Environment Canada

Environnement Canada

National Water Research Institute

Institut National de Recherche sur les Eaux

1982

ACTIVITY SUMMARY

TECHNICAL OPERATIONS DIVISION

NATIONAL WATER RESEARCH INSTITUTE

1982

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NATIONAL WATER RESEARCH INSTITUTE

1 9 8 2

ACTIVITY SUMMARY

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INTRODUCTION

The role of Technical Operations Division in the National Water Research Institute is to supply technical assistance to scientific research projects both on and off the site of the Canada Centre for Inland Waters. The Division lent its expertise--pertaining to the logistics of sample collection in the varied geographic and climatic environments found across Canada and the Great Lakes, to some seventy-five projects sponsored by NWRI and to various other departments, agencies and universities.

Water quality and eutrophication parameters are monitored as part of the Open Lake Surveillance Program by Technical Operations as input to the Water Quality Board Annual Report to the International Joint Commission.

The Underwater Operations Unit supplies experienced and up-to-date dive support to many projects, while performing training, diver certification and equipment maintenance functions.

Field parties from all groups within NWRI are assisted, on a daily basis, by the Rigging Shop during the field season with transporting equipment and carrying out emergency repairs. It maintains and repairs winches and generators, sampling equipment and mooring hardware during the winter months while being responsible for the CCIW Warehouse.

The Division also controls the purchasing, scheduling and maintenance of the NWRI fleet of vehicles, trailers and campers and operates a Field Equipment Stores.

The intent of this report is to give the reader some comprehension of the diversity of capabilities and supportive technology provided nationally by this Division by summarizing in part the activities of the 1982 field season.

STAFF LIST

Macdonald, H.B.	Chief, Technical Operations Division
Mitchell, Mrs. S.	Secretary
Kennedy, Mrs. C.	Administrative Officer
Taylor, W.B.	Head, Field Survey Section
Diaz, J.A.	Head, Limnological Instrumentation Section
Healey, P.M.	Head, Ship Survey Section
Mawhinney, M.R.	Senior Field Officer
Don, F.H.	Head, Underwater Operations Unit
Benner, L.E.	OIC - Field Parties: Sudbury, Elmira, Ottawa River, Thames River
Bisutti, C.	Science Cruises and Surveillance, CSS LIMNOS; Sudbury
Bruce, G.D.	OIC - Field Party: Owen Sound; Lake St. George, Sault Ste. Marie
Carew, T.J.	LRTAP, Sault Ste. Marie
*Dunn, J.L.	Data Abstraction, Limnological Instrumentation Section
Greencorn, H.E.	Rigger
Hess, R.J.	Science Cruises and Surveillance, CSS LIMNOS: Field Party: Stratford
Hill, K.J.	Field Parties; Dive Unit; Few Cruises, CSS LIMNOS
Hunt, W.D.	Field Storesperson
Koteles, G.J.	Science Cruises and Surveillance, CSS LIMNOS; Quebec
Kraft, J.A.	Science Cruises and Surveillance, CSS LIMNOS; Niagara-on-the-Lake
LaHaie, G.G.	Science Cruises and Surveillance, CSS LIMNOS; Port Burwell
Lomas, L.J.	Foreman Rigger
Moore, B.H.	OIC - CSS LIMNOS
Perigo, G.M.	Vehicle Maintenance
Smith, E.G.	Unit Head, Field Instruments & MET Systems, Limnological Instrumentation Section
Smith, S.B.	OIC - CSS ADVENT, CSS LIMNOS
Tozer, J.E.	Field Parties: Sudbury, Elmira, Sault Ste. Marie, Thames River, Ottawa River
Tyler, J.A.	Unit Head, Current Meters & Data Abstraction, Limnological Instrumentation Section
Walker, E.H.	OIC - CSS BAYFIELD
Youakim, P.R.	Bioindex Monitoring, Upper Lakes, CSS BAYFIELD: Surveillance, CSS LIMNOS
Brown, J.R.	Resigned May 1982
Nicholson, H.K.	Retired August 1982
**Bomans, J.M.	Limnological Instrumentation Section
**Sieloff, M.E.	CSS LIMNOS
**Webb, D.E.	Canadian Wildlife Service

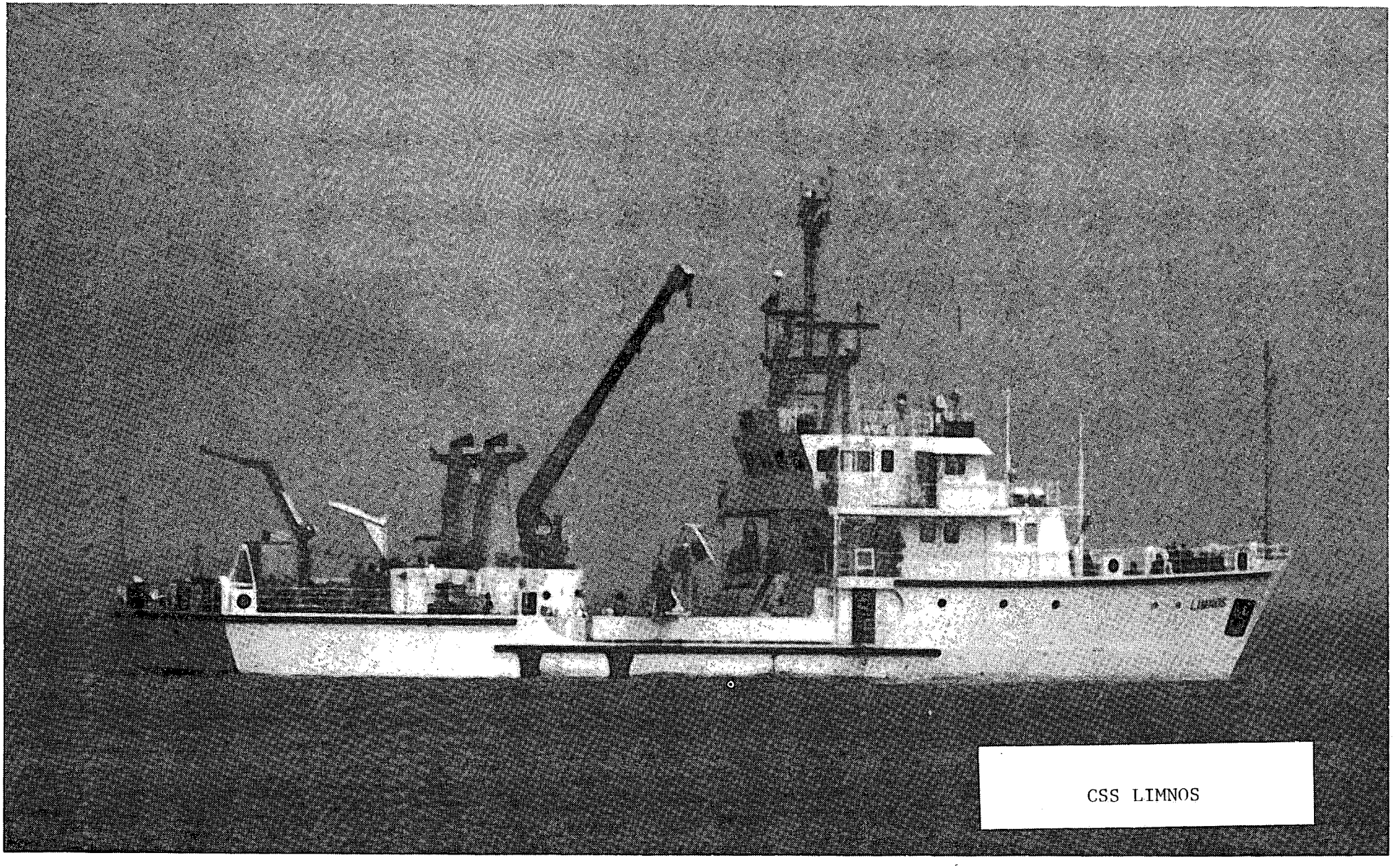
*Completed specified term appointment November 1982
**Student

STUDY LIST

NUMBER	LEADER	LOCATION/SUPPORT
Director's Office		
106	Daley	Research
106	Kenney	Research
109	Sly	Habitat Studies
Environmental Contaminants Division		
212	Kaiser	Contaminants
216	Platford	Toxic Chemicals
218	Oliver	Bioavailability
219	Platford	Micro Layer
220	Fox	Niagara River
223	Metcalfe	Biota
224	Scott	50-Mile Point
225	Carey	Streams
230	Lum	Trace Metal Availability
231	Jeffries	LRTAP
232	Y.K. Chau	Central Ontario Lakes
234	Mudroch	Niagara River
235	Jeffries	LRTAP (Runoff)
240	Durham	Great Lakes Samples
241	Durham	Pt. Granby Samples
Hydraulics Division		
313	Beltaos	Ice Jams and Flooding
314	Beltaos	Ice Survey
344	Coakley	Point-aux-Pins
345	Zeman	Erodability
346	Zeman	Pt. Burwell
347	Rukavina	Profile 18
348	Rukavina	Data Sediment Service
353	Bishop	Floating Tire Breakwater
355	Rukavina	Sediment Atlas
374	Desrosiers	PILP-Moniteq
375	Valdmanis	Underice Observations
376	Watson	Ice Thickness Measurement
377	Ford	Frazil Ice Recorder
380	Harrison	SCRIBE
381	Valdmanis	Retrofit RCM-12
383	Roy	GVAPS
384	Valdmanis	MET Pack II

NUMBER	LEADER	LOCATION/SUPPORT
Aquatic Ecology Division		
405	Carignan	Sediment Trace Metals
410	Bourbonniere	Lake Acidification
411	Wong/Nriagu	Lead 210 Geochronology
412	Nriagu	Stable Isotope of Sulfur
413	Arafat	Arsenic Transport
416	Glooschenko	Peat Studies
419	Bourbonniere	Biochemical Processes
421	Rosa	Sediment Trap Data
423	Kalas	Benthic Invertebrates
425	Charlton	Sedimentation
428	Sandilands	Nepheloid Layer
430	Manning	Phosphorus Bioavailability
431	Brownlee	Aquatic Nitrogen
432	Brownlee	Organic Compounds
437	Murphy	Phytoplankton Productivity
438	Lean	Lake Ecosystem
439	Lean	Lake Restoration
475	Carignan	Aquatic Macrophytes
477	Painter	Eurasian Milfoil
478	Painter	Aquatic Macrophytes
494	Lean	LONAS
495	Bourbonniere	Sediment Bank
Aquatic Physics and Systems Division		
510	Murthy	Northshore Lake Ontario
540	Bukata	Spectro-Optical Modelling
Analytical Methods Division		
607	Sekerka	O_2 Profiler
610	Afghan	Miscellaneous Sampling
615	Onuska	Sediments
622	Dutka	Legionella
628	Rao	WQ Surveillance
653	Aspila	Quality Assurance
683	Rao	Acid Rain Effect
Technical Operations Division		
801	Macdonald	Management
802	Taylor	Logistic Support
803	Healey	Surveillance
804	Taylor	Equipment Maintenance
805	Mawhinney	Coring Support
806	Macdonald	External Agencies
807	Diaz	MET and Ships Systems
808	Diaz	Limnological Instrumentation
809	Macdonald	Open House '82

SHIP PROGRAMS



CSS LIMNOS

LAKE ONTARIO

CSS LIMNOS

During the 1982/83 field season, twenty-nine cruises were completed by the major research vessel, CSS LIMNOS on Lake Ontario. These multi-disciplinary cruises consisted of:

- 8 - Open Lake Surveillance
- 6 - Sediment Trap Mooring
- 5 - Nutrient Assessment Study
- 4 - Mooring
- 2 - Chemical Forms and Potential Availability of Trace Metals
- 2 - Peeper Placement
- 1 - Bioavailability of Organic Contaminants in Sediments
- 1 - Organic Contaminant Uptake in Sediments and Suspended Solids and Nutrient Assessment Study

OPEN LAKE SURVEILLANCE

The Open Lake Surveillance Program was designed to provide a continuing report and long-term trend information on water quality and eutrophication parameters in the Great Lakes. The Program has remained basically the same since its inception in 1974 with the exception of the omission and relocation of several stations and improvement in sampling techniques. During the 1982/83 field season, ten cruises were conducted on Lake Ontario. Ninety-four stations were occupied during eight of the ten cruises. During the remaining two cruises, sixty-six stations were occupied. This alteration in station pattern occurred to accommodate the support vessel utilized in the sampling of the program. The results from the samples collected from these stations will serve as input to the Canada-U.S. Agreement for the Water Quality Board Annual Report to the International Joint Commission. The cruises were supported by Technical Operations Division staff and were conducted from the CSS LIMNOS (eight cruises) and the CSS BAYFIELD (two cruises) operated by Bayfield

Laboratory for Marine Science & Surveys, DFO. The ships were equipped with electronic bathythermographs, rosette/EBT water sampler, transmissometer, radar, Loran C positioning systems and a variety of winches used for chemical and biological water sampling.

The basic surveillance parameters observed on Lake Ontario cruises were: temperature profile, transmission profile, dissolved oxygen, specific oxygen, specific conductance, pH, chlorophyll a, phytoplankton, particulate organic carbon, total phosphorus unfiltered, chloride, meteorological observations and Secchi disc observations during daylight hours.

During the course of the field season, there were three chemistry cruises piggybacked onto the basic Surveillance Program. These cruises included additional sampling for: total filtered phosphorus, soluble reactive phosphorus, total filtered nitrogen, nitrate and nitrite, ammonia, reactive silicate, dissolved organic carbon and alkalinity.

There were five microbiology cruises piggybacked onto the basic Surveillance Program. On these cruises, additional samples were collected for: fecal coliform, fecal streptococci, Pseudomonos, Aerobic Heterotrophs, oligotrophic bacteria and total bacteria counts.

On all surveillance cruises, the Long Term Biological Index Monitoring Program in support of Great Lakes Fisheries Research Branch, PFF was piggybacked. Additional samples were collected for: dissolved oxygen, 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.

Sampling depths for all samples collected were the same for all 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 thermocline, 1 m below thermocline, 10 m above bottom and 2 m above bottom.

Numerous additional tasks were supported during the Lake Ontario surveillance cruises. Some of these tasks included: installation and retrieval of a meteorological buoy in the Adolphus Reach/Picton Bay area for GLFRB, Study No. 806; water samples for Radionuclide Section, Environmental Contaminants Division Study No. 240; water samples for Nutrient Assessment Study, Aquatic Ecology Division Study No. 494; microbiological water samples for Analytical Methods Division Study No. 622; installation of a meteorological buoy at a mid-lake site for Aquatic Physics & Systems Division Study No. 510; bulk water samples for United States Environmental Protection Agency; refurbishment of sediment trap moorings for Aquatic Ecology Division Study No. 425; water samples for APSD Study No. 540; water samples for ECD Study No. 212. Several of the above-mentioned tasks were completed with regularity.

SURVEILLANCE STATIONS

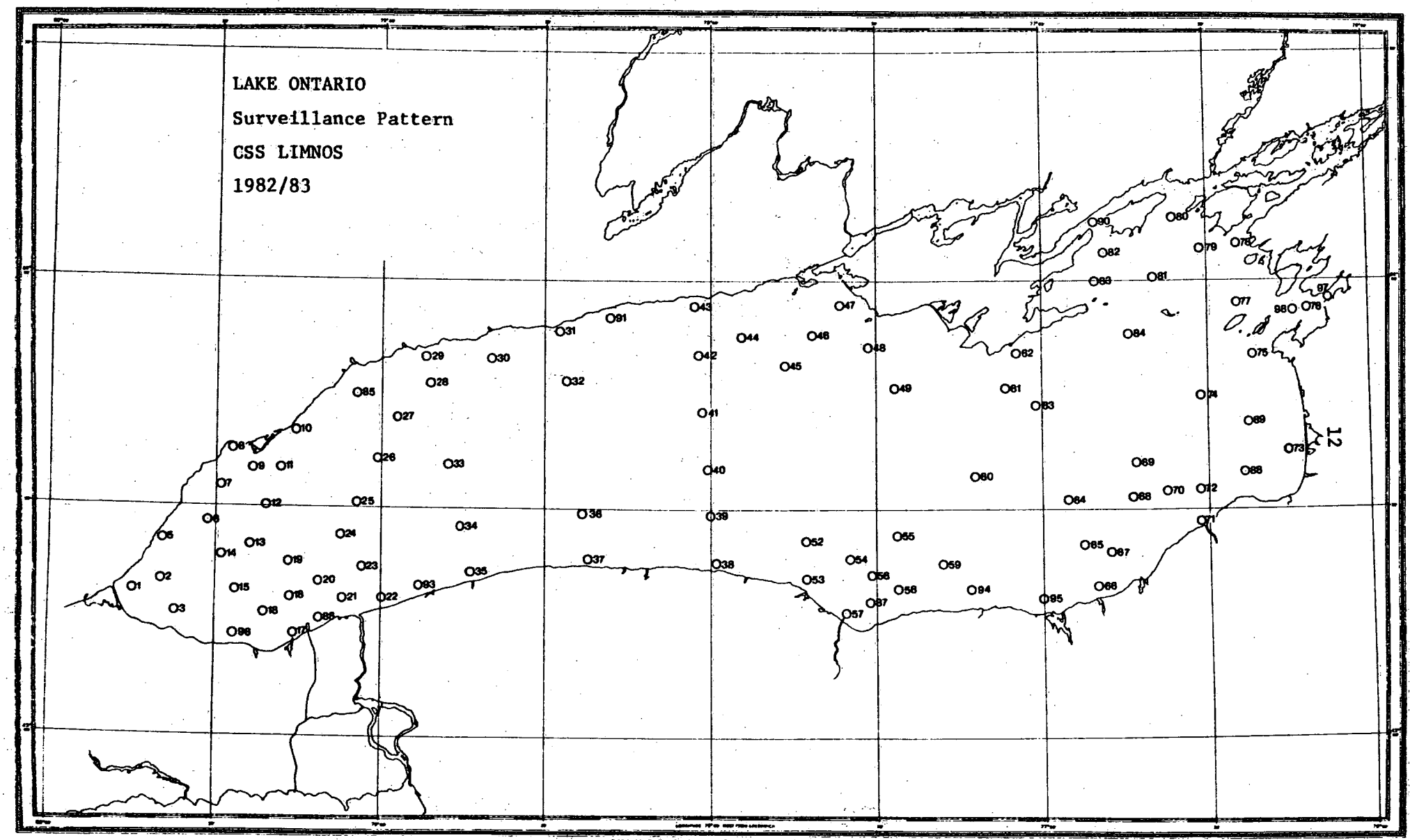
LAKE ONTARIO

1982/83

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"


LAKE ONTARIO
Surveillance Pattern
CSS LIMNOS
1982/83
12
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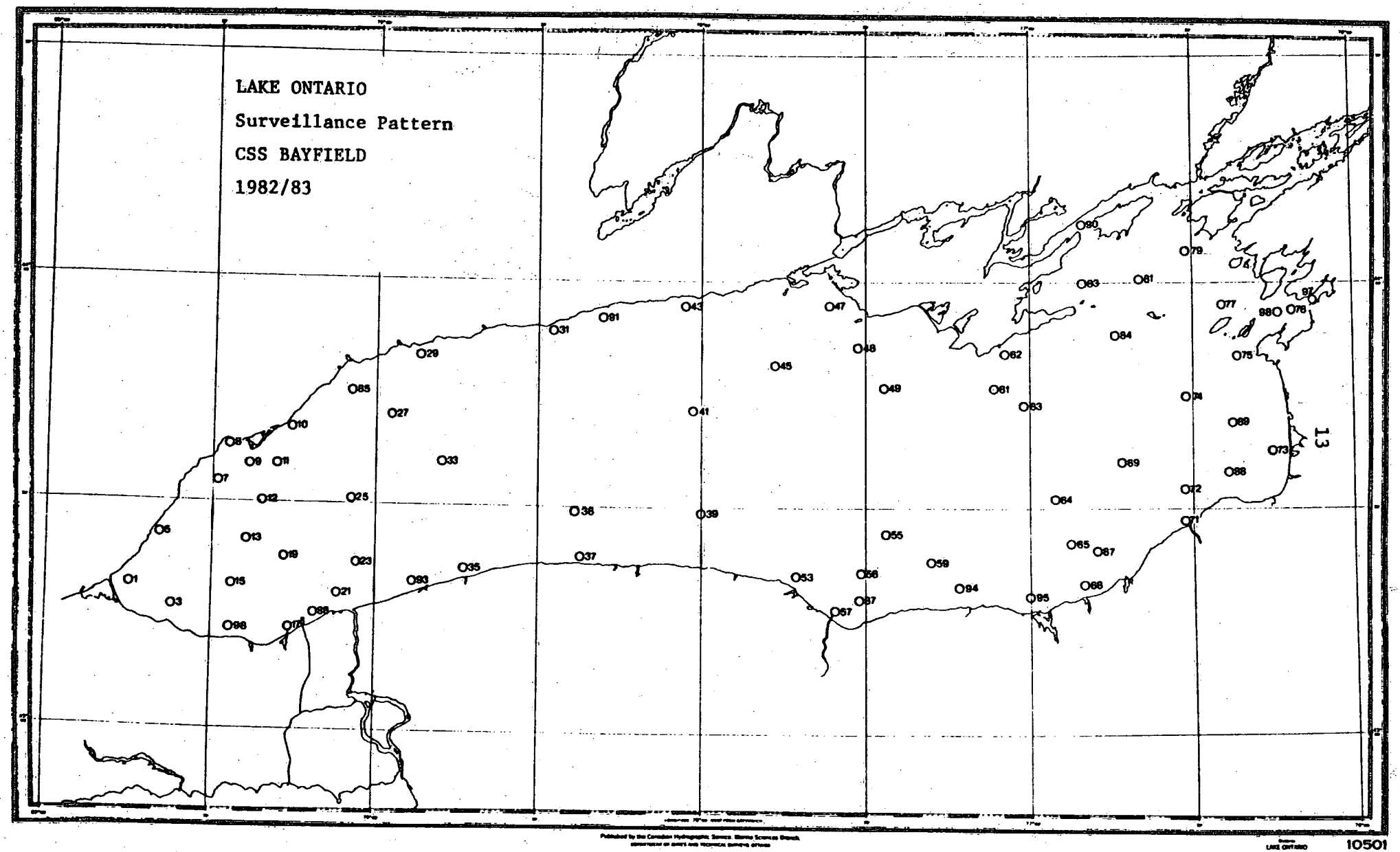

LAKE ONTARIO
Surveillance Pattern
CSS BAYFIELD
1982/83
13
10501

STATISTICS SUMMARY

CRUISE NO. _____ CONSEC. NO. _____ SHIP CSS LIMNOS/CSS BAYFIELD

DATES FROM March TO November (Monthly) LAKE ONTARIO

CRUISE TYPE Open Lake Surveillance N.MILES STEAMED 6496.09

DESCRIPTION	TOTAL	DESCRIPTION	TOTAL
Stations Occupied	876	Moorings Established, MET	2
Rosette Casts	886	Moorings Retrieved	1
EBT Casts	765	Moorings Established, Sediment Trap	2
Transmissometer Casts	833	Moorings Retrieved, Sediment Trap	2
Reversing Thermometer Obs. (No. of Thermo.	57	Moorings Established	
Secchi Disc Obs.	451	Moorings Retrieved	
		Moorings Serviced	
Zooplankton Hauls	80	Moorings Serviced	
Water Samples Filtered (Total Phosphorus)	1379	Moorings Serviced	
Water Samples Filtered (Chloride)	1219	Cores Taken (Gravity), Benthos	4
Water Samples Filtered (Trace Metals)	55	Cores Taken (Piston)	
Integrator (10m) Integrator (20m)	920	Grab Samples Taken, Ponar	19
Total Number of Depths Sampled	3604	Drogues Tracked	
Water Samples Collected (Chemistry)	10133	Dye Releases	
Water Samples Collected (1ℓ Surface)	84		
Water Samples Collected (Mercury)	14	Observations (Weather)	293
Water Samples Collected (Trace Metals)	55	Observations ( )	
Water Samples Collected (Radio-Nuclides)	14		
Water Samples Collected (TP uf)	2552	Continuous Observations (Days)	
Water Samples Filtered (POC)	1411	Air Temperature	
Water Samples Filtered, Chlorophyll	1443	Relative Humidity	
Water Samples Treated, Phytoplankton	132	Water Temperature (In-Hull)	
Total Number of Water Samples Collected	18113	Water Temperature (Towed)	
ONBOARD ANALYSES		Solar Radiation, Days	18
		Integrated Printout	
Manual Chemistry (Tech. Ops.)	10851	Long Wave (IR) Radiation	
Nutrients (WQB)	1523	Water Samples Filtered (Residue)	8
Microbiology	765	Water Samples Filtered (Seston)	138
Water Samples Filtered (Major Ions)	910	Water Samples Filtered (Ashed Weight)	31

SEDIMENT TRAP MOORING, M.N. CHARLTON, AED 425

The Sediment Trap Mooring cruises began May 10th and were completed monthly until the termination of the sampling program in November. The purposes of these cruises were:

1. To measure sedimentation and regeneration rates of nutrients and contaminants in Lake Ontario
2. To determine the fate of material loaded by the Niagara River as an aspect of inshore-offshore water quality differences

In support of this project, a total of six cruises were carried out on the Western end of Lake Ontario. Sediment traps were positioned at six locations in this end of the lake with particular emphasis on the Niagara River area. On all cruises, sediment trap moorings were refurbished at each site. In addition, temperature profiles, transmission profiles, benthos cores and water samples for water chemistry analysis were collected from the same locations. On all cruises, an EBT/transmissometer survey of the Niagara River plume area would be completed.

Throughout the season, additional tasks were piggybacked with these cruises. Some of the tasks included:

Sediment and Water Samples for Mrs. A. Mudroch, ECD 234

Biota and Sediment Samples for Mr. M.E. Fox, ECD 220

Sediment Samples for Dr. P.G. Manning, AED 430

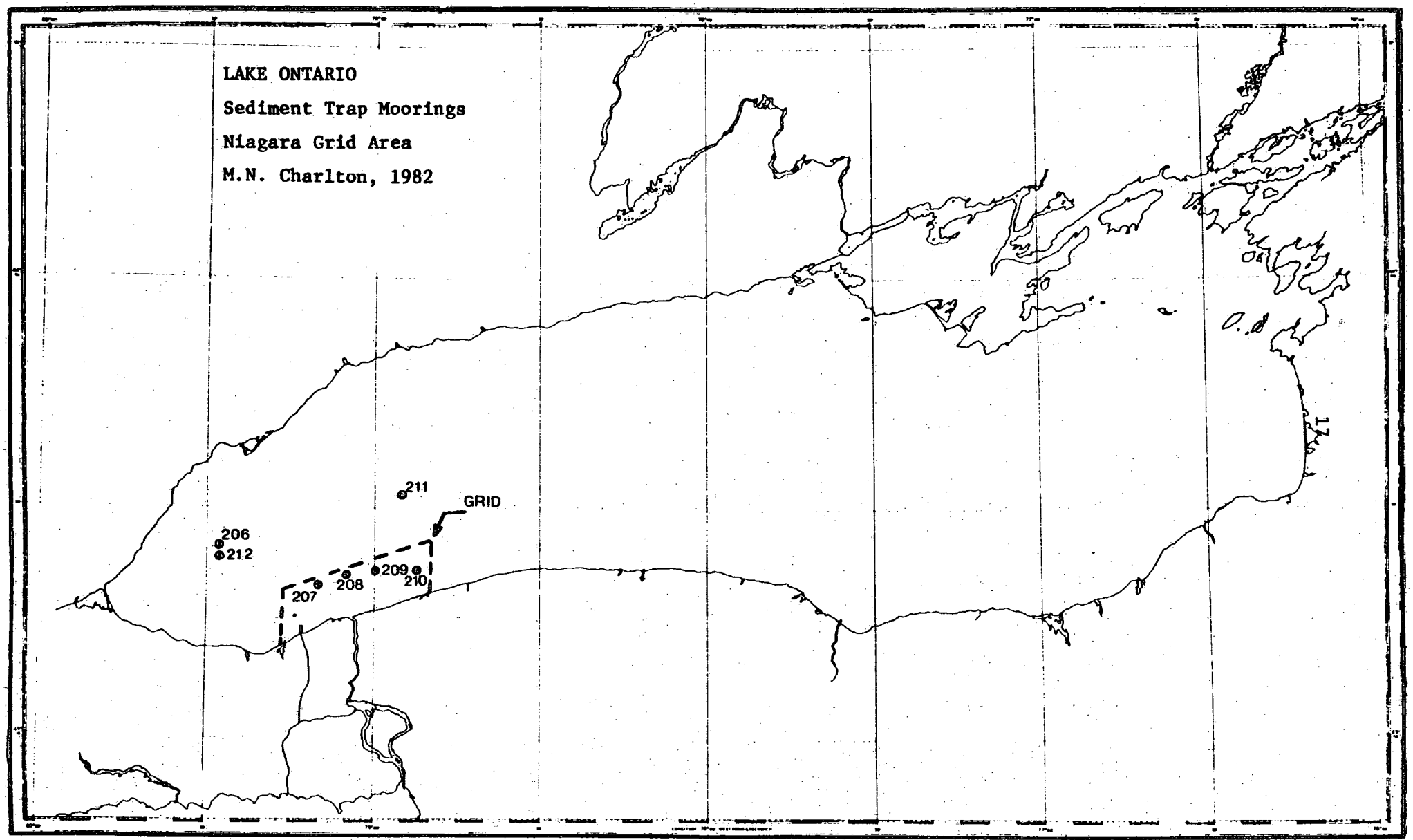
Retrieval of Current Meters for Dr. C.R. Murthy, APSD 510

STATION POSITIONS

STATION NUMBER	LATITUDE N.	LONGITUDE W.
206	43° 23' 53"	79° 27' 39"
207	43° 19' 16"	79° 09' 25"
208	43° 20' 14"	79° 04' 31"
209	43° 20' 36"	78° 59' 31"
210	43° 21' 42"	78° 51' 36"
211	43° 27' 57"	78° 53' 53"
212	43° 23' 49"	79° 26' 52"

NIAGARA RIVER PLUME GRID POSITIONS

STATION NUMBER	LATITUDE N.	LONGITUDE W.
240	43° 12' 36"	79° 17' 54"
241	43° 13' 36"	79° 17' 54"
242	43° 14' 36"	79° 17' 54"
243	43° 15' 36"	79° 17' 59"
244	43° 16' 35"	79° 17' 54"
245	43° 17' 37"	79° 17' 58"
246	43° 20' 34"	79° 10' 02"
247	43° 19' 32"	79° 10' 00"
248	43° 18' 32"	79° 10' 01"
249	43° 17' 36"	79° 10' 00"
250	43° 16' 35"	79° 10' 03"
251	43° 15' 32"	79° 10' 03"
252	43° 17' 06"	79° 04' 00"
253	43° 18' 02"	79° 03' 59"
254	43° 19' 02"	79° 03' 59"
255	43° 20' 00"	79° 04' 00"
256	43° 21' 00"	79° 04' 00"
257	43° 21' 59"	79° 03' 59"
258	43° 22' 43"	79° 00' 00"
259	43° 21' 45"	78° 59' 56"
260	43° 20' 41"	78° 59' 59"
261	43° 19' 38"	79° 00' 01"
262	43° 18' 39"	78° 59' 58"
263	43° 17' 39"	78° 00' 02"
264	43° 18' 41"	78° 55' 19"
265	43° 19' 42"	78° 55' 18"
266	43° 20' 41"	78° 55' 19"
267	43° 21' 38"	78° 55' 22"
268	43° 22' 40"	78° 55' 21"
269	43° 23' 44"	78° 55' 18"
270	43° 24' 47"	78° 50' 44"
271	43° 23' 52"	78° 50' 46"
272	43° 22' 54"	78° 50' 46"
273	43° 21' 54"	78° 50' 42"
274	43° 20' 54"	78° 50' 45"
275	43° 19' 53"	78° 50' 43"
276	43° 15' 09"	79° 03' 25"



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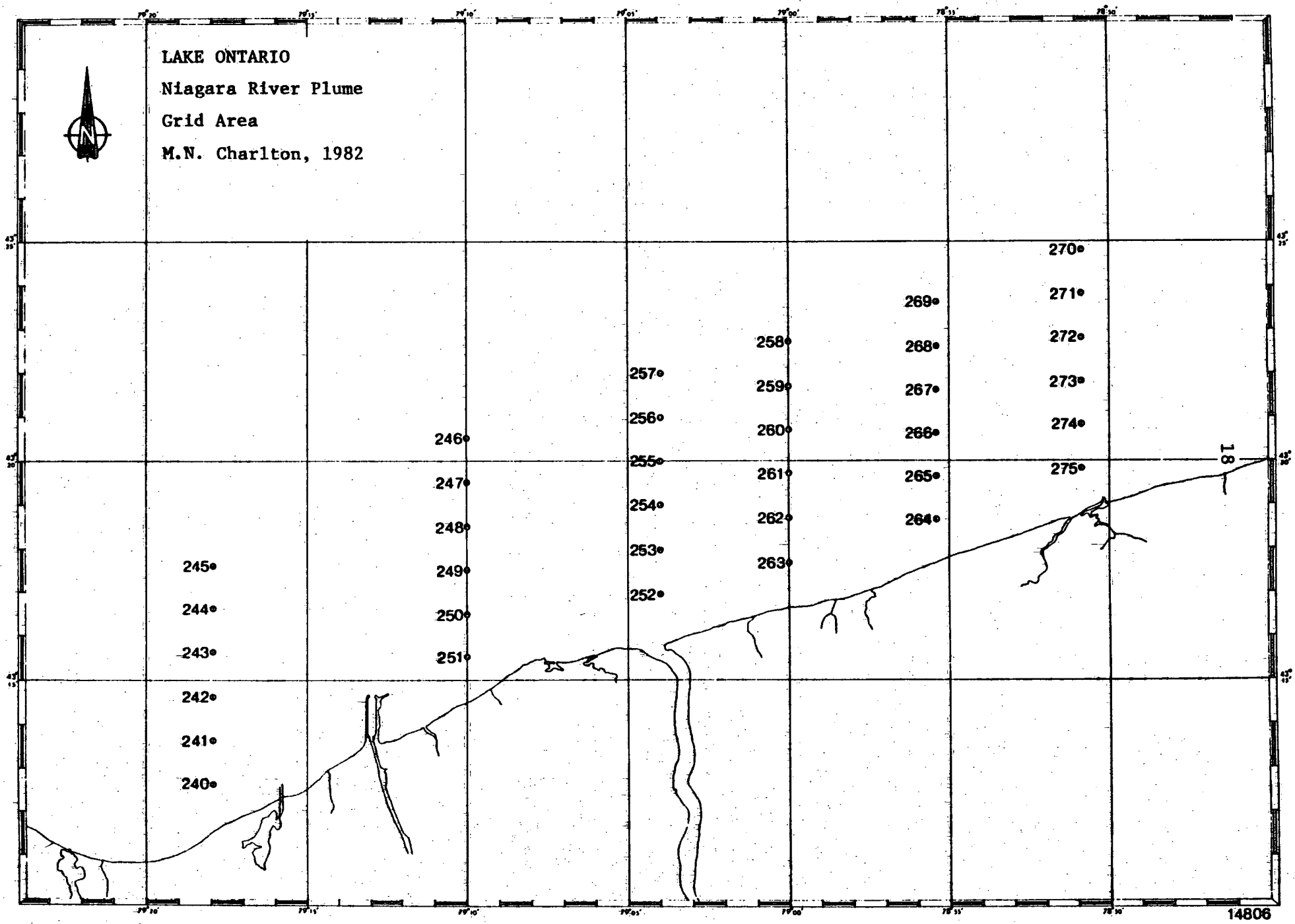
DEPARTMENT OF MINES AND TECHNICAL SURVEYS OTTAWA

LAKE ONTARIO

10501


LAKE ONTARIO
Niagara River Plume
Grid Area
M.N. Charlton, 1982
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14806

NUTRIENT ASSESSMENT STUDY, DR. D.R.S. LEAN, AED 494

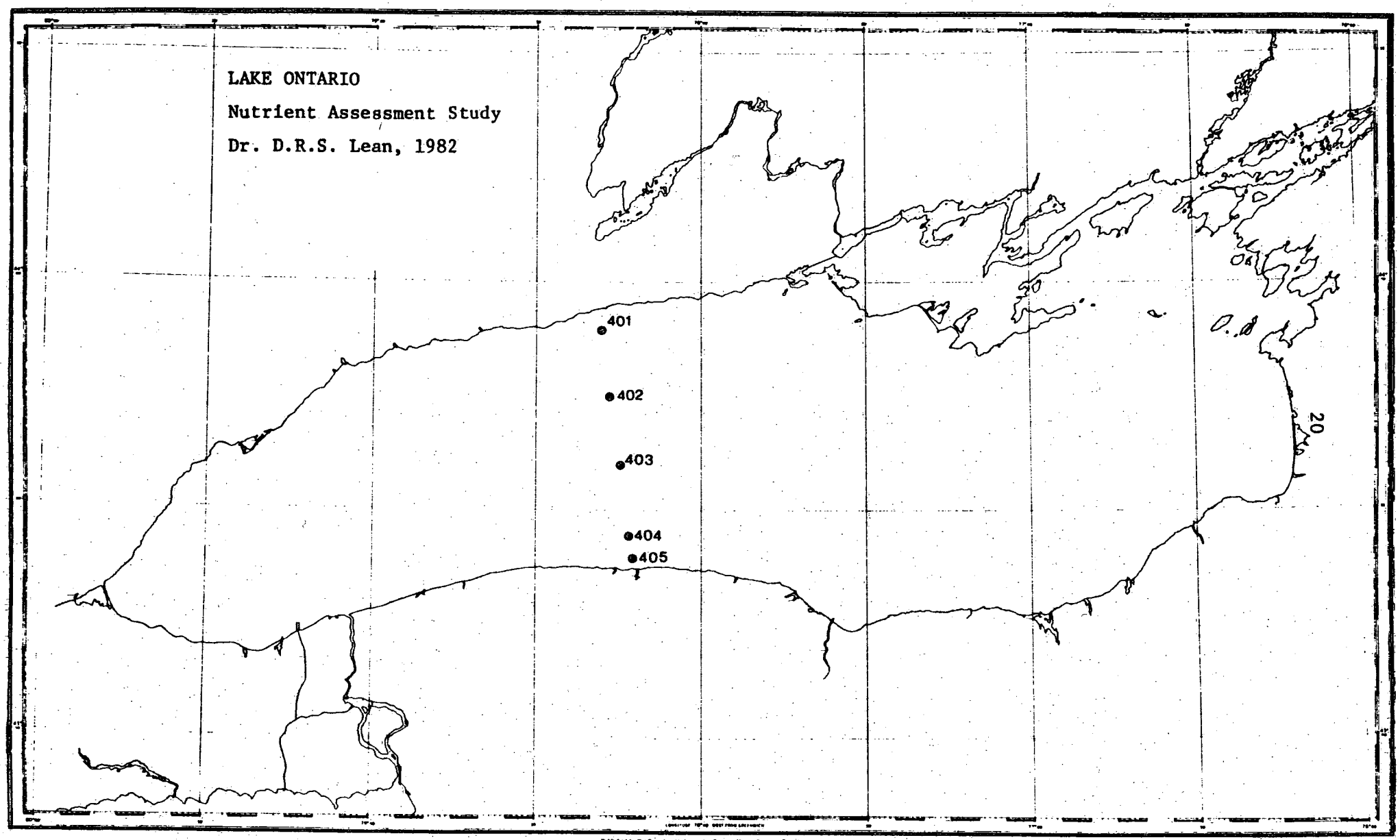
Field support to this project consisted of five one-week cruises during the months from June to October aboard the CSS LIMNOS in the Central Basin of Lake Ontario. The purpose of these cruises was to determine the duration and degree of nutrient limitation of algae in Lake Ontario, to estimate its effect on overall water quality and assess its implications on phosphorus management strategies (AED Study No. 494).

Five stations in the Central Basin of Lake Ontario were visited each cruise. Sampling at these stations involved the collection of water samples using the rosette water sampler for water chemistry analysis, water sampling from discrete depths using Niskin bottles for primary productivity and nutrient uptake experiments which were conducted over a 24-hour period at selected stations and the collection of percent transmission and temperature profiles.

Additional tasks performed on these cruises included:
Sediment Trap Mooring Refurbishment for M.N. Charlton, AED 425
and Sediment Sampling for Dr. P.G. Manning, AED 430

STATION POSITIONS

STATION NUMBER	LATITUDE N.	LONGITUDE W.
401	43° 53' 29"	78° 15' 44"
402	43° 49' 02"	78° 15' 32"
403	43° 35' 52"	78° 13' 51"
404	43° 26' 39"	78° 12' 12"
405	43° 24' 03"	78° 12' 00"


LAKE ONTARIO
Nutrient Assessment Study
Dr. D.R.S. Lean, 1982
401
402
403
404
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20
10501

MOORING, DR. C.R. MURTHY, APSD 510

The support to this Study consisted of four one-week cruises. These were carried out during the months of May, August and November aboard the CSS LIMNOS on Lake Ontario. The purpose of these cruises was to research the physical processes and water quality properties of the coastal zones. Such information is vital to the solution of practical problems such as environmental impact of energy development on the North shore of Lake Ontario and the influence of the Niagara River on the Lake Ontario Western Basin.

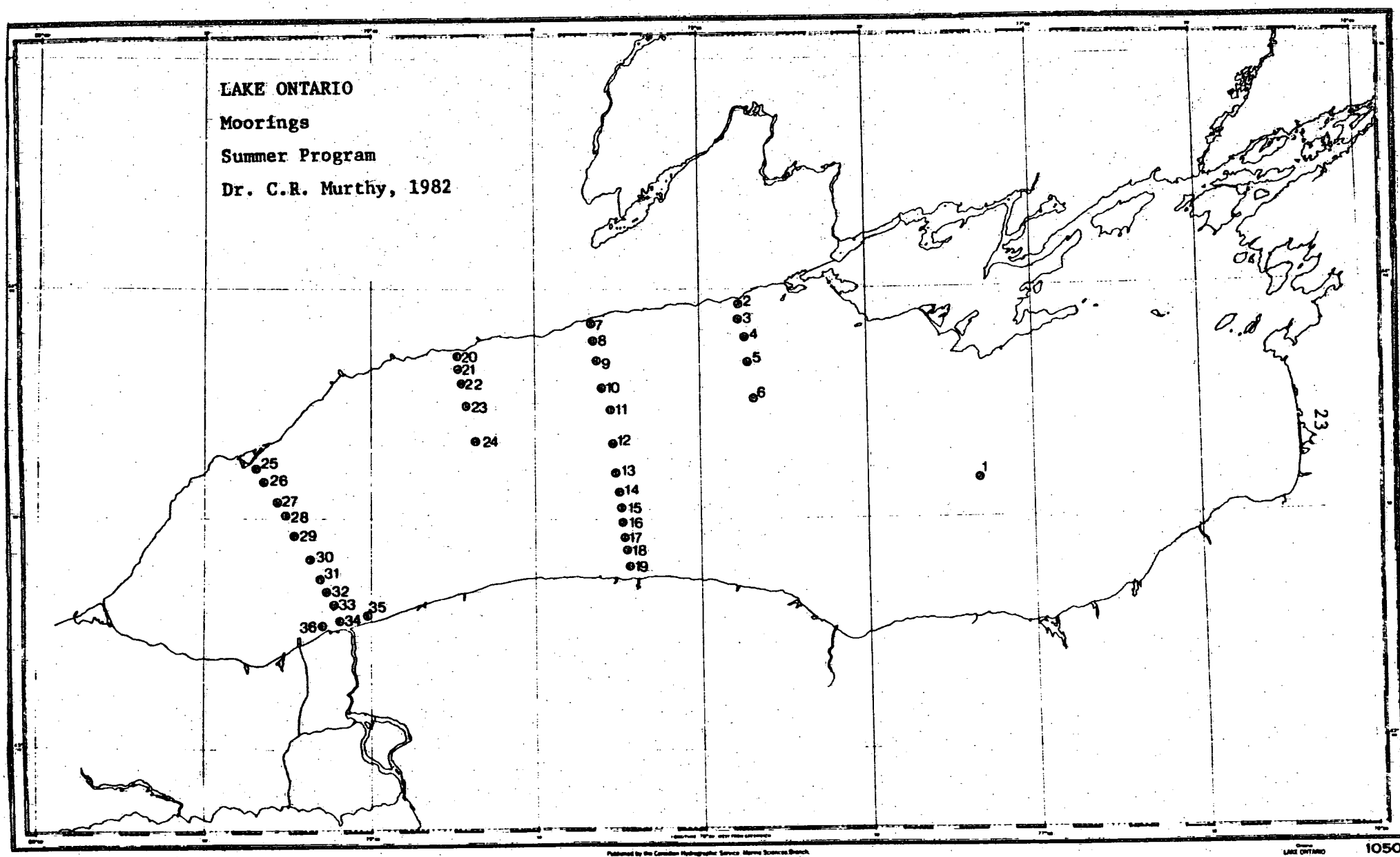
The program consisted of various physical parameters being studied at 36 sites throughout Lake Ontario. This required the installation of meteorological buoys, current meter moorings, fixed temperature profiler moorings, wave rider moorings and tide gauges at the various sites. During the summer, all thirty-six sites were utilized while the fall/winter program consisted of only eighteen sites being monitored.

LAKE ONTARIO MOORINGS - SUMMER PROGRAM

SITE	LATITUDE N.	LONGITUDE W.	INSTRUMENT
1	43° 35' 30"	77° 16' 00"	MET
2	43° 58' 00"	77° 52' 25"	TG
3	43° 56' 36"	77° 52' 16"	CM, FTP
4	43° 53' 02"	77° 51' 53"	CM, FTP
5	43° 49' 38"	77° 51' 27"	CM
6	43° 45' 04"	77° 50' 54"	CM
7	43° 55' 57"	78° 17' 16"	TG
8	43° 53' 46"	78° 16' 54"	CM, FTP, WR
9	43° 52' 20"	78° 16' 39"	MET, WM, WR, FTP, BBA, CM
10	43° 48' 52"	78° 16' 00"	CM, WR
11	43° 45' 12"	78° 15' 20"	CM, TG
12	43° 42' 50"	78° 14' 54"	CM
13	43° 40' 08"	78° 14' 27"	CM
14	43° 35' 50"	78° 13' 48"	CM, MET, FTP
15	43° 31' 10"	78° 12' 58"	CM
16	43° 26' 41"	78° 12' 15"	CM
17	43° 25' 48"	78° 12' 05"	CM
18	43° 24' 47"	78° 11' 49"	CM
19	43° 23' 32"	78° 11' 40"	CM, FTP
20	43° 52' 14"	78° 39' 38"	TG
21	43° 51' 15"	78° 39' 32"	CM, FTP
22	43° 49' 07"	78° 39' 14"	CM, FTP
23	43° 45' 24"	78° 38' 42"	CM
24	43° 41' 35"	78° 38' 10"	CM
25	43° 35' 58"	78° 22' 55"	CM
26	43° 34' 19"	78° 21' 19"	CM
27	43° 31' 43"	78° 18' 54"	CM
28	43° 29' 11"	78° 16' 31"	CM
29	43° 27' 00"	78° 14' 33"	CM, MET
30	43° 24' 16"	78° 12' 00"	CM
31	43° 21' 53"	78° 10' 00"	CM
32	43° 20' 11"	78° 08' 16"	CM
33	43° 19' 16"	78° 07' 27"	CM
34	43° 18' 23"	78° 06' 36"	CM
35	43° 17' 30"	79° 00' 00"	CM
36	43° 15' 58"	79° 10' 00"	CM

CM - Current Meter
FTP - Fixed Temperature Profiler
WR - Wave Rider
BBA - Benthic Boundary Array

MET - Meteorological Buoy
TG - Tide Gauge
WM - Wave Motion


LAKE ONTARIO
Moorings
Summer Program
Dr. C.R. Murthy, 1982
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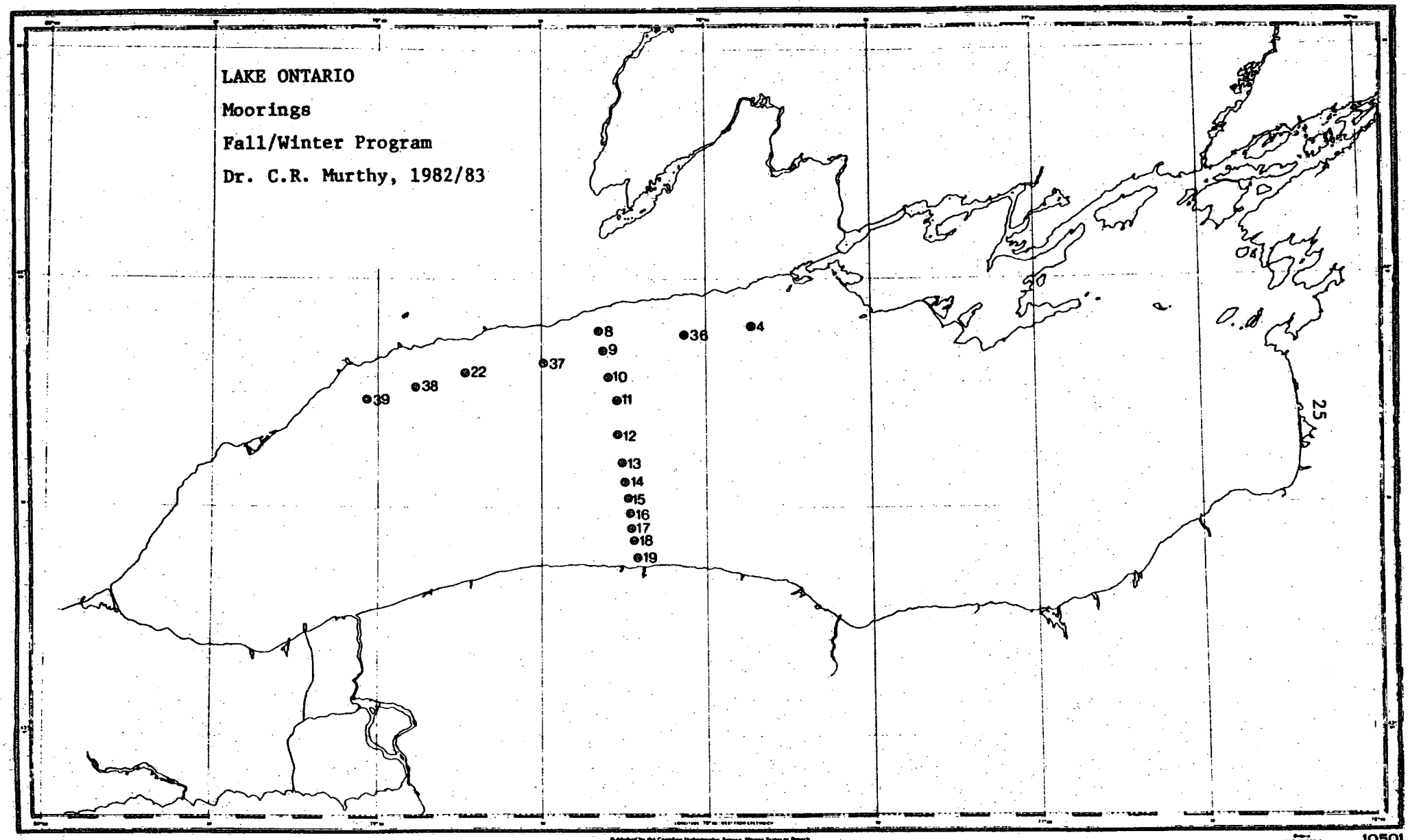
LAKE ONTARIO MOORINGS - FALL/WINTER PROGRAM

SITE	LATITUDE N.	LONGITUDE W.	INSTRUMENT
4	43° 53' 02"	77° 51' 53"	CM
8	43° 53' 46"	78° 16' 54"	CM
9	43° 52' 20"	78° 16' 39"	CM, WR, WM, BBA, MET, FTP
10	43° 48' 52"	78° 16' 00"	CM
11	43° 45' 12"	78° 15' 20"	CM, MET
12	43° 43' 50"	78° 14' 54"	CM
13	43° 40' 08"	78° 14' 27"	CM
14	43° 35' 50"	78° 13' 48"	CM, MET
15	43° 31' 10"	78° 12' 58"	CM
16	43° 26' 41"	78° 12' 15"	CM
17	43° 25' 48"	78° 12' 05"	CM
18	43° 24' 47"	78° 11' 49"	CM
19	43° 23' 32"	78° 11' 40"	CM
22	43° 49' 07"	78° 39' 14"	CM
36	43° 54' 00"	78° 04' 00"	CM
37	43° 50' 28"	78° 28' 00"	CM
38	43° 47' 30"	78° 50' 30"	CM
39	43° 45' 30"	79° 02' 00"	CM

CM - Current Meter
FTP - Fixed Temperature Profiler
WR - Wave Rider
BBA - Benthic Boundary Array
MET - Meteorological Buoy
TG - Tide Gauge
WM - Wave Motion


LAKE ONTARIO
Moorings
Fall/Winter Program
Dr. C.R. Murthy, 1982/83
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CHEMICAL FORMS AND POTENTIAL AVAILABILITY OF TRACE METALS, DR. K.R. LUM, ECD 230

Field support to this Study consisted of two 2-day cruises during the months of May and July aboard the CSS LIMNOS in the Western end of Lake Ontario. The purpose of these cruises was to study particle dynamics and their role in regulating trace element forms and availability in order to provide input into the Canada/U.S. Great Lakes Water Quality Agreement (annexes 7, 11 and 12).

Fourteen stations in the Western end of Lake Ontario were visited each cruise. Sampling at these stations was composed of; the collection and centrifuging of large volume water samples (up to 1200ℓ); water sampling from discrete depths using Niskin bottles for trace metals and other water chemistry parameters; and the collection of transmission and temperature profiles.

Additional tasks performed on these cruises included:

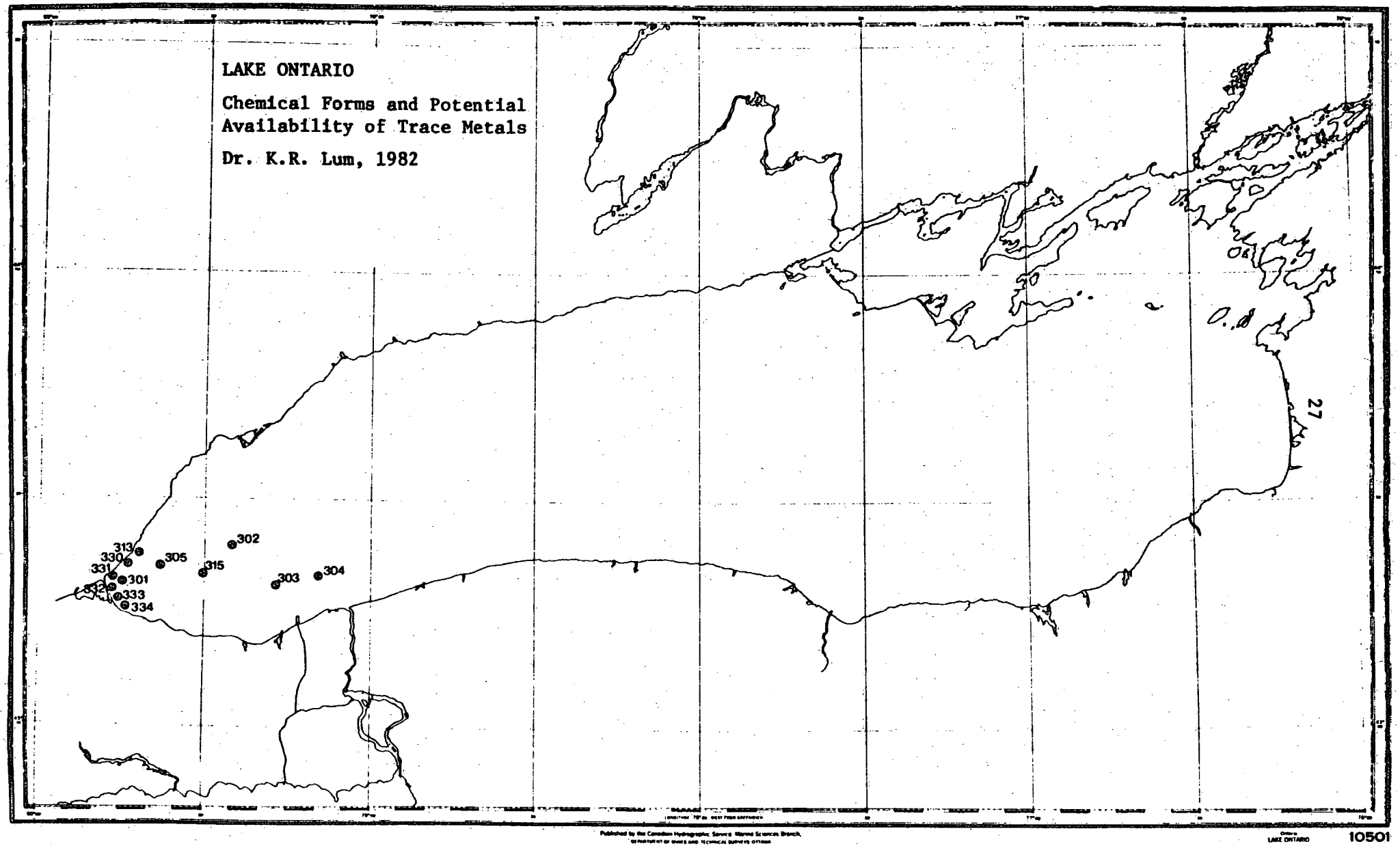
Sediment Sampling for Dr. P.G. Manning, AED 430

Sediment Sampling for M.E. Fox, ECD 230

Sediment Sampling for Dr. L.L. Kalas, AED 423

STATION POSITIONS

STATION NUMBER	LATITUDE N.	LONGITUDE W.
301	43° 19' 17"	79° 44' 56"
302	43° 24' 10"	79° 24' 43"
303	43° 16' 00"	79° 16' 00"
304	43° 20' 00"	79° 08' 00"
305	43° 20' 52"	79° 37' 34"
312	43° 21' 30"	79° 42' 07"
315	43° 20' 00"	79° 30' 00"
330	43° 20' 30"	79° 44' 00"
331	43° 19' 00"	79° 46' 00"
332	43° 18' 00"	79° 46' 00"
333	43° 17' 00"	79° 45' 00"
334	43° 16' 00"	79° 44' 00"
335	43° 19' 56"	79° 41' 19"
336	43° 24' 03"	79° 39' 52"


LAKE ONTARIO
Chemical Forms and Potential Availability of Trace Metals
Dr. K.R. Lum, 1982
313
330
331
332
301
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10501

PEEPER PLACEMENT, DR. R. CARIGNAN, AED 475

The support to this Study comprised two one-day cruises: September 27 and October 26 onboard the CSS LIMNOS. The purpose of this Study was to determine the feasibility of placing peepers in the Great Lakes System using a major research vessel.

The program consisted of the placement of two U-shaped moorings in the Western Basin of Lake Ontario. The peepers were installed and retrieved using the 21-ft. MonArk lab #4.

BIOAVAILABILITY OF ORGANIC CONTAMINANTS IN SEDIMENTS, MRS. A. MUDROCH AND DR. B.G. OLIVER, ECD 234, 218

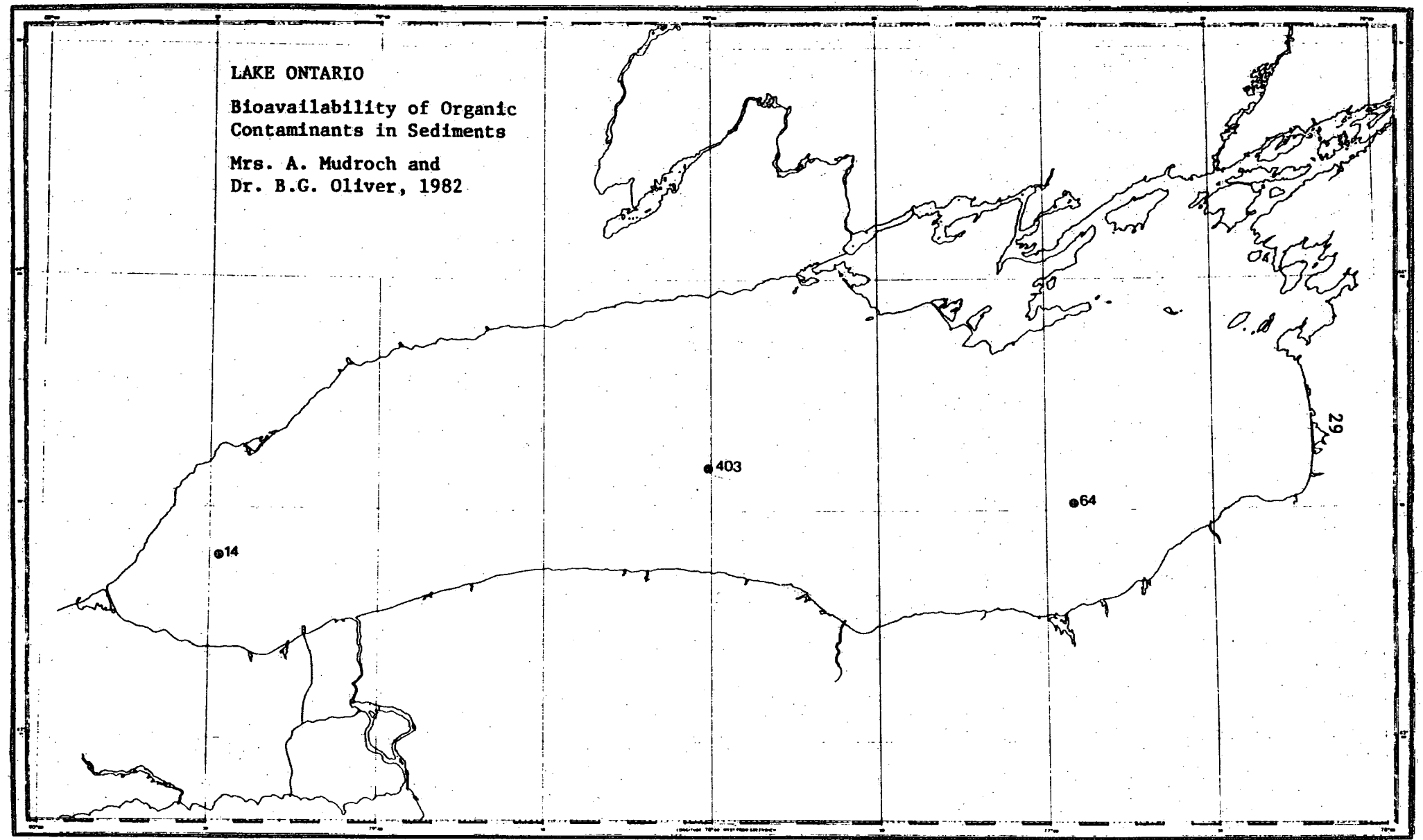
This was the only cruise of this type to be carried out on Lake Ontario this field season. The purpose of this cruise was to measure organic contaminants which are available near the sediment water interface and to investigate the changes in sediment characteristics as they relate to the distances from the outfalls located in the Niagara River.

Three stations were visited in Lake Ontario during the week of July 19 - 23. Sampling at these stations included the collection and centrifuging of large-volume water samples (5000ℓ), water sampling from discrete depths using Niskin bottles for nutrients as well as other water chemistry parameters and collection of large sediment samples using the box corer. The box cores were subsectioned using 60 cm core tubes, capped and stored at 4°C. Light transmission and temperature profiles were also taken.

Additional tasks performed on this cruise included:
Water Sampling for K. Aspila, AMD 653 and
Grazing for Dr. H. Fricker, AED 438

STATION POSITIONS

STATION NUMBER	LATITUDE N.	LONGITUDE W.
14	43° 23' 35"	79° 29' 13"
403	43° 36' 05"	78° 14' 14"
64	43° 31' 34"	76° 55' 49"


LAKE ONTARIO
Bioavailability of Organic
Contaminants in Sediments
Mrs. A. Mudroch and
Dr. B.G. Oliver, 1982
403
64
14
26
10501

STATISTICS SUMMARY

CRUISE NO. 82-00-012 CONSEC. NO. 82-22-030 SHIP CSS LIMNOS

DATES FROM July 19 TO July 23, 1982 LAKE ONTARIO

CRUISE TYPE Bioavailability of Organic Contaminants in Sediments N.MILES STEAMED 272.4

DESCRIPTION	TOTAL	DESCRIPTION	TOTAL
Stations Occupied	7	Moorings Established	
Rosette Casts	8	Moorings Retrieved	
EBT Casts	5	Moorings Established	
Transmissometer Casts	2	Moorings Retrieved	
Reversing Thermometer Obs. (No. of Thermo.		Moorings Established	
Secchi Disc Obs.		Moorings Retrieved	
		Moorings Serviced	
Zooplankton Hauls		Moorings Serviced	
Zooplankton Hauls (Mysis)		Moorings Serviced	
Primary Productivity Moorings		Cores Taken (Box)	11
Bottom Samples (Fauna)		Cores Taken (Piston)	
Integrator (10m) Integrator (20m)		Grab Samples Taken	
Total Number of Depths Sampled		Drogues Tracked	
Water Samples Collected (Chemistry)		Dye Releases	
Water Samples Collected (Microbiology)			
Water Samples Collected (Bulk 5000ℓ)	6	Observations (Weather)	
Water Samples Collected (Manual)	36	Observations ( )	
Water Samples Collected (WQB)	12		
Water Samples Filtered ( )		Continuous Observations (Days)	
Water Samples Filtered ( )		Air Temperature	
Water Samples Filtered, Chlorophyll		Relative Humidity	
Water Samples Treated, Phytoplankton		Water Temperature (In-Hull)	
Total Number of Water Samples Collected	54	Water Temperature (Towed)	
ONBOARD ANALYSES		Solar Radiation	
		Integrated Printout	
Manual Chemistry (Tech. Ops.)	36	Long Wave (IR) Radiation	
Nutrients (WQB)		Hauls (Shindler)	32
Geolimnology		Hauls (Grazing Chamber)	40
Microbiology			

1982

ORGANIC CONTAMINANT UPTAKE IN SEDIMENTS & SUSPENDED SOLIDS, DR. L.L. KALAS, AED 423 AND
NUTRIENT ASSESSMENT STUDY, DR. D.R.S. LEAN, 494

There was only one cruise of this nature carried out on Lake Ontario. The objectives were to collect data on small scale distribution of benthic organisms in Western Lake Ontario and to determine the duration of nutrient limitation of algae in Lake Ontario.

The Niagara River Plume grid stations were occupied, as well as five stations in the Central Basin of Lake Ontario. Sampling at these stations included the collection of sediment samples using ponar grabs and benthos cores, water sampling from discrete depths using Niskin bottles for primary productivity and water chemistry analysis as well as collection of percent transmission and temperature profiles.

An additional task performed on this cruise was Retrieval of Moorings for Dr. C.R. Murthy, APSD 510.

STATION POSITIONS

STATION NUMBER	LATITUDE N.	LONGITUDE W.
401	43° 53' 29"	78° 17' 12"
402	43° 49' 29"	78° 15' 28"
403	43° 35' 40"	78° 13' 11"
404	43° 26' 43"	78° 12' 10"
405	43° 23' 57"	78° 12' 10"

For Niagara River Plume Grid Positions, see Sediment Trap Mooring, M.N. Charlton, AED 425, p 16.

OTHER TASKS ACCOMPLISHED ON LAKE ONTARIO DURING THE 1982/83 FIELD SEASON

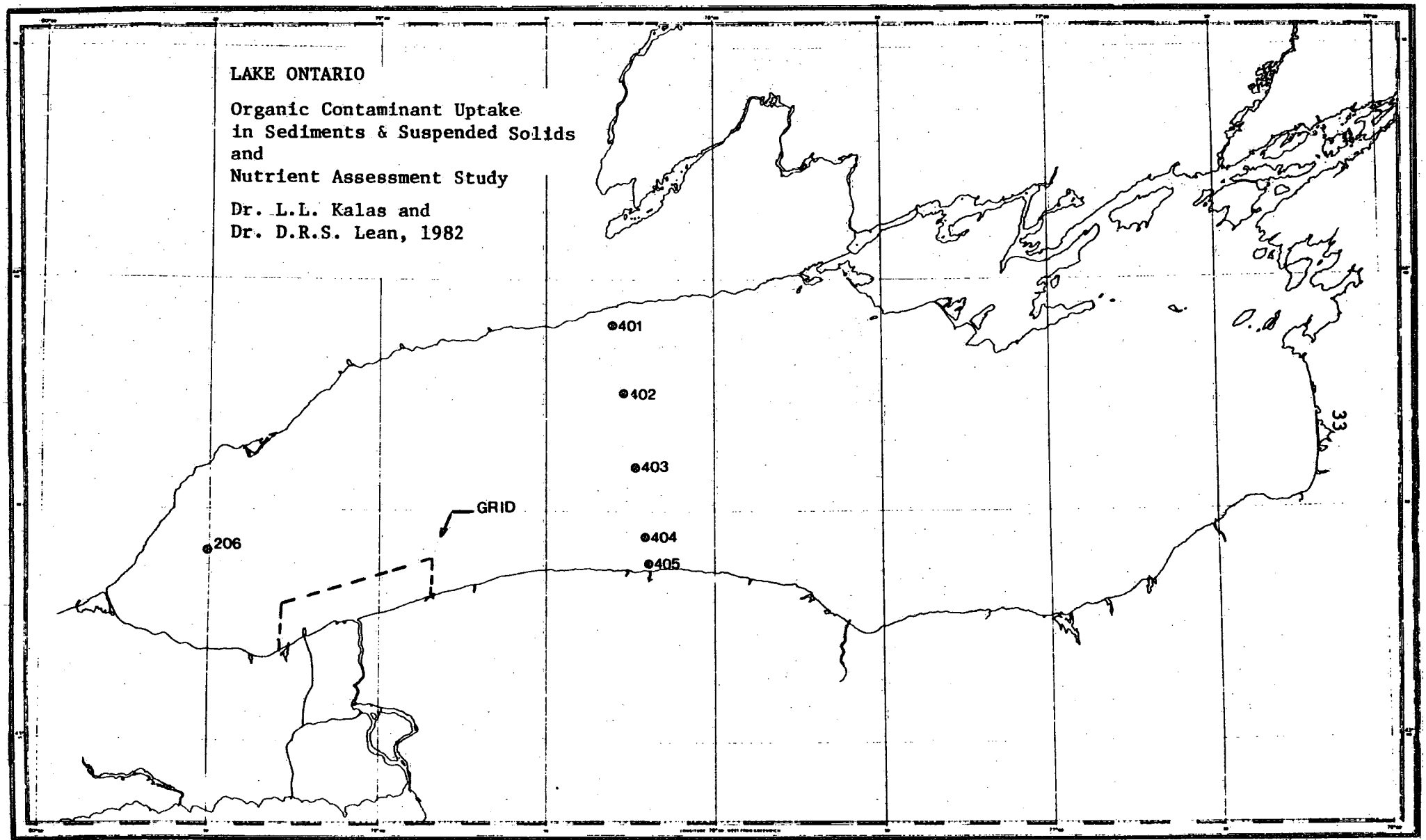
Throughout the field season, for other than the scheduled scientific support cruises, the CSS LIMNOS was utilized for ten Long Term Biological Index Monitoring cruises, D.O. Study No. 117. These cruises were piggybacked aboard the CSS LIMNOS on all Open Lake

Surveillance cruises and other scientific cruises while the CSS BAYFIELD was utilized for Nannoplankton studies on the Upper Lakes and Phytoplankton studies on Lake Ontario.

1 - Engineering Field Trial, ESS, HD 540

1 - MET II Retrieval, HD 384

1 - Sediment Trap Retrieval, AED 494


LAKE ONTARIO
Organic Contaminant Uptake
in Sediments & Suspended Solids
and
Nutrient Assessment Study
Dr. L.L. Kalas and
Dr. D.R.S. Lean, 1982
401
402
403
404
405
206
GRID
33
10501

STATISTICS SUMMARY

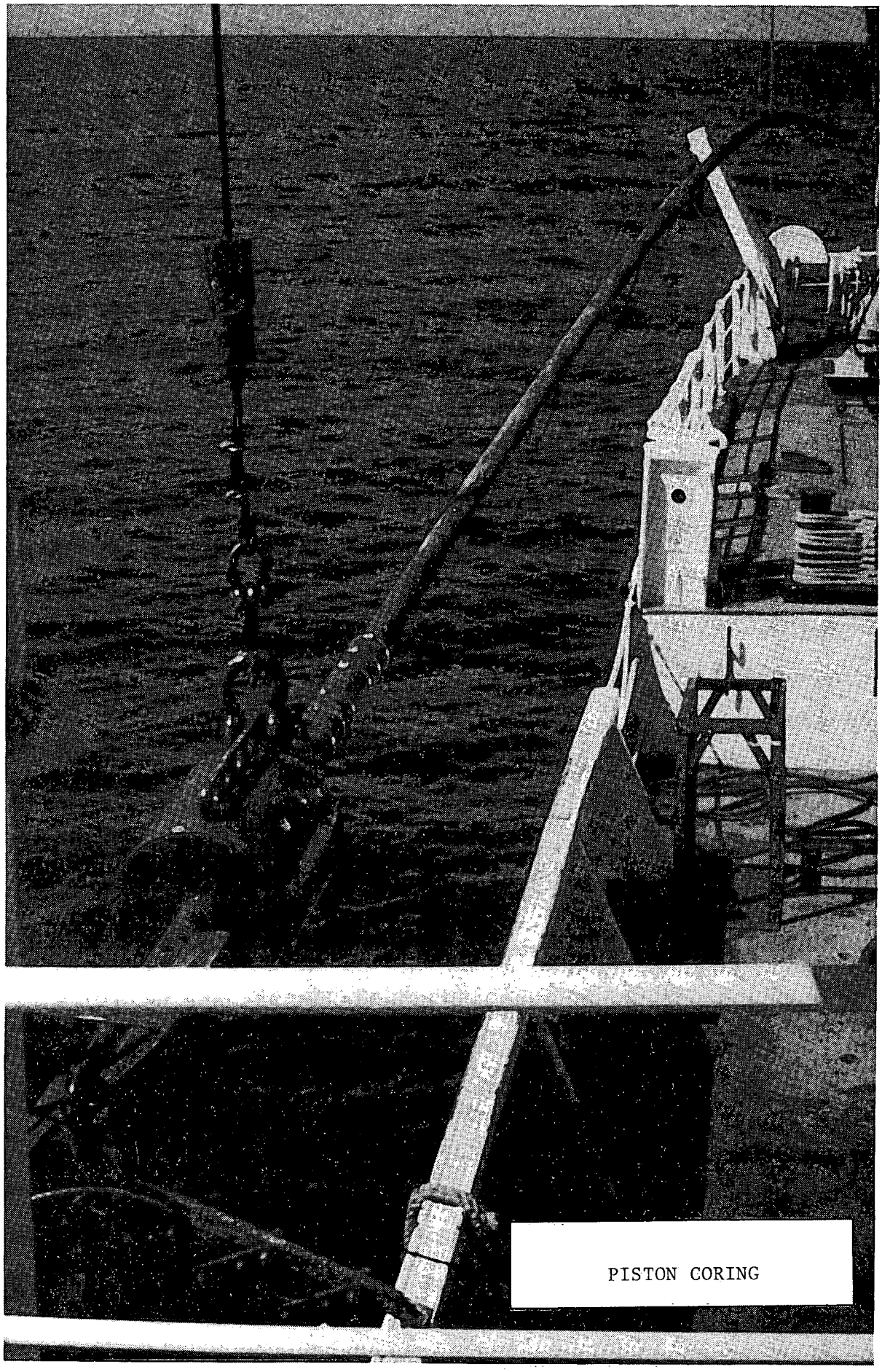
CRUISE NO. 82-00-020 CONSEC. NO. 82-22-045 SHIP CSS LIMNOS

DATES FROM September 20 TO September 24, 1982 LAKE ONTARIO

CRUISE TYPE Organic Contaminant Uptake in Sediments & Suspended Solids and Nutrient Assessment Study N.MILES STEAMED 216.0

DESCRIPTION	TOTAL	DESCRIPTION	TOTAL
Stations Occupied	56	Moorings Established	
Rosette Casts		Moorings Retrieved, MET	23
EBT Casts	56	Moorings Established	
Transmissometer Casts	9	Moorings Retrieved, Current Meter	1
Reversing Thermometer Obs. (No. of Thermo.	1	Moorings Established	
Secchi Disc Obs.		Moorings Retrieved	
		Moorings Serviced, Sediment	2
Zooplankton Hauls	9	Moorings Serviced	
Zooplankton Hauls (Mysis)		Moorings Serviced	
Primary Productivity Moorings	2	Cores Taken (Gravity), Benthos	44
Bottom Samples (Fauna)		Cores Taken (Piston)	
Integrator (20m)	11	Grab Samples Taken, Ponar	62
Total Number of Depths Sampled	92	Drogues Tracked	
Water Samples Collected (Chemistry)	331	Dye Releases	
Water Samples Collected (Microbiology)			
Water Samples Collected ( )		Observations (Weather)	
Water Samples Collected ( )		Observations ( )	
Water Samples Collected ( )			
Water Samples Filtered (Carb & Prot)	128	Continuous Observations (Days)	
Water Samples Filtered (POC)	89	Air Temperature	
Water Samples Filtered, Chlorophyll	89	Relative Humidity	
Water Samples Treated, Phytoplankton		Water Temperature (In-Hull)	
Total Number of Water Samples Collected		Water Temperature (Towed)	
ONBOARD ANALYSES		Solar Radiation	4
		Integrated Printout	
Manual Chemistry (Tech. Ops.)	252	Long Wave (IR) Radiation	
Nutrients (WQB) TP(f), TP(uf), Maj. Ions, Nut.	79		
Geolimnology			
Microbiology			

1982



PISTON CORING

LAKE ERIE

CSS LIMNOS

LAKES ERIE AND ST. CLAIR SEDIMENT BANK STUDY, DR. R.A. BOURBONNIERE, AED 495

One cruise was completed by the major research vessel, CSS LIMNOS on Lake Erie. The purpose of the cruise was to collect large volumes of sediment from depositional basins in the lake for the Great Lakes Sediment Bank (GLWQA 1320). These samples will permit retroactive analysis of persistent toxic substances which are relevant to the Canada/U.S. Great Lakes Water Quality Agreement of 1978.

During the cruise, fifty-three stations were occupied in the Western, Central, Sandusky and Eastern basins. Large volumes of surficial sediment were collected using the box corer for the Sediment Bank Study from fifty-one of fifty-three stations.

In addition to Lake Erie, a short cruise was taken on Lake St. Clair where six stations were occupied and surficial sediments collected using a double Shipek.

Several extra tasks were completed during this cruise. Some of these tasks included:

Piston and Gravity Coring for Dr. R.A. Bourbonniere, AED 419
Piston Coring for Dr. Mothersill, Lakehead University
Water Sampling for M.N. Charlton, AED 425
Temperature Profiles for F.M. Boyce, APSD 510
Piston Coring for Dr. Carmichael, University of Western Ontario
Sediment Cores for Dr. P.G. Manning, AED 430
Sediment Cores for J.P. Coakley, HD 344
Bulk Water (600ℓ) for Dr. J. Robbins, NOAA, Ann Arbour, Michigan

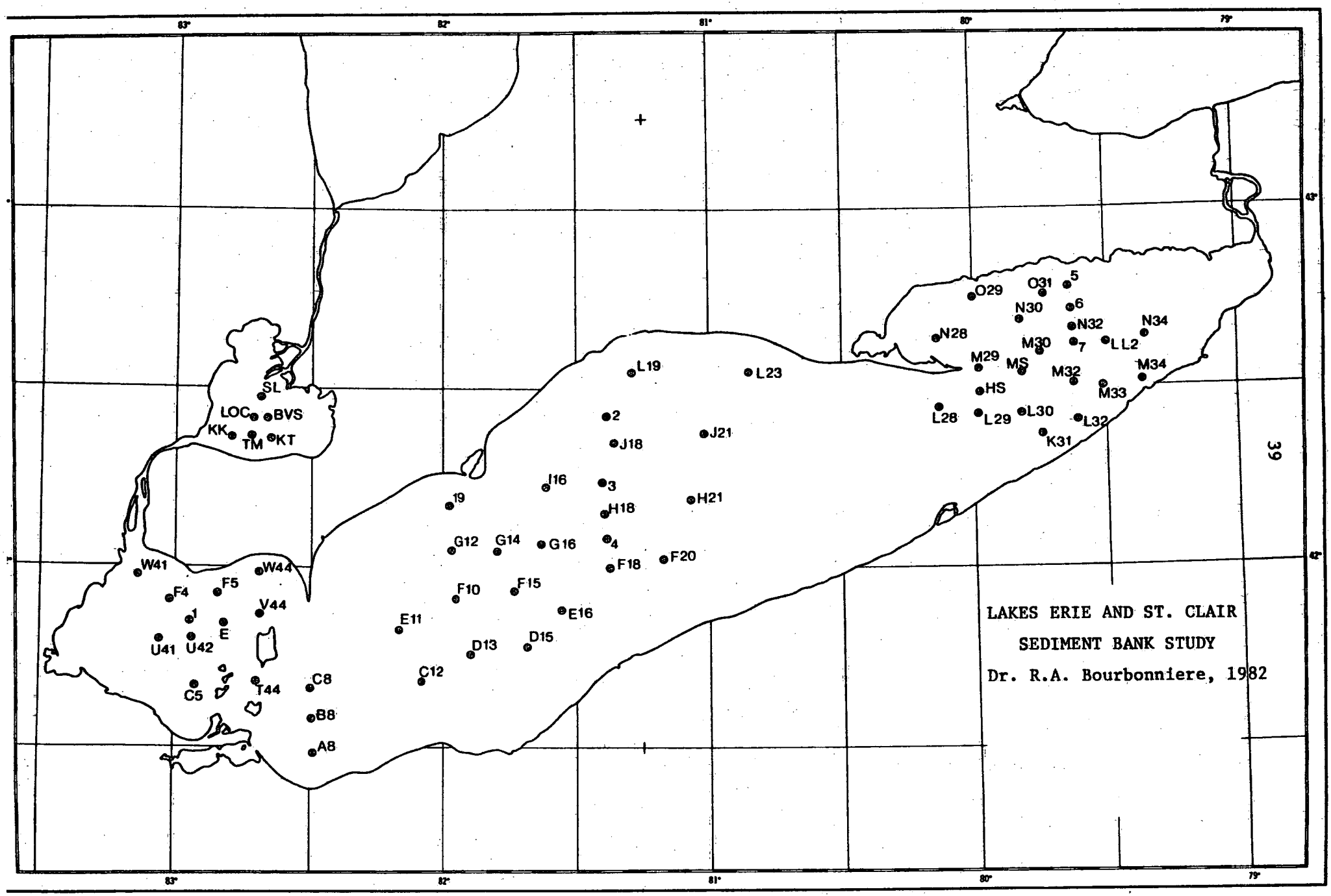
SEDIMENT BANK STUDY STATIONS

LAKE ERIE

1982/83

STATION NUMBER	LATITUDE N.	LONGITUDE W.
U-42 Western Basin	41° 45' 42"	82° 59' 19"
U-41	41° 45' 35"	83° 06' 15"
W-41	41° 56' 22"	83° 06' 24"
F-4	41° 53' 19"	83° 03' 03"
C-5	41° 37' 29"	82° 55' 15"
W-44	41° 56' 24"	82° 44' 51"
T-44	41° 40' 31"	82° 44' 06"
V-44	41° 51' 17"	82° 45' 02"
E-5	41° 48' 32"	82° 55' 35"
F-5	41° 53' 49"	82° 55' 49"
F-18 Central Basin	41° 54' 56"	81° 21' 36"
H-18	42° 05' 44"	81° 21' 22"
J-18	42° 16' 31"	81° 21' 51"
G-16	42° 00' 02"	81° 36' 04"
I-16	42° 10' 58"	81° 36' 24"
E-16	41° 49' 15"	81° 36' 00"
H-21	42° 05' 44"	81° 00' 06"
J-21	42° 16' 19"	80° 59' 19"
L-19	42° 27' 15"	81° 14' 30"
F-20	41° 54' 57"	81° 07' 37"
F-15	41° 54' 44"	81° 43' 25"
D-15	41° 43' 48"	81° 43' 36"
G-14	42° 59' 59"	81° 50' 44"
G-12	42° 00' 01"	82° 05' 09"
F-10	41° 54' 23"	82° 59' 58"
E-11	41° 49' 09"	82° 12' 01"
D-13	41° 43' 47"	81° 57' 40"
C-12	41° 38' 17"	82° 04' 50"
L-23	42° 27' 51"	80° 45' 52"
A-8 Sandusky Basin	41° 27' 12"	82° 33' 23"
B-8	41° 32' 39"	82° 33' 27"
C-8	41° 38' 06"	82° 33' 42"
0-29	42° 43' 16"	80° 01' 19"
0-31	42° 43' 17"	79° 46' 50"
N-28	42° 38' 01"	80° 08' 49"

STATION NUMBER	LATITUDE N.	LONGITUDE W.
LS	42° 32' 47"	79° 45' 19"
N-30	42° 38' 20"	79° 54' 06"
N-32	42° 37' 36"	79° 39' 29"
N-34	42° 37' 20"	79° 24' 52"
M-29	42° 32' 35"	80° 01' 25"
M-33	42° 32' 08"	79° 32' 18"
NS	42° 31' 00"	79° 53' 36"
L-28	42° 27' 08"	80° 08' 54"
L-30	42° 26' 56"	79° 54' 20"
L-32	42° 26' 44"	79° 39' 42"
K-31	42° 21' 06"	79° 47' 21"
LLS	42° 35' 18"	79° 34' 18"
M-32	42° 32' 11"	79° 39' 38"
M-34	42° 32' 00"	79° 25' 00"
L-29	42° 26' 30"	80° 01' 30"
HS	42° 29' 12"	80° 21' 18"
1	41° 52' 51"	81° 55' 42"
2	42° 20' 47"	81° 21' 48"
3	42° 08' 51"	81° 21' 31"
4	42° 00' 00"	81° 21' 31"
5	42° 43' 05"	79° 36' 32"
6	42° 41' 48"	79° 36' 31"
7	42° 39' 40"	79° 36' 31"
19	42° 02' 23"	81° 58' 40"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D13
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J18
J21
L19
L23
O29
O31
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N30
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N32
N34
N28
M30
7
LL2
M29
MS
M32
M34
HS
M33
L28
L29
L30
L32
K31
LAKES ERIE AND ST. CLAIR
SEDIMENT BANK STUDY
Dr. R.A. Bourbonniere, 1982

STATISTICS SUMMARY

CRUISE NO. 82-01-001 CONSEC. NO. 82-22-102 SHIP CSS LIMNOS

DATES FROM May 26 TO May 29, 1982 LAKE ONTARIO

CRUISE TYPE Sediment Bank Study N.MILES STEAMED 901.9

DESCRIPTION	TOTAL	DESCRIPTION	TOTAL
Stations Occupied	60	Moorings Established	
Rosette Casts		Moorings Retrieved	
EBT Casts	59	Moorings Established	
Transmissometer Casts		Moorings Retrieved	
Reversing Thermometer Obs. (No. of Thermo.		Moorings Established	
Secchi Disc Obs.		Moorings Retrieved	
		Moorings Serviced	
Zooplankton Hauls		Moorings Serviced	
Zooplankton Hauls (Mysis)		Moorings Serviced	
Primary Productivity Moorings		Cores Taken (Gravity)	27
Bottom Samples (Fauna)		Cores Taken (Piston)	11
Integrator (10m) Integrator (20m)		Grab Samples Taken, Double Shipek	16
Total Number of Depths Sampled	16	Drogues Tracked	
Water Samples Collected (Chemistry)		Dye Releases	
Water Samples Collected (Microbiology)		Box Cores Taken	69
Water Samples Collected (WaterQuality)	21	Observations (Weather)	
Water Samples Collected ( )		Observations ( )	
Water Samples Collected ( )			
Water Samples Filtered ( )		Continuous Observations (Days)	
Water Samples Filtered ( )		Air Temperature	
Water Samples Filtered, Chlorophyll		Relative Humidity	
Water Samples Treated, Phytoplankton		Water Temperature (In-Hull)	
Total Number of Water Samples Collected	21	Water Temperature (Towed)	
ONBOARD ANALYSES		Solar Radiation	
		Integrated Printout	
Manual Chemistry (Tech. Ops.)		Long Wave (IR) Radiation	
Nutrients (WQB)			
Geolimnology			
Microbiology			

1982

CSS LIMNOS
1982

	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
FEB	31	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
MAR	28	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
APR	28	29	30	31	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
MAY	25	26 LAKE	27 ONTARIO	28 SURVEILLANCE	29 LAKE	30 ONTARIO	1 CCIW
	2 CCIW	3 LAKE ONTARIO	4 MOORINGS	5 LAKE ONTARIO	6 MOORINGS	7 CCIW	8 CCIW
	9 CCIW	10 LAKE ONTARIO	11 CHEMICAL FORMS TRACE METALS	12 SEDIMENT TRAP	13 MOORINGS	14 CCIW	15 CCIW
	16 CCIW	17 LAKE	18 ONTARIO	19 SURVEILLANCE	20 LAKE	21 ONTARIO	22 CCIW
	23 CCIW	24 CCIW	25 LAKE ERIE	26 SEDIMENT	27 BANK	28 STUDY	29 LAKE ERIE
JUN	30 SEDIMENT	31 BANK	1 STUDY	2 LAKE	3 ST. CLAIR	4 CCIW	5 CCIW
	6 CCIW	7 LAKE	8 ONTARIO	9 NUTRIENT	10 ASSESSMENT	11 CCIW	12 CCIW
	13 CCIW	14 LAKE ONTARIO	15 SURVEILLANCE	16 LAKE ONTARIO	17 SURVEILLANCE	18 CCIW	19 CCIW
	20 CCIW	21 CCIW	22 LAKE ONTARIO	23 ORGANIC CONTAM UPTAKE	24 CCIW	25 CCIW	26 CCIW
	27 CCIW	28 LAKE	29 ONTARIO	30 NUTRIENT	1 ASSESSMENT	2 STUDY	3 CCIW
JUL	4 CCIW	5 LAKE ONTARIO	6 SEDIMENT TRAP	7 MOORINGS	8 LAKE ONTARIO	9 CCIW	10 CCIW
	11 CCIW	12 LAKE	13 ONTARIO	14 SURVEILLANCE	15 LAKE	16 ONTARIO	17 CCIW
	18 CCIW	19 LAKE ONTARIO	20 BIOAVAILABILITY	21 OF ORGANIC	22 CONTAMINANTS	23 LAKE ONTARIO	24 CCIW
	25 CCIW	26 LAKE ONTARIO	27 CHEMICAL FORMS TRACE METALS	28 CCIW	29 CCIW	30 CCIW	31 CCIW
AUG	1 CCIW	2 CCIW	3 CCIW	4 CCIW	5 CCIW	6 CCIW	7 CCIW
	8 CCIW	9 LAKE ONTARIO	10 SEDIMENT	11 TRAP	12 MOORINGS	13 LAKE ONTARIO	14 CCIW
	15 CCIW	16 LAKE	17 ONTARIO	18 SURVEILLANCE	19 LAKE	20 ONTARIO	21 CCIW
	22 CCIW	23 LAKE	24 ONTARIO	25 NUTRIENT	26 ASSESSMENT	27 STUDY	28 CCIW
	29 CCIW	30 LAKE ONTARIO	31 MOORINGS	1 LAKE ONTARIO	2 MOORINGS	3 CCIW	4 CCIW
SEP	5 CCIW	6 CCIW	7 LAKE	8 ONTARIO	9 SEDIMENT	10 TRAP	11 CCIW
	12 CCIW	13 LAKE	14 ONTARIO	15 SURVEILLANCE	16 LAKE	17 ONTARIO	18 CCIW
	19 CCIW	20 LAKE ONTARIO	21 LOADS	22 LAKE ONTARIO	23 ORGANIC	24 CONTAMINANT UPTAKE	25 CCIW
	26 CCIW	27 LAKE ONTARIO PEEPERS AND COR	28 CCIW	29 CCIW	30 CCIW	1 CCIW	2 CCIW
OCT	3 CCIW	4 LAKE ONTARIO	5 SEDIMENT TRAP	6 MOORINGS	7 CCIW	8 CCIW	9 CCIW
	10 CCIW	11 CCIW	12 LAKE	13 ONTARIO	14 SURVEILLANCE	15 LAKE	16 ONTARIO
	17 SURVEILLANCE	18 LAKE ONTARIO	19 LOADS	20 LAKE ONTARIO	21 LOADS	22 CCIW	23 CCIW
	24 CCIW	25 CCIW	26 LAKE ONTARIO	27 PEEPER	28 RETREIVAL	29 CCIW	30 CCIW
	31 CCIW	1 LAKE ONTARIO	2 MOORINGS	3 LAKE ONTARIO	4 MOORINGS	5 CCIW	6 CCIW
NOV	7 CCIW	8 LAKE ONTARIO	9 SEDIMENT TRAP	10 MOORINGS	11 CCIW	12 CCIW	13 CCIW
	14 CCIW	15 LAKE ONTARIO	16 SURVEILLANCE	17 LAKE ONTARIO	18 SURVEILLANCE	19 CCIW	20 CCIW
	21 CCIW	22 LAKE ONTARIO	23 MOORINGS	24	25	26	27
	28	29	30	1	2	3	4
DEC	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	

LONG TERM BIOLOGICAL INDEX MONITORING

CSS BAYFIELD

The CSS BAYFIELD was utilized for many different projects but the majority of the work was occupied by two Great Lakes Fisheries Research Branch programs included in Study No. 803.

The Long Term Biological Index Monitoring Program on Lake Ontario, under the leadership of Dr. H. Shear of GLFRB, was continued in 1982 in much the same manner as 1981. The purpose of the program was to collect chemical and biological data simultaneously, at selected stations on Lake Ontario on a weekly basis so that the seasonal trends of various parameters could be more precisely established. Cruises were carried out during a 39-week period from early March until the end of November. During this period, twenty-six Bio Index cruises were carried out on the BAYFIELD; ten were piggybacked aboard the CSS LIMNOS and one was piggybacked aboard a Sediment Trap Mooring Cruise aboard the BAYFIELD. This totalled 38 weeks of data--the only missing week being Open House in mid-April. A typical cruise required two days to occupy stations 12, 93, 41 and 81 of the Bio Index Survey. At each station, the rosette sampler was used to collect water samples at predetermined depths for the analysis of chemical and biological parameters. The epilimnion was also sampled by integrated water sampler and zooplankton net hauls. One cruise per month required the collection of sediment samples from stations 93, 41 and 81 for bottom fauna studies by Dr. R. Dermott of GLFRB. All stations of all cruises of the Bio Index Survey were occupied except the following cases: station 81 was not sampled until April because of ice conditions in the Kingston Basin and station 41 was not sampled on two occasions because of severe weather conditions.

The second major program carried out by the CSS BAYFIELD was the Impact of Contaminants on Plankton Study of Dr. M. Munawar (GLFRB). The purpose of the Study was to assess the damage of toxic contaminants

on phytoplankton in the Great Lakes. The toxic contaminants are eventually transferred up the food chain to man. Dr. Munawar and his staff utilized the BAYFIELD on 22 separate occasions to carry out sampling for the various segments of his program. Much of the work was carried out in conjunction with the Bio Index cruises. This Program required a wide variety of sampling methods and locations throughout the year and was often modified as data from previous cruises became available. Listed below is a summary of the cruises which made up the bulk of the work:

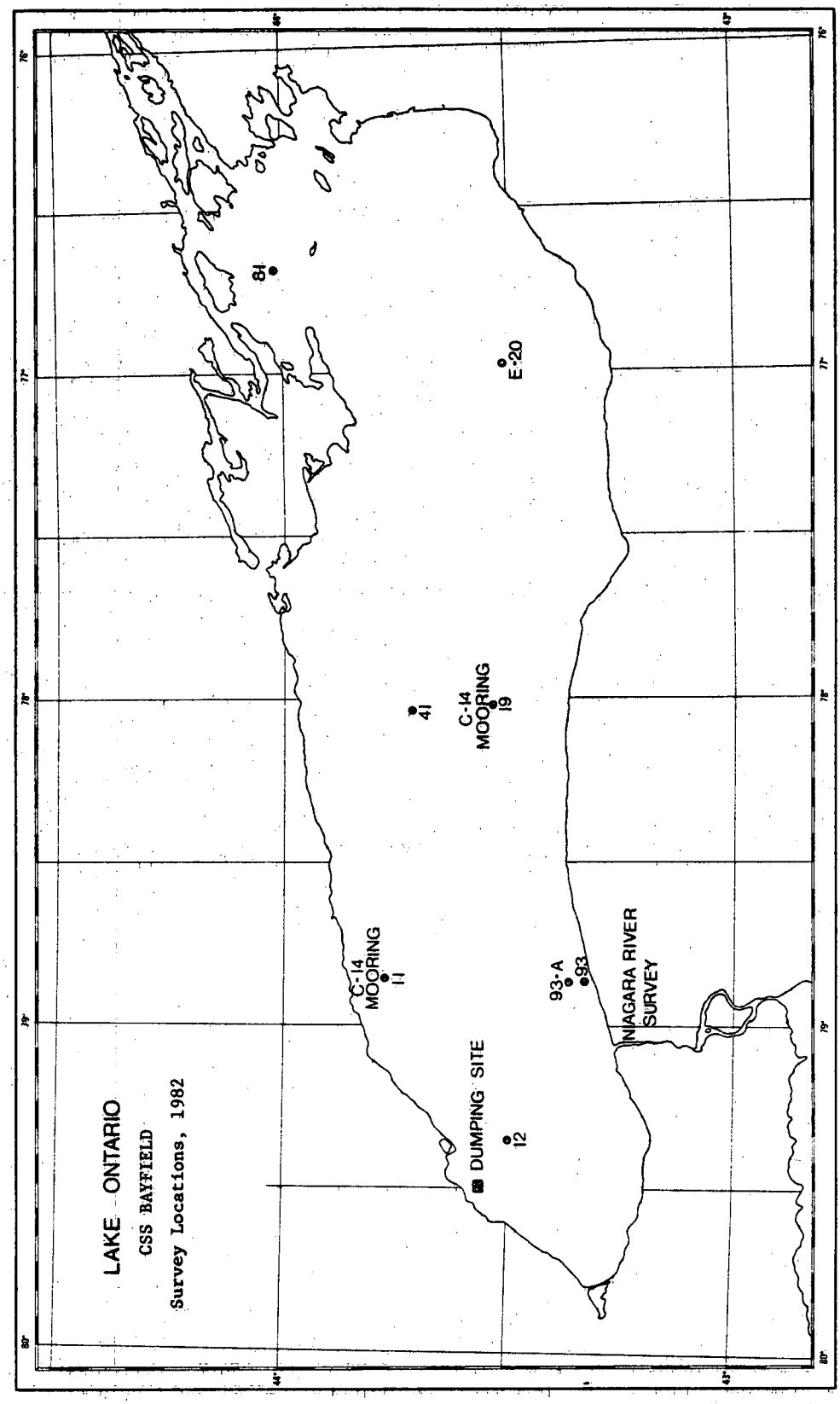
- Dr. Munawar's staff accompanied the BAYFIELD on five Bio Index cruises throughout the year and collected water and sediment samples from the Bio Index stations and station E20
- The lower Niagara River was surveyed five times to determine the level of contaminants in the river plankton
- A dredge-dumping site near Port Credit was surveyed before, during and after dumping to determine the effect of Port Credit Harbour spoils on the phytoplankton
- C_{14} primary productivity moorings were placed at different stations throughout the lake on five different cruises
- One cruise to Pelee Island in Lake Erie was completed to determine level of contaminants in Lake Erie plankton
- Other miscellaneous work included transects across Lake Ontario twice and single-day trips to various stations for phytoplankton work occupied other cruises

The BAYFIELD was also utilized for NWRI projects during the months of March and April. These cruises had been originally scheduled for CSS LIMNOS which did not become operational until May. These cruises included two Surveillance cruises in March and two Nutrient Assessment cruises for Aquatic Ecology Division in April. The BAYFIELD also conducted a Sediment Trap Mooring and Transmissometer Survey Cruise for M.N. Charlton.

SUMMARY

The season for CSS BAYFIELD saw the successful completion of all scheduled cruises. No serious injury to personnel nor major damage to scientific equipment or vessel occurred and other than five cruises throughout the year being somewhat curtailed by weather, all data was collected.

The greatest co-operation was received from all members of CSS BAYFIELD crew who did more than requested many times to make the workload lighter.


LAKE ONTARIO
CSS BAYFIELD
Survey Locations, 1982
81
E-20
41
C-14
MOORING
19
C-14
MOORING
11
DUMPING SITE
12
93-A
93
NIAGARA RIVER
SURVEY

CSS BAYFIELD
1982

	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	5	6
FEB	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	1	2	3	4	5	6
MAR	7	8 LAKE	9 ONTARIO	10 SURVEILLANCE	11 LAKE	12 ONTARIO	13 CCIW
	14 CCIW	15 CCIW	16 CCIW	17 LAKE ONTARIO LONG TERM	18 BIO-INDEX MONITORING	19 CCIW	20 CCIW
	21 CCIW	22 LAKE ONTARIO	23 CHEMICAL FORMS TRACE METALS	24 LAKE ONTARIO LONG TERM	25 BIO-INDEX MONITORING	26 CCIW	27 CCIW
	28 CCIW	29 LAKE	30 ONTARIO	31 SURVEILLANCE	1 LAKE	2 ONTARIO	3 CCIW
APR	4 CCIW	5 LAKE ONTARIO	6 NUTRIENT ASSESSMENT	7 STUDY	8 CCIW	9 CCIW	10 CCIW
	11 CCIW	12 CCIW	13 LAKE	14 ONTARIO	15 SEDIMENT TRAP	16 MORNINGS	17 LAKE ONTARIO
	18 CHEMICAL FORMS TRACE METALS	19 CCIW	20 CCIW	21 CCIW	22 CCIW	23 CCIW	24 CCIW
	25 CCIW	26 CCIW	27 LAKE ONTARIO	28 NUTRIENT	29 ASSESSMENT	30 STUDY	1 CCIW
MAY	2 CCIW	3 CCIW	4 LAKE ONTARIO LONG TERM	5 BIO-INDEX MONITORING	6 CCIW	7 CCIW	8 CCIW
	9 CCIW	10 LAKE ONTARIO LONG TERM	11 BIO-INDEX MONITORING	12 LAKE	13 ERIE	14 MANNOPLANKTON	15 DYNAMICS
	16 LAKE	17 HURON	18 MANNOPLANKTON	19 DYNAMICS	20 LAKE	21 ST. CLAIR	22 MANNOPLANKTON
	23 DYNAMICS	24 LAKE MICHIGAN	25 MANNOPLANKTON	26 DYNAMICS	27 LAKE ONTARIO LONG TERM	28 BIO-INDEX MONITORING	29 CCIW
	30 CCIW	31 LAKE ONTARIO LONG TERM	1 BIO-INDEX MONITORING	2 CCIW	3 CCIW	4 CCIW	5 CCIW
JUN	6 CCIW	7 LAKE ONTARIO	8 LONG TERM	9 BIO-INDEX	10 MONITORING	11 CCIW	12 CCIW
	13 CCIW	14 CCIW	15 CCIW	16 CCIW	17 CCIW	18 CCIW	19 CCIW
	20 CCIW	21 LAKE ONTARIO	22 LONG TERM	23 BIOLOGICAL	24 INDEX	25 MONITORING	26 CCIW
	27 CCIW	28 LAKE ONTARIO LONG TERM	29 MONITORING	30 CCIW	1 CCIW	2 CCIW	3 CCIW
JUL	4 CCIW	5 LAKE ONTARIO LONG TERM	6 BIOLOGICAL INDE MONITORING	7 LAKE	8 ERIE	9 MANNOPLANKTON	10 DYNAMICS
	11 LAKE	12 HURON	13 MANNOPLANKTON	14 DYNAMICS	15 LAKE ST. CLAIR	16 MANNOPLANKTON	17 DYNAMICS
	18 LAKE MICHIGAN	19 MANNOPLANKTON	20 DYNAMICS	21 LAKE ONTARIO LONG TERM	22 BIO-INDEX MONITORING	23 CCIW	24 CCIW
	25 CCIW	26 LAKE ONTARIO LONG TERM	27 BIO-INDEX MONITORING	28 LAKE ERIE	29 MANNOPLANKTON	30 DYNAMICS	31 CCIW
AUG	1 CCIW	2 CCIW	3 LAKE ONTARIO	4 LONG TERM BIO-INDEX	5 INDEX	6 MONITORING	7 CCIW
	8 CCIW	9 LAKE ONTARIO	10 LONG TERM	11 BIOLOGICAL	12 INDEX	13 MONITORING	14 CCIW
	15 CCIW	16 CCIW	17 CCIW	18 CCIW	19 CCIW	20 CCIW	21 CCIW
	22 CCIW	23 LAKE ONTARIO	24 LONG TERM	25 BIOLOGICAL	26 INDEX	27 MONITORING	28 CCIW
	29 CCIW	30 LAKE ONTARIO	31 LONG TERM	1 BIO-INDEX	2 MONITORING	3 CCIW	4 CCIW
SEP	5 CCIW	6 CCIW	7 LAKE	8 ERIE	9 MANNOPLANKTON	10 DYNAMICS	11 LAKE ST. CLAIR
	12 MANNOPLANKTON	13 DYNAMICS	14 LAKE HURON	15 MANNOPLANKTON	16 DYNAMICS	17 GEORGIAN BAY	18 MANNOPLANKTON
	19 DYNAMICS	20 LAKE MICHIGAN	21 MANNOPLANKTON	22 DYNAMICS	23 LAKE ONTARIO LONG TERM	24 BIO-INDEX MONITORING	25 CCIW
	26 CCIW	27 CCIW	28 LAKE ONTARIO LONG TERM	29 BIO-INDEX MONITORING	30 CCIW	1 CCIW	2 CCIW
OCT	3 CCIW	4 LAKE ONTARIO	5 LONG TERM	6 BIO-INDEX	7 MONITORING	8 CCIW	9 CCIW
	10 CCIW	11 CCIW	12 CCIW	13 LAKE ONTARIO PHYTOPLANKTON	14 CCIW	15 CCIW	16 CCIW
	17 CCIW	18 LAKE ONTARIO	19 LONG TERM BIOLOGICAL	20 INDEX	21 MONITORING	22 CCIW	23 CCIW
	24 CCIW	25 LAKE ONTARIO LONG TERM	26 BIO-INDEX MONITORING	27 CCIW	28 CCIW	29 CCIW	30 CCIW
	31 CCIW	1 LAKE ONTARIO	2 LONG TERM BIOLOGICAL	3 INDEX	4 MONITORING	5 CCIW	6 CCIW
NOV	7 CCIW	8 LAKE ONTARIO LONG TERM	9 BIO-INDEX MONITORING	10 CCIW	11 CCIW	12 CCIW	13 CCIW
	14 CCIW	15 CCIW	16 LAKE ONTARIO	17 MANNOPLANKTON DYNAMICS	18 CCIW	19 CCIW	20 CCIW
	21 CCIW	22 LAKE ONTARIO LONG TERM	23 BIO-INDEX MONITORING	24	25	26	27
	28	29	30	1	2	3	4
DEC	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	

GREAT LAKES NANNOPLANKTON DYNAMICS

CSS BAYFIELD

Field support to Dr. M. Munawar, GLFRB No. 141 during the 1982 field season consisted of three two-week cruises aboard the CSS BAYFIELD on the Upper Great Lakes. A total of 106 nannoplankton stations were sampled as follows:

1. Lake Michigan: the major study area with 55 stations
2. Lake Erie: 32 stations--comprised of 26 original stations and 6 along a transect of the Western Basin
3. Lake Huron: 11 stations
4. Lake St. Clair: 6 stations
5. Georgian Bay: 2 stations

The purposes of this work were:

1. To study the transfer of contaminants from lake water to nannoplankton and from nannoplankton to herbivorous zooplankton
2. To develop a quick and simple method for estimating mortality in phytoplankton
3. To develop a universally applicable technique for isolating the key algal size fraction (< 20 µm) as a test population for contaminant bioassays, and
4. To continue studies of basic phytoplankton ecology

Having established that the < 20 µm size fraction of phytoplankton shows the greatest inhibition of photosynthesis when exposed to a heavy metal mixture and that zooplankton graze almost exclusively on the very same fraction, one hypothesizes that pelagic food chain transfer of these contaminants must follow this route.

Samples were taken by the 10 m or 20 m integrator, rosette casts or Van Dorn bottles. These samples were prepared for subsequent water chemistry, phytoplankton and chlorophyll *a* analyses. Toxicity experiments were carried out using onboard incubators. Chlorophyll *a* samples were fractionated onboard usually completing a set of 5 filtrations per

station. The filter papers were subsequently transferred to 5 scintillation vials.

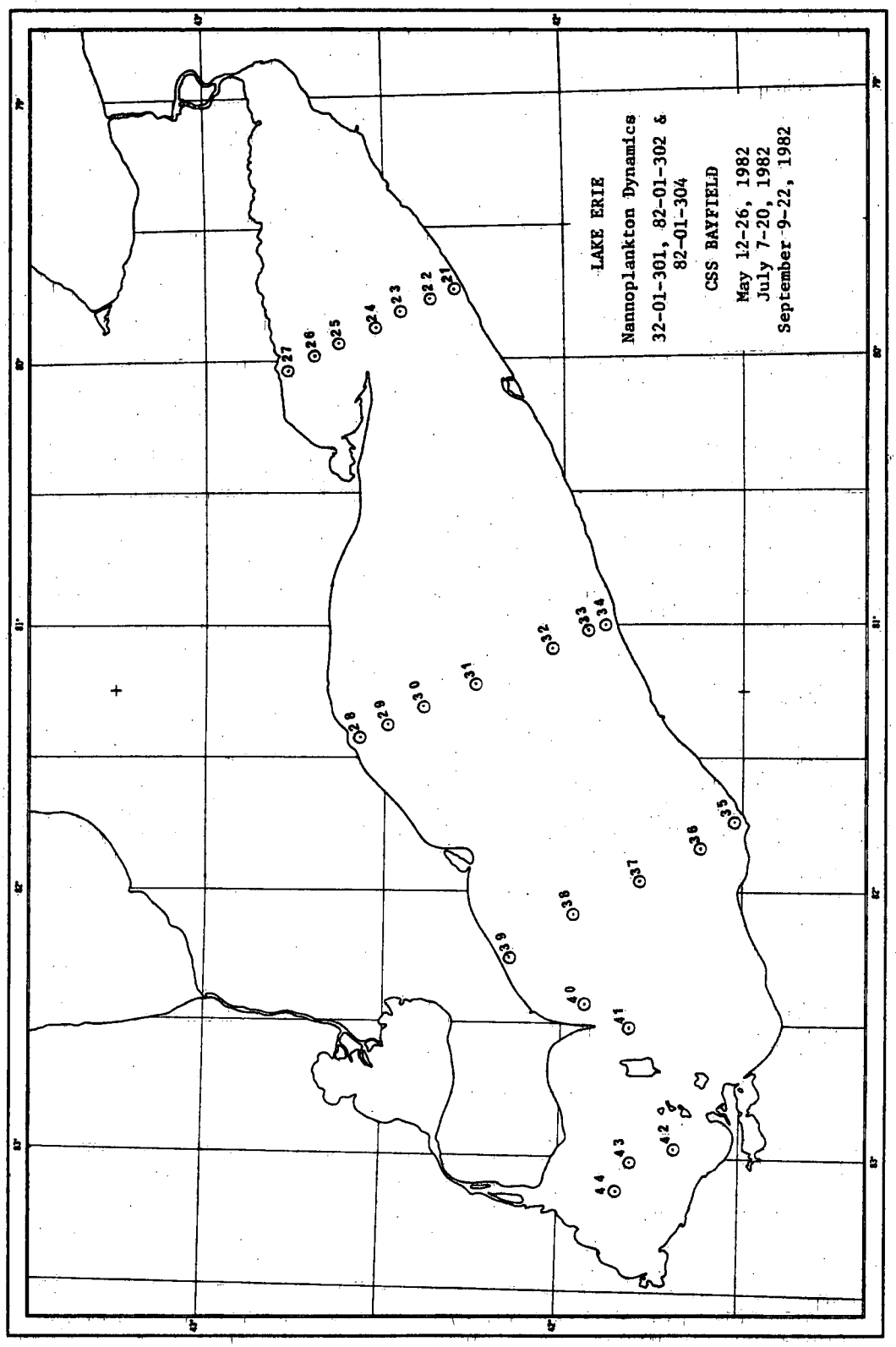
At all primary and selected stations, an EBT and transmissometer trace were obtained. Several primary productivity moorings were established with a 4-hour duration.

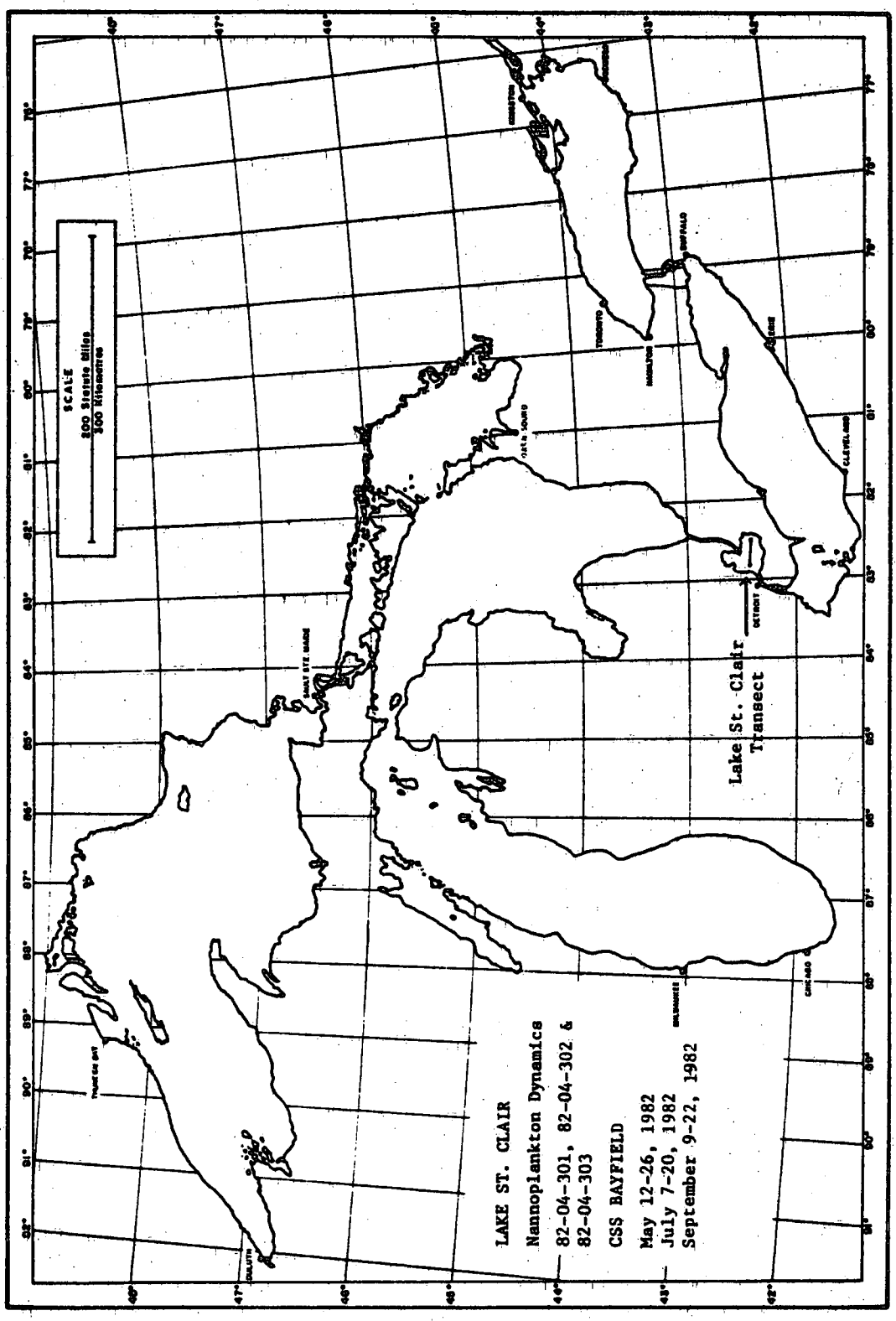
The effect of a variety of toxic metals on algal metabolism was studied utilizing the photosynthetic incubator onboard the BAYFIELD. Many samples were processed onboard and returned to shore labs at the University of Montreal and the Great Lakes Fisheries Research Branch at CCIW for further analyses.

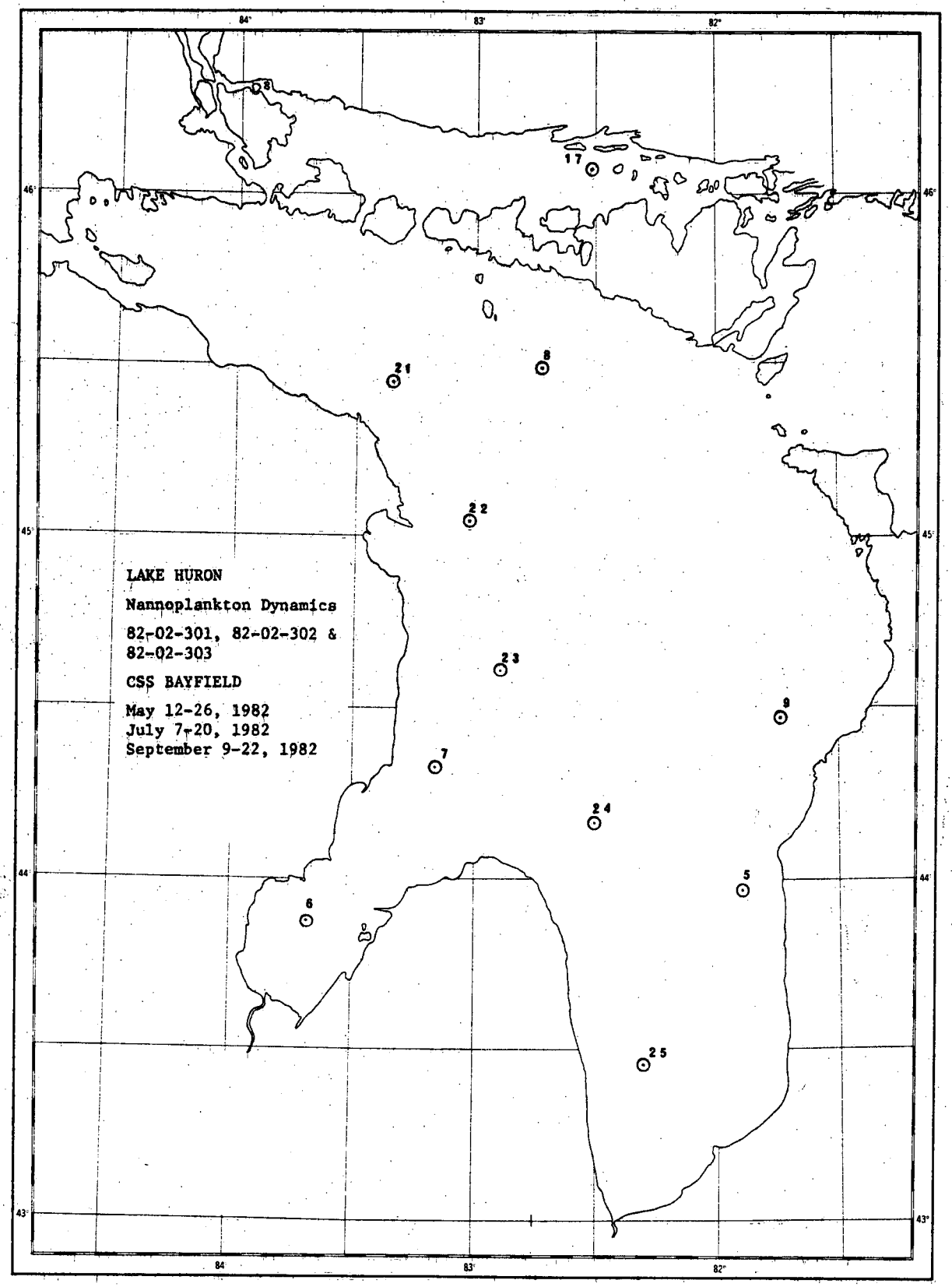
Zooplankton grazing experiments were also carried out:

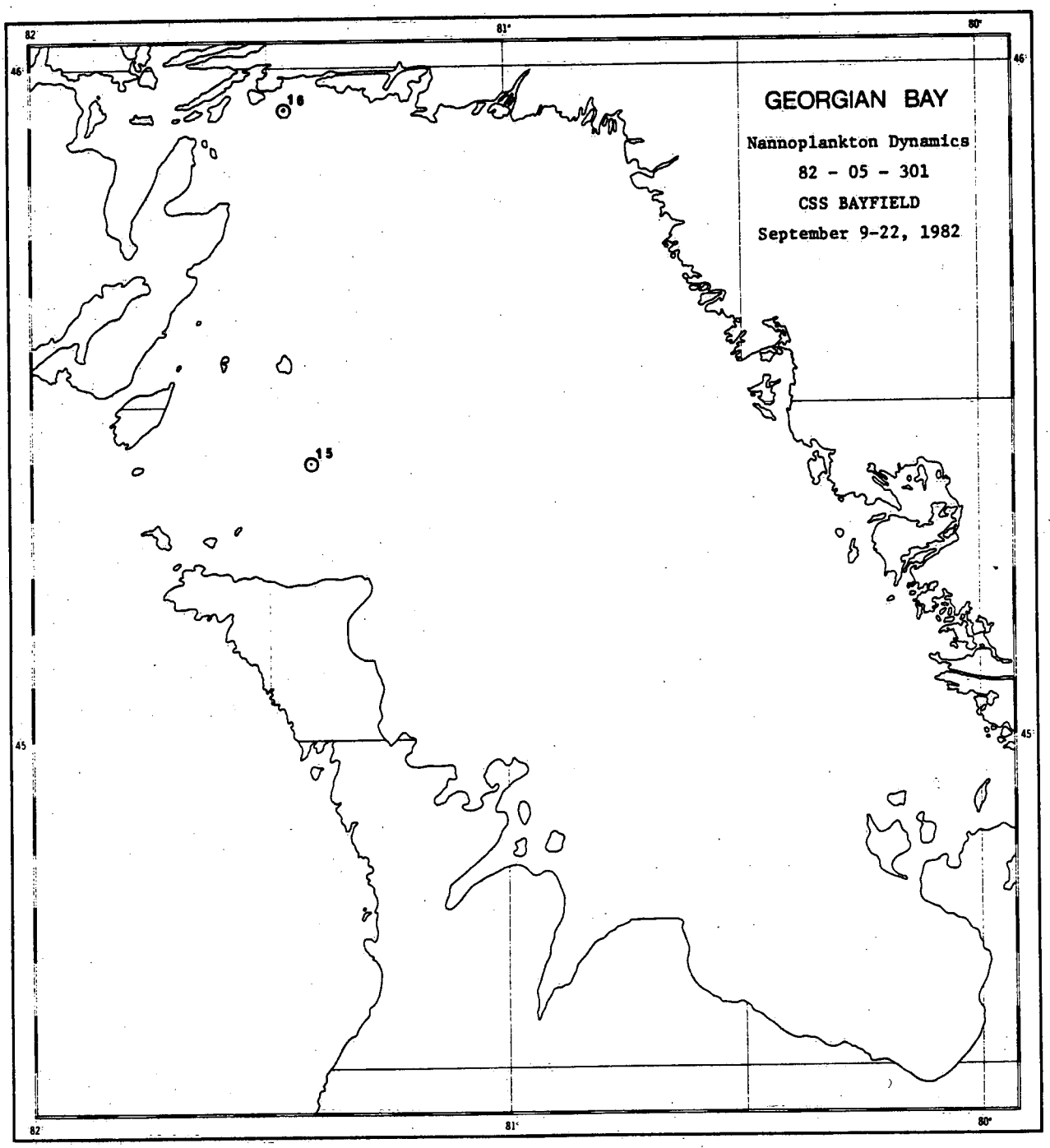
1. To determine the filtration rates of the most abundant zooplankton species
2. To determine the preferred size class of algae eaten by herbivorous zooplankton
3. To estimate the portion of the daily primary production that is cropped by zooplankton

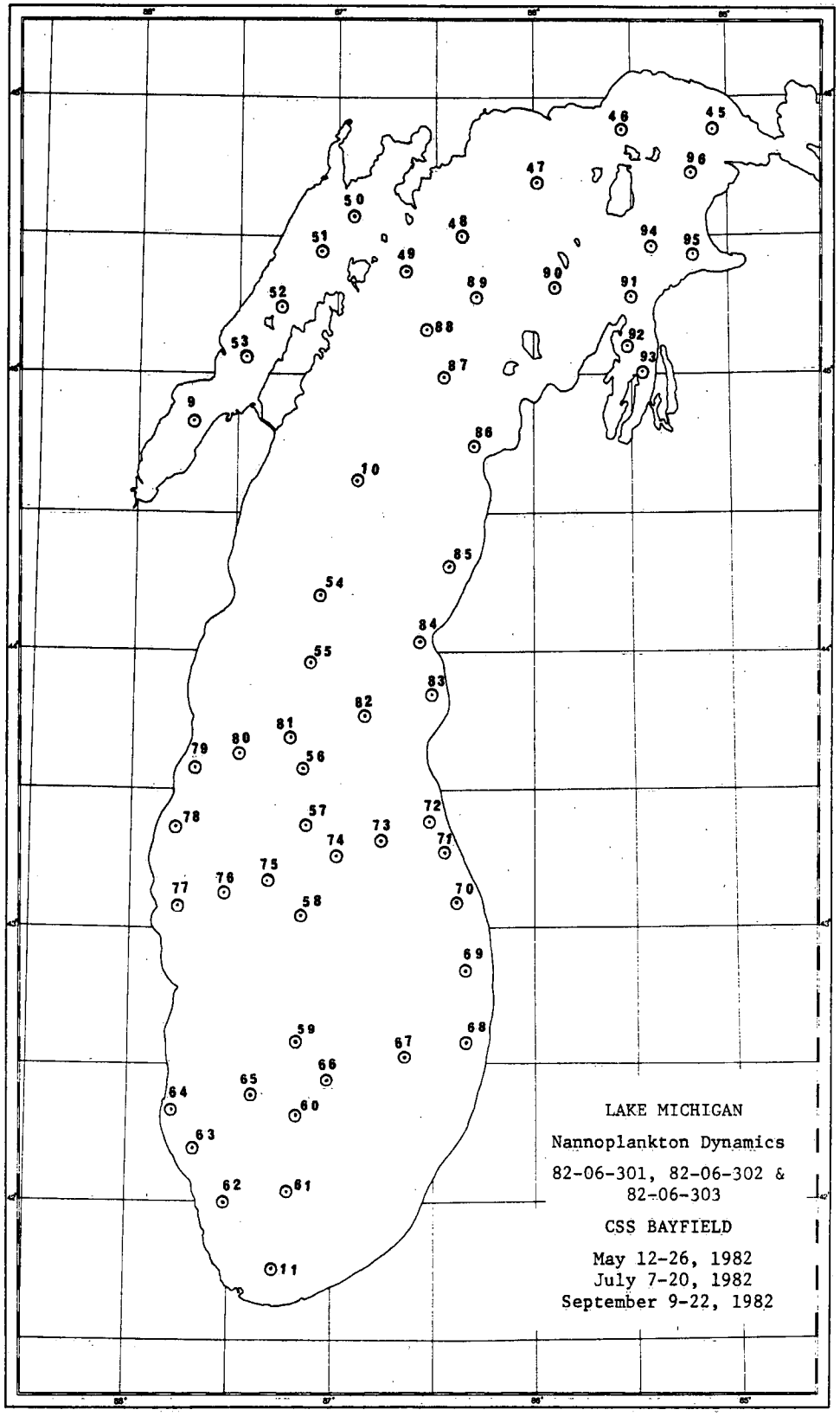
A set procedure, described in one of the published cruise reports for 1982, was followed. On-station work lasted for approximately 70 minutes employing the Gliwicz-Haney zooplankton grazing chamber.

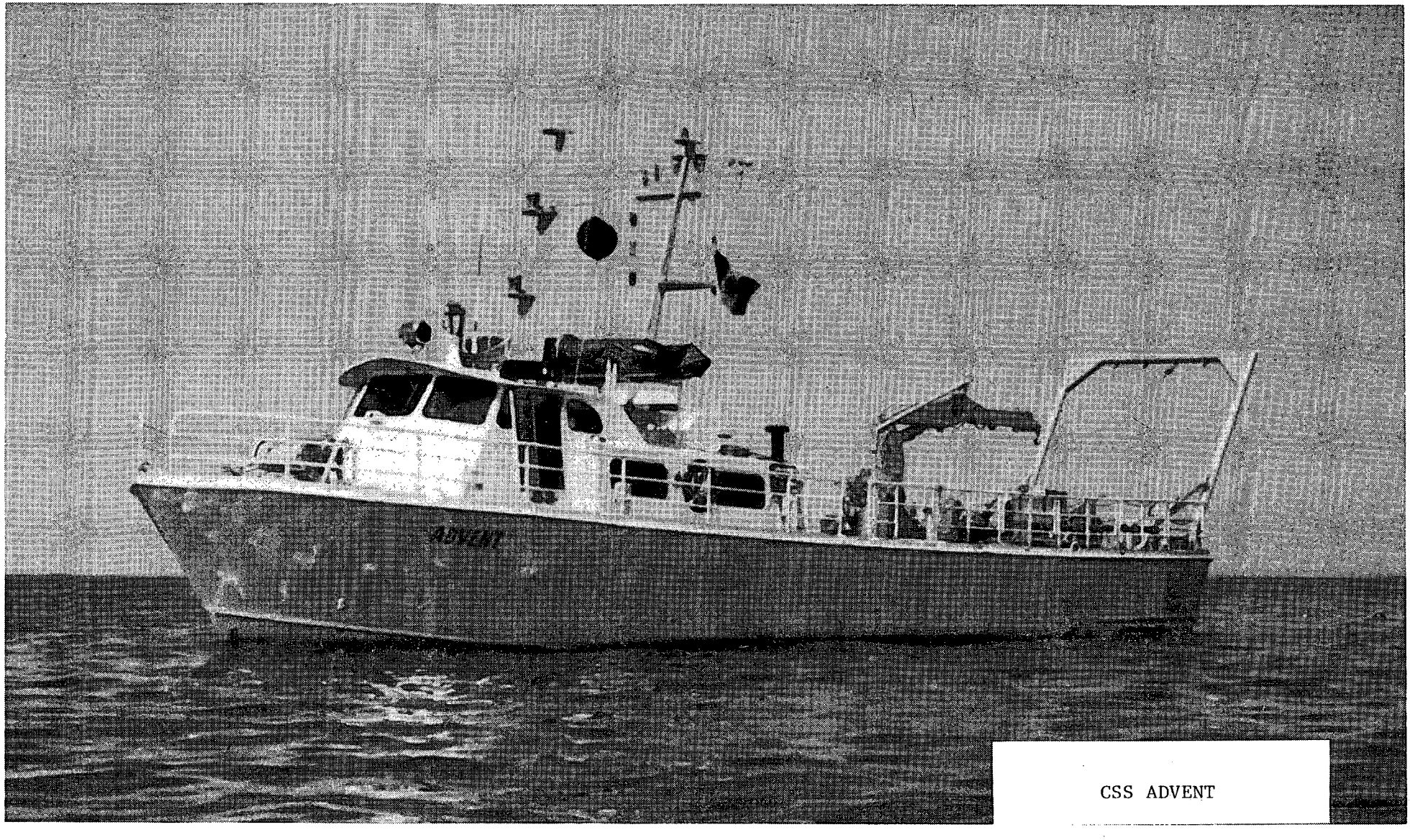

LAKE ERIE
Nannoplankton Dynamics
32-01-301, 82-01-302 &
82-01-304
CSS BAYFIELD
May 12-26, 1982
July 7-20, 1982
September 9-22, 1982


SCALE
100 Statute Miles
100 Kilometers
LAKE ST. CLAIR
Nannoplankton Dynamics
82-04-301, 82-04-302 &
82-04-303
CSS BAYFIELD
May 12-26, 1982
July 7-20, 1982
September 9-22, 1982
Lake St. Clair
Transect


84°
83°
82°
46°
45°
44°
43°
LAKE HURON
Nannoplankton Dynamics
82-02-301, 82-02-302 &
82-02-303
CSS BAYFIELD
May 12-26, 1982
July 7-20, 1982
September 9-22, 1982
1
2
3
4
5
6
7
8
9
17
21
22
23
24
25


GEORGIAN BAY
Nannoplankton Dynamics
82 - 05 - 301
CSS BAYFIELD
September 9-22, 1982
16
15
82°
81°
80°
46°
45°


LAKE MICHIGAN
Nannoplankton Dynamics
82-06-301, 82-06-302 &
82-06-303
CSS BAYFIELD
May 12-26, 1982
July 7-20, 1982
September 9-22, 1982



CSS ADVENT

LAKE ONTARIO NORTHSHORE SURVEY

CSS ADVENT

The Northshore Survey, APSD Study No. 510 was directed by Dr. C.R. Murthy to determine to what extent the local physical processes of the nearshore zone are affected by lakewide processes and large-scale forcing by studying currents, water temperatures, meteorological conditions and lake levels. The program commenced in May and terminated at the end of August.

CURRENT METER

All current meters (110) were moored in Lake Ontario by the CSS LIMNOS during the week of May 3 to 7 and removed by the LIMNOS during the week of August 30 to September 3, except for the moorings in the Toronto-Niagara chain from mid-lake South, which were removed in October. The CSS ADVENT obtained temperature profiles at most moorings at least once throughout the survey and changed lights on the marker buoys mid-way through the Survey.

METEOROLOGICAL SYSTEM

A total of eight systems: 4 land sites and 4 buoys at sites 1, 9, 14 and 29, were installed during the week of May 3 to 7. The CSS LIMNOS installed the buoys and the CSS ADVENT instrumented the buoys and maintained them throughout the Survey. The CSS ADVENT also maintained the land site at Pt. Breeze, New York. The other three land sites: Toronto, Pt. Hope and Pt. Petre, were instrumented and maintained by Limnological Instrumentation Section personnel from CCIW. The buoys monitored wind speed, wind direction, air temperature, relative humidity, water temperature and buoy orientation. The land sites monitored wind speed, wind direction, air temperature and relative humidity. All meteorological systems, with the exception of the buoy on the Toronto-Niagara line were removed during the week of August 30 to September 3. The remaining buoy was removed in October along with the remaining current meters.

FIXED TEMPERATURE PROFILER (FTP)

A total of eight FTP's were installed in Lake Ontario at sites 3, 4, 8, 9, 14, 18, 21 and 22. The moorings were installed by the CSS LIMNOS and instrumented by the CSS ADVENT. All digitizers were installed with 30-minute time cams and were monitored every 2-to-3 weeks by the CSS ADVENT. An EBT was done at each FTP site at the time of the monitor. All FTP's were removed during the week of August 30 to September 3.

TIDE GAUGE

Four tide gauges were installed--one by the CSS LIMNOS on a current meter mooring at site 11 and the other three at sites 2, 7 and 20. These three sites were nearshore sites along the North shore. The tide gauges were strapped to a railway wheel stand and moored in a U-shaped pattern by the CSS ADVENT during the week of May 3 to 7 and were also removed by the CSS ADVENT during the week of August 30 to September 3.

WAVE RIDER

Three wave riders were installed at sites 8, 9 and 10. All three moorings were installed by the CSS ADVENT during the week of May 3 to 7. Tape refurbishment for the onboard sea-data recorders in each wave rider was completed on June 29 and again on August 18. All wave rider moorings were removed by the CSS ADVENT on August 31.

WAVE MOTION BUOY

The wave motion buoy was moored at site 9 by the CSS LIMNOS and was then instrumented and tapes installed by the CSS ADVENT during the week of May 3 to 7. Tape changes were made every 10-to-13 days by Technical Operations Division personnel aboard the CSS ADVENT. The solar power cell onboard the buoy worked very well and kept the battery charged for the entire program. The wave motion buoy was stripped and removed by the CSS LIMNOS during the week of September 20 to 24.

BOTTOM BENTHIC ARRAY (BBA)

The BBA was installed at site 9 on August 17 by the CSS ADVENT. Upon installation, the tilt sensors on the BBA showed a tilt of

approximately 2° to 3°. The BBA was installed in a standard U-shaped configuration. Upon retrieval, September 1, the BBA was brought to the surface with one of the bridal cables hooked under a plug on the battery can. This damaged the connector to the extent that the BBA could not be monitored. Upon return to CCIW, it was repaired and found to have worked satisfactorily during the entire period.

VAPS

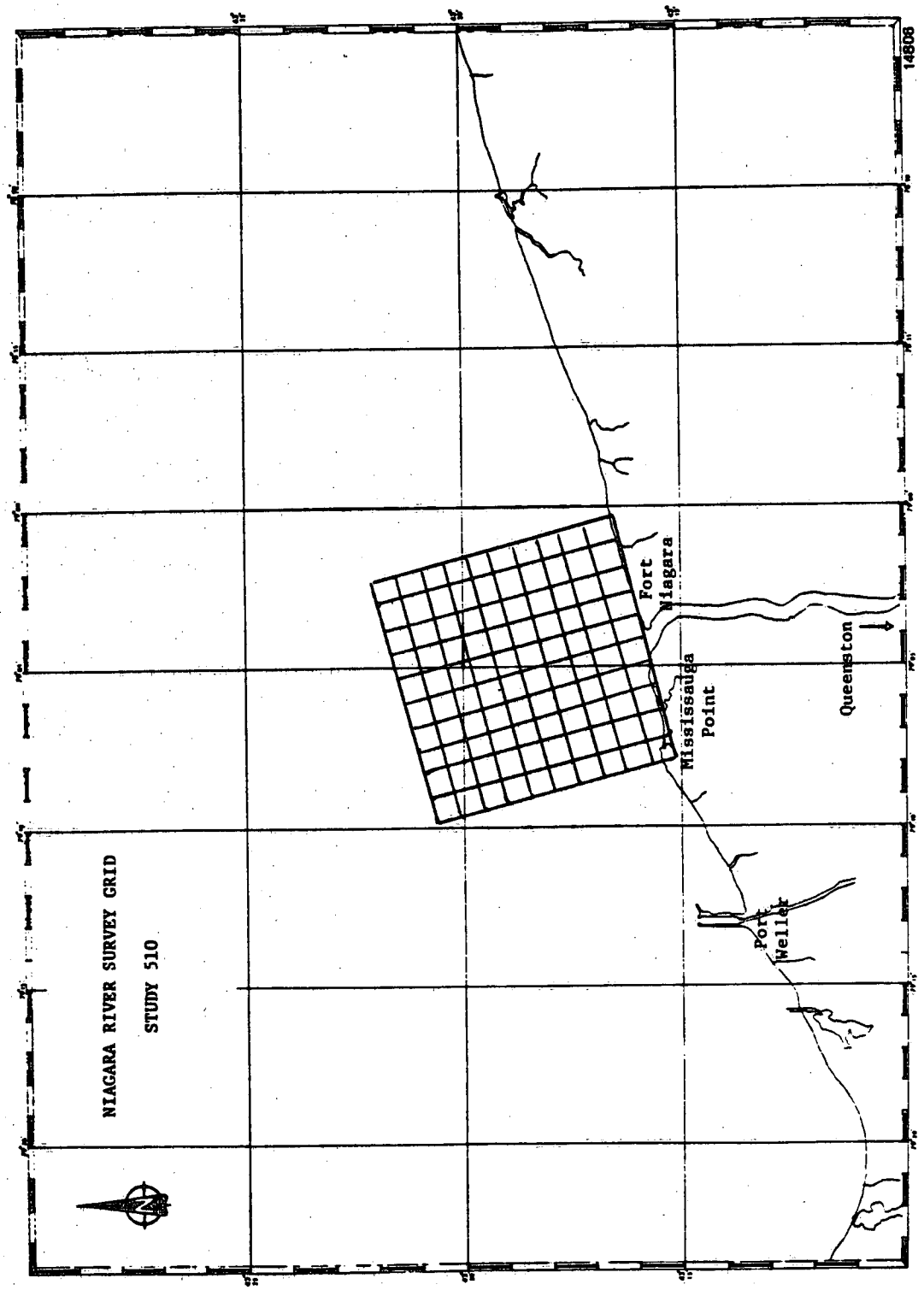
The CSS ADVENT assisted in mooring the VAPS on both occasions and retrieved the winch and cable after the VAPS buoy had broken the cable.

NIAGARA RIVER SURVEY

CSS ADVENT

The Niagara River Survey, APSD Study 510 for Dr. C.R. Murthy was conducted to determine the seasonal characteristics of the Niagara River Plume in support of toxic contaminants and other related biochemical surveys. The survey consisted of defining the plume extent by temperature profiles and by tracking drogues to determine the movement, speed and direction at the plume.

Seven surveys were completed on the Niagara River: April 13 - 16, May 25 - 28, June 21 - 25, July 5 - 9, August 9 - 13, October 4 - 8 and November 8 - 10. During the first five surveys--April to August, the CSS ADVENT was utilized to determine the extent of the plume by doing temperature profiles to the bottom, using a shipboard EBT system. Profiles were completed on a 500 m grid system which extended for 5 km East and West and 10 km North of the river mouth. The plume usually exceeded these boundaries in at least one direction on each survey. Approximately 1200 EBT traces were obtained. The CSL SHARK was utilized for the October and November surveys after the CSS ADVENT was de-commissioned for the season.


NIAGARA RIVER SURVEY GRID
STUDY 510
Fort Niagara
Mississauga Point
Queenston
Port Weller
14806

CSS ADVENT
1982

	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	5	6
FEB	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	1	2	3	4	5	6
MAR	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
APR	4	5	6	7 NIAGARA	8 RIVER	9 CCIN	10 CCIN
	11 CCIN	12 CCIN	13 LAKE	14 ONTARIO	15 NIAGARA	16 RIVER	17 CCIN
	18 CCIN	19 CCIN	20 CCIN	21 CCIN	22 CCIN	23 CCIN	24 CCIN
	25 CCIN	26 CCIN	27 CCIN	28 CCIN	29 CCIN	30 CCIN	1 CCIN
MAY	2 CCIN	3 LAKE	4 ONTARIO	5 COASTAL	6 STUDY	7 LAKE	8 ONTARIO
	9	10 LAKE	11 ONTARIO	12 COASTAL STUDY	13 LAKE	14 ONTARIO	15 CCIN
	16 CCIN	17 LAKE	18 ONTARIO	19 COASTAL STUDY	20 LAKE	21 ONTARIO	22 CCIN
	23 CCIN	24 CCIN	25 PLUME	26 STUDY	27 NIAGARA	28 RIVER	29 CCIN
	30 CCIN	31 LAKE	1 ONTARIO	2 COASTAL STUDY	3 LAKE	4 ONTARIO	5 CCIN
JUN	6 CCIN	7 LAKE ONTARIO	8 SEDIMENT TRAP	9 LAKE ONTARIO	10 COASTAL	11 STUDY	12 COBOURG
	13 COBOURG	14 LAKE ONTARIO	15 COASTAL	16 STUDY	17 LAKE	18 ONTARIO	19 CCIN
	20 CCIN	21 NIAGARA	22 RIVER	23 PLUME STUDY	24 NIAGARA	25 RIVER	26 CCIN
	27 CCIN	28 LAKE ONTARIO	29 COASTAL	30 STUDY	1 CCIN	2 CCIN	3 CCIN
JUL	4 CCIN	5 NIAGARA	6 RIVER	7 PLUME STUDY	8 NIAGARA	9 RIVER	10 CCIN
	11 CCIN	12 LAKE	13 ONTARIO	14 COASTAL STUDY	15 LAKE	16 ONTARIO	17 COBOURG
	18 COBOURG	19 LAKE	20 ONTARIO	21 COASTAL STUDY	22 LAKE	23 ONTARIO	24 COBOURG
	25 COBOURG	26 LAKE	27 ONTARIO	28 COASTAL STUDY	29 LAKE	30 ONTARIO	31 COBOURG
AUG	1 COBOURG	2 COBOURG	3 LAKE	4 ONTARIO	5 COASTAL	6 STUDY	7 CCIN
	8 CCIN	9 NIAGARA	10 RIVER	11 PLUME STUDY	12 NIAGARA	13 RIVER	14 CCIN
	15 CCIN	16 LAKE	17 ONTARIO	18 COASTAL STUDY	19 LAKE	20 ONTARIO	21 COBOURG
	22 COBOURG	23 LAKE	24 ONTARIO	25 COASTAL STUDY	26 LAKE	27 ONTARIO	28 COBOURG
	29 COBOURG	30 LAKE	31 ONTARIO	1 COASTAL STUDY	2 LAKE	3 ONTARIO	4 COASTAL STUDY
SEP	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
OCT	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	5	6
NOV	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
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DEC	5	6	7	8	9	10	11
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SHORE PROJECTS

ENVIRONMENTAL CONTAMINANTS DIVISION

ELMIRA FISH HATCHERY STUDY, ECD 223

The Program, under the leadership of J. Metcalfe, was to determine the accumulation rates and effects of contaminants in fish, fish eggs and larvae under field conditions and to evaluate the potential of freshwater leeches as indicators and accumulators of synthetic contaminants.

The two fish-hatchery sites used for 1982 were the same sites occupied in 1981; namely, the shed at the Top Breed Dog Food Plant (CN-05) and the lab trailer located at CN-03 on a private lot.

Technical Operations assistance was required only during the setup and shutdown of the systems at the two sites. In the spring, the plumbing and general setup was completed at the shed and similarly at the trailer after it had been relocated at CN-03. In the fall, the shed was removed and returned to CCIW for storage as that site will not be used next year. The trailer was also removed and again stored for the winter at the Sewage Treatment Plant in Elmira.

The study team members operated all fish and egg experiments but occasionally additional operations support was provided with leech collection and pump maintenance.

A chart of the study site is included with Elmira Stream Studies, AED 431 and 432.

OAKVILLE CREEK, ECD 225

STUDY LEADER

Dr. J.H. Carey

PURPOSE

To monitor lampreycide in the Oakville Creek after the introduction of chemicals by Ontario Ministry of Natural Resources staff.

METHOD

After selecting an appropriate site, the sampling equipment was installed. A flow meter along with an automatic Isco sampler was installed to measure stream current and collect water samples at pre-determined intervals. The equipment was started about twelve hours after the introduction of the lamprecide upstream.

SUMMARY

Due to heavy rainfall, water levels were high and the equipment was flooded. The equipment was recovered but sampling was unsuccessful.

MEASURING ICE THICKNESS

TURKEY LAKES WATERSHED PROGRAM, ECD 231

HYDROGEOCHEMICAL RESPONSES OF TURKEY LAKES WATERSHED TO ACID RAIN, DR. D.S. JEFFRIES

There are many provincially and federally-approved investigations underway at the Algoma Long Range Transport of Atmospheric Pollutants (LRTAP) site at Turkey Lakes in Ontario. This report summarizes field operations for ECD Study Nos. 231 and 235.

Study Leader:	Dr. D.S. Jeffries, ECD
Scientist-in-Charge:	R.G. Semkin, ECD
Technician:	R.J. Neureuther, ECD
Summer Students:	L. Cornacchio L. Maceachern

Project Co-Ordinator: T.J. Carew, Technical Operations Division

Great Lakes Fisheries Research Branch (GLFRB) scientist, Dr. J.R.M. Kelso and his team--in particular, R.H. Collins worked in the Turkey Lakes area all summer and autumn.

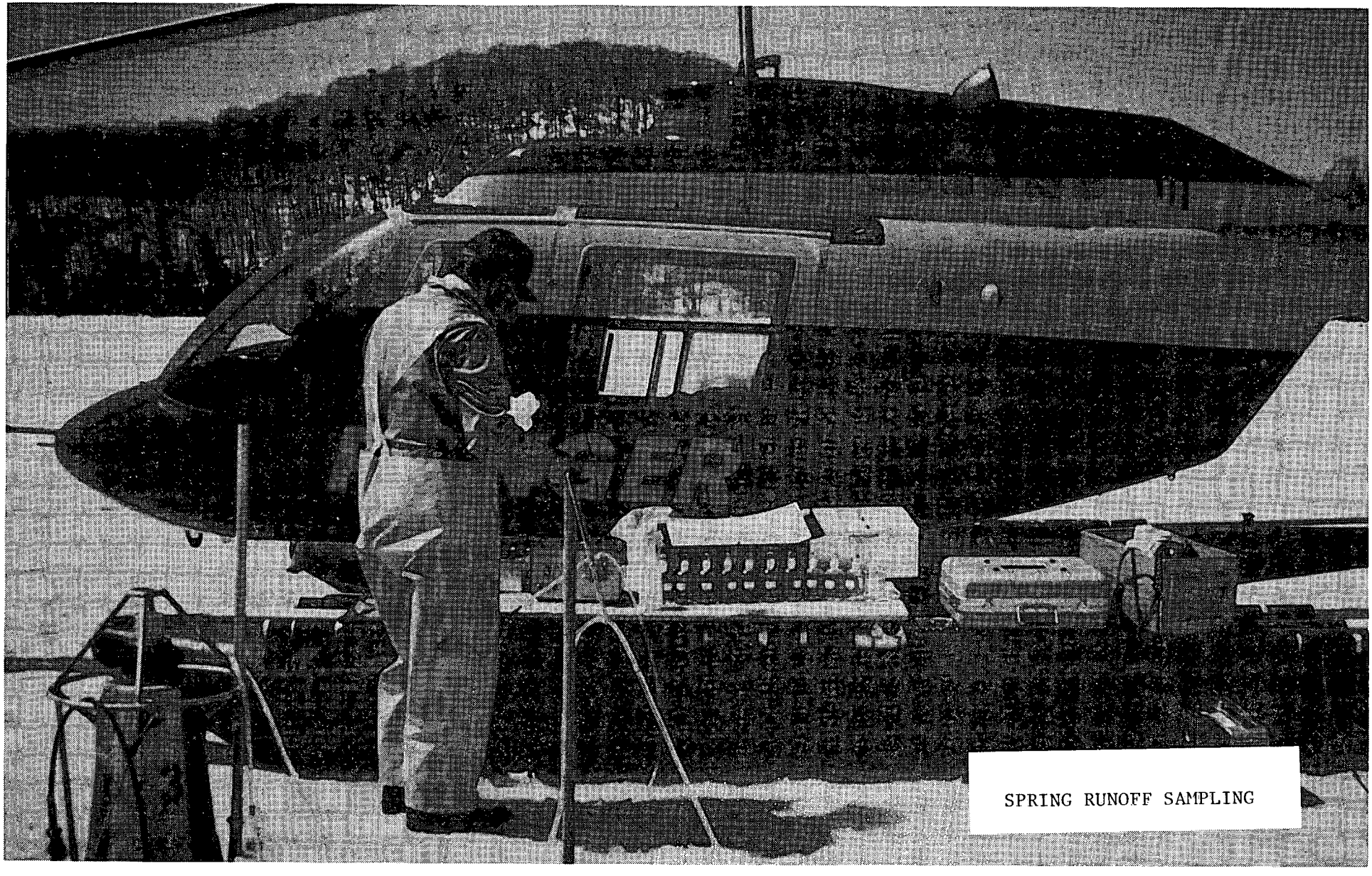
D. Craig, National Hydrological Research Institute (NHRI) and various helpers were in the study area sporadically from spring until winter.

A team from Atmospheric Environment Service (AES) was on site November 10 and 11 to install two large air samplers on the MET Hill, which are scheduled to begin operating in the spring of 1983.

Water Survey of Canada (WSC) visited every six weeks to service water level recorders and perform a series of stream measurements.

A Department of Supply and Services (DSS) contractor, L.F. Barnett visited the site on Tuesdays and Saturdays to sample air and precipitation and to service the generators.

Great Lakes Forest Research Centre (GLFRC) Engineering Staff headed by R. Moffat were at the camp on Thursdays for generator maintenance and roadway assessment. Further, they were responsible for overall camp and road maintenance.



SPRING RUNOFF SAMPLING

SPRING RUNOFF SUMMARY, ECD 235

Runoff sampling began March 23 and continued until May 1. Snowmobiles, Argo ATV and helicopters were used for access to lakes and streams--the helicopters being the most time-efficient. A Bell Jet Ranger 216-B was used for complete lake-series sampling on five occasions; snow machines were used for an additional five series. Streams were measured and sampled twenty times. Precipitation samples were collected six times. Maintenance to the machines, equipment and camp was ongoing. There were a few trips to town when the roads were passable. Samples were delivered and equipment was exchanged at the GLFRC laboratory. Time was taken for shopping, telephone calls and mail checks.

The weather was varied and unpredictable. Air temperatures ranged from -20 to +18°C with snow one day and rain the next, often followed by freezing cold.

Approximately 200 dissolved oxygen titrations were performed by Technical Operations as well as monitoring MET Hill.

ROUTINE SAMPLING, ECD 231

There are now six lakes and six streams under study in the watershed--making an increase in sampling and measuring of twenty percent (20%) over previous years.

LAKES

Lake sampling was systematic and efficient. A peristatic pump was the principal device for obtaining three to four samples from each metre of depth; one sample from each depth was filtered during collection. It took about one and one-half hours to sample each lake. Getting to the lakes was awkward. A small boat was loaded to capacity with equipment and empty bottles, was launched from a makeshift dock and off-loaded afterwards. Samples and gear were then transported over rough roads to the next lake where the procedure was repeated. Two full days were required for the lake series operations and overtime was usually involved. The highlight of the year was the regularity and consistency with which lake sampling was completed.

STREAMS

This straightforward task required a full day--more in winter when ice and snow were cleared before measurements could commence. The sixth and newest stream station, at the outlet of the headwater lakes, was not accessible by ordinary vehicle.

PRECIPITATION

The field work for rain and snow collection was a slick operation. Snow sampling took longer because there were more stations.

METEOROLOGICAL

The MET station was monitored weekly whenever possible. Modernization of hardware improved the efficiency and safety aspects of the changing and servicing of sensors. The building on the MET Hill became too small to house all of the meteorological, air and precipitation recorders and associated gear.

OTHER

Microbiological sampling (discontinued from December until further notice) necessitated trips to the Sault Ste. Marie Airport some 100 kilometres from the camp. There were sulphur determination samples taken by and for Dr. J.O. Nriagu. It appears we will be taking over the ISCO precipitation sampling on a full-time basis in 1983.

CAMP AND EQUIPMENT MAINTENANCE

Keeping the site orderly and organized was a major responsibility. There were five buildings, nine boats and six vehicles, including snow machines, to care for. The garage was full of tools and equipment--most of which is on Technical Operations inventory. The equipment and space was used by ECD, GLFRC and other staff as well as by Tech. Ops. Materiel management could at times be overwhelming. A minimum of one day per week, year-round, was required for the care of equipment and of the camp itself. There is not at present any problem with camp security. However, one could arise with increased LRTAP activities coinciding with fishing and hunting seasons. There is a need at the Turkey Lakes campsite for the hiring of a part-time custodian and maintenance person

(COSEP, CO-OP, Government Job Creation) who could live at the site between the end of spring runoff and the onset of winter.

LIST OF MAJOR IMPROVEMENTS

1. SQ (Stream Station Zero): new construction. Water level gauge, two flumes, tube measurement capability
2. S1 (Stream Station 1): flume and V-notch structures built
   These two sites were left unimproved prior to this year mainly because of financial restraints but also because of their very difficult accessibility. All work was done by hand, requiring dozens of trips by men carrying lumber, concrete mix, bags of sand and gravel and all other material and implements. Much effort was required and it is anticipated the accurate flow readings obtained will make it worthwhile.
3. A new trail was made between Little Turkey and Big Turkey lakes
4. A lean-to was added to the garage for housing snow machines and other articles
5. At the camp, overhead wiring was moved and buried to avoid the hazard of vehicle contact. The Atco trailer was moved, connected to hydro and heated. Wiring at the entire camp was checked
6. Propane-burning generators replaced the diesel generators

INNOVATIONS AND INITIATIVES SUMMARY

1. The TOD trailer at Chippewa was de-activated
2. The Sault Ste. Marie Detachment of the Ontario Provincial Police was visited and given a description of the operation at Turkey Lakes. They were advised of our helicopter landing pad
3. Mobile radio in the TOD truck was helpful and re-assuring
4. The Tech. Ops. mailbox at the Sault Ste. Marie Post Office was very handy and may be advantageous as well to the Ship Survey Section in 1983
5. Motorcycle batteries are replacing standard automobile batteries, as the latter wear out, for operating sampling pumps and electric motors since the motorcycle battery is lighter, easier to handle and a few dollars cheaper.
6. An aluminum boat is retained at the camp for contingencies

7. A standard mechanical bathythermograph (MBT) has been introduced to our lake surveys. The Scientist-in-Charge is satisfied with its accuracy and reliability. We have had to use it on wet days when it was impossible to keep the EBT recorder dry. It eliminates the need to carry a generator and accordingly, occupies less space in the boat, Argo or snowmobile

RECOMMENDATIONS

1. Assess scientific construction projects objectively. (There has been a tendency to underestimate time and work required.)
2. Eliminate weekly stream measurements. Measure bi-monthly or monthly and continue to sample streams weekly
3. Enlarge the hut on the MET Hill
4. Develop forms for lakes and streams on paper on which to record under wet conditions
5. Consider hiring part-time custodian/maintenance person for the camp (see Camp Maintenance)
6. Allow time and funds for building docks as required on the lakes
7. Limit use of the Argo ATV
8. Dispose of the diesel fuel tanks

CONCLUSIONS

1. This was a highly productive and satisfying field year for many reasons. In part, the successful year was due to the re-location of the TOD Co-Ordinator and to the acquisition of a superior technician by ECD; these events have enabled the Scientist-in-Charge to spend fewer days in the field
2. Administrative and technical support from TOD, Burlington was essential to this project and this support continues to improve

HYDRAULICS DIVISION

ICE JAMMING SURVEYS, ECD 313, 314

STUDY LEADER: DR. S. BELTAOS

PROJECT SITES

1. Ganaraska River, Port Hope - Study No. 314
2. Thames River, Bothwell to Prairie Siding - Study No. 313

The purpose of the program was to attempt to formulate criteria for forecasting the time and flooding potential of ice jams after breakup. Since there is little understanding of the ice jamming phenomenon and less of quantitative predictions, the resulting flooding is a major problem. It is thought that through observations and evaluation of data collected, a method of predicting the location and severity of ice jams may be derived. This would assist the Flood Reduction Program.

The Program was supported in two parts;

1. Study No. 314 at Port Hope from September 27 - October 1, 1982 and
2. Study No. 313 on the Thames River from November 15 - December 3, 1982

In each case, ground control was established to reference the breakup.

Study No. 314 on the Ganaraska River involved the running of nine cross-section profiles of the river and the establishment of temporary bench marks for each line. Study No. 313 on the Thames River is an ongoing program from previous years. Twenty-four new temporary bench marks were established and four new staff gauges were referenced to existing bench marks. Flood levels were derived from a series of pictures of the 1982 breakup using these temporary bench marks.

All ground control was completed on the Ganaraska River. The Thames River cross-section profiles will be completed during January and February of 1983, as working from the ice surface will be far simpler and more accurate.

PORT BURWELL BLUFFS, HD 345

STUDY LEADER: A. ZEMAN

PURPOSE

To collect several undisturbed till cores from the bluffs at Port Burwell and Port Stanley in order to relate subaqueous erodibility to geotechnical properties of cohesive soils.

WORK PLAN

Thirty bluff samples were to be collected from both Port Burwell and Port Stanley sites. The support requested was for a two-week duration in September. The Port Stanley site was sampled with relatively little difficulty from the exact location as the cores collected in 1981. The cores were wrapped in cheesecloth and waxed immediately to prevent drying of the sample. No samples were collected from the Port Burwell area as no suitable sites could be located. Accessibility to the site at Port Burwell was also very poor due to the lack of a beach to land a boat. The bluff is too steep and slippery for accessibility by land.

This year, instead of collecting large bluff samples of 1 cubic foot, cores 7 inches in diameter and 6 inches long were taken. A special steel holder and a 5-pound hammer were used to drive the tubes into the bluff. The disturbed outside sediment was cut away leaving an undisturbed sample encased in a plastic tube. The tube was then covered in cheesecloth and waxed for preservation.

The Port Burwell bluff site was becoming rapidly unstable and extreme care was exercised while working in the areas on or below the bluff.

GENERAL VERTICAL AUTOMATIC PROFILING SYSTEM (GVAPS), HD 383

STUDY LEADER: F. ROY

The purpose of GVAPS is to collect synoptic data on physical parameters of lakes by profiling depth at a fixed location. The system is intended for automatic operation with infrequent visits from field personnel to conduct experiments and change data cassettes. The objectives of the 1982 field program were:

1. To obtain detailed profiles of lake dynamic behaviour during the intensive study period (end-August - mid-September) in co-ordination with the Lake Ontario Coastal Study
2. To obtain further field experience with GVAPS and its mooring system by collecting wave force and wave height data

The GVAPS was installed on August 5 at a position 5 miles South of Pt. Hope (43° 53' 06" N., 78° 16' 51" W.) (82-00V-73A). The barge GOOSE was utilized for the installation with assistance from CSS ADVENT.

Six days later, during a service visit, the VAPS buoy was found to have gone adrift (August 11). The buoy was located, by charter aircraft, that same evening, in a position 6 miles South of Scotch Bonnet Shoal. CSL AQUA towed the buoy to Cobourg for repairs. The electrical cable which had broken was repaired and floatation added. The remainder of the GVAPS mooring was retrieved by the CSS ADVENT August 18.

The entire GVAPS mooring was re-installed on August 27 using the barge GOOSE and CSS ADVENT. The system was operating smoothly.

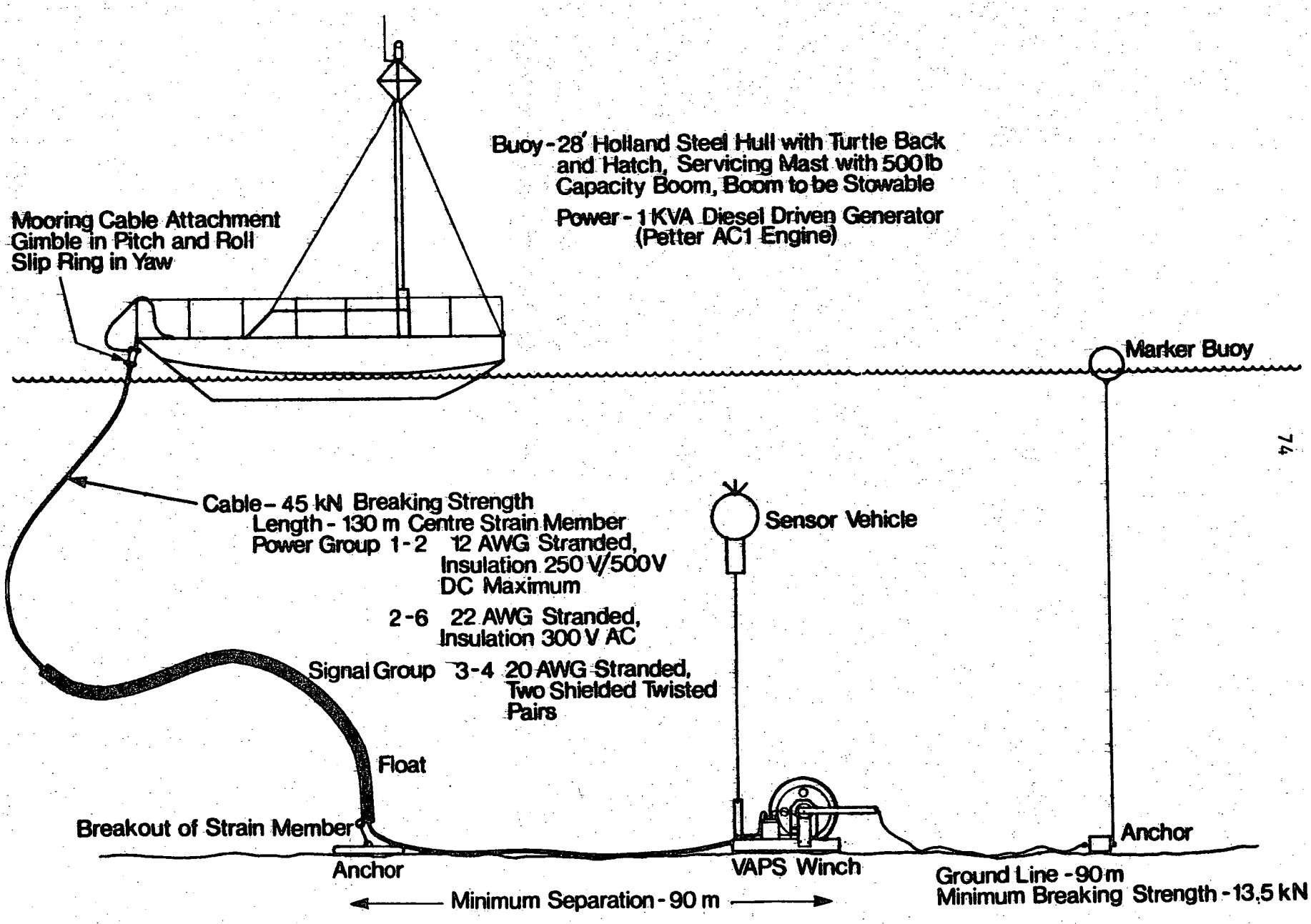
The GVAPS system was retrieved twelve days later on September 8 using the barge GOOSE and CSL SHARK. The system had operated smoothly throughout the period while surviving two wind storms (one of which recorded winds of 50 kts Westerly).

Personnel involved: S.B. Smith, Technical Operations Division
K.J. Hill
F.H. Don

Capt. M. Head and crew, CSS ADVENT, OSS, BLMSS

Capt. D. Ashdown and crew, CSL SHARK, OSS, BLMSS

AQUATIC ECOLOGY DIVISION



Installation Configuration

SEDIMENT TRACE METALS, AED 405

STUDY LEADER: DR. R. CARIGNAN

OPERATIONS

The project was supported by providing a lightweight corer, extruder and sampling assistance at lakes in the Sudbury and Kawartha areas. At Clearwater Lake, an echo sounder was used to select appropriate locations for three sampling stations. Marker buoys were installed submersed to avoid interference with float-plane traffic on the lake. Lightweight cores were taken at the sampling stations and extruded on shore. Duplicate cores were sampled at three stations on McFarlane Lake and extruded at the Ontario Ministry of Natural Resources Air Base dock. Four lightweight cores were also sampled and extruded at Jack's Lake.

At a later date, light peepers were retrieved and sampled at Clearwater and McFarlane lakes.

LAKE ACIDIFICATION, AED 410

STUDY LEADER: DR. R.A. BOURBONNIERE

The purpose of the program was to determine the effects of lake acidification on the cycling of organic matter in five Precambrian Shield lakes around Sudbury and to investigate naturally-occurring organic components in these lakes which are biochemical markers of ecological change. Acidification has led to important ecological changes in Shield lakes which effects the stability of organic matter residing in the various compartments of these freshwater ecosystems. Modification of the cycling of the organic matter can in turn lead to further ecological changes.

Bulk water samples (1000 - 2400ℓ) were collected from each lake and run through a centrifuge. The suspended matter collected was frozen and transported back to CCIW for analysis. In addition, lightweight cores were taken, subsectioned and similarly transported. Five lakes were sampled: Clearwater, Wavy, McFarlane, Ramsey and Windy. The sampling time was critical as it was desired that each lake be sampled just after breakup. The weather was favourable and each lake was sampled at, or close to breakup. The project was completed within the time allotted.

LAKE SAMPLING - SUDBURY, AED 411, 412

STUDY LEADERS: H. WONG AND DR. J.O. NRIAGU

GOALS

1. To measure the deposition of trace metal and suspended particles in selected lakes in Northern Ontario, particularly around Sudbury and to establish an accumulative metal budget with reference to atmospheric input
2. To correlate the lake metal inventory with deposition
3. To access the changes in atmospheric loading of trace metals
4. To evaluate the short and long-term effects of acid precipitation

WORK OUTLINE

Support for Study No. 411, 412 began in early spring of 1982. Assistance was given in the design and preparation of the sediment trap moorings required to collect the samples necessary for analyses.

The lakes in which sediment traps were installed were: Nelson, McFarlane, Wavy, Windy (2 moorings) and Vermillion.

The first sediment trap mooring installation took place in May. The moorings were refurbished monthly until October when they were removed for the season.

At every lake and previous to every mooring installation, a pH and conductivity profile to 20 metres was completed. Samples were collected from the surface and every metre thereafter until 20 m or bottom, whichever came first.

Throughout the field season, several of the lakes were sounded to locate the deep hole and other areas with flat bottoms for coring. Several lightweight cores were collected from all lakes where sediment traps were installed. These cores were subdivided and analyzed for Pb 210, trace metals and various forms of sulfur.

During August, an intensive coring of several of the lakes was carried out--McFarlane in particular. Cores were collected from several basins within the lake. Simultaneously, cores were collected from Basin Lake in Algonquin Park and Kelly Lake in Sudbury. Six cores were also collected from two lakes in the Turkey Lake System. Two cores were collected from the Headwater Lake and two cores from Big Turkey Lake. Two cores were also collected from the marshes of the Headwater Lake and below Turkey Lake.

While working in the Sudbury area, all boats and equipment were stored at the McFarlane Sea Plane Base (owned by Ministry of Transport and Communications). This proved very helpful as all materials were protected from theft and the accessibility of the equipment to NWRI staff was unlimited (24 hours a day). The boats then did not have to be towed repeatedly from CCIW to Sudbury thus decreasing the accident probability and the hazards of trailer towing.

ELMIRA STREAM STUDIES, AED 431, 432

STUDY LEADER: DR. B.G. BROWNLEE

The purpose of Study No. 431 was to obtain information on sources and fate of ammonia-nitrogen in highly eutrophic or heavily polluted streams in order to develop an 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. The emphasis in this instance will be a study of nitrification--a natural process which removes ammonia by oxidation and can reduce the potential threat to aquatic life.

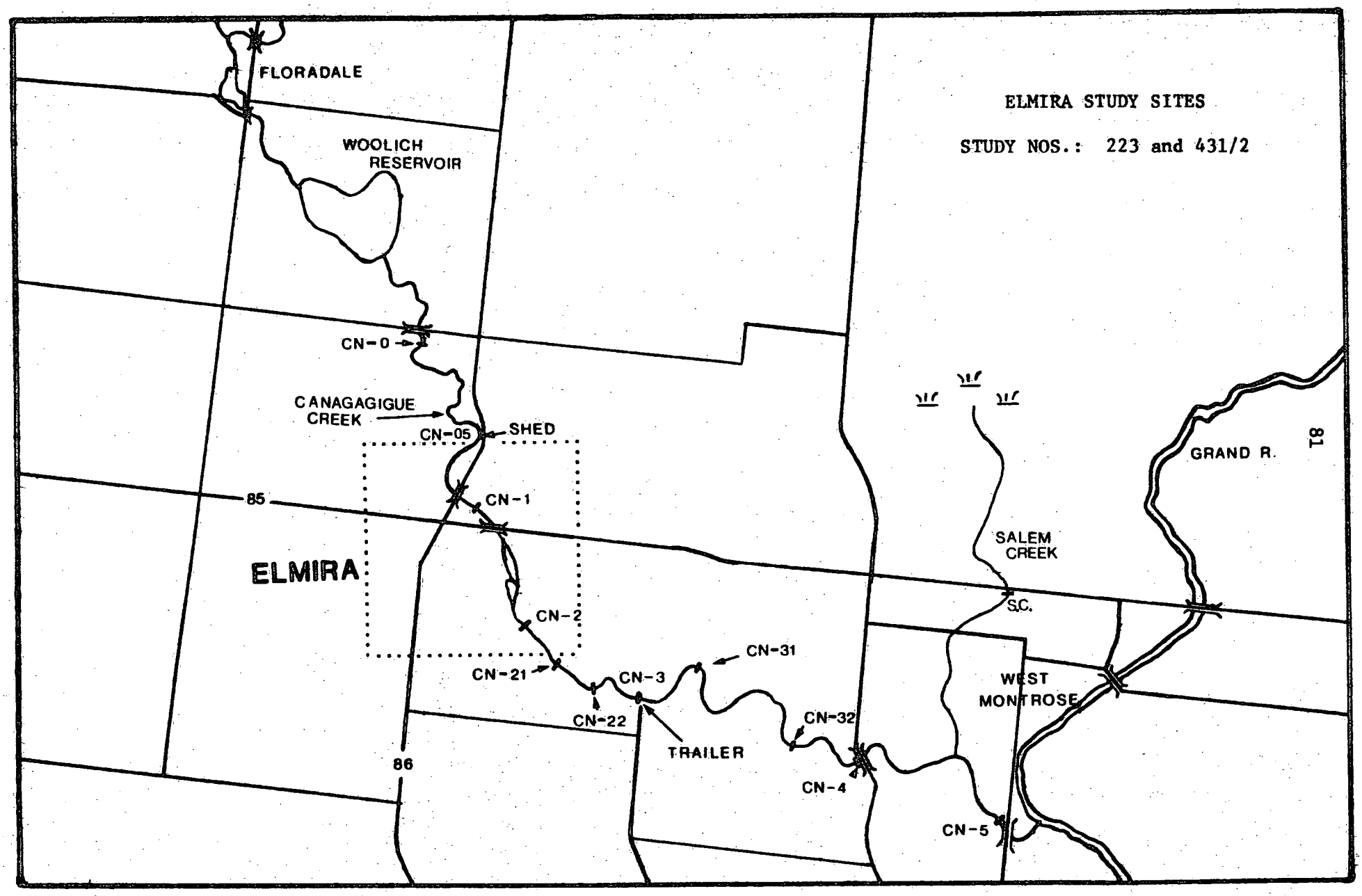
Study No. 432 will attempt to describe the general processes by which a polluted stream recovers from nutrient/organic loading.

Canagagigue Creek in Elmira proved to be an ideal study site as it receives effluent from the sewage treatment plant at Elmira. The plant processes both municipal and industrial wastes which results in a loading of nutrients and synthetic organic compounds. Similarly, 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. Hence, the two projects were run jointly since Canagagigue Creek satisfied the requirements of both studies and sampling could easily be combined.

The creek was monitored for one week each month from May to October. Continuous monitoring for solar radiation, dissolved oxygen, temperature and pH was set up in the lab trailer at CN-3. Also, an ISCO sampler was set to collect hourly samples for conductivity. Similarly, portable systems provided continuous monitoring of dissolved oxygen, temperature, pH and hourly ISCO samples for two days each at CN-2 and

CN-4. The following samples were collected once during the week. The rate of flow was established and water samples were collected according to this rate and extracted for organic compounds at CCIW. Sediment tubes were collected and reinstalled at stations CN-05, CN-2, CN-3 and CN-4. Water quality samples were collected from stations CN-0, CN-05, CN-1, CN-2, CN-21, CN-22, CN-3, CN-31, CN-32, CN-4, CN-5 and Salem Creek. These samples were transported to the trailer and prepared for major ions and total P (uf) determinations and filtered for POC, nutrients and particulate nitrogen. Samples for periphyton and macrophyton were collected from the above stations with the exception of CN-0, CN-05, CN-5 and Salem Creek. In addition, 30 litres of water and a few periphyton and macrophyton-covered rocks were collected from CN-3 and transported to CCIW to be used for circular stream aquarium experiments.

All equipment operated extremely well except for an occasional problem with the ISCO samplers. The result was very little data loss. This should aid in the collation and interpretation of the data acquired.


ELMIRA STUDY SITES
STUDY NOS.: 223 and 431/2
FLORADALE
WOOLICH RESERVOIR
CN-0
CANAGAGIGUE CREEK
CN-05
SHED
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.
81
WEST MONTROSE

PHYTOPLANKTON PRODUCTIVITY, AED 437

STUDY LEADER: T.P. MURPHY

PURPOSE

To study the co-precipitation of phosphate with calcium carbonate as a potential method of reducing summer algal bloom in hypertrophic lakes.

WORK PLAN

Most of the experiments were done on Friskin and Black lakes in British Columbia because of their extremely high phosphate concentrations and moderate alkalinities. The work was done in conjunction with University of British Columbia, Fish and Wildlife of B.C. and NWRI, Pacific & Yukon Detachment.

There were to be three intensive study periods: late April, June and mid-August. The April period was to be an intense preparation period. The installation of the aeration system, a meteorological system and the repair of a sea curtain were of top priority. The latter two were completed but the installation of the aeration system was not attempted. The weather conditions were such that there was still up to 4 feet of snow blocking the access to the lake.

The June period was spent installing the aeration system and aerating and titrating the aerated plume with calcium oxide to precipitate the phosphate. All this was done on Friskin Lake. Limnocorrals were installed and calcium nitrate was added to Black Lake near the Okanagan.

Due to the poor response of the calcium oxide in Friskin Lake and the calcium nitrate in Black Lake, the August intensive period was postponed until October. In the October intensive period, cores and water samples were collected from Friskin, Roche, Green, Black and Chain lakes. All of these lakes are on drainage systems which have at least one lake with an extremely high phosphate level.

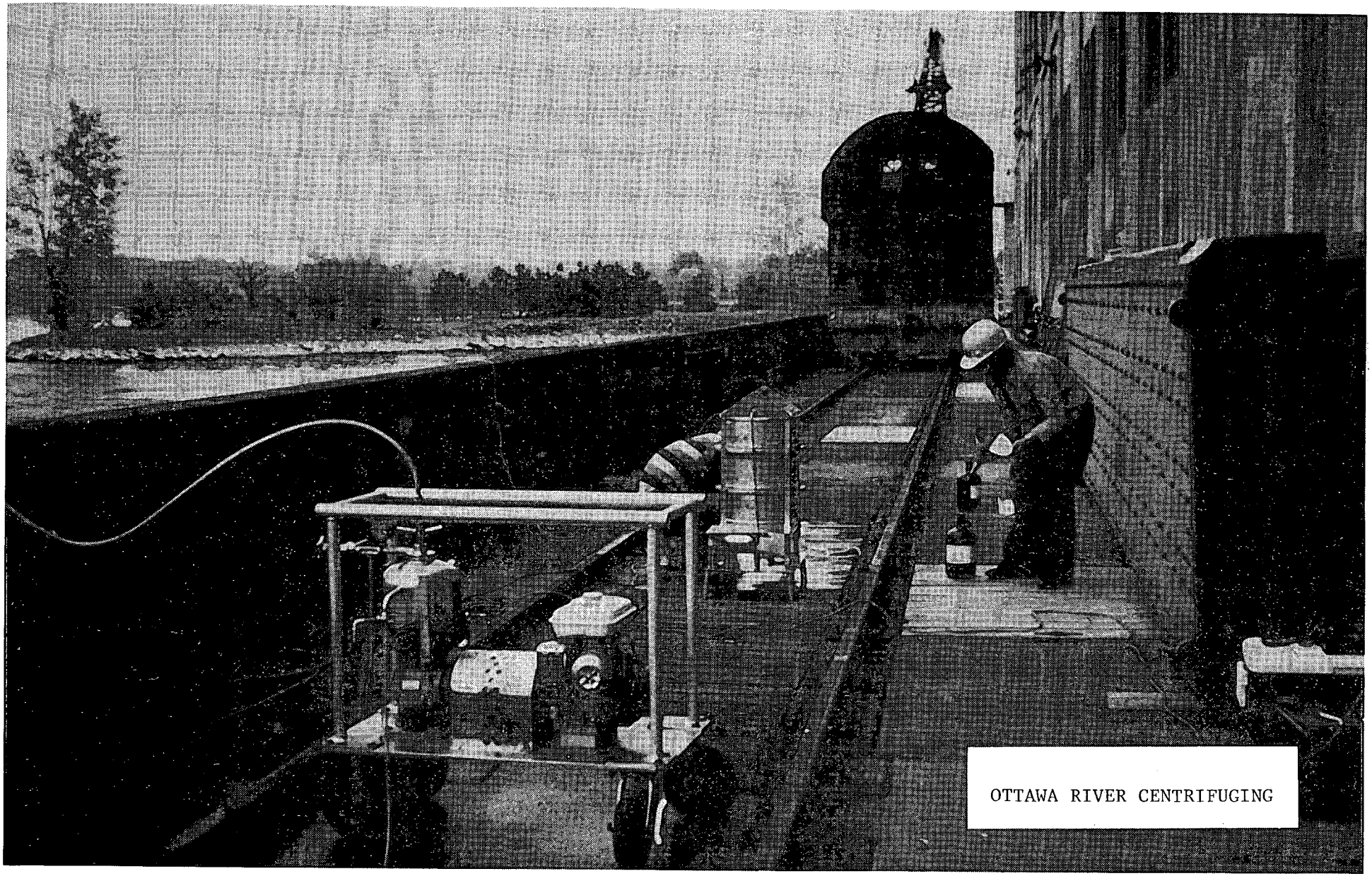
At the completion of the October intensive period, the meteorological system and sampling equipment; i.e.: pumps and bottles, were returned to CCIW.

ANALYTICAL METHODS DIVISION

ACID RAIN EFFECTS, AMD 683

Dr. S.S. Rao, AMD was Study Leader for the Acid Rain Effects Study. The study area lakes were: Silver, Lohi, Wavy, Ramsey, Windy, Hannah, McFarlane, Clearwater, Richard and Kelly, all located in and around the City of Sudbury, Ontario. Twelve sampling surveys were conducted on these lakes throughout the season (approximately one every three weeks). Each survey took two technicians three days to complete. Identical sampling procedures were carried out at each of the ten lakes on every survey. One of the Technical Operations 4X4 crewcab trucks was used to transport all of the gear plus a 14-foot aluminum run-about to each sampling site. The small run-about, powered by a 7.5 hp Evinrude outboard motor was used for the mid-lake and nearshore sampling at each lake. A 1-metre water sample and a bottom sediment sample were collected at both the nearshore and mid-lake stations. Temperatures and pH were recorded at the time of sampling and marked on the labels of the appropriate plastic bottles that were supplied by AMD staff. All samples were stored in coolers with ice before being transported to CCIW for further analyses.

TECHNICAL OPERATIONS DIVISION



OTTAWA RIVER CENTRIFUGING

OTTAWA RIVER, TOD 803

STUDY LEADER: J. MERRIMAN, WQB, IWD-OR

Six field survey trips were made to the Ottawa River area throughout the field season. One Technical Operations technician accompanied a Water Quality Branch scientist on each trip. Sampling was carried out at two of the hydro dams along the Ottawa River. The first site was at Carillon--the largest dam on the Ottawa River about 40 miles East of Ottawa. Permission was granted by Quebec Hydro to drive out onto the dam, allowing sampling from the wall of the dam. Water was pumped up about 20 feet at a rate of 6ℓ per minute and then through a portable gas-driven centrifuge. The centrifuge was run continuously for 7 hours except for a 10-minute stop for additional sampling and refueling. Approximately 50ℓ of the centrifuged water was run through the A.P.L.E. (Aqueous Phase Liquid Extractor). One litre of solvent (dichloromethane) was mixed with the water in the A.P.L.E. for one hour. After being allowed to settle for several hours, the more dense solvent was drawn off the bottom and retained for several analyses at CCIW.

The identical sampling procedure was carried out at the second site at Chats Falls Hydro Dam 25 miles West of Ottawa. Once again, permission was granted by Ontario Hydro and sampling was conducted from the wall of the dam. Hydro was available at both sites to operate the submersible pump.

During the July Survey, in addition to the regular sampling routine, bottom samples were collected at several locations along the Ottawa River between the two dams. Operating a mini-Shipek from a 14-foot aluminum car-topper, bottom samples were collected along transect lines running across the river.

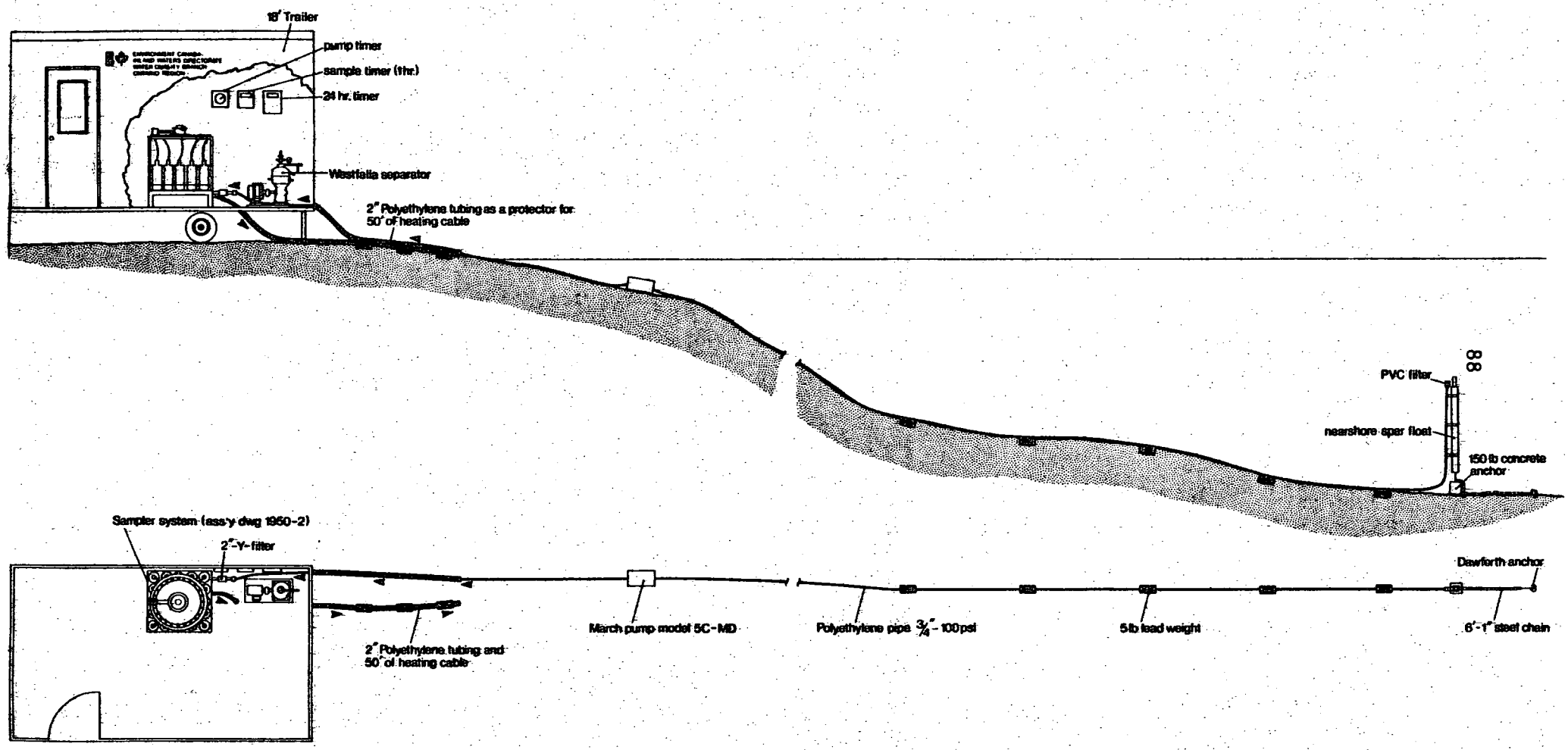
ST. LAWRENCE RIVER, TOD 803

STUDY LEADER: J. MERRIMAN, WQB, IWD-OR

This Water Quality Monitoring Program has been ongoing for the past five years. Automatic sampling sites located at Niagara-on-the-Lake and Wolfe Island (near Kingston) were used for daily and weekly sampling.

The sampling system consisted of four components: intake line, pump, daily water sampler and suspended sediment sampler. The intake line and the pump were submerged under water and the samplers were housed on the river bank. The Westfalia separator (centrifuge) was added to the Wolfe Island station for the 1982 field season. A load of clean automatic sampler bottles was taken to the site each trip and given to the island resident hired to maintain the sampler. Technical Operations Division staff were involved in monthly trips to the Wolfe Island site for 24-hour centrifuge sampling as well as other water samples. Centrifuged suspended sediment samples and all other water samples were returned to CCIW for analysis.

PARTS LIST		
PART NO.	DESCRIPTION	QTY



NO.	DATE	DESCRIPTION REVISION	DRAWN BY	APPD BY

MATERIAL SPECIFICATIONS

Environment Canada — Conada Centre for Inland Waters
Environnement Canada — Centre Canadien des Eaux Intérieures

TITLE: NIAGARA ON THE LAKE
SITE ASSEMBLY
AUTOMATIC WATER SAMPLER

DESIGNED BY	CHECKED BY	APPROVED BY
DRAWN BY P.McCOLL	CHECKED BY	DRAWING NO
SCALE	DATE	SHEET OF

OWEN SOUND - GREAT LAKES FISHERIES RESEARCH BRANCH, TOD 806

STUDY LEADER: DR. M.G. JOHNSON

OPERATIONS

Field support in 1982 was provided to continue the efforts of the 1981 Benthic Survey of Georgian Bay and the North Channel and other studies in the Georgian Bay and Bay of Quinte areas. Sampling in Manitowaning Bay consisted of seine and gill netting and the installation of minnow traps for the collection of Yellow Perch and Spot-tail Shiners. Crawfish and clams were collected by snorkellers in Collin's Inlet. Bad weather conditions prevented similar sampling in Baie Finn. A primary productivity station in South Bay, Manitoulin Island was also sampled each week during the field season.

In preparation for next year's field season, a laboratory trailer was set up at the Ontario Ministry of Natural Resources Field Office in Parry Sound. Also, stream sites in the area were selected as potential gauging and sampling sites.

A sampling survey consisting of Ekman grab samples and dissolved oxygen samples was also conducted in the Adolphus Reach in the Bay of Quinte area.

SUMMARY

The project was supported for a six-week duration in co-operation with GLFRB staff. It involved small boat sampling, laboratory sample preparation and diving operations.

UNDERWATER OPERATIONS UNIT

The Underwater Operations Unit provided support throughout the Great Lakes Basin in areas of diver observation, inspections, equipment installations and retrievals, sample collections, underwater 35 mm photography, underwater television surveys, land/beach surveys, equipment demonstrations/lectures, equipment trials, search and recovery and diver training.

Support was given to the regional offices of NWRI (Vancouver and Winnipeg). A trip was made to the regional offices by the Head of the Underwater Operations Unit to inspect diving equipment, procedures and to check out divers.

The Underwater Operations Unit supported twenty-five divers. A total of five hundred accident-free hours were logged in support of field projects for NWRI; Great Lakes Fisheries Research Branch; Canadian Hydrographic Service, Ship Division and Oceanographic Division, OSS, BLMSS.

During the 1982 field year, divers followed a new CSA Standard (Z2752-M1982), Occupational Safety Code for Diving Operations. This Standard follows closely the DOE Departmental Directive for Diving Safety which is upgraded on an annual basis. With the increased safety regulations, the diver training program was stepped up to include under-ice operations in remote areas and diver rescues in emergency situations.

Projects supported in 1982 included:

HABITAT STUDIES, STUDY NO. 109, DR. P.G. SLY

A shoal survey of Snowshoe Bay, N.Y. (Eastern Lake Ontario) at the end of April completed studies of the area. TRS recorders were retrieved at Snowshoe Bay, Clarkson Gulf Oil Pier and Seneca Lake, N.Y. TRS recorders were installed in Keuka Lake, N.Y. and Clarkson Gulf Oil Pier.

At the end of November, divers surveyed bluff point shoal in Keuka Lake, N.Y. using underwater photography and underwater television. This successful survey documented one of the rare occasions when divers observed the spawning rites of Lake Trout.

LRTAP, DR. D.S. JEFFRIES, ECD 231

During the first two weeks of July, forty groundwater collectors were installed in the Turkey Lakes Watershed. The collectors were implemented with 1/4" hoses to fill surface sample collection bags to eliminate diving during sampling periods.

PROFILE 18, DR. N. RUKAVINA, HD 347

The Profile 18 Survey was a continuation of the 1981 surveys at Van Wagner's Beach. The site was cleared of ice-damaged stakes in the early spring. A new stake was installed at station four to accommodate the datalogger which was deployed three times.

During the fall storm period, transducers were mounted onto stake #10. The beach area was level surveyed four times (monthly) as sounding lines were made with a launch. The datalogger was deployed three times and the transducers at stake #10 were measured four times.

FLOATING TIRE BREAKWATER, C. BISHOP, HD 353

In mid-June, strain sensors (four mechanical and three electronic) were installed on the anchor lines of the Western floating tire breakwall at LaSalle Park Marina. Four water pressure sensors were installed (two on either side of the breakwater) to measure water level fluctuations. All gauges were removed at the end of November and electrical cables were laid on the bottom for the winter.

NORTHSHORE LAKE ONTARIO, DR. C.R. MURTHY, APSD 510

Diving support was limited to the installation, inspection and retrieval of three tide gauge moorings (Bowmanville, Pt. Hope and Cobourg). The major support role took the form of rigging, mooring installations/retrievals and monitoring.

During August, GVAPS was installed and retrieved on two occasions. An underwater television survey was made of the area in which both GVAPS and M-CATS were moored.

Smaller studies supported included:

Port Burwell (Bluff Sampling), HD 346

Lake St. George (Limnocorrals), AED 438

Aquatic Macrophytes (Buckhorn Lake), AED 478

Northshore Lake Ontario (MET Stations), APSD 510

Surveillance (WQB - Wolfe Island), TOD 803

LIMNOLOGICAL INSTRUMENTATION SECTION

Meeting the demands of limnological instrumentation support kept Section staff extremely busy. Support and responsibility for additional equipment; i.e.: transmissometer systems, tide gauges, etc., was transferred to Technical Operations Division during the year, adding to the workload. General electronic instrumentation support was also provided to allied sections of NWRI and outside agencies. Field work and support was provided for all land MET sites and Port Burwell.

Limnological Instrumentation Section staff designed and developed a robot system (RU4 H_2O), remotely controlled both for speech and motor functions for the 1982 CCIW Open House. Feedback from the public suggested the system was a success for Technical Operations Division.

All in all, LIS personnel were kept busy meeting the rather heavy demands of instrumentation systems for the 1982 field projects of NWRI.

METEOROLOGICAL AND SHIPBOARD SYSTEMS

This year, nine meteorological buoys and seven land MET sites were established and serviced by LIS. This required the preparation of sixty-six Hymet recording systems--establishing a record for one season.

Total solar radiation stations were set up at seven locations:

NWRI - all year

Dunnville - 1 January - 23 February 1982

Glenora - 3 May - 30 September 1982

Jack Lake - all year

Turkey Lakes - all year

Dorset - 6 April - 17 November 1982

CSS LIMNOS - as required 12 May - 21 October 1982

The following shipboard systems were prepared by LIS staff;

1. Four winch systems were serviced and kept operational
2. Five EBT systems were serviced and kept operational

3. One rosette system with EBT was serviced and kept operational
4. One ship's transmissometer system was serviced and kept operational for the complete field season
5. Four portable EBT systems were overhauled and serviced
6. Two portable EBT MK II systems were overhauled and serviced
7. Two portable transmissometer systems were overhauled, serviced and kept operational
8. One portable transmissometer/depth/temperature system was assembled, tested and shipped to Pacific & Yukon Detachment staff for field use. The system's performance was very encouraging
9. One portable transmissometer system was overhauled and dispatched to the Ministry of Environment in Toronto for field use

CURRENT METER AND METEOROLOGICAL DATA ABSTRACTION

A total of sixty Geodyne current meters and fifty Plessey current meters were overhauled and shipped for deployment. Twenty digitizer systems and one new generation Sea Data digitizer were prepared and shipped for field use. Four Applied Micro Systems tide gauges were serviced and pre-field prepared for deployment.

A total of 2.1 million data points from fifty-three field tapes of 1982 MET data were processed and edited. Fifty-two tapes of 1972 MET data were re-processed for a magnetic deviation correction.

Work was suspended in November due to the loss of a person/year in the Division.

CANADIAN WILDLIFE SERVICE

The surveillance of toxic substances in Great Lakes Wildlife by the Canadian Wildlife Service (CWS) was continued in 1982 with the support of Technical Operations Division. CWS has monitored the effects of toxics on the Herring Gull (*Larus argentatus*) in the four Canadian Great Lakes since 1975. This year, Lake Michigan was included in field operations. Effects on the gulls are reflected in egg-loading and reproductive success rate.

The steadily decreasing reproductive success rate of the Herring Gull colony on Agawa Rocks (an International Joint Commission monitor colony) recorded by CWS over the past five years, determined it as the focus of this year's study. CWS has found that 85 percent of the colony's chicks have been disappearing between hatch and 21 days old. The primary objectives of the 1982 Survey were to monitor the situation and attempt to identify the cause of the problem.

This year's field season began with two field parties; but, due to a reassignment of duties of one CWS biologist, finished most of June and all of July with one crew.

Surveillance duties on Lake Ontario and Lake Erie were based out of CCIW while work on the upper lakes, particularly Lake Superior, was based in Montreal River Harbour located 120 kilometres North of Sault Ste. Marie, Ontario. Although preliminary results of this year's behavioural study have shown that many of the young are being consumed by adult Herring Gulls, CWS staff are still uncertain as to the exact reasons for this type of adult behaviour. A number of theories have been put forward ranging from food stress to toxic chemicals but at present none has been substantiated. Further studies into this phenomenon are planned for 1983.

REGIONS AND OUTSIDE AGENCIES

REGIONS

Although Technical Operations Division did not support the regions in a major way, some advice and technical assistance was provided on request. This year, instrumentation needed to maintain the FTP system was provided the Pacific & Yukon Detachment. Also, a portable EBT/transmissometer system was packaged and made operational as well as assistance with system-testing and field logistics support in the Yukon. Discussions with both the P&Y Detachment and the W&N Detachment have identified the need for greater co-operation and communication in order to tackle more remote field locations for study.

OUTSIDE AGENCIES

Technical Operations Division supported a number of groups outside the National Water Research Institute detailed in TOD 806 and some of the more extensive studies are outlined separately in this Report. The type of support given included equipment loans, piggyback sampling, vehicle loans for short durations, equipment/sample transportation (heavy truck), staff support, safety and logistical advice.

Continued cutbacks in resources will make this type of support increasingly difficult.

RIGGING SHOP

Rigging Shop staff were used for field support in several areas--the main two being Sudbury and Niagara. Sudbury and surrounding area required the use of the five-ton truck and two six kw generators for the pumping and processing of water samples. The Niagara River project required approximately two days each month throughout the field season for drogue tracking. The remaining field trips were of the usual nature: rigging towers, moving trailers and delivering samples. The services of a rigger were also required for the deployment of moorings from the CSS LIMNOS in the spring of 1982.

The CCIW Warehouse which also comes under the care of the Rigging Shop, experienced problems this fall with overcrowding, because as new equipment came in, old or obsolete equipment was not disposed of. A major clearout is being undertaken.

Vehicle purchases and disposal have remained even throughout the year with five new vehicles in and five old vehicles out. A new lab trailer and ski-doo were also purchased. One 1982 station wagon was converted from gasoline to propane in accordance with a request from Ottawa. The preparation and submission of monthly MV2 forms to FMIS, Ottawa is now the responsibility of Technical Operations Division.

FIELD STORES

The Open House displays and the early start of CSS BAYFIELD increased the demand for equipment for the opening of the field season. Close to 900 requisitions were processed to fill demands for equipment. A catalogue, in booklet form, of the equipment available in Field Stores has been prepared. A call-up of equipment on loan for refurbishing and write-off in preparation for the coming winter projects and the 1983 field season is in progress.

OPEN HOUSE

CCIW conducted an Open House April 22 - 25, considered by many to have been a great success.

All Technical Operations Division displays were well received by the public. CSS LIMNOS, CSS BAYFIELD and CSS ADVENT were opened to the public, labs were set up and staffed by TOD. The Dive Unit conducted shows outside using a large glass-sided tank. This was well attended by all age groups.

Inside the building, the RU4 H_2O mechanical robot, built by J.A. Tyler, Limnological Instrumentation Section was a great attraction for children. Other displays included coring equipment, diving equipment, models of measurement systems, lighted picture display of field operations and the Electronics Shop was open to the public.

All staff of TOD worked diligently to make our contribution to Open House '82 a success.