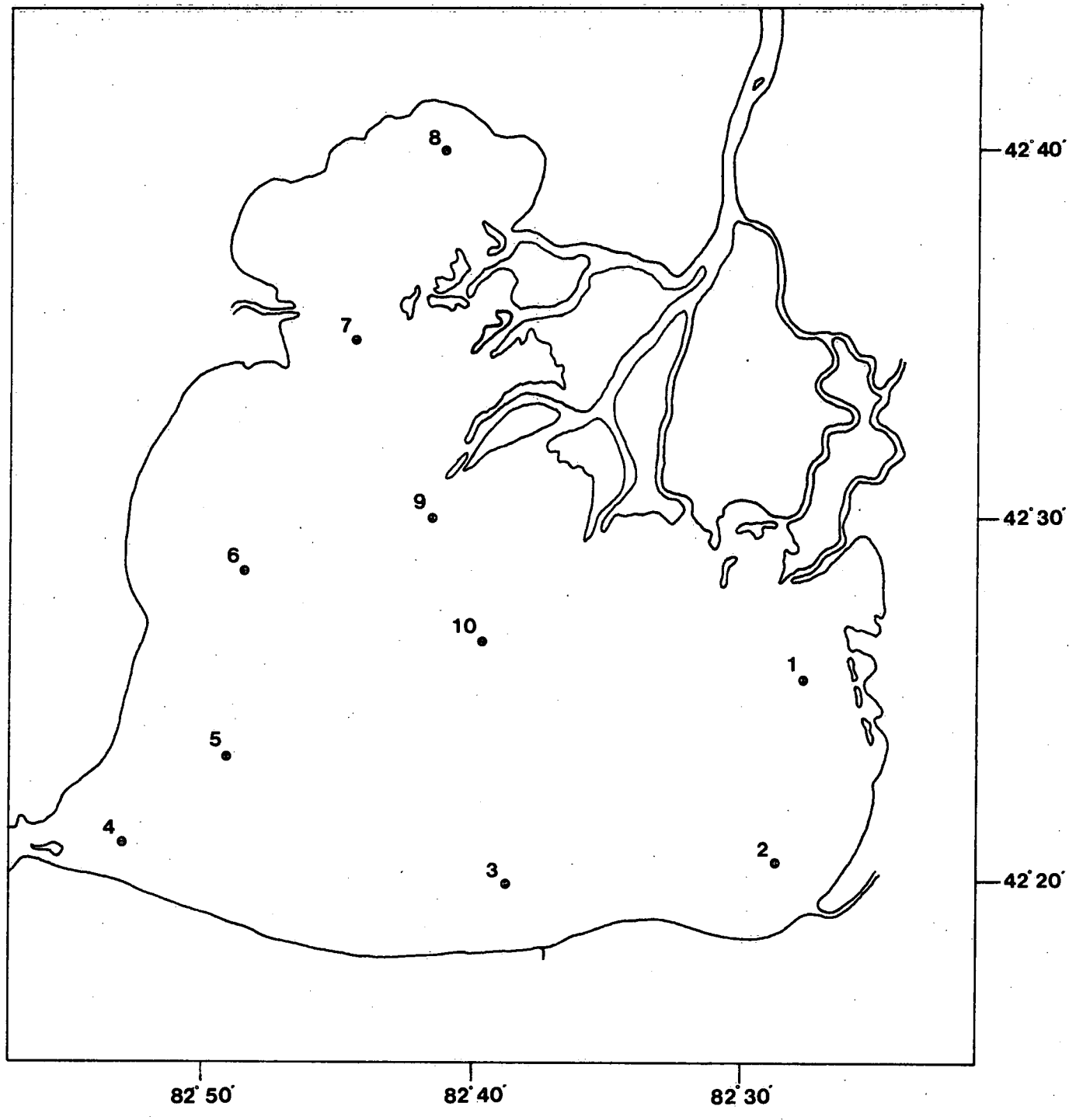
LAKE ERIE

1984/1985

STATION NUMBER	LATITUDE N.	LONGITUDE W.
1	42° 34' 06"	79° 35' 35"
3	42° 37' 40"	79° 54' 14"
4	42° 30' 59"	79° 53' 07"
5	42° 28' 04"	80° 05' 39"
6	42° 18' 22"	80° 33' 18"
7	42° 14' 30"	80° 51' 47"
8	42° 01' 42"	80° 57' 58"
9	42° 25' 05"	81° 15' 50"
10	42° 02' 00"	81° 29' 32"
11	41° 43' 03"	81° 44' 12"
12	41° 51' 36"	81° 50' 12"
13	41° 55' 51"	82° 09' 58"
14	42° 03' 15"	82° 00' 21"
15	42° 09' 37"	81° 50' 02"
19	42° 08' 28"	80° 29' 26"
84	41° 55' 52"	81° 39' 31"
84-01A-04	41° 53' 51"	81° 38' 37"

MOORINGS ON LAKE ERIE

LAKE ST. CLAIR
PLANKTON DYNAMICS STUDY
CSS ADVENT



PLANKTON DYNAMICS STUDY

STATION POSITIONS

LAKE ST. CLAIR

1984/1985

STATION NUMBER	LATITUDE N.	LONGITUDE W.
1	42° 25' 30"	82° 27' 40"
2	42° 20' 20"	82° 28' 40"
3	42° 19' 50"	82° 38' 45"
4	42° 21' 04"	82° 53' 18"
5	42° 23' 23"	82° 49' 12"
6	42° 28' 30"	82° 48' 30"
7	42° 34' 47"	82° 44' 30"
8	42° 40' 15"	82° 41' 06"
9	42° 30' 00"	82° 41' 42"
10	42° 26' 38"	82° 38' 50"

SHORE PROGRAMS

DIRECTOR'S OFFICE

SPAWNING STUDY

D.O. STUDY NO. 109, DR. P.G. SLY

Support to this Study involved the retrieval of Lake Trout egg incubators and temperature recording systems from 2 sites in Eastern Lake Ontario. This equipment was installed in November 1983 and monitored during the winter.

Four incubators were recovered from a shoal on Yorkshire Island and fish eggs were recovered and transported to Glenora Fisheries Station for analysis. Four incubators and a TRS, which had been located on a shoal near Yorkshire Island, could not be located and are presumed lost.

In addition to the recovery of equipment, a final survey of both sites to determine a grain size distribution of the bottom sediments was completed.

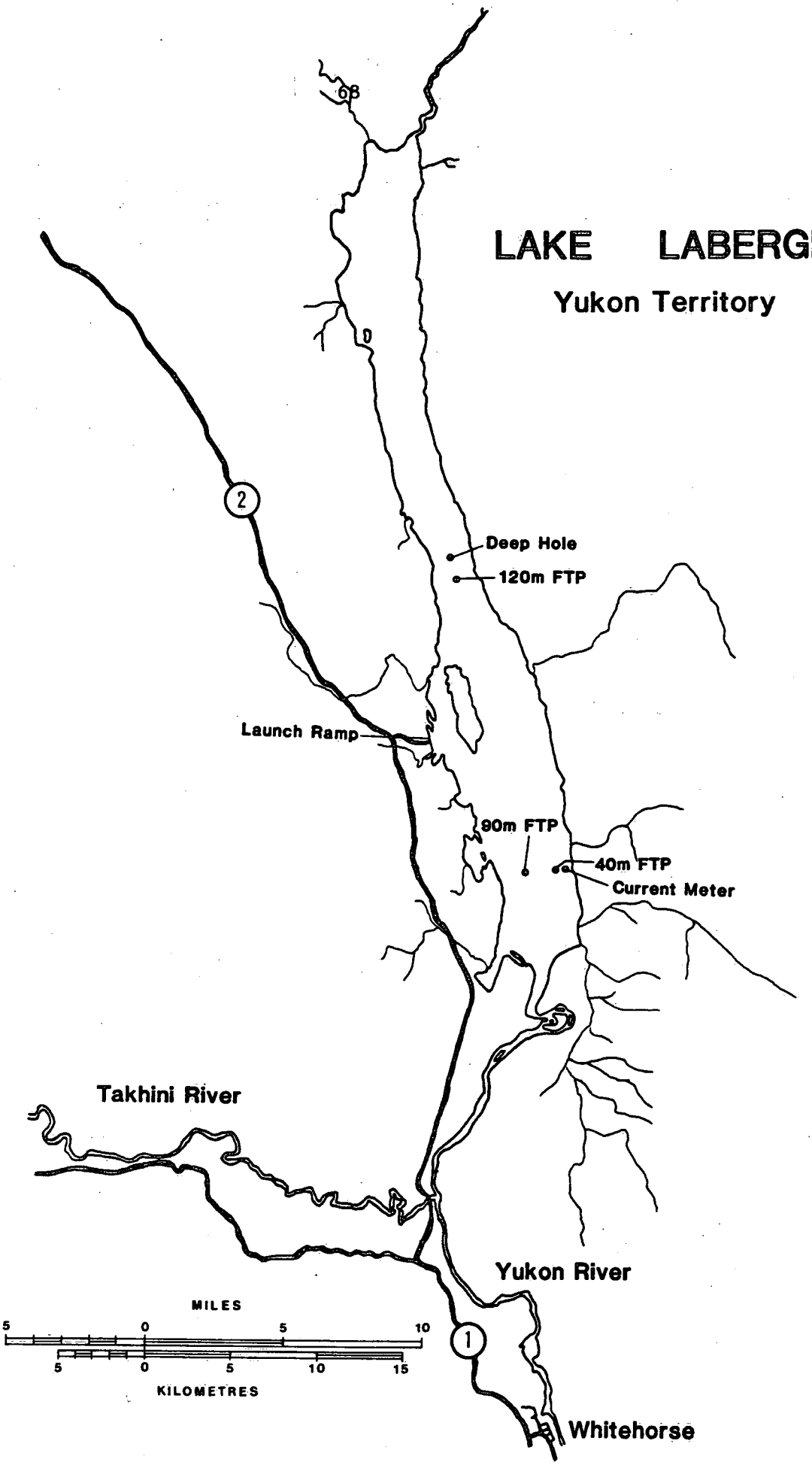
LAKE LABERGE MOORINGS, YUKON TERRITORY

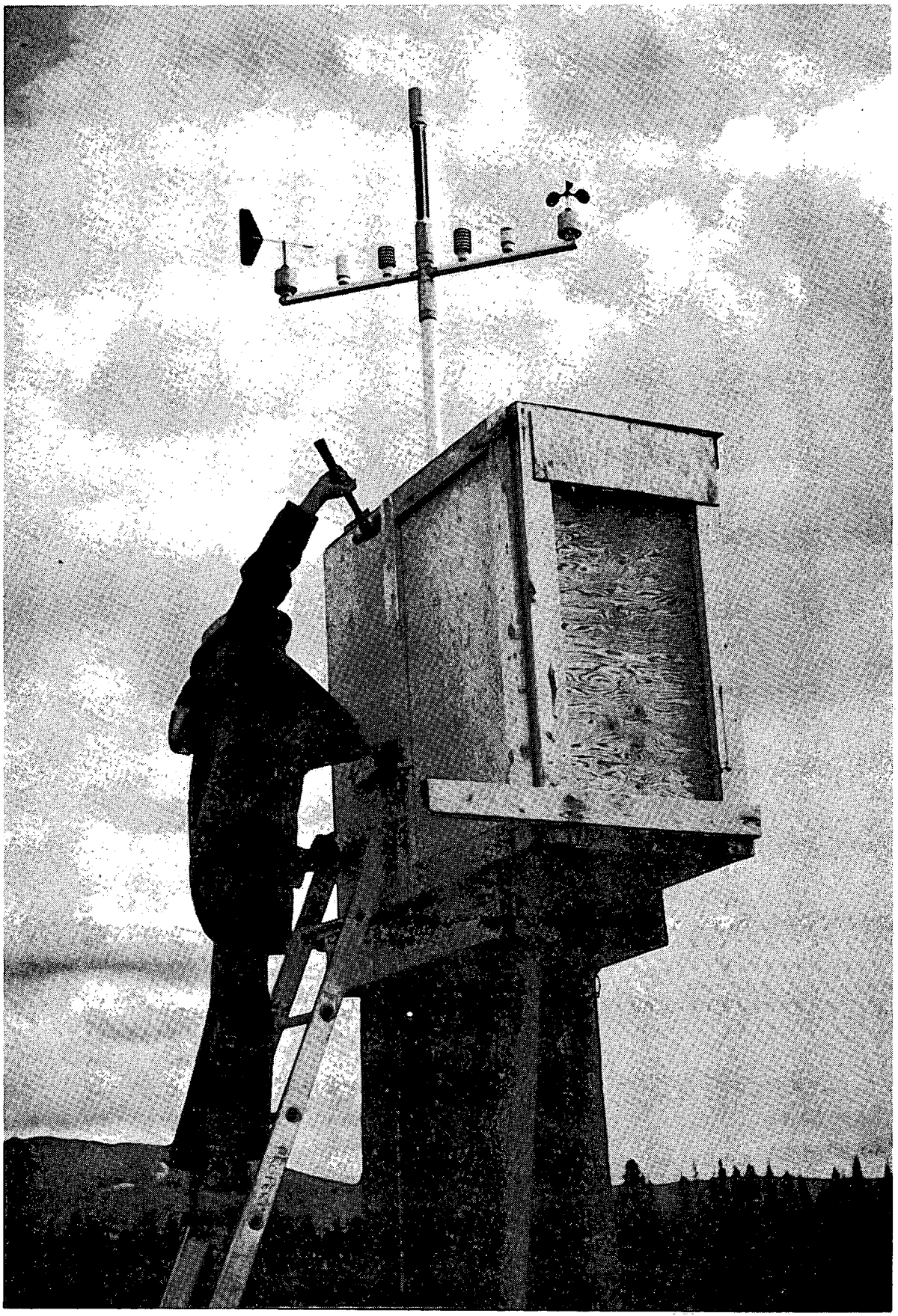
D.O. STUDY NO. 161, DR. C.H. PHARO

The main purpose of this field Study was to support the Pacific and Yukon Detachment of NWRI in the refurbishment, installation and removal of moorings in Lake Laberge. Support was carried out by Mr. B. Moore for the period June 11 to 23 and by Mr. S. Smith for the period August 17 to 31.

During the period in June, Mr. B. Moore assisted Mr. E. Marles, P&Y Region, Vancouver in the refurbishment of three Fixed Temperature Profile (FTP) moorings, the launching of one current meter mooring and also in the refurbishment of one meteorological station on the Yukon River. Low water levels and poor weather conditions caused delays in the work schedule but all work was completed.

For the Study in August, Mr. S. Smith assisted Mr. E. Marles in the removal of all moorings and the meteorological station. All equipment was crated and shipped to NWRI, Vancouver for maintenance during the winter. A one-day chemical sampling study was done to coincide with a satellite overflight. Poor weather conditions caused delays in the work schedule but all work was completed and equipment returned to CCIW, Burlington.


LAKE LABERGE
Yukon Territory
68
2
Deep Hole
120m FTP
Launch Ramp
90m FTP
40m FTP
Current Meter
Takhini River
Yukon River
1
Whitehorse
MILES
5 0 5 10
5 0 5 10 15
KILOMETRES



MET STATION - Yukon

TOBIN LAKE STUDY

NORTH SASKATCHEWAN RIVER SYSTEM

D.O. STUDY NO. 170, DR. E.D. ONGLEY

The Tobin Lake Study is a research program of the Western and Northern Detachment of the National Water Research Institute. The rationale of this program is to study the dynamics of contaminant transport processes within the North Saskatchewan River System. Tobin Lake, due to its location at the most downstream end of the river system, integrates the input of toxic substances from the entire basin.

The objectives of the Study were the following:

1. Evaluate biogeochemical processes of transport characteristics and degradation products of selected organic contaminants in one reach of the North Saskatchewan River.
2. Determine the ecological impact of selected organic contaminants on benthic organisms.

Nine sampling sites were chosen according to their point source and tributary contributions. The following locations were sampled between Edmonton and Saskatoon:

Pakan
Fort Saskatchewan
Devon
Myrnam
Lloydminster Ferry
Bordon
New Battlefords
Battle River
La Colette Falls
Weldon Ferry (South Saskatchewan River)

At all sites, triplicate water samples were collected, pressure filtered and run through resin columns for later analysis of organic chlorides. Suspended solids samples were also filtered. With the exception of the Battle River site, where only water was collected, biological samples were collected for characterization of the benthic community at each site. Samples were frozen for later analysis of chlorophenol and organic chloride concentrations.

ENVIRONMENTAL CONTAMINANTS DIVISION

ORGANIC CONTAMINANTS IN LAKE ST. CLAIR

ECD STUDY NO. 210, DR. K.L.E. KAISER

Technical Operations Division assisted with the collection of sediment and water samples from Lake St. Clair and the lower St. Clair River in support of these projects June 18 - 21. A total of 72 stations, widely spread over the lake and river, were located with a portable Loran C navigation system. Water samples were collected by Van Dorn bottle from a depth of one metre. A 200 ml sample was required for the isolation of volatile organic contaminants, 100 ml was needed for microtox evaluation and 100 ml for yeast culture. Sediment samples were collected by mini-Shipek sampler wherever sediment composition permitted and taken to CCIW for contaminant analysis. Water was collected from all stations visited but sediment was not obtainable from 13 of them. The Lakeview Marina, operated by the City of Windsor was chosen as the base of operations. The lab facilities in a 5-ton truck operated by the Department of Fisheries & Oceans, parked dockside in support of a project led by Dr. M. Munawar, GLFRB, were used to process samples as they came in from the lake aboard the MonArk LAB IV.

SEDIMENT SAMPLING IN THE DETROIT RIVER

ECD STUDY NO. 211, DR. B.G. OLIVER

The relevance of this program was to find what portion of organic contaminants is available to the biological community and what portion has been effectively removed by association with sediments. Analysis of naturally contaminated and spiked sediments is carried out to study the desorption of contaminants from sediment into lakewater at various temperatures and to study the biological uptake of pollutants by oligochaete worms. Sampling was conducted at nine sites in May from Belle Island to Stony Island in the river. Ekman dredges were used to determine the composition of the river bottom. Unfortunately, only sand and fine gravel was found.

In October, additional sampling was conducted in an area ranging from the River Rouge to the Detroit River marker light in Lake Erie. At these sites, approximately 300L of water were centrifuged and extracted in the APLE sampler. An Ekman dredge was used to collect sediment samples containing oligochaete worms. The samples were to be later analyzed for PCB's and chlorobenzene compounds.

KAWARTHA 2,4-D STUDY

ECD STUDY NO. 221, DR. E. NAGY

This project attempted to identify the source of the herbicide 2,4-D--high levels of which have been found in Buckhorn Lake. Previous sampling of this lake indicates that the level is higher in May than in September.

In order to ascertain if the herbicide is local or the result of material movement through the system, an intensive sampling program has been set up in which water and sediment were sampled from 10 stations on the lake.

EFFECTS ON BIOTA

ECD STUDY NO. 223, J.L. METCALFE

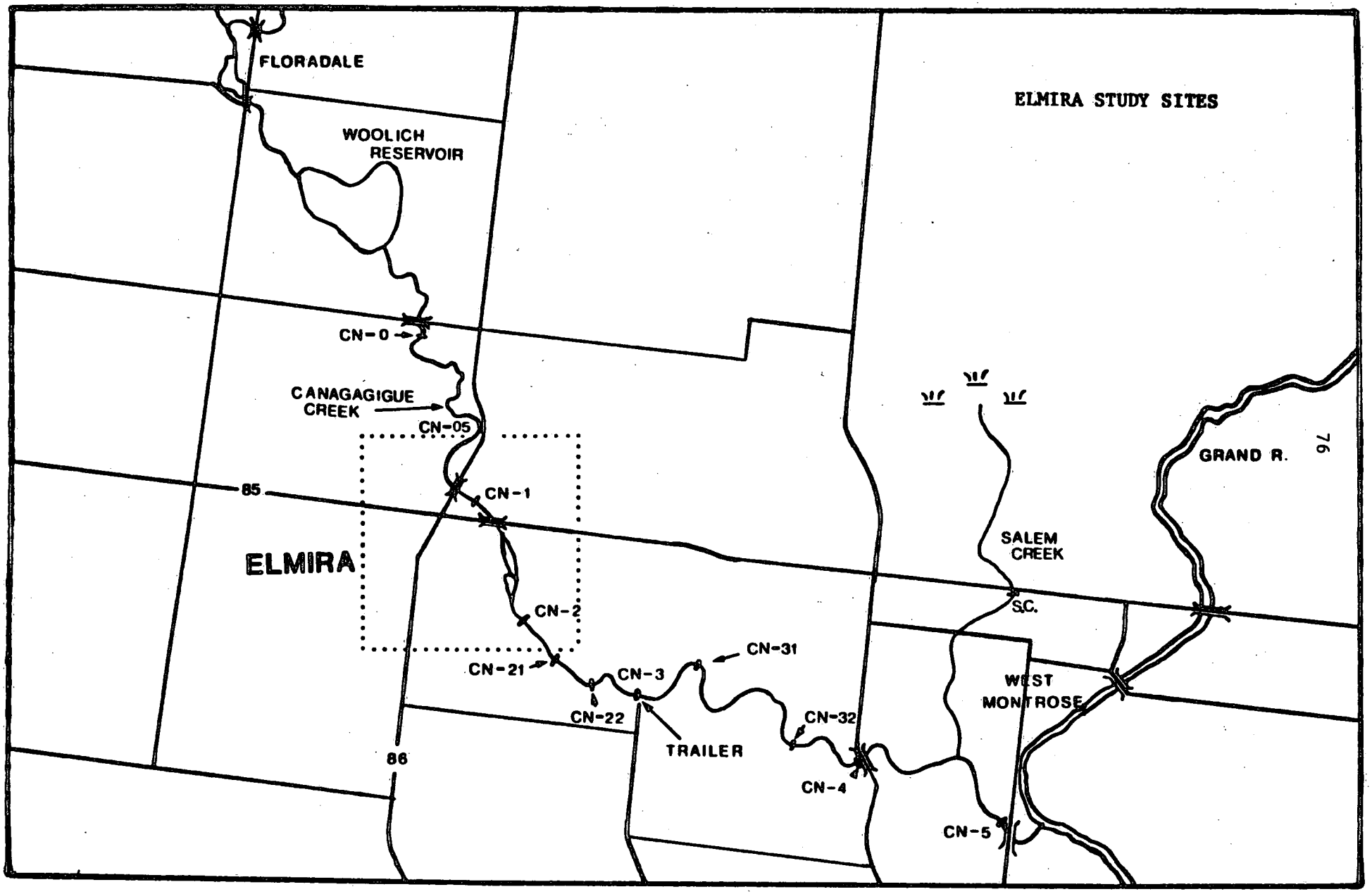
The objective was to continue studies aimed at establishing the potential of leeches as bioindicators of contaminants in freshwater systems by:

a) obtaining field collections of leeches and other sentinel species such as molluscs and crustaceans from several polluted locations (e.g., Canagagigue Creek, Detroit River, North Saskatchewan River) and comparing their bioconcentration potentials for various contaminants.

b) conducting controlled laboratory accumulation and depuration experiments with leeches to determine uptake rates and accumulation plateaus for contaminants with differing properties (e.g., chlorophenols, neutral OCs, organometallics).

Technical Operations support was used occasionally in the collection of leeches and other species.

A map of the sampling sites along Canagagigue Creek (Elmira) follows.


ELMIRA STUDY SITES
FLORADALE
WOOLICH
RESERVOIR
CN-0
CANAGAGIGUE
CREEK
CN-05
CN-1
85
ELMIRA
CN-2
CN-21
CN-3
CN-31
CN-22
TRAILER
CN-32
86
CN-4
CN-5
SALEM
CREEK
S.C.
GRAND R.
WEST
MONTROSE
76

RAIN SAMPLERS, LAKE SUPERIOR

ECD STUDY NO. 224, DR. W.M.J. STRACHAN

The purpose of this Study is to determine whether organics, such as toxaphene, lindane and PCB's are being deposited in the Lake Superior area by precipitation. Two (2) sites were selected for the collection of rainfall--one in Lake Superior Provincial Park, 30 km South of Wawa and the other on Caribou Island in Lake Superior. Caribou Island, which is located 60 km offshore, was selected because it is isolated from any local contamination and therefore will provide a more representative sample of precipitation over the area.

Both sites were equipped with 3 automatic organic rain samplers as well as a rain gauge. These organic rain samplers allow rainfall to pass slowly through a core of resin which captures any organic molecules present in the sample. These cores were collected on a regular basis and returned to CCIW for analysis.

EFFECT OF ACIDIC DEPOSITION ON THE TURKEY LAKES WATERSHED

ECD STUDIES 231 AND 235, DR. D.S. JEFFRIES

"Whole Watershed" studies allow determination of the rate and processes of acidification in the natural environment. Several such studies are underway in North America encompassing a range of existing and potential impact. One of these is the Turkey Lakes Watershed. It is located near Sault Ste. Marie, Ontario in an area of moderate acid deposition (rain pH = 4.5) and moderate geochemical sensitivity. The Turkey Lakes Watershed contains a "staircase" of 5 lake basins. Each lake is thoroughly sampled year round to define spatial and temporal changes in acidity. The lakes exhibit increasing acidity at higher elevation with the replacement of the "normal" bicarbonate anion chemistry by sulphate. This may be indicative of incipient acidification. Sharp declines in lake pH have been measured in Batchawana Lake during spring and there are no fish in this lake.

Changes in precipitation chemistry as it passes through the forest canopy and soils are being monitored. Stream flow and chemistry are monitored at selected locations year round. Large variations in the concentrations of many parameters are observed, sometimes with a seasonal pattern.

AVERAGE pH AND MAJOR ELEMENT CHEMISTRY
A COMPARISON

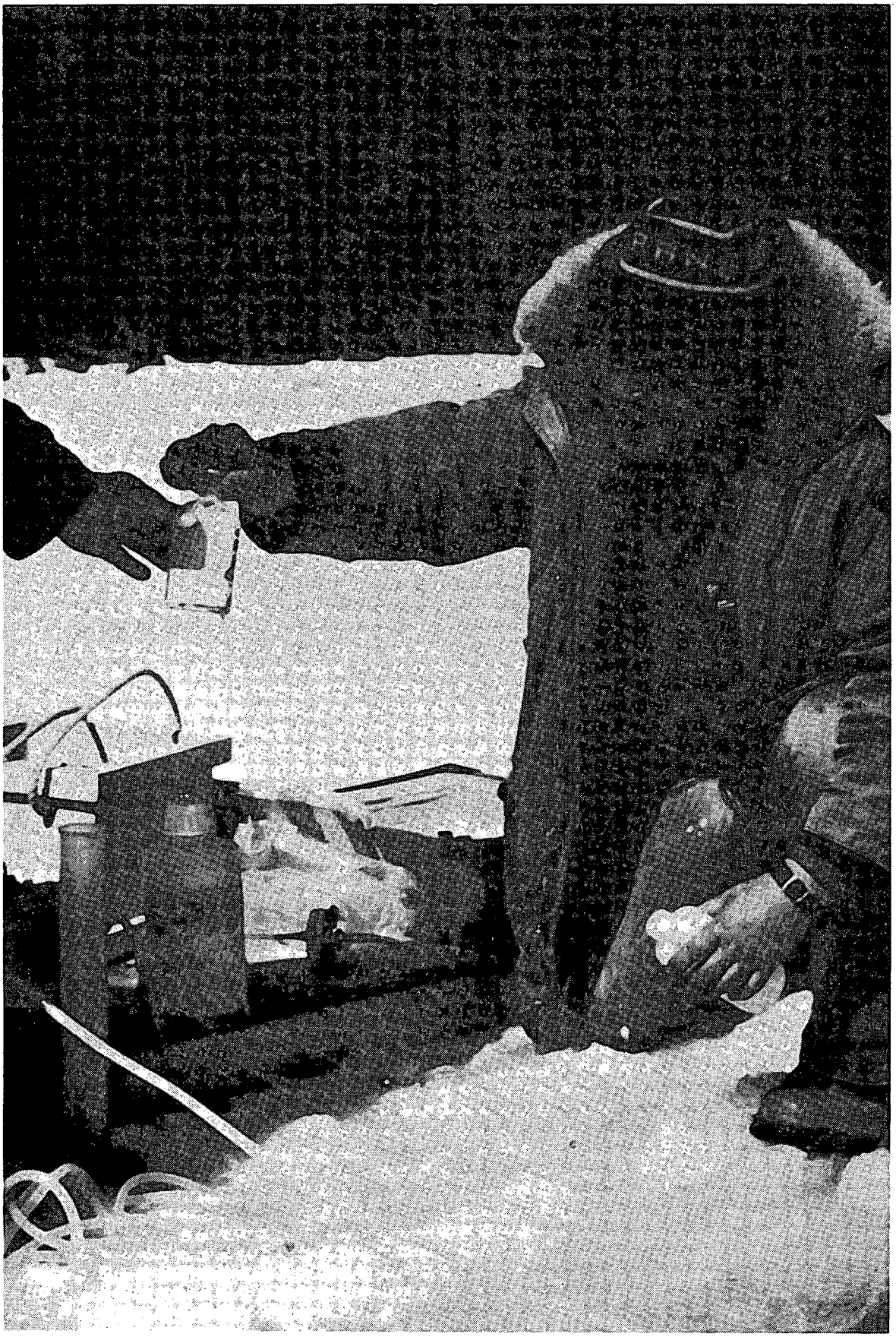
LAKE	pH	CALCIUM	MAGNESIUM	ALKALINITY	SULPHATE
		MILLIEQUIVALENTS/LITRE			
Batchewana	5.9	0.12	0.03	0.04	0.11
Turkey	6.6	0.27	0.04	0.19	0.13
Ontario	8.3	2.14	0.53	1.88	0.56

Meteorological parameters, precipitation and air chemistry are monitored throughout the year. Some timed samplers are unattended for periods of up to one week while others are examined on a daily basis.

Variations in snowfall across the watershed are monitored at 4 locations. Snowpack chemistry is measured at 12 sites. The accumulated acid in the snowpack is quickly lost during melting.

During spring melt, working conditions are very difficult; however, stream and lakewater quality must be monitored closely since acidity levels can change very quickly at this time.

FIELD ACCOMMODATION - "TURKY HILTON"



LAKE SAMPLING - TURKEY LAKES

NOVA SCOTIA

ECD STUDY NO. 236, A. MUDROCH

Two field trips to Nova Scotia were supported by TOD. Several small lakes in the Shubenacadie Watershed near Waverley were sampled using the lightweight corer, Ekman dredge, mini-Shipek and Van Dorn bottle. The sediment and water will be analyzed for arsenic and mercury. As well, clams and smaller benthic animals were collected for contaminant analysis. These contaminants are prevalent in the water and sediment as a result of gold-mining operations in the past.

TOXIC METAL DISTRIBUTION IN SEDIMENT

ECD STUDY NO. 236, A. MUDROCH

GOAL

The goal of this project was to determine partical size and geochemical composition effects on distribution of toxic metals in sediments collected from selected localities in Canada, chosen to represent various sources of contaminants (mining activities, disposal of waste, leakage from dump sites, contaminated sediments in harbours).

Yellowknife was one of the areas chosen in which to conduct this project. There are two very large gold mines in and near Yellowknife both of which use cyanide to extract the gold from the raw ore. Although this cyanide-treated ore (tailings) is kept in specified areas, some of these toxic chemicals manage to contaminate small lakes and streams which, in turn, flow into Yellowknife Bay--a part of Great Slave Lake.

TOD participation in this segment of Study No. 236 was to collect 5 cores from Yellowknife Bay, 5 cores from Back Bay and 5 cores from Kam Lake. All cores were subdivided and returned to NWRI. Each site (5 cores at each site) was cored in a triangular fashion; i.e., two cores were collected beside a marker situated in the lake then three more cores were collected from 15 - 20 metres away from the central marker in an imaginary triangular shape. This sample collection was to verify that the bottom sediments did not fluctuate in composition over a reasonably large area of the bottom.

PORT GRANBY

ECD STUDY NO. 241, DR. R.F. PLATFORD

This is an ongoing study at the Eldorado Nuclear Dump site near Port Granby. The Study has been looking into the leaching of radium-226, uranium and nitrates from the pond on the bluff through the soil into Lake Ontario as this is a possible potential radioactivity hazard to the public. Sediment samples and water samples were collected along the beach area in an effort to locate the permeable layer through which flow takes place. Technical Operations personnel assisted in a preliminary Dye Tracer Study and with the subsequent water and sediment sampling along the beach both on and offshore.

HYDRAULICS DIVISION

LITTORAL ZONE, PRINCE EDWARD ISLAND

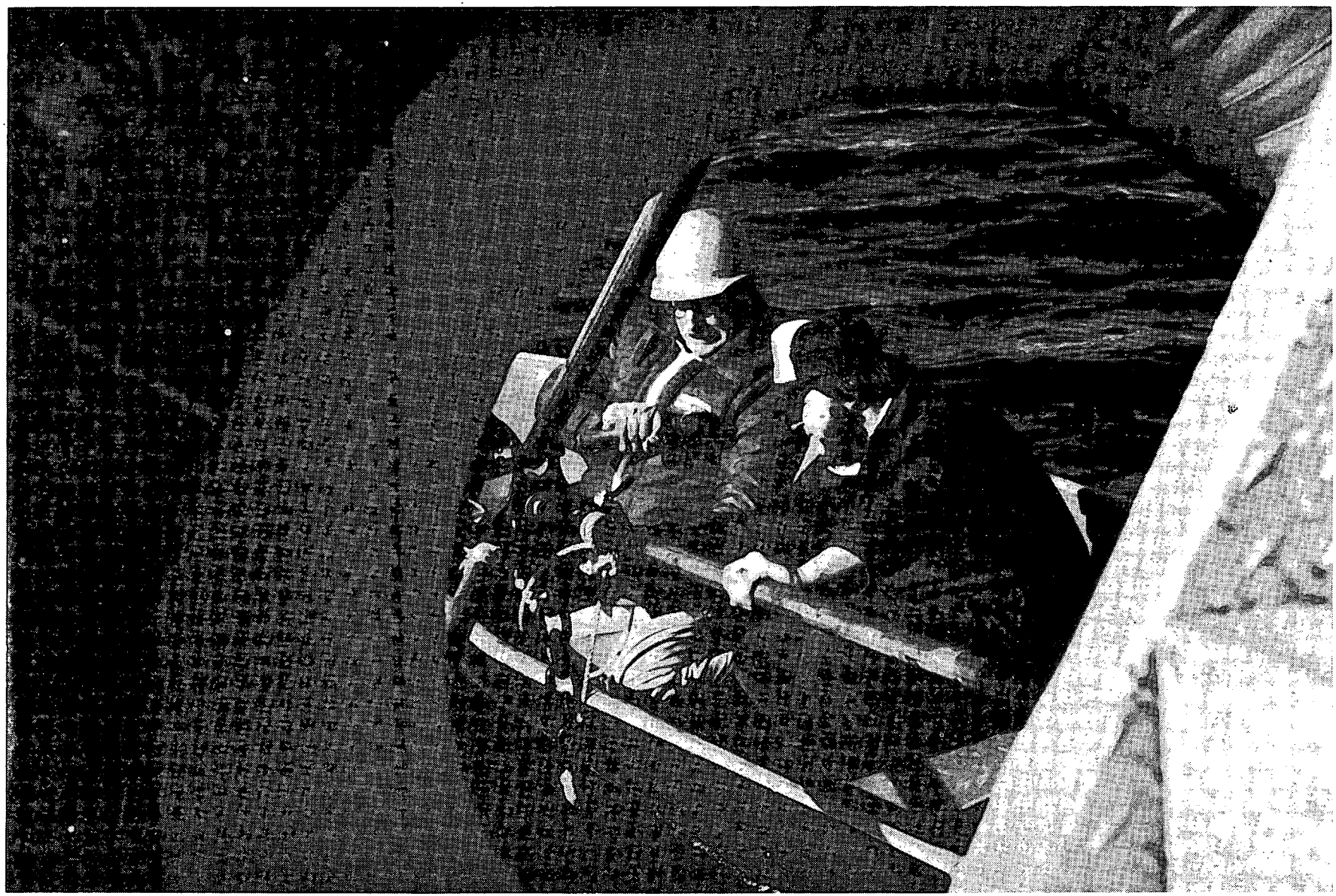
HD STUDY NO. 321, DR. M.G. SKAFEL

An important component of Dr. M.G. Skafel's "Littoral Zone Applied Studies" was the completion of wave statistics and direction for joint studies on coastal zones sponsored by NRC and supported by NWRI.

TOD installed and retrieved a meteorological buoy and a wave motion buoy off Stanhope on the North shore of P.E.I.

The systems were trucked to the site and installed late in September. The self recording instrumentation remained in place until retrieval in early November.

TOD was fortunate to receive excellent field support through staff from HD, P.E.I. National Park, NRC and the local fishing boat owner.



MET BUOY INSTALLATION - P.E.I.

SUBAQUEOUS EROSION

HD STUDY NO. 322, DR. N.A. RUKAVINA

The Study area is located offshore from Treens Road, Stoney Creek. The sediment in this area is glacial till clay. A thin sand layer is present from the shoreline to a point approximately 200 m offshore.

Seven stations were established in a line with the aid of a theodolite and a distomat. At each site, an anchor was driven into the clay till after a hole had been drilled with a hydraulic auger. A T-frame was then fastened to each anchor and electronic transducers and monitor cables were installed. Monitoring from a small boat gave measurements from the transducer to the sediment interface. Changes in these measurements can be used to determine erosional processes, particularly after an onshore storm.

As well, impact core samples were taken and a CATS mooring installed. Upward-pointing transducers were mounted on the mooring to determine wave height.

FRAZIL ICE MEASUREMENT

HD STUDY NO. 340, DR. G. TSANG

In co-operation with Hydro-Quebec, a frazil ice measurement site was selected behind the City of Montreal water intake building at the Lachine Rapids. The study site co-ordinates are as follows: Lat. 44° 24' 53" N., Long. 78° 37' 51" W.

During the month of December, a Hydro-Quebec construction crew erected a 70 x 40 ft. fenced compound and supplied electrical power to the site. NWRI/TOD transported a 20 ft. scientific trailer to the site and erected a 6-metre tower on the riverbank of the Lachine Rapids with the co-operation of Hydro-Quebec construction crew. A meteorological station was instrumented with wind speed and direction, air temperature, relative humidity and two water temperature sensors. Global solar and net radiation sensors were attached to the meteorological tower. The scientific trailer housed strip chart recorders, solar integrator recorder, net radiation nitrogen pumping system, MET recording can and frazil ice measurement instrumentation and provided a heated area for personnel to work in some degree of comfort. At the request of Hydro-Quebec, for real time meteorological data, a Bristol Aerospace Hydro MET Data Collection Platform (DCP) was incorporated into the installation. This DCP was loaned by Water Survey Canada, Hull, Quebec and MET sensors loaned by AES. The data collection platform uses the GOES satellite system and transmits wind speed and direction, air temperature and relative humidity along with some housekeeping parameters. Data is available via a phone line terminal from Washington, D.C.

TOD rigging crew provided a portable battery-operated winch/boom for profiling of the frazil ice sensor from shore.

Hydro-Quebec provided 24-hour security of site with their own security police staying at the scientific trailer on a three-shift operation.

ICE JAMS AND FLOODING

ON THE THAMES, GRAND AND MOOSE RIVERS

HD STUDY NO. 345, DR. S. BELTAOS

The purpose of this Study was to better understand and predict ice jams, their destructive force, flood potential and their capacity to do damage to buildings and property. During breakup on both the Grand and Thames rivers, photographs were obtained of ice movements and high water areas caused by ice jamming. Current measurements were also obtained in some areas. When water levels had returned to near normal, photographs of the high water areas were examined in the field and the actual location marked where the high water mark had been. Elevations of these high water marks were then obtained by working from nearby benchmarks or temporary benchmarks where the elevation was known. A prototype mount for a solarimeter which will be used on both the Grand and Thames rivers was tested on a bridge over the Grand River near Marsville.

The Moose River was chosen as a study situation since it flows in a northerly direction, in contrast to the Thames and Grand rivers. Two field trips were made to the Moose River--January 15 - 22 and January 31 - February 8. The Study area was a 30 kilometer stretch of river up and downstream of Moose River Station, approximately 70 kilometers upstream of the Town of Moosonee. Six temporary benchmarks had been placed above the river bank during a reconnaissance trip the previous fall to mark the location of the six transect lines to be run across the river. Holes were drilled through the ice at 60-metre intervals on these transects and ice thickness and river depth data was collected. Nearshore, the holes were located closer together, at 3-metre intervals. A profile of the river at each transect was

produced using the water depth measurement and by levelling from the temporary benchmarks to the water's edge and then from the water's edge on the far shore to the top of the bank. The temporary benchmarks were all tied in with the benchmark on the railway bridge at Moose River Station by the four-man team using snowmobiles, two rods and an automatic level.

FRAZIL ICE RECORDER

HD STUDY NO. 352, J.S. FORD

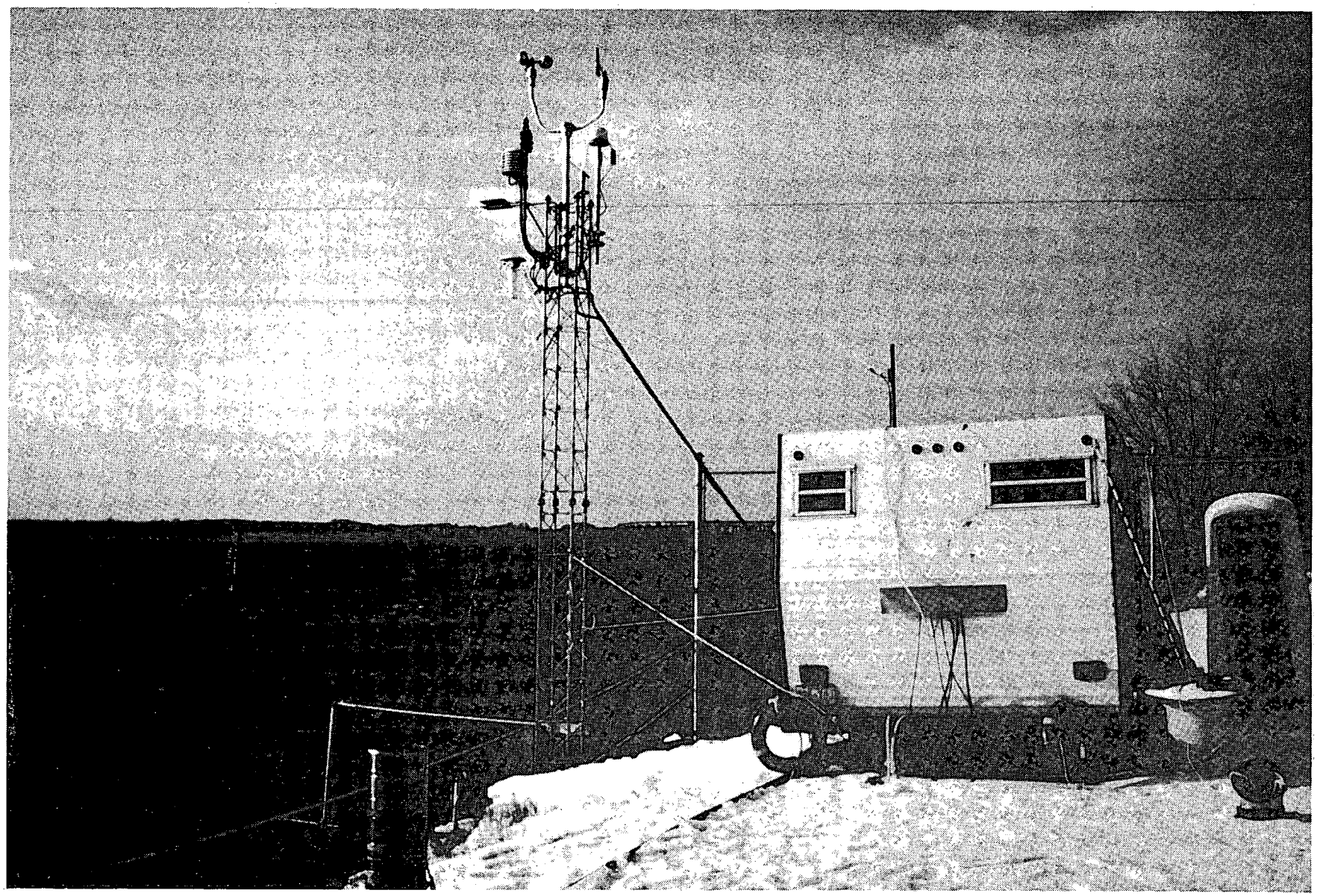
GOALS

To install and evaluate the frazil ice recording head under field conditions.

The frazil ice recording head was installed during mid-August at Durham Bridge, New Brunswick (Nashawaak River) 10 km North of Fredericton. The head was located midstream and 25 m downstream of the bridge. It is resting in a level position in 2 m of water. The electrical cable was buried in the bottom (15 - 30 cm) and 30 cm deep from the waters edge to the Water Survey of Canada Gauge Station. Two 1/4 in. stainless steel safety wires were attached to the base along with four lead pigs (80 lb. each).

Water Survey of Canada personnel at Fredericton will conduct continuity tests during the winter. Next summer, a TOD diver team will return to the site to retrieve the system and assess any damage. This information will be used for future design changes.

A frazil ice recording head was installed in Bronte Creek during January to March '85 to assess the performance of the electronics system.



METEOROLOGICAL STATION - LACHINE

AQUATIC ECOLOGY DIVISION

TRACE METALS AND ALUMINUM IN INTERSTITIAL WATER OF ACID LAKE SEDIMENT

AED STUDY NO. 405, DR. J.O. NRIAGU AND H.K.T. WONG

Plastic interstitial water samplers (peepers) were installed in four softwater lakes in Sudbury, Ontario and Kejimkujik National Park, Nova Scotia to investigate trace metals and total aluminum at the sediment/water interface using the dialysis technique.

SUDBURY AREA

Wavy Lake and Nelson Lake were selected for the Sudbury area field sites. Sounding surveys were conducted on each lake to determine station selection. Four stations were established in each lake where the bottom afforded a gradual slope from shore to the deep hole.

WAVY LAKE		NELSON LAKE	
Station 1	70'	Station 1	40'
Station 2	73'	Station 2	45'
Station 3	88'	Station 3	95'
Station 4	95'	Station 4	88'

Three peepers were installed by divers at each station (two for metals analysis and one for pH measurements). The peepers were refurbished by divers as follows:

WAVY LAKE		NELSON LAKE	
May 23	Installed	May 24	Installed
June 21	Retrieval	June 20	Retrieval
June 21	Installed	June 20	Installed
July 5	Retrieval	July 4	Retrieval

Launch support for the Sudbury area was provided by the CSL PACER which required a 4 x 4 vehicle for launching and retrieval.

KEJIMKUJIK AREA

The two lakes selected for this project were Kejimkujik Lake and Mountain Lake located in Kejimkujik National Park, Nova Scotia.

Sounding surveys were completed near the deep holes of each lake, searching for station positions on a gradual slope from shore to the deep hole.

KEJIMKUJIK LAKE		MOUNTAIN LAKE	
Station 1	19.5 m	Station 1	6 m
Station 2	7.0 m	Station 2	16.5 m
Station 3	5.0 m	Station 3	12 m
Station 4	19.0 m	Station 4	6.5 m

Three peepers were installed by divers at each station (two for metals analysis and one for pH measurements). The peepers were refurbished by divers as follows:

KEJIMKUJIK LAKE		MOUNTAIN LAKE	
August 22	Installed	August 23	Installed
Sept. 18	Retrieved	Sept. 19	Retrieved
Sept. 18	Installed	Sept. 19	Installed
Oct. 17	Retrieved	Oct. 16	Retrieved

Launch support was provided by CWS Halifax with two cartoppers and Parks Canada gave permission for the use of a large "Smoker Craft" for Kejimkujik Lake.

THE PALEOLIMNOLOGY OF SELECTED LAKES

IN SOUTHERN ONTARIO AND SASKATCHEWAN

AED STUDY NO. 406, DR. L.D. DELORME

It is assumed by most people that water quality problems are a recent phenomena and entirely caused by man. There is very little historical water quality data available, but by studying the bottom sediments of selected lakes, it may be possible to determine whether water quality problems existed in the past.

Support to this Study involved the taking of bottom cores using a modified lightweight corer with diver assistance. These cores were then extruded immediately at 1 cm intervals and samples returned to CCIW for analysis of carbon and fossil content.

During the 1984 field season, cores were taken from 3 lakes in Southern Ontario and 3 lakes in Saskatchewan. The Ontario lakes visited included Whitaker Lake (Avon), Little Lake (Vanessa) and Pinehurst Lake (Paris). The Saskatchewan lakes visited included Clear Lake (170 km South of Regina), Stoney Lake (Humboldt) and Morin Lake (100 km Northeast of Prince Albert).

HARBOUR SEDIMENT

AED STUDY NO. 423, DR. L.L. KALAS

The need to standardize the method of determining the concentration of contaminants in the aquatic environment has led to the search for standard study organisms. Since the concentration of contaminants in fish tissue varies from one muscle group to another and one organ to another, Dr. Kalas is attempting to use tubifex as a study organism.

Sediment was collected to provide a sample of tubifex worms large enough to do a hexane extraction of PCB's from their tissue.

On August 27th, Dr. Kalas and a technician left Burlington with a technologist from TOD to sample Oshawa Harbour using an Ekman dredge from a cartop boat. Twelve Ekman grabs were taken from the middle of the harbour and were rinsed through a plankton net. The resulting debris containing the worms was taken for PCB analysis. Three additional grabs were made--one off the nearby beach, one in a small creek entering the harbour and another in a narrow channel on the Eastern side of the harbour, to relate species composition to the sample taken from the middle of the harbour basin. A 4-litre surface water sample was collected. Dr. Kalas and a technologist from TOD sampled Toronto Harbour in a similar manner on August 28th. Eleven Ekman grabs were taken for PCB analysis and a 4-litre surface water sample was collected.

BIOAVAILABILITY IN THE QU'APPELLE VALLEY

AED STUDY NO. 428, DR. P.G. MANNING

The Qu'Appelle Valley lakes are highly eutrophic, reflecting the bioavailability of phosphorus. In many lakes, the chemistry of phosphorus, and hence its bioavailability, is strongly associated with iron. In sulfide-rich sediments however, iron-phosphorus interactions are severely weakened. Sediment cores were collected in the 4 "fishing" lakes: Pasqua, Echo, Mission and Katepwa. On July 16 and 17, these lakes were visited by Dr. P.G. Manning and K.J. Hill and a total of 5 cores were taken from the bottom sediments. A modified KB corer fitted with 3" benthos core tubes approximately 1.5 m long was used to collect the cores and these were immediately extruded onshore at 1 cm intervals for later analysis at CCIW.

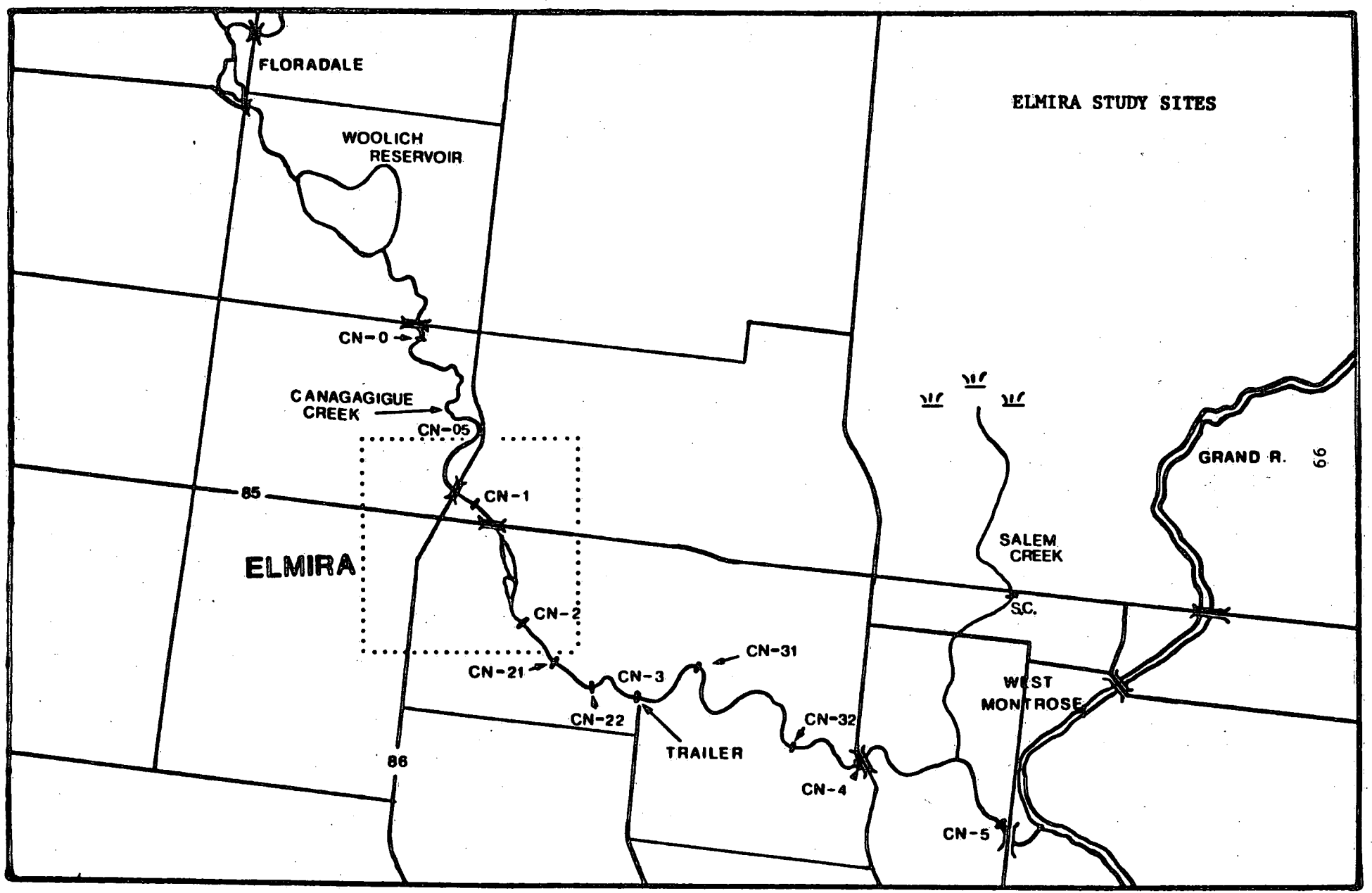
ELMIRA STREAM STUDY

AED STUDY 432, DR. B.G. BROWNLEE/G.A. MacINNIS

The purpose of this Study was to continue to obtain information on sources and fate of ammonia-nitrogen in highly eutrophic or heavily polluted streams in order to improve the ammonia model for a polluted stream. Ammonia--being the central species in the aquatic nitrogen cycle, can be toxic to aquatic life at high concentrations and at higher pH. The study of ammonia cycling will lead to a better understanding of the fate of this potential toxicant in the aquatic system.

Canagagigue Creek in Elmira was used again as the study site. The creek is an ideal study site as it receives effluent from the sewage treatment plant in Elmira. The plant processes both municipal and industrial wastes which results in a loading of nutrients and synthetic organic compounds. The creek offers an excellent opportunity to study the recovery processes as the water quality is degraded below the treatment plant outfall but recovers markedly by the time it enters the Grand River. Therefore, it provides a perfect test-ground for the ammonia model being developed.

The field season ran from early May to early November. The lab trailer was utilized again at CN-3 as the main site. Sampling and monitoring were carried out for 1 week each month. During this time, conductivity, pH, dissolved oxygen, water temperature and surficial bottom sediment temperature were constantly monitored in the creek at CN-3. Solar radiation was also recorded throughout the week. At CN-4, only dissolved oxygen and water temperatures were monitored. Water quality profiles were carried out at both high and low-flow


ELMIRA STUDY SITES
FLORADALE
WOOLICH
RESERVOIR
CN-0
CANAGAGIGUE
CREEK
CN-05
CN-1
85
ELMIRA
CN-2
CN-21
CN-3
CN-31
CN-22
TRAILER
CN-32
86
CN-4
CN-5
SALEM
CREEK
S.C.
GRAND R.
WEST
MONTROSE
99

rates to determine if flow rate effects the rate of disappearance of the organic compounds in the water. Sediment tubes were again installed at 6 sites along the creek and refurbished every month.

As in previous years, the lab trailer, water supply and hydro availability were essential to the success of the sampling effort. This was the end of the Study and these facilities will not be re-installed in 1985.

LAKE RESTORATION

ECD STUDY NO. 437, T.P. MURPHY

During the past three field seasons, Technical Operations Division has supported T. Murphy's Study in several areas of British Columbia.

The support to this project has been varied from the addition of chemicals to Black and Frisken lakes; the water sampling of several lakes throughout the southern interior of B.C.; the coring of several lakes; and the installation of MET stations at Frisken, Green and Mahoney lakes.

Again this year, support was quite diversified. Frisken Lake was limed and sampled. Chain Lake was to be sampled, sounded and partially dredged to test the theory of introducing a man-made thermocline into a lake to sustain fish stock.

PURPOSE

1. To evaluate the effect of colloidal and dissolved organic substances on calcite stability and phosphate availability
2. To observe the long-term effect of lime application upon phosphate solubility
3. To determine if an application of lime in late May can prevent the formation of blue-green algal blooms
4. To determine both the immediate and long-term effect of lime application upon fish
5. To dredge a small area of Chain Lake to form man-made cold water depression at the bottom of the lake

WORK PLAN

There were to be two intensive periods for which TOD support was required: The first period from May 14 to June 1 and the second

from September 17 to September 28. The first period was spent transporting a vehicle and equipment from Burlington to Frisken Lake and sampling and liming the lake with 16 metric tonnes of hydrated lime. Before liming, the lake was sampled every 6 hours for 48 hours. This was done to develop diurnal oxygen curves, the zooplankton and phytoplankton levels and the phosphate concentrations. After liming, the lake again was sampled for a 48-hour period to compare the above physical and chemical parameters for effects of the addition of the lime.

The second intensive period from September 17 - 28 was cancelled due to the lack of total agreement by all agencies involved. The second intensive period was to concentrate solely on Chain Lake. However, because of the cancellation, Chain Lake was sampled and sounded only. No dredging of any kind was done.

JACK LAKE

AED STUDY NO. 438, DR. D.R.S. LEAN

Jack Lake:	Latitude 44° 41' 20" N.
	Longitude 78° 02' 48" W.
Instrument:	Eppley Model PSP Radiometer
Recorder:	Campbell Scientific CRS Integrator

Jack Lake is situated about 62 km North Northeast of Peterborough on the fringe of the Canadian Shield. The lake is multi-basined with shallow channels separating the bays. The water chemistry is similar in each of the bays but differences in morphometry contribute to differences in oxygen consumption. A lab trailer and a boat are permanently on this site in support of Study No. 438.

Field trips were made by Technical Operations personnel to Jack Lake mainly to collect solar radiation data. The schedule was to visit the site every 3 weeks to maintain and collect the data from the solar radiation unit and also to monitor the meteorological station at Dorset (Study No. 805). With the exception of one period, the solar radiation data was successfully obtained during the 1984 field year.

It is to be noted that the Global solar radiation is the measurement made at Jack Lake. And the Global solar radiation is defined as the downward direct and diffuse solar radiation as received on a horizontal surface from a solid angle of 2 pi. Light measurements are essential to the ongoing scientific studies at Jack Lake. The following scientific papers are cited as reference:

1. Nutrient status of metalimnetic phytoplankton peaks: By Pick, F.R., Lean, D.R.S. and Nalewajko, C. (1984).

2. Chemical and Radiotracer measurements of phosphorus uptake by lake plankton: Lean, D.R.S. and White, E. (1983).

BUCKHORN LAKE MILFOIL STUDY

AED STUDY NO. 477, D.S. PAINTER

During the summer and fall of 1984, TOD supported S. Painter's monthly sampling program at Buckhorn Lake. Four one-day trips were made--one trip each in the months of July, September, October and November.

Sampling of both the control and harvested areas of the lake was undertaken. On all of the trips, twenty-five milfoil plants were collected by a diver from each area. Diver hand-cores were also collected. On the first three trips, five diver hand-cores were collected from each area. On the final trip, four diver hand-cores were collected from each area. All the cores were subsectioned in the field.

On the field trips in July, October and November, bulk sediment was collected. An average of three coolers were filled with sediment using an Ekman dredge.

Finally, in November, a visual survey of the milfoil population of the entire lake was completed. The bulk of the survey had previously been completed by S. Painter. The small portion which remained was completed in less than an hour.

AQUATIC PHYSICS AND SYSTEMS DIVISION

DPDX EXPERIMENT

APSD STUDY NO. 512, F.M. BOYCE

The main purposes of this experiment were, first, statistical and numerical studies of alongshore current fluctuations to establish that knowledge of alongshore pressure gradients is essential to eliminate uncertainties in existing models and to determine the momentum balance in the coastal zone. Second, the pressure gradients of interest are equivalent to surface slope in the order of 10^{-7} with characteristic horizontal scales of less than 10 kilometers, thus requiring observations of water level differences well below 1 millimeter. This cannot be accomplished by two independent pressure sensors and hence there is a need for direct measurement of relative pressure differences. An experiment of this nature was conducted in the ship canal between Hamilton Harbour and Lake Ontario during the period January 31 to March 8, 1983. The site chosen for this experiment was offshore Cobourg Harbour on the North shore of Lake Ontario (see figure 1).

Installation of the sensor hoses and recording equipment was done during the week of September 17 to 21. Two sensor hoses, comprised of 1/4" stainless steel cable and 3/8" ID plastic tubing taped together, were laid on the bottom of the lake leading Southwest and Southeast from the Cobourg Lighthouse. Both sensor hoses terminated at a marker approximately one kilometer from the lighthouse (see figure 1). The sensor hoses were weighted to the bottom by taping building bricks to the sensor hose every 1 m in the nearshore areas and every 2 to 3 metres in the offshore area. The inshore end of the sensor hoses were fed through 12 m of 2" plastic pipe and 9 m

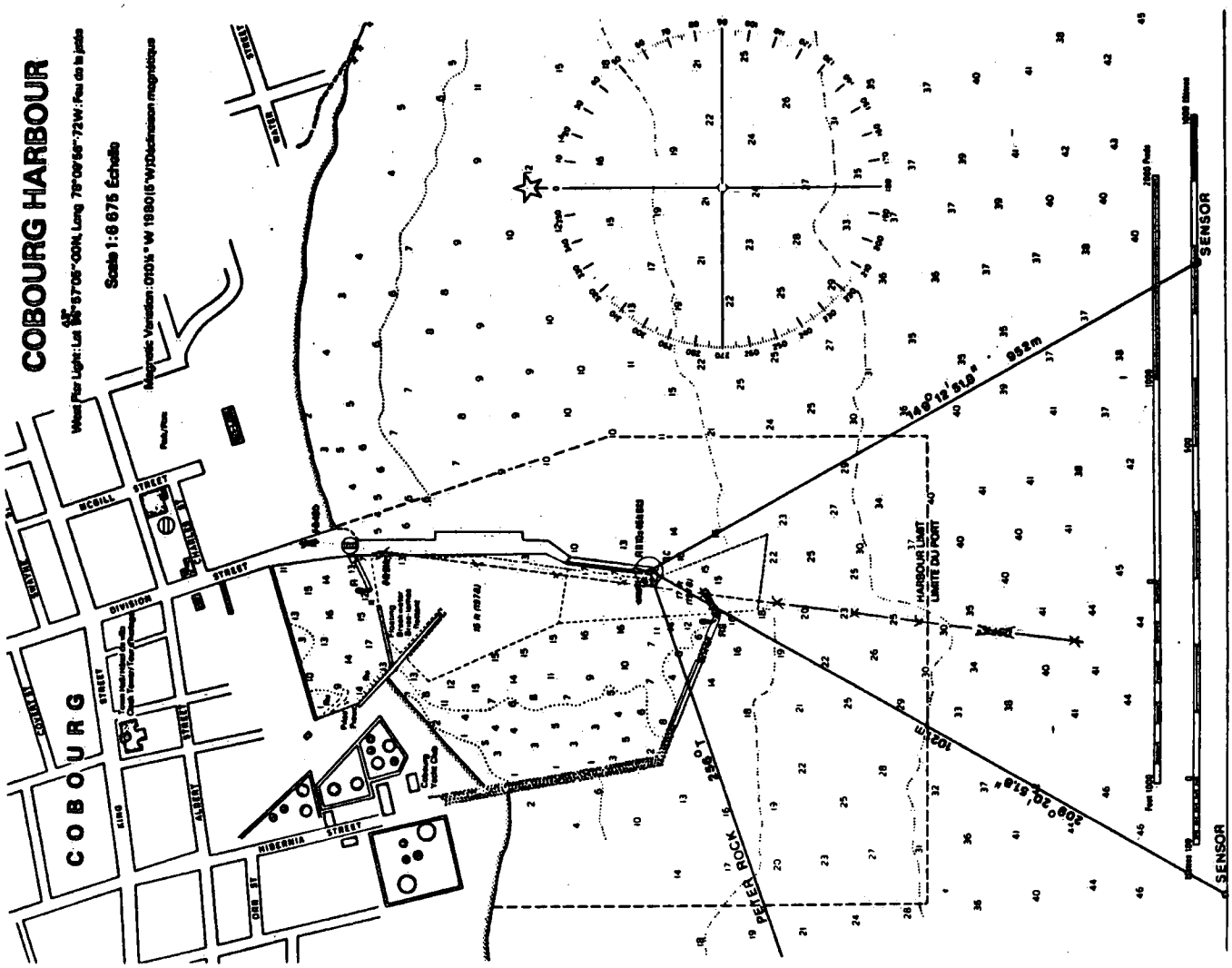


Figure 1

SHORE END OF DPDX LAYOUT

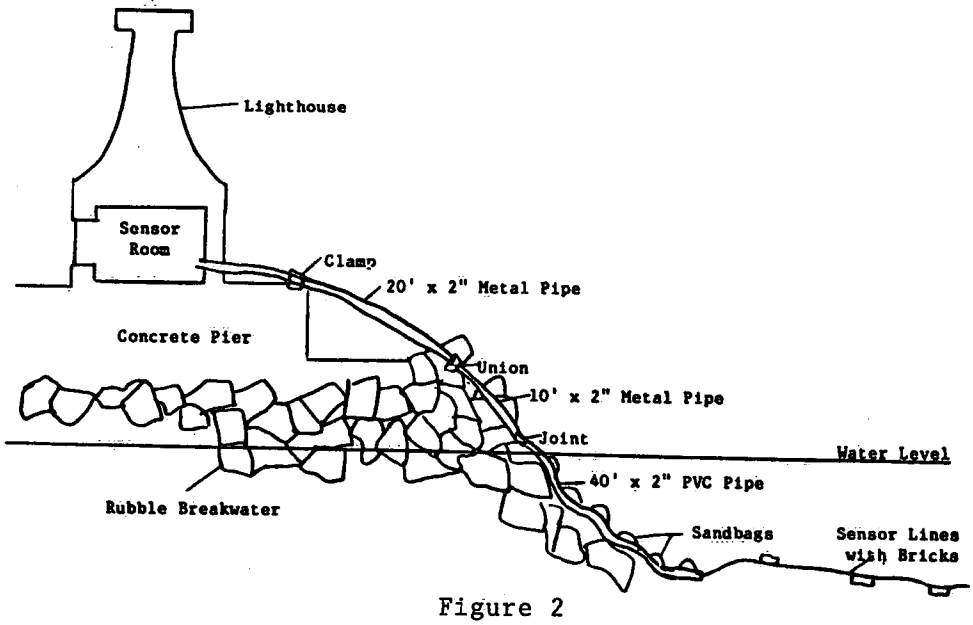
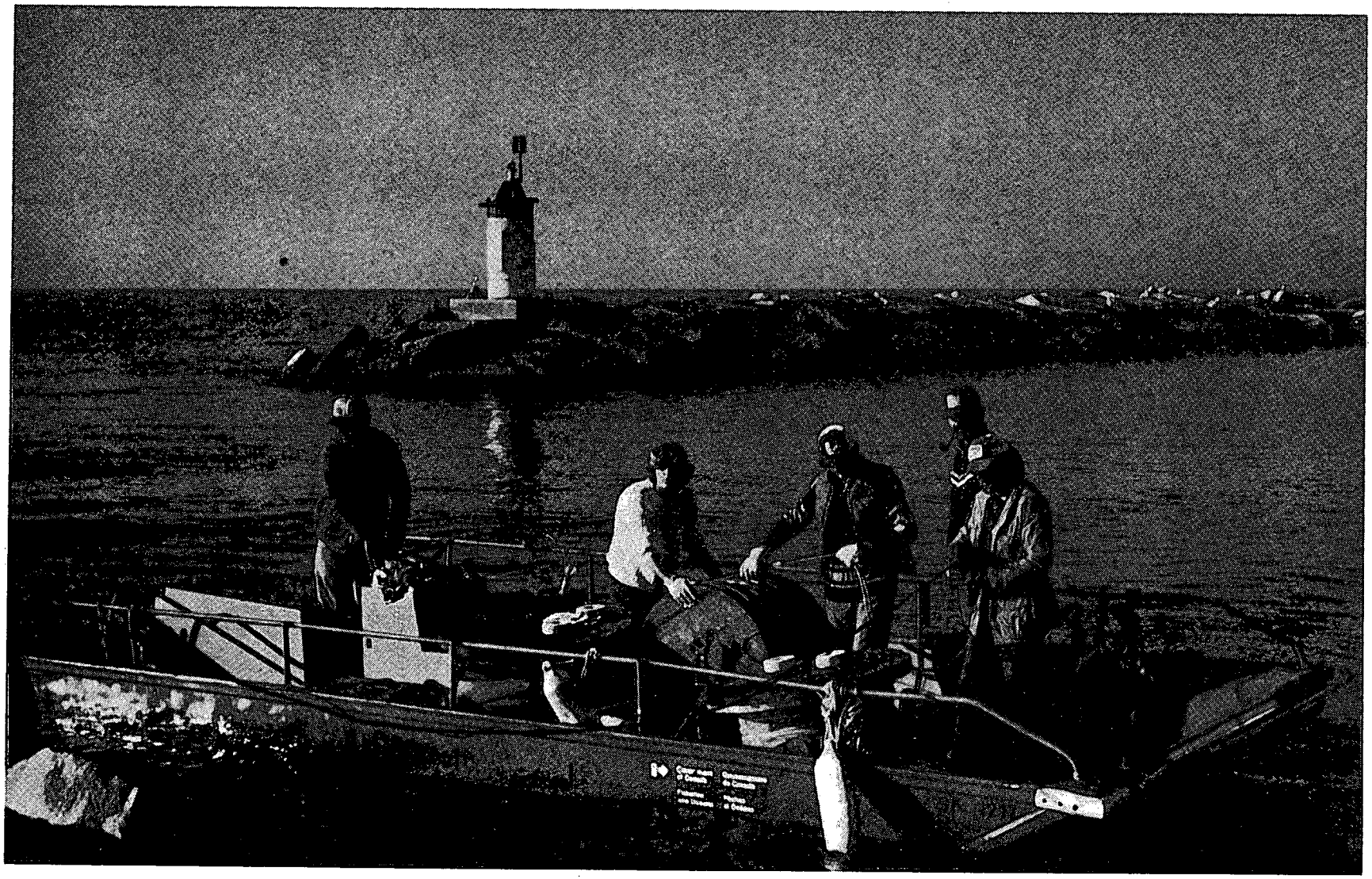


Figure 2



DPDX - COBOURG

of 2" metal pipe which was attached to a pipe leading through the South wall of the lighthouse (see figure 2). The sensor hoses were then attached to the sensor boards with a strip chart recorder and a tape recorder attached.

Divers weighted the outer 2" plastic pipe with concrete-filled bags and installed the sensors on the outer end of the sensor hoses. Divers also inspected the total length of both Eastern and Western sensor hoses while de-gassed water spiked with red rhodamin dye was pumped through the hose at low pressure; no leaks were found.

The system operated from September 21 until November 26 with no problems. During the week of November 26 to 29, all equipment was removed from the lighthouse and the sensor hoses removed from the lake.

NIAGARA RIVER PLUME

APSD STUDY NO. 514, DR. C.R. MURTHY

The Niagara River mouth has been identified as a critical and serious source of toxic contaminants to Lake Ontario. The purpose of this Study was to study the physical parameters of current and temperature during three experiments timed in conjunction with the Persistant Organic Contaminants (Fox, ECD 220) cruises onboard the CSS LIMNOS.

The experiments were conducted from May 28 - June 1, July 16 - 20 and September 24 - 28. The mini-ranger positioning system was used with transponders located at Pt. Weller Light and the Niagara River Lighthouse. The drogues (10) were released in the river mouth each morning and tracked until dusk, using CSL PACER.

During the drogue tracking, CSL SHARK conducted EBT surveys using a twenty-five square mile grid.

Mr. K. Miners of APSD kept in close contact with Dr. M. Fox onboard CSS LIMNOS to keep him apprised of the results of the drogue and EBT surveys.

ANALYTICAL METHODS DIVISION

LEGIONELLA

AMD STUDY NO. 622, B.J. DUTKA

Over the past few years, NWRI Microbiology Laboratories staff have been attempting to map the Legionella bacteria distribution across Canada. This year will complete the National Survey by the collection of water from Northern Ontario to British Columbia.

Technical Operations support to this project was to deliver the incubator truck (83-131) to Vancouver by mid-June and to collect samples from any open hot spring in the Fall. The truck was delivered to Vancouver by the end of May and left at NWRI Pacific & Yukon Detachment for pick-up by B. Dutka.

Samples from Radium Hot Spring and Banff Hot Spring were collected in September. When the samples were collected, the temperature of the water was recorded. If samples were collected from a public use area, they were always collected from the source prior to any possible contamination and from the outlet after any contamination had occurred. The samples were then stored at $4^{\circ}C$ until analysis.

ACIDIFICATION AND HEAVY METAL INTERACTIONS IN MICRO-ORGANISMS

AMD STUDY NO. 627, DR. S.S. RAO

PURPOSE

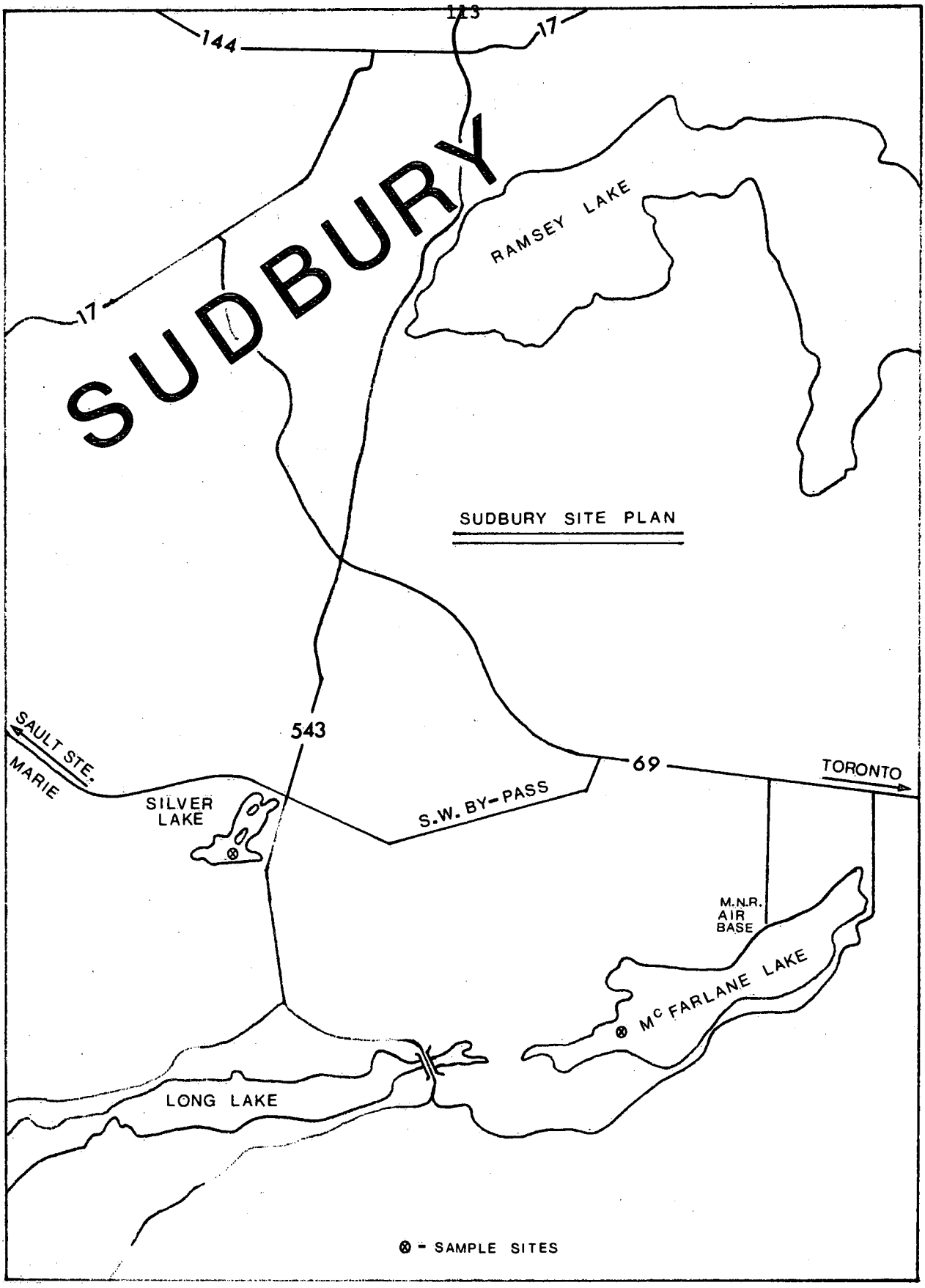
This Study is required to provide high priority data to the LRTAP Program to fill information gaps in the area of environmental contaminants. The effects of low pH on the cell physiology of microbes will be studied and how the role these microbes play in mobilization of heavy metals and selenium changes in the presence of low pH will be assessed. The role of selenium in the reduction of heavy metal toxicity will also be studied.

Sediment cores from acid stressed and non-acid stressed lakes will be analyzed for microbial population composition, sediment activity and heavy metal content. Laboratory experiments will be conducted to assess the effects of low pH on metal release from sediments and acid stress on microbial populations and activity. The electron microscope will be used to ascertain changes in cell physiology and toxic metal affinity to microbes caused by acid stress.

McFarlane and Silver lakes in the Sudbury area--the sites of last year's investigation, were again chosen for sampling as examples of acid stressed lakes.

SAMPLING REQUIREMENT

A total of six KB cores from the deep hole were required from each lake. One core was sampled for pH and Eh at every centimeter of its length. Two cores were subdivided at every centimeter down to 10 cm and every two centimeters from there to the bottom. Subsections of the same depth were then combined. The remaining three cores were similarly subdivided and combined.


144
113
17
17
SUDBURY
RAMSEY LAKE
SUDBURY SITE PLAN
543
69
TORONTO
SAULT STE. MARIE
SILVER LAKE
S.W. BY-PASS
M.N.R. AIR BASE
Mc FARLANE LAKE
LONG LAKE
⊗ - SAMPLE SITES

Three surface water samples were collected from each lake. A 1-litre sample for Microbiology was obtained and refrigerated and a 500 cc sample for water quality analysis was collected and preserved with 1 ml of a 50:50 solution of nitric acid and distilled water. A 125 cc water sample for selenium analysis was also required.

SUPPORT REQUIREMENT

The sampling program required the efforts of two technologists from Technical Operations Division for the periods:

April 30 - May 4

June 4 - June 8

July 9 - July 13

August 20 - August 24

September 24 - September 28 (cancelled due to government travel freeze)

November 19 - November 23

A van and a trailered small boat, such as the STARCRAFT, with a 7.5 hp motor and a KB corer with extruder were required to collect and process the samples.

This is an ongoing Study which probably will run through the 1985 season.

TECHNICAL OPERATIONS DIVISION

INTERCONNECTING CHANNELS

WOLFE ISLAND WATER QUALITY STATION

TOD STUDY NO. 803

A new intake pipe was installed at the Wolfe Island Water Quality Station on the St. Lawrence River. The new pipe was installed parallel to the old one and both intakes are six feet apart. The inshore portion of the old pipe was replaced and both intake lines were attached to a double submersible pump. The pumps were located in 25 ft. of water depth to minimize ice damage. The inshore pipe was buried under rocks. This Water Quality Station now has a complete back-up system.

PARRY SOUND

TOD 805, DR. M.G. JOHNSON, GLFRB

Field support to the Owen Sound Field Office of GLFRB aids in the study of the effects of long range airborne pollutants on aquatic ecosystems. Several lakes in the Shawanaga and Seguin watersheds were sampled for water chemistry, fish population density and contaminants. This was achieved by working with GLFRB staff from small boats and canoe as well as a chartered helicopter for the remote lakes. All field work and sample preparation was conducted from a lab trailer situated at the OMNR base, Parry Sound.

As a continuation of the Georgian Bay and North Channel Benthic Survey which began in 1980, core samples were collected from major bays and inlets of Georgian Bay and Manitoulin Island.

The project was supported for the seven-week period from July 3 to August 17.

CANADIAN WILDLIFE SERVICE

TOD STUDY NO. 803, DR. V.W. WESELOH

Technical Operations again supported the Canadian Wildlife Service (CWS) field program on the Great Lakes.

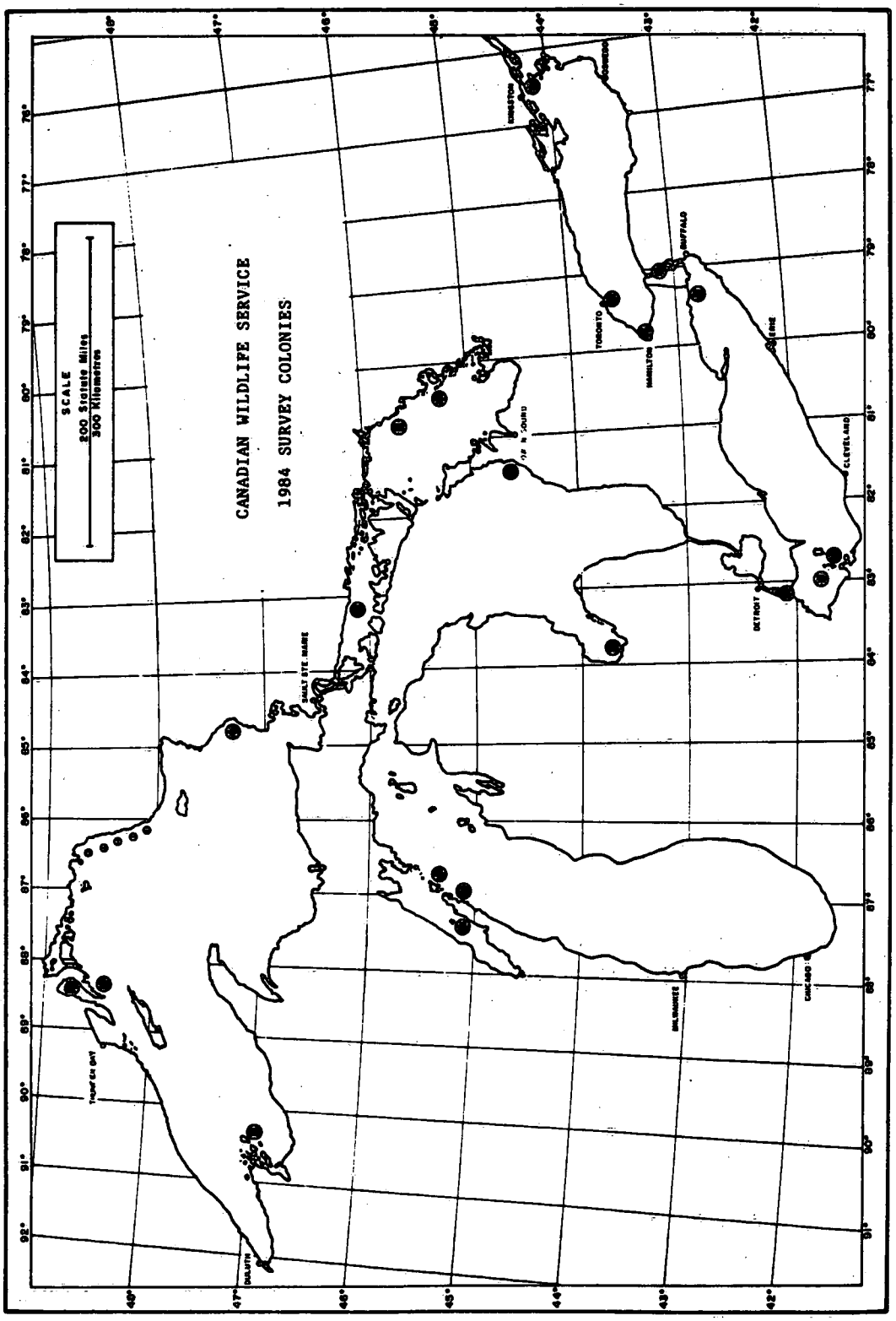
PURPOSE

To determine or aid in the determination of the following factors as they may constitute biological effects of toxic chemicals in Herring Gulls at several nesting colonies throughout the Great Lakes. Also, to assess the reproductive success of Herring Gull colonies in all of the Great Lakes, Lake of the Woods, Niagara River and Detroit River.

a) egg collections to determine levels of organochlorines at 15 locations on the Great Lakes
b) population levels of Herring Gulls from the above colonies
c) to investigate congenital anomalies (deformaties) in Herring Gull chicks on Lake Michigan in conjunction with studies being carried out by the U.S. Fish and Wildlife Service
d) to re-survey colonial nesting birds (gulls and Great Blue Heron) in Pakaskwa Park, Lake Superior
e) to determine reproductive success of Double Crested Cormorants in the Great Lakes, including banding and collection of food items for a feeding study

METHOD

Since the largest percentage of the CWS field program was directed toward the gull chicks, the scheduling of field trips was critical. The field program, although quite short in duration (April - July), was very intensive. Because of varying ice conditions throughout the Great Lakes, egg hatching takes place over a two-week


CANADIAN WILDLIFE SERVICE
1984 SURVEY COLONIES
SCALE
200 Statute Miles
300 Kilometres
TORONTO
HAMILTON
BUFFALO
CLEVELAND
DETROIT
CHICAGO
MILWAUKEE
DULUTH
SAULT STE. MARIE

period even though the incubation time is the same (22-25 days). A two field party system was used to monitor the many colonies spread out around the Great Lakes. Several of the colonies were visited at the 3 most important times:

1. Nest building and egg laying during the end of April and early May
2. Chick counts, measurements and banding during the month of June
3. Chick counts and measurements for reproductive assessment approximately 21 days after hatching

The scheduling of field trips for the monitoring and banding of Double Crested Cormorants did not interfere with the Gull Survey because they lag 2 to 3 weeks behind in breeding and hatching. Also, the Cormorant egg-laying is spread out over a longer period than the gulls. While working closely with the U.S. Fish and Wildlife Service, Herring Gull and Double Crested Cormorant colonies at Green Bay area, Lake Michigan and Apostle Islands, Lake Superior were surveyed for congenital anomalies (deformaties). No obvious deformities were noticed in Herring Gulls at either location, but several Cormorant chicks were found on Spider Island Green Bay with grossly deformed beaks. The American biologists also found abnormal livers and spleens upon closer examination of the chicks. One Double Crested Cormorant chick with a beak deformity was also found near Blind River, North Channel, Lake Huron.

Near the end of May, a Herring Gull census survey was conducted along 60 miles of shoreline that borders Pukaskwa Park Northeast Lake Superior. 1050 nests were counted after visiting 75 islands.

Three 18' workboats (THUNDERBIRD, SAB No. 2 and CABOT No. 2) were utilized throughout the season to visit the many islands. Over 2,600 sea miles were logged along with over 30,000 land km of boat trailering. Although the field work required a great deal of travel covering a large area, it was successfully completed without mishap, damage or injury. Similar surveys are scheduled for the 1985 field season.

OTTAWA RIVER WATER QUALITY STATION

TOD STUDY NO. 805

A water quality sampling intake system was installed in the Ottawa River during the week of August 7 - 10. The station (23 ft. Glendale Trailer) was installed behind the City of Ottawa Department of Public Works buildings at Lemeiux Island.

Three intake hoses in a protective jacket were installed between the trailer and the stainless steel intake frame located fifty feet offshore at a depth of 12 ft. The intake frame was bolted down onto the bottom using rock bolts. The intake hoses were bolted to the bottom in three places using clamps. The hoses pass under a crib and through a settling lagoon before entering the trailer. A triple submersible pump system was connected to the hoses in the lagoon. A stainless steel wire was attached to the pumps for retrieval in event of emergency repairs.

The 5-ton truck was utilized to transport all equipment to the work site.

OTTAWA RIVER WATER QUALITY

TOD STUDY NO. 805, J. MERRIMAN, WQB

The water quality of a 17.7 km stretch of the Ottawa River downstream of Chaudiére Falls was monitored on a monthly basis--May through October. This particular area had not been sampled extensively since the late 1970's. It was the intent of this Study to collect water quality data and compare it to the earlier data to determine the effectiveness of sewage treatment facilities installed along the river since that time.

Twenty-five stations were visited and sampled on each trip by bacti sampler for microbiology samples and by hand pump for such parameters as total phosphorus, nutrient, major ion, Ar/Se and mercury. In each case, the microbiology samples were shipped by air to Hamilton within hours of collection so that they could be plated the same day by WQB personnel at CCIW. The remaining water quality samples were split and filtered in the trailer recently installed to house the permanent water quality centrifuge station on Lemieux Island.

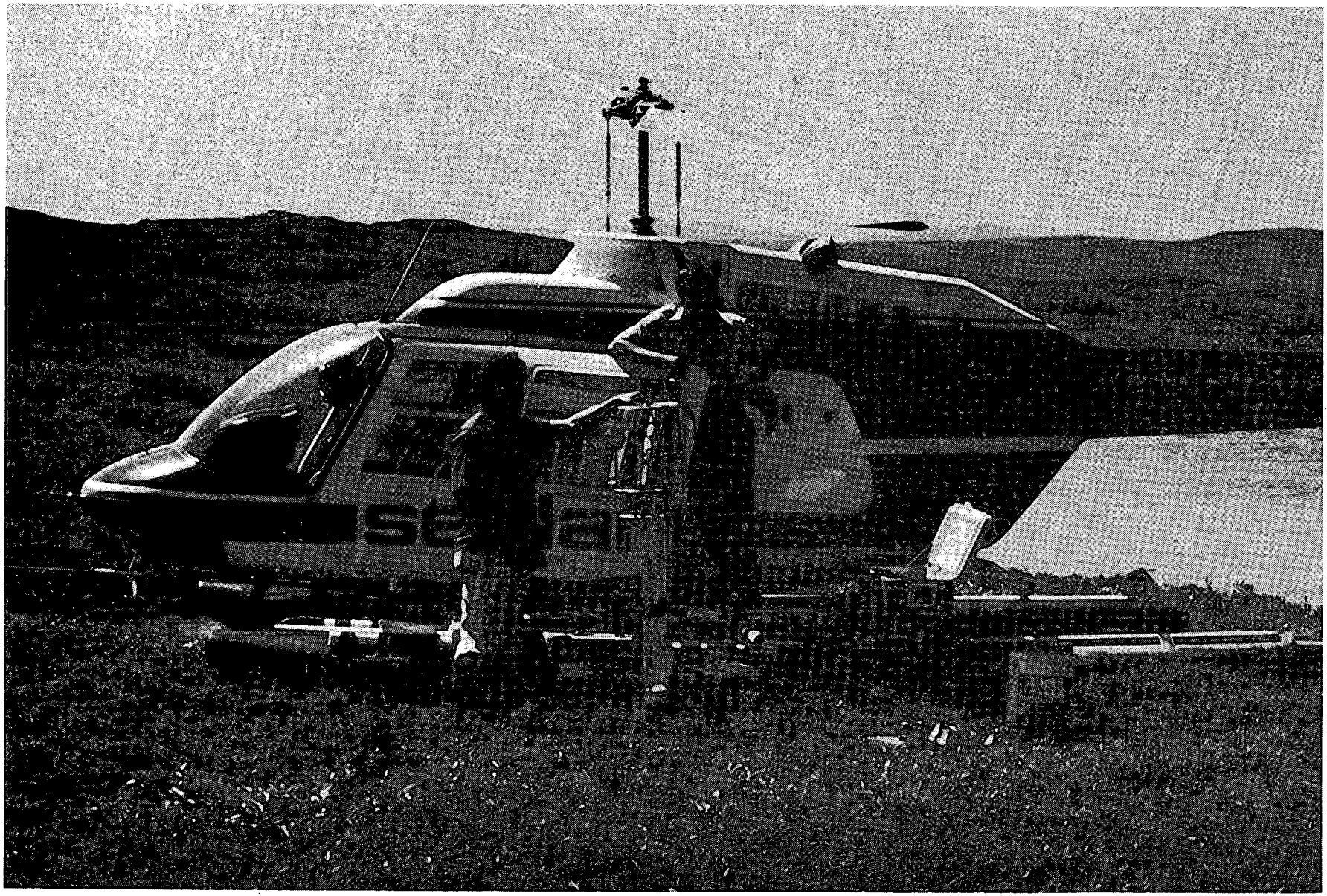
The sampling program was a complete success and no gaps occurred in the data during the sampling period.

LIGHTWEIGHT CORING, NEWFOUNDLAND

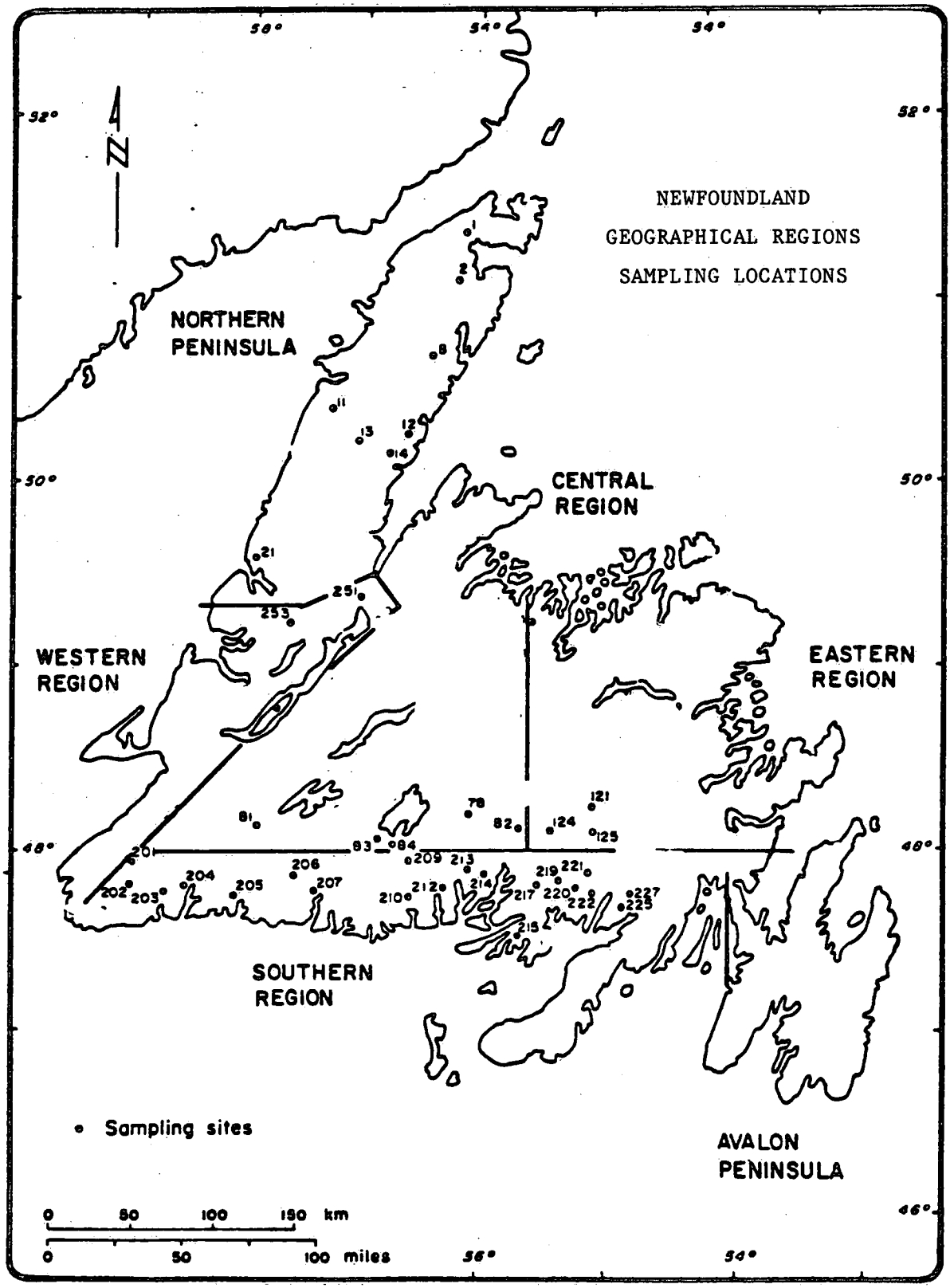
TOD STUDY NO. 805, D. SCRUTON, DFO, ST. JOHN'S, NFLD.

Technical Operations Division support to this project consisted of the collection and subsectioning of lightweight cores and mini-Shipeks from 40 headwater lakes in insular Newfoundland. The survey was carried out in lakes on the South shore, Western region and Northern penninsula with operations being conducted from Bay D'espoir and Deer Lake.

Due to the size of the lakes, a Bell jet ranger 206 helicopter on floats was used to collect all the samples. Along with core samples, water samples were collected for pH, alkalinity and major ions. These samples were collected for a continuing research program on the aquatic effects of acid precipitation using a paleolimnological approach to examine freshwater lake sediments for evidence of historical acidification.



LIGHTWEIGHT CORING - NEWFOUNDLAND


NEWFOUNDLAND
GEOGRAPHICAL REGIONS
SAMPLING LOCATIONS
NORTHERN PENINSULA
CENTRAL REGION
WESTERN REGION
EASTERN REGION
SOUTHERN REGION
AVALON PENINSULA
• Sampling sites
0 50 100 150 km
0 50 100 miles
60°
54°
52°
50°
48°
46°
56°

BOWLAND LAKE CORING SURVEY

TOD STUDY NO. 805, MOE/BOOTH AQUATIC RESEARCH, LEWIS MOLOT

Bowland Lake lies approximately 45 minutes North of Sudbury by air. Until recent years, it was a documented Lake Trout lake but acid rain has now reduced the fish population to a few Spotted Yellow Perch. In an attempt to rejuvenate the lake, an aerial liming of the whole lake took place in July 1983.

This liming has raised the pH of the lake from approximately 4.5 to 6.7. This pH was considered safe to support Lake Trout life. The lake was stocked in the fall of 1983 with 2000 Lake Trout fry and 47 adult fish. Sixteen of these adults were implanted with mini homing devices which will switch on in the fall of 1984. This will allow the progress and habitat of the fish to be monitored.

Technical Operations Division involvement was the collection of 15 lightweight cores from 5 stations that had been cored in 1983. Each core was extruded and the top 5 cm was collected for analysis as to the reactions of the lime with the surficial sediments.

Transportation to and from the lake was again provided by M.N.R. Air Service at McFarlane Lake in Sudbury, utilizing a twin-engine Otter Aircraft.

AMBIENT AIR AEROSOL, GOVERNORS STATE UNIVERSITY, FOREST PARK, ILLINOIS

TOD STUDY NO. 805, DR. H. SIEVERING, P.ENG.

As part of a rental agreement between Governors State University and Hydraulics Division, NWRI, TOD was requested to support the research of Dr. H. Sievering in sampling Ambient Air Aerosol at the WAVES tower. Part of the agreement also requested the installation and monitoring of a meteorological station at the same level as Dr. Sievering's equipment; i.e., 2 and 11-metres.

The survey was conducted on three different 2-week periods, from June 25th to November 2nd.

A subsequent agreement between the two parties will enable NWRI to receive the results of the sampling as soon as they are available to Dr. Sievering.

SUMMARY OF WINTER SUPPORT TO OTHER DIVISIONS

1. R.J. Hess: AED Study No. 425 for M.N. Charlton

   This assignment involved work with sediment trap data collected from 1979 to 1982. The results of all chemical analyses of trap samples had been stored on diskettes and formatted by the program Supercalc. The Northstar Advantage microcomputer was used with an Epson NS-100 printer. By using the spreadsheet created by Supercalc, a file was built to calculate a statistical comparison for selected pairs of values. The advantage of this file is the elimination of lengthy manual calculations. Other tasks included calculation of mean values for Lake Erie Central Basin sample analyses, plotting of Lake Erie Winkler and oxygen profiler results and contouring the 1983 transmissometer profiles taken at the Burlington Water Intake.

2. J.E. Tozer: ECD Study No. 223 for Mrs. J. Metcalfe

   Work involved the processing of fish samples collected from Canagagigue Creek which flows through Elmira. These samples were being tested for levels of chlorophenols and other contaminants. Sodium sulfate was used as the grinding compound. The ground mixture was placed in a glass thimble and in turn placed in a Soxhlet apparatus which extracts the lipids and other compounds using dichloromethane as the extraction solvent. The separation of solvent from lipids and other compounds of interest was accomplished by using the Rotovapor unit. The next step involved further reduction of the lipid sample to 1 ml and running it through a gel-permeation column (GPCO). The solution obtained can now be run through a gas chromatograph (GC) to detect the type and concentrations of these compounds.

3. P.R. Youakim: ECD Study No. 234, Trace Metal Bioavailability for Dr. K.R. Lum

A variety of chemical lab work was undertaken. One major task, however, was the processing and analysis of ten different samples from the Welland area. Initially, pH and conductivity measurements were made on these samples. This was followed by column chromatography extractions and filtrations. Atomic absorption analyses for Cadmium, Copper, Zinc and Lead were made. The new Zeeman 180-80 atomic absorption spectrometer was used. A separate, scientific paper has been issued as a result of this work! In addition, a purely scientific experiment has been underway to assess the interaction of a number of trace metals. For instance, the effect of other trace chemicals on the atomic absorption signal for lead was examined. The last few weeks of this assignment were spent processing samples obtained during the 1983 field season.

Lum, K.R., Bhupsingh, W.A., Comba, M.E. and Youakim, P.R.: Some observations on inorganic contaminants and water quality in the Welland River watershed, (1984): ECD publication.

4. C. Bisutti: AED Study No. 410, Dr. R.A. Bourbonniere

The major task was the preparation of subsections from a specific core (LE83HSBEN) for fatty acids analyses. Selected core sections were ground and extracted. The extract was partitioned, evaporated, saponified, methylated and fractioned. The fractions were then stored until they could be analyzed by means of gas chromatography. The final week of this assignment was spent inputting data into the laboratory computer.

5. G.G. LaHaie: HD Study No. 347, Dr. N.A. Rukavina

The bulk of this support was spent editing existing computer files or creating new data files. Time was also spent completing an inventory of samples remaining from the nearshore surveys along with small subsampled cores. Plotting of accuracy lobes for positioning chains used in field sampling was also completed. The following is a list of completed assignments during the work period:

1. Information entered onto computer files according to set format, edited and printouts obtained for:
   Lake Erie Jetting
   Lake Erie Coring
   Lake Huron Jetting
   Lake Huron Coring
   Georgian Bay Jetting
   Georgian Bay Coring
2. Accuracy lobes plotted according to chain setups and a listing compiled for Shipek samples, jets and cores in Lake Erie, Lake Huron and Georgian Bay.
3. Decode files were updated by editing and adding to the files. Other sample notes such as biology information and related sample information were also added.

6. K.J. Hill: HD Study No. 322, A. Zeman

This winter project included the transfer of Port Burwell data from punched tape into magnetic tape. The Port Burwell Bluff site is an area of high erosion. Boreholes containing piezometers were installed in 1975 and water levels were recorded from 1976 to 1983. This data was recorded on a total of 120 punched paper tapes. During this assignment, data from these punched tapes were transferred into magnetic tapes and plots were made from each set of data. Port Burwell data is now stored on 3 identical magnetic tapes in the CCIW Computer Room.

7. G.J. Koteles: AED Study No. 432, Dr. B.G. Brownlee

Support was provided in the area of "Nutrient Dynamics and Organic Substances in Pollutant Systems". Assistance can be summarized under the following two tasks:

1. Setting of aquariums for microcosms (small model systems) as this relates to studies in pollutant behaviour.
2. Instrument repair such as repairing dissolved oxygen cables and monitoring their electronic output.

8. G.D. Bruce: AED, F. Rosa

The assignment began with a two-day course involving the use and operation of a CCIW computer terminal. The course given by Data Management familiarizes an operator with the basic commands to access the main computer to run programs and create data files. The data worked on was values of numerous parameters from Lake Ontario Surveillance and Bioindex cruises and from Lake Erie Hypolimnetic surveys. The data was worked up in various tables and graphs of values of each parameter versus time. Temperature data was input into files for storage and easy access for the running of computer programs. The work assignment took place from November '83 to January '84

UNDERWATER OPERATIONS

The Underwater Operations Unit provided national support to various scientific studies in areas of diver observation, inspections, installations and retrievals, sample collection, underwater photography, underwater television surveys, land and beach surveys, equipment demonstrations/lectures, equipment trials, search and recovery, and diver training.

The Underwater Operations Unit supported eighteen divers located at Burlington, Winnipeg, Vancouver and Owen Sound. Five hundred accident-free hours were logged in support of projects for NWRI, Great Lakes Fisheries Research Branch, PFF, DFO, Canadian Hydrographic Service, DFO, Water Survey of Canada, DOE, Water Quality Branch, OR, DOE, Ship Division and Oceanographic Division, OSS, BLMSS, DFO.

The Underwater Operations Unit has represented research/scientific diving on the CSA Standards Working Committee for Diving Operations, and the Ontario Commercial Diving Council (Ontario Construction Safety Association). In April, Mr. F.H. Don chaired the Annual Meeting of the Department of Environment Diving Safety Committee in Vancouver, B.C.

The Underwater Operations Unit has a complete inventory of specialized diving and dive support equipment which, when used by highly skilled divers, can complete even the most difficult of subsea operations.

Projects supported in 1984 included:

Study No. 109 Spawning Research, Lake Ontario

Study No. 322 Subaqueous Erosion, Lake Ontario

Study No. 352 Frazil Ice Engineering, New Brunswick and Bronte Creek

DIVE OPERATIONS FROM THE "PACER"

Study No. 405	Peepers, Sudbury and Nova Scotia
Study No. 406	Coring, Southern Ontario and Saskatchewan
Study No. 420	Lake Erie Resuspension
Study No. 477	Buckhorn Lake Milfoil
Study No. 512	DPDX Experiment, Cobourg
Study No. 514	Niagara River Study
Study No. 803	Water Quality Station, Ottawa River
	Water Quality Station, Wolfe Island
	Water Quality Station, Fort Erie
	Water Quality Station, Niagara-on-the Lake
Study No. 805	GLFRB, Owen Sound
	GLFRB, Plankton Dynamics, Lake St. Clair
	Water Survey of Canada, Lake Ontario
	Canadian Hydrographic Service, Resolute Bay
	WAVES Tower
Study No. 807	DOE Dive Safety Meetings, Vancouver

LIMNOLOGICAL INSTRUMENTATION

The Limnological Instrumentation Section has seen another busy year. While the demand for current meters fell below the normal requirement, Section staff were busy servicing and maintaining additional and new equipment coming to the mainstream of NWRI Study Plans. Limnological Instrumentation staff are designing and building the MK II version of EBT systems for shipboard use. Field trials are planned for 1985/86 field season. LIS personnel, along with a local Canadian manufacturer of primary batteries, have built a replacement battery pack for the acoustic release systems. This local manufacturer will save NWRI approximately 25% in the cost of each new battery pack.

MET AND SHIPBOARD SYSTEMS

This year, four meteorological buoys and 12 land MET sites with an overall average of nine arisings were established and serviced. Meteorological systems were serviced and established for data acquisition for Dome Petroleum at Port Simpson, B.C.; McMaster University at Eagle Pt. and Hopkins Pt., Ontario and Governors State University, U.S.A. at the WAVES tower.

Four winches and five EBT systems were serviced and kept operational for shipboard use. The table below is a consolidated list of total equipment supplied, serviced and maintained for 1984/85 by Limnological Instrumentation Section for field use and data acquisition:

		QUANTITY
1.	Current Meters	31
2.	Digitizer Arisings (FTP)	19
3.	Acoustic Release Units	15
4.	Evaluation of New Acoustic Release Unit	1

5.	Digital Data Monitors	5
6.	EBT Portable MK2	5
7.	EBT Ship's System, New Version	2
8.	Shipboard Transmissometer System	1
9.	Portable Transmissometer System	3
10.	Meteorological Systems both Land-based and Buoy-mounted Arisings .	110
11.	TRS Systems	10
12.	Solar Radiation Systems	10
13.	Shipboard Instrument Winches	4
14.	Tide Gauges	6
15.	Acoustic Current Meters (evaluation test)	3

FIELD STORES

The LIMNOS was outfitted for an early cruise to check the monitoring sites on Lake Ontario and start the 1984 season. The major re-organization of the Rigging Shop and the large number of seasonal help, in addition to the scheduled programs, resulted in a heavy demand for equipment and tools from the Field Stores. A labelling and stenciling program for many of the Field Stores items was initiated. A call-up of equipment on loan for refurbishing or disposal in preparation for the coming winter programs and the 1985 field season is now in progress.