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GEOLOGICAL SURVEY OF CANADA
OPEN FILE 8744

Legacy geophysical and geological data from Lake Ontario, Lake Erie, Lake Huron, Georgian Bay, and Lake Michigan, Canada and U.S.A.

B.J. Todd and C.F.M. Lewis

2020

Canada

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Publications in this series have not been edited; they are released as submitted by the authors.

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Abstract

Some geophysical surveys of the Great Lakes undertaken by the Government of Canada and various scientific partners have been undiscoverable and unavailable to geoscientists and other investigators for up to 60 years. This report presents the descriptive and administrative metadata for this legacy geoscience information. The information described herein is in printed form but digital versions will be eventually available for download from Geological Survey of Canada (GSC) databases.

Résumé

Certains levés géophysiques des Grands Lacs entrepris par le gouvernement du Canada et divers partenaires scientifiques sont introuvables et inaccessibles aux géoscientifiques et autres chercheurs depuis 60 ans. Ce rapport présente les métadonnées descriptives et administratives de ces informations géoscientifiques héritées. Les renseignements décrits dans le présent document sont sous forme imprimée, mais des versions numériques seront éventuellement disponibles pour téléchargement à partir des bases de données de la Commission géologique du Canada (CGC).

Introduction

Geophysical surveys of the Great Lakes (Fig. 1) undertaken by the Government of Canada and various scientific partners in the 1960s, 1970s and 1990s have been undiscoverable and unavailable to geoscientists and other investigators for up to 60 years (Tables 1, 2, 3, 4). The purpose of this report is to present the descriptive and administrative metadata for this legacy geoscience information. The information described herein is all in printed form, either on paper or plastic film and includes navigation data and charts, expedition reports, ships' bridge logs, seismic reflection profiles, and interpretive maps. The original material has been scanned, processed, and catalogued to create digital, and thereby web-accessible, files ***eventually*** available for download from Geological Survey of Canada (GSC) databases. ***When*** this information is loaded onto the GSC databases is beyond the control of the report authors. Because scientific papers based on this information may be submitted for publication before the original material is available online, we employ this report to reveal the existence of this legacy geoscience information and to provide names and contact information for potential users who may wish to access the data before it is loaded on to GSC databases.

The scientific significance and inherent financial value of the Great Lakes legacy geoscience data are considerable. In the Great Lakes, the seismostratigraphy revealed by high-resolution seismic reflection profiles provides insight to sediment thickness, depth to bedrock (or acoustic basement), and sediment stratigraphy. This information aids in the interpretation of the history of sediment deposition and lake level history, and possible pathways for movement of groundwater or contaminants.

Figure 1: Location map of the Great Lakes.

Databases and contacts

There are two GSC databases of significance to the Great Lakes legacy geoscience information described in this report. The Expedition Database (ED) contains information (metadata) and data related to marine and lacustrine field surveys conducted by, or on behalf of, the Atlantic and Pacific offices of the Geological Survey of Canada. ED is the source of track line navigation for seismic reflection profiles collected by the GSC:

http://ed.gdr.nrcan.gc.ca/index_e.php

The contacts for ED are Kate Jarrett (kate.jarrett@canada.ca, 902-426-6127) and Sheila Hynes (sheila.hynes@canada.ca, 902-426-8355).

Scanned seismic reflection profiles that correspond to the navigation information in ED are available in the Seismic Data Archive (SDA):

http://ftp.maps.canada.ca/pub/nrcan_rncan/raster/marine_geoscience/Seismic_Reflection_Scanned

The contacts for SDA are Robert Courtney (robert.courtney@canada.ca, 902-426-5062) and Sheila Hynes (as above).

ED and SDA are the internal and external points of contact for researchers seeking marine and lacustrine seismic geoscience data. These are evergreen databases, meaning that the databases are updated when new data are acquired, or when previously collected data are discovered. However, as noted in the Introduction, the Great Lakes legacy geoscience information from the 1960s and 1970s has not yet been uploaded to these databases. Most, but not all, of the geoscience data from the 1990s are in the databases.

Navigation data and trackplots

Seismic reflection data without associated navigation cannot be used for any analysis. The expeditions reported here are only those for which written positions and/or track plots exist. Many thousands of navigation positions were entered into spreadsheets and many thousands of positions were digitized from georegistered track plots. In ED and SDA all times are standardized to Coordinated Universal Time (UTC). The majority of the legacy expeditions recorded local time when noting positions, thus the UTC times for all written and mapped positions had to be determined.

Appendix 1 lists the digital navigation files provided as Microsoft Excel Open XML format (xlsx) spreadsheet files. Note that *Limnos* 72-00-012 (Table 1) has no trackplot per se, rather a page-sized map (included as a tagged image file TIF format) was georegistered to provide ersatz navigation. The scanned seismic reflection profiles for this expedition have not been "fitted" to this navigation and their positioning remains incomplete.

Appendix 2 lists the survey trackplots generated from the digitized navigation data. The trackplots are in PDF format. In all cases ship tracks are represented by a black lines. Navigational fixes or waypoints are represented by black dots. Where fixes are numerous (e.g., 1 minute interval), the black dots are omitted for clarity. These trackplots are not intended for practical use; they are intended to provide spatial context for the distribution of legacy surveys across Lakes Ontario, Erie, Huron and Michigan. Users are encouraged to import the navigation spreadsheets into the Geographical Information System software of their choice to create their own trackplots. The bathymetric and topographic data used for the trackplots in this report are published by the US National Atmospheric and Oceanic Administration (NOAA) (National Geophysical Data Center, 1996; Virden *et al*., 1999; NOAA, 1999; Vincent *et al*., 1999).

Scanned seismic data and processing

All the seismic profiles are listed in the Appendix 3 Great Lakes data inventory spreadsheet on the "seismic" sheet. The paper and film records were scanned in greyscale at 300 dots per inch in TIF format. (The scanned and processed seismic profiles constitute 182 GB of data, and therefore are not appropriate for release as a digital Open File, but will eventually be available through download from the SDA). The greyscale scans were used as input into the seismic data processing software described

below. Note that original seismic reflection profiles for *Limnos* 69-2-01 in Lake Huron (Table 3) are not available. For this particular expedition, interpreted seismic reflection profiles were scanned.

The following description outlines the steps used in transforming scanned records of seismic data into attributed digital images that can be interpreted, located on a GIS, and eventually uploaded to the SDA. All the software is available for free download at:

http://ftp.maps.canada.ca/pub/nrcan_rncan/raster/marine_geoscience/Seismic_Reflection_Scanned/tools

This software was created by Dr. Robert C. Courtney of the Geological Survey of Canada–Atlantic (Courtney, 2012) and is the intellectual property of the Government of Canada. All rights to modify and distribute this software are retained by the Government of Canada.

Step 1: Using program SectionJP2, the greyscale TIF files were image compressed to JPEG 2000 (or JP2) format.

Step 2: Program RegJP2000 was used to register the scanned seismic sections in JP2 format and project them into SEGY format for subsequent processing. Horizontal and vertical scales were applied. Vertical time shifts and/or changes in sweep rate were accounted for.

Step 3: Program SegyJP2 was used to convert from SEGY format to JP2 format once again.

Step 4: Program JP2Viewer was used to view and manipulate the output files from step 3. This software enables the insertion of navigation data and the interpretation of seismostratigraphy.

Scanned maps and charts

Other legacy material associated with the Great Lakes geoscience expeditions constituted 326 items on paper and film, some in poor physical condition requiring careful archival repair. This material was scanned and constitutes 37 GB of data. The “map, charts, diagrams” sheet of the Appendix 3 Great Lakes data inventory spreadsheet lists this legacy material and its associated metadata. As was the case for the seismic information, this large data volume is not suitable for release as a digital Open File. It is anticipated that ED will eventually provide a web-based home for this information. Interested users should contact Kate Jarrett for access to this information (kate.jarrett@canada.ca, 902-426-6127).

Scanned expedition reports and bridge logs

Available legacy expedition reports and bridge logs were scanned for a total of 70 MB of data (Table 5, Appendix 4). Only reports for Lake Ontario expeditions were available. In one case, an expedition report was created based on unpublished information (Rea *et al*., 2018). Eventually these reports will be available through ED.

Acknowledgements

We thank the Officers and crews of the vessels employed in collecting geoscience data in the Great Lakes. Dr. Robert C. Courtney (GSCA) provided valuable software edits during the Great Lakes legacy data recovery. Data processing assistance was provided by Elliot McLauchlan and Gavin McNamara.

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National Geophysical Data Center. 1996. Bathymetry of Lake Michigan. National Geophysical Data Center, NOAA. doi:10.7289/V5B85627

NOAA National Geophysical Data Center. 1999. Bathymetry of Lake Erie and Lake Saint Clair. NOAA National Centers for Environmental Information. doi:10.7289/V5KS6PHK

Rea, D.K., Todd, B.J., and Lewis, C.F.M. 2018. Laurentian 95800 expedition report, Lake Huron, Georgian Bay and Lake Michigan, Ontario, Canada and Michigan, U.S.A. Geological Survey of Canada, Open File 8431, 12 p. doi:10.4095/308482

Virden, W.T., Warren, J.S., Holcombe, T.L., Reid, D.F., and Berggren, T.L., 1999. Bathymetry of Lake Ontario. National Geophysical Data Center, World Data Center for Marine Geology and Geophysics, Boulder, Colorado, Report MGG-15.

Vincent, P., Warren, J.S., Holcombe, T.L., Reid, D.F., Divins, D., and Virden, W.T. 1999. Bathymetry of Lake Huron. National Geophysical Data Center, National Oceanic and Atmospheric Administration. doi:10.7289/V5G15XS5

Table 1. Lake Ontario geoscience expeditions.

Year	Vessel / expedition no.	Instrument
1966	Brandal	Boomer
1966	Mandarin	Boomer
1967	Theron 67-0-6	Kelvin Hughes 26B
1967	Theron 67-0-8	Boomer
1967	Theron 67-0-14	Boomer
1967	Theron 67-0-18	Kelvin Hughes 26B
1968	Limnos 68-0-13	Kelvin Hughes 26B, boomer
1968	Limnos 68-0-18	Kelvin Hughes 26B, boomer
1968	Theron 68-0-17	Kelvin Hughes 26B
1969	Martin Karlsen 69-0-13	Kelvin Hughes 26B
1969	Martin Karlsen 69-0-16	Kelvin Hughes 26B
1970	Limnos 70-0-29	Kelvin Hughes 26B
1970	Limnos 70-0-34	Kelvin Hughes 26B
1972	Limnos 72-00-012	Kelvin Hughes 26B, boomer
1974	Martin Karlsen 74-00-102	Kelvin Hughes 26B
1992	Griffon 92800	Boomer, Seistec, sleevegun
1993	Griffon 93800	Seistec, sleevegun
1994	Risley 94800	Huntec, Seistec, sleevegun

Table 2. Lake Erie geoscience expeditions.

Year	Vessel / expedition no.	Instrument
1993	Griffon 93800	Seistec, sleevegun
1994	Risley 94800	Huntec, Seistec, sleevegun

Table 3. Lake Huron and Georgian Bay geoscience expeditions.

Year	Vessel / expedition no.	Instrument
1969	Limnos 69-2-01	Airgun
1991	Laurentian 91800	Sleevegun, Seistec, chirp
1994	Risley 94800	Huntec, Seistec, sleevegun
1995	Laurentian 95800	Seistec, sleevegun

Table 4. Lake Michigan geoscience expeditions.

Year	Vessel / expedition no.	Instrument
1995	Laurentian 95800	Seistec, sleevegun

Table 5. Lake Ontario expeditions cruise reports and bridge logs.

Year	Vessel / expedition no.	Type
1967	Theron 67-0-06	Bridge log
1967	Theron 67-0-08	Cruise report
1967	Theron 67-0-14	Cruise report
1967	Theron 67-0-18	Bridge log
1968	Limnos 68-0-13	Bridge log
1968	Theron 68-0-17	Bridge log
1968	Limnos 68-0-18	Bridge log
1969	Martin Karlsen 69-0-13	Bridge log
1969	Martin Karlsen 69-0-16	Bridge log
1970	Limnos 70-0-29	Bridge log
1970	Limnos 70-0-34	Cruise report
1972	Limnos 72-0-12	Cruise report
1974	Martin Karlsen 74-00-102	Bridge log Cruise report

Appendix 1: Navigation data

Lake Ontario

- 1966 Brandal navigation data.xlsx
- 1966 Mandarin navigation data.xlsx
- 1967 Theron 67-0-06 navigation data.xlsx
- 1967 Theron 67-0-08 navigation data.xlsx
- 1967 Theron 67-0-14 navigation data.xlsx
- 1967 Theron 67-0-18 navigation data.xlsx
- 1968 Limnos 68-0-13 navigation data.xlsx
- 1968 Limnos 68-0-18 navigation data.xlsx
- 1968 Theron 68-0-17 navigation data.xlsx
- 1969 Martin Karlsen 69-0-13 navigation data.xlsx
- 1969 Martin Karlsen 69-0-16 navigation data.xlsx
- 1970 Limnos 70-0-29 navigation data.xlsx
- 1970 Limnos 70-0-34 navigation data.xlsx
- 1972 Limnos 72-00-012 Lake Ontario survey map.tif
- 1972 Limnos 72-00-012 navigation data.xlsx
- 1974 Martin Karlsen 74-00-102 navigation data.xlsx
- 1992 Griffon 92800 navigation data.xlsx
- 1993 Griffon 93800 navigation data Lake Ontario.xlsx
- 1994 Risley 94800 navigation data Lake Ontario.xlsx

Lake Erie

- 1993 Griffon 93800 navigation data Lake Erie.xlsx
- 1994 Risley 94800 navigation data Lake Erie.xlsx

Lake Huron and Georgian Bay

- 1969 Limnos 69-2-01 navigation data.xlsx
- 1991 Laurentian 91800 navigation data.xlsx
- 1994 Risley 94800 navigation data Lake Huron.xlsx
- 1995 Laurentian 95800 navigation data Lake Huron.xlsx

Lake Michigan

- 1995 Laurentian 95800 navigation data Lake Michigan.xlsx

Appendix 2: Survey trackplots

Note: These trackplots are for *illustration purposes only* to show the spatial context of the surveys. Because of the small scale of the trackplots, the waypoints and labels (where present) are challenging to display clearly, thus these trackplots should not be employed as base maps. Users should create their own trackplots, tailored to their specific needs, using the navigation data provided (Appendix 1).

Lake Ontario

- 1966 Brandal
- 1966 Mandarin
- 1967 Theron 67-0-06
- 1967 Theron 67-0-08
- 1967 Theron 67-0-14
- 1967 Theron 67-0-18
- 1968 Limnos 68-0-13
- 1968 Limnos 68-0-18
- 1968 Theron 68-0-17
- 1969 Martin Karlsen 69-0-13
- 1969 Martin Karlsen 69-0-16
- 1970 Limnos 70-0-29
- 1970 Limnos 70-0-34
- 1972 Limnos 72-00-012
- 1974 Martin Karlsen 74-00-102
- 1992 Griffon 92800
- 1993 Griffon 93800
- 1994 Risley 94800

Lake Erie

- 1993 Griffon 93800
- 1994 Risley 94800

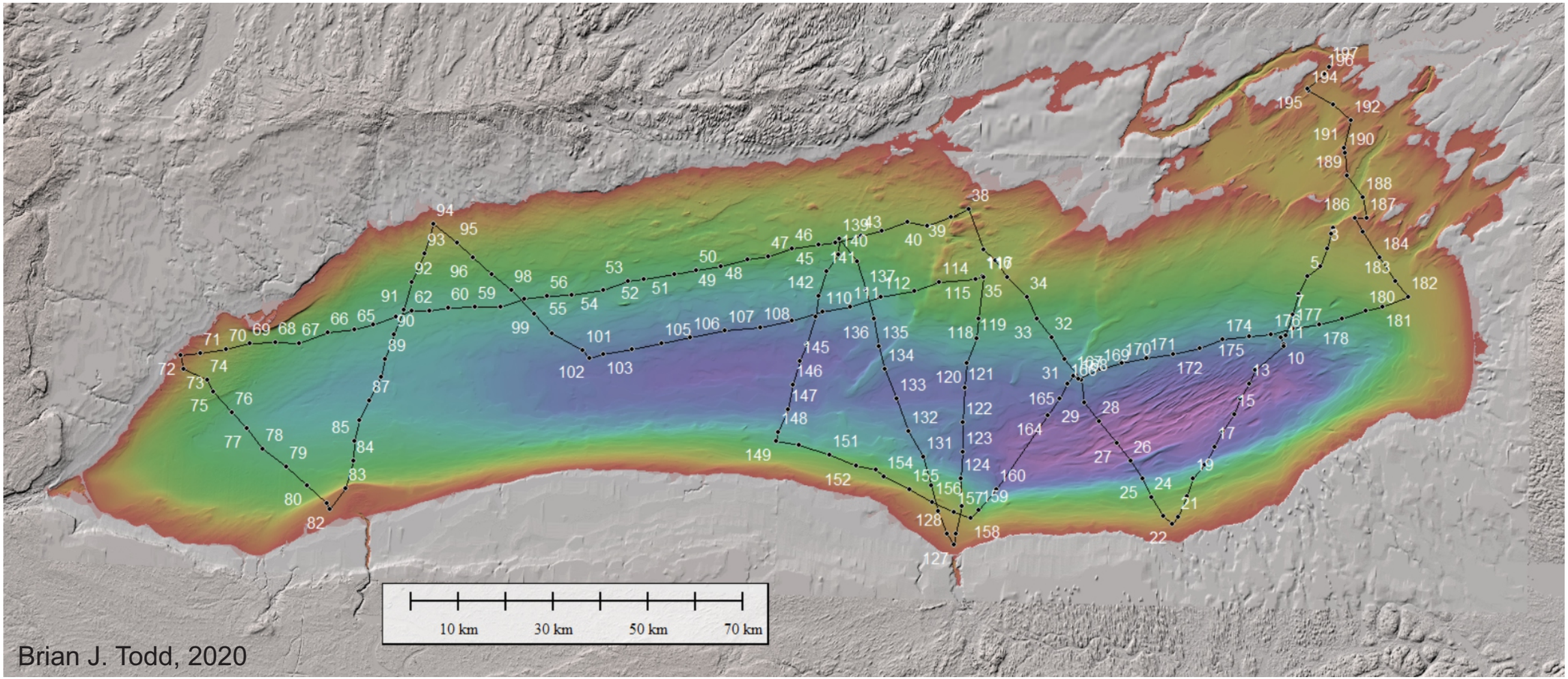
Lake Huron and Georgian Bay

- 1969 Limnos 69-2-01
- 1991 Laurentian 91800
- 1994 Risley 94800
- 1995 Laurentian 95800

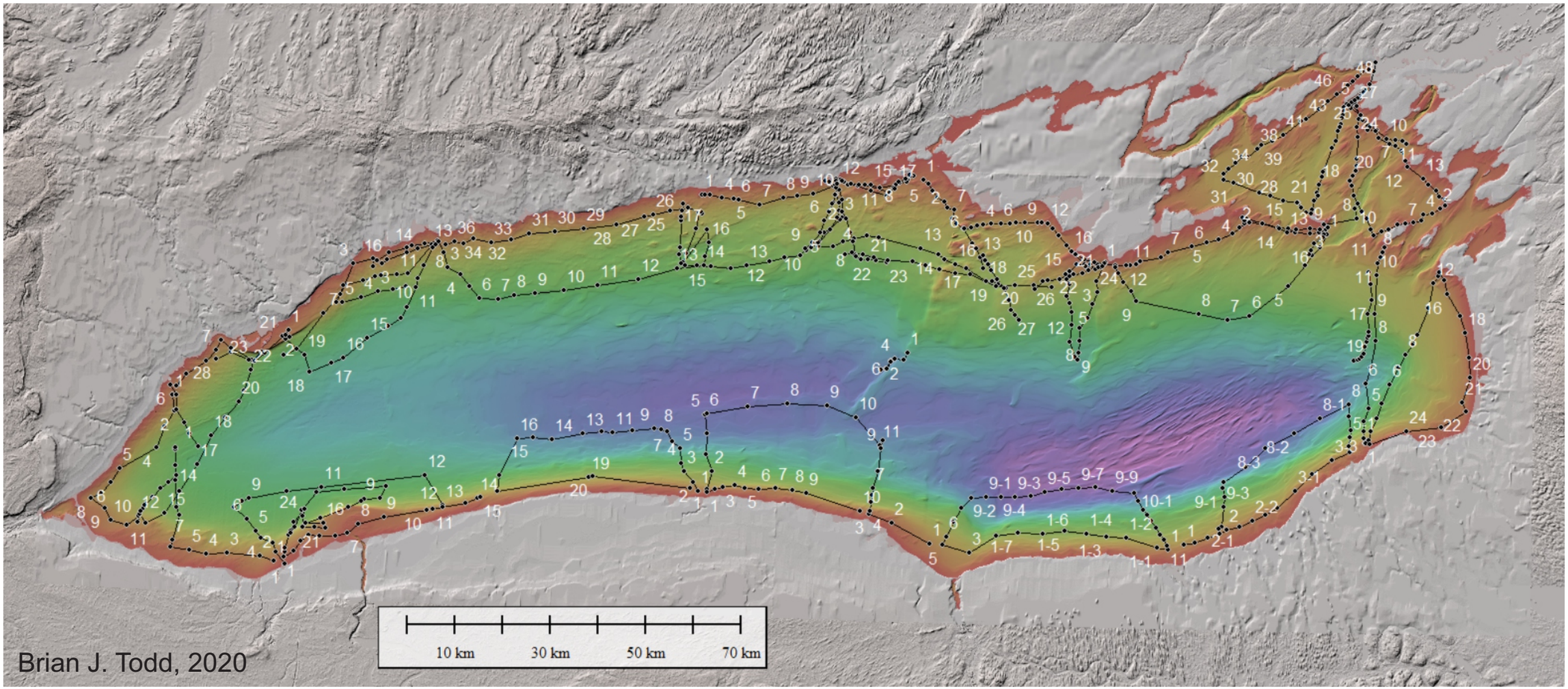
Lake Michigan

- 1995 Laurentian 95800

Lake Ontario
1966 Brandal survey lines and fixes



Lake Ontario
1966 Mandarin survey lines and fixes



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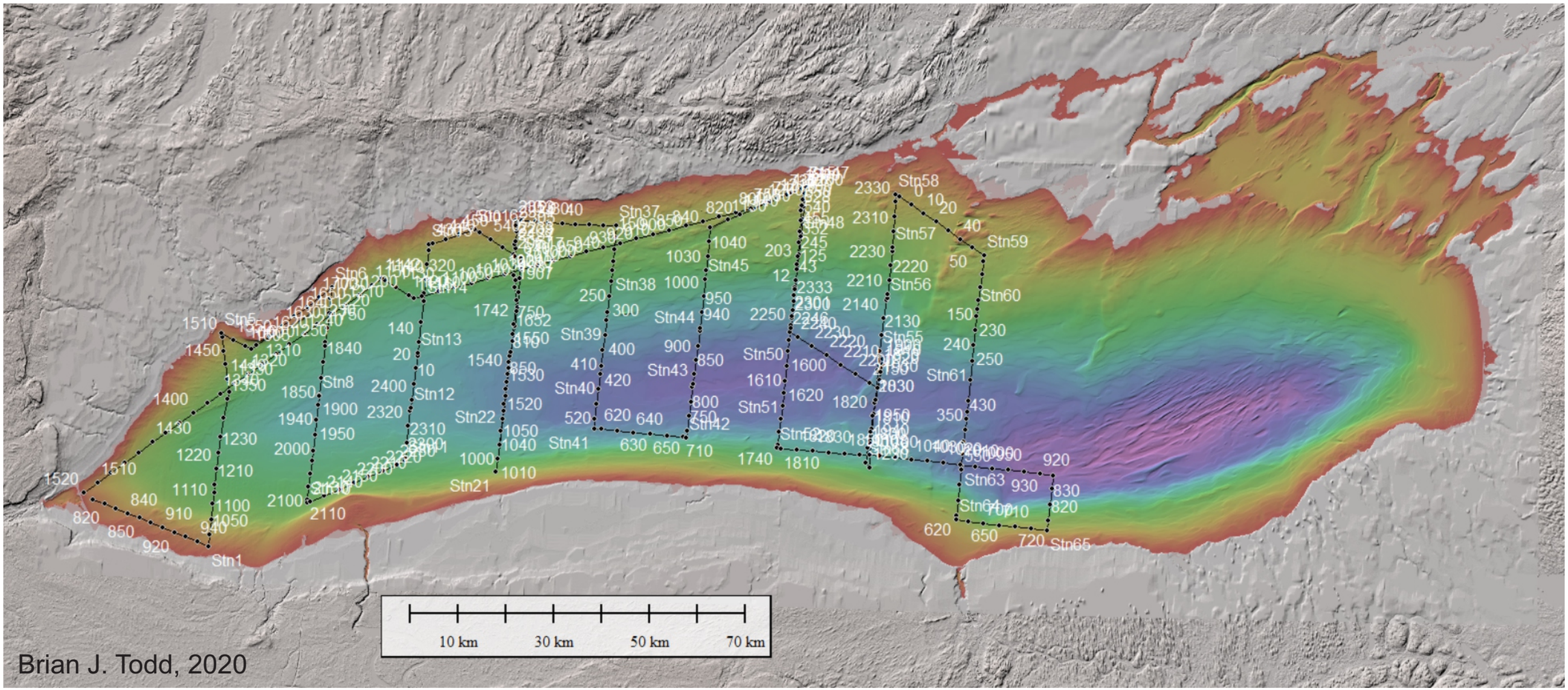

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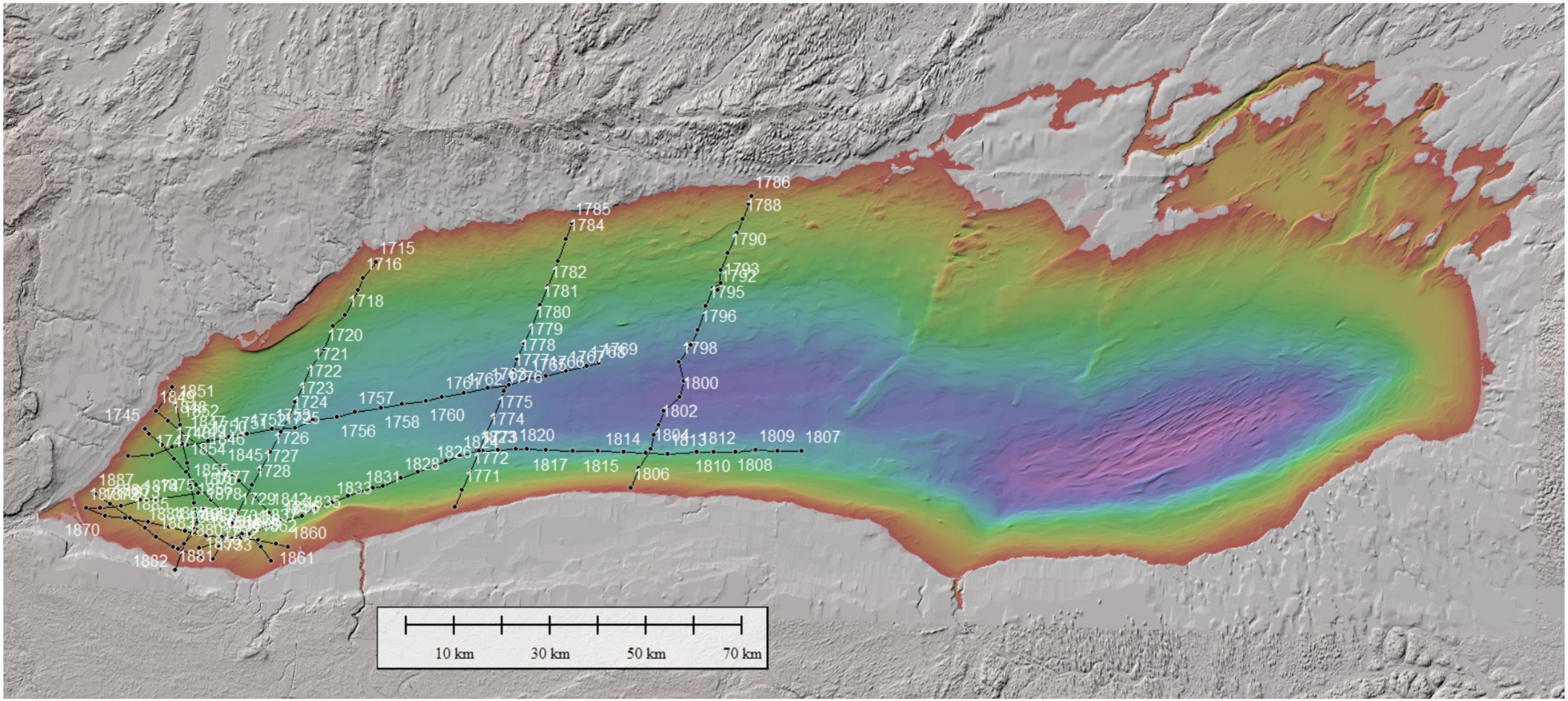

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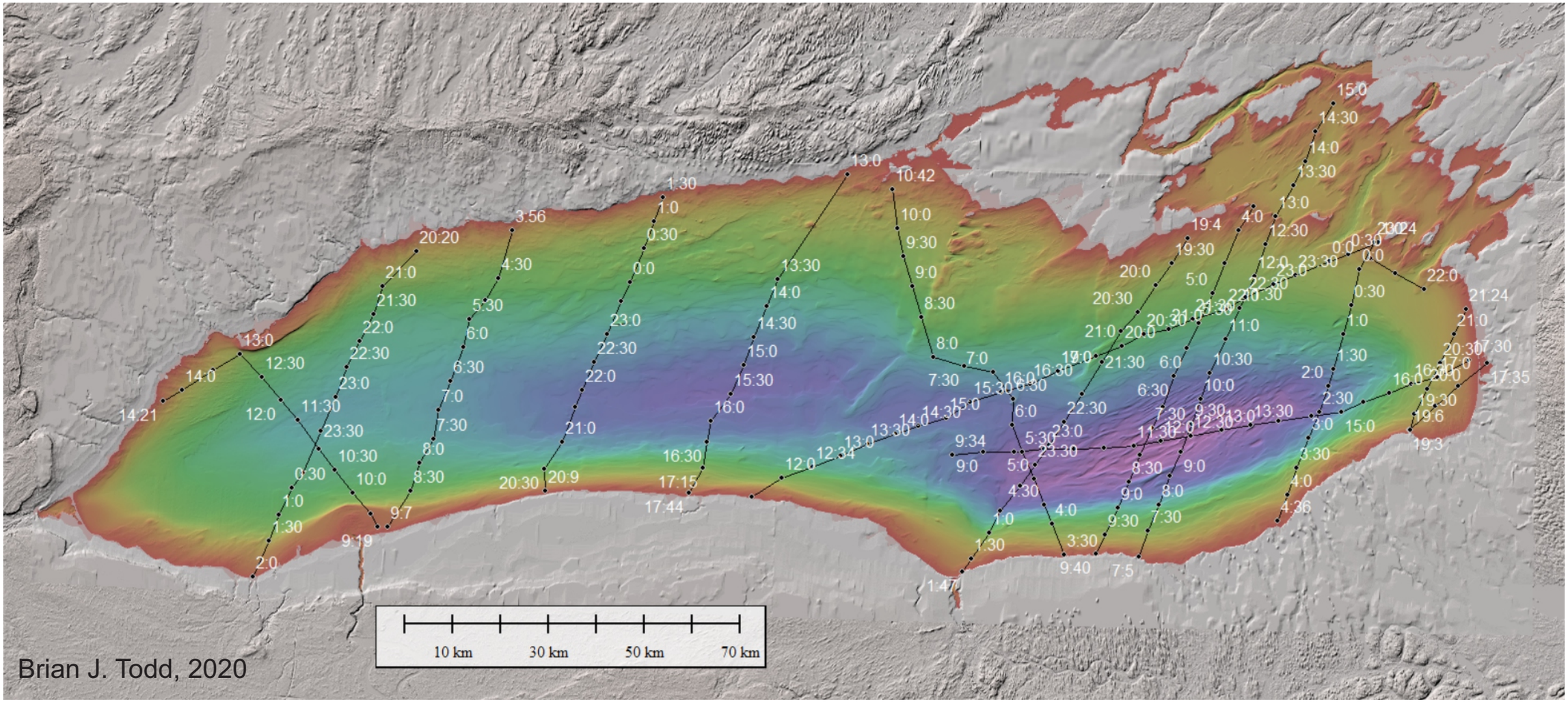
1967 Theron 67-0-14 survey lines and fixes



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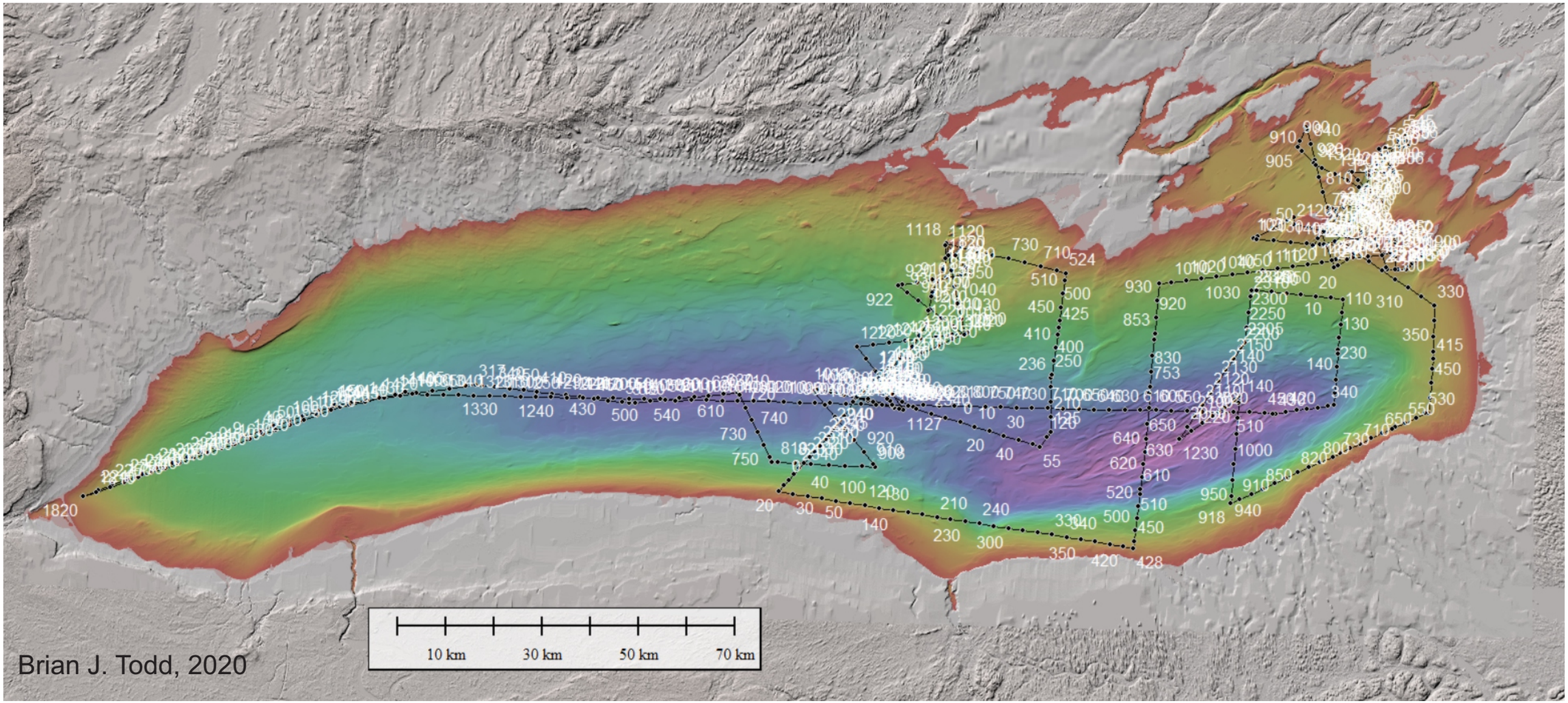

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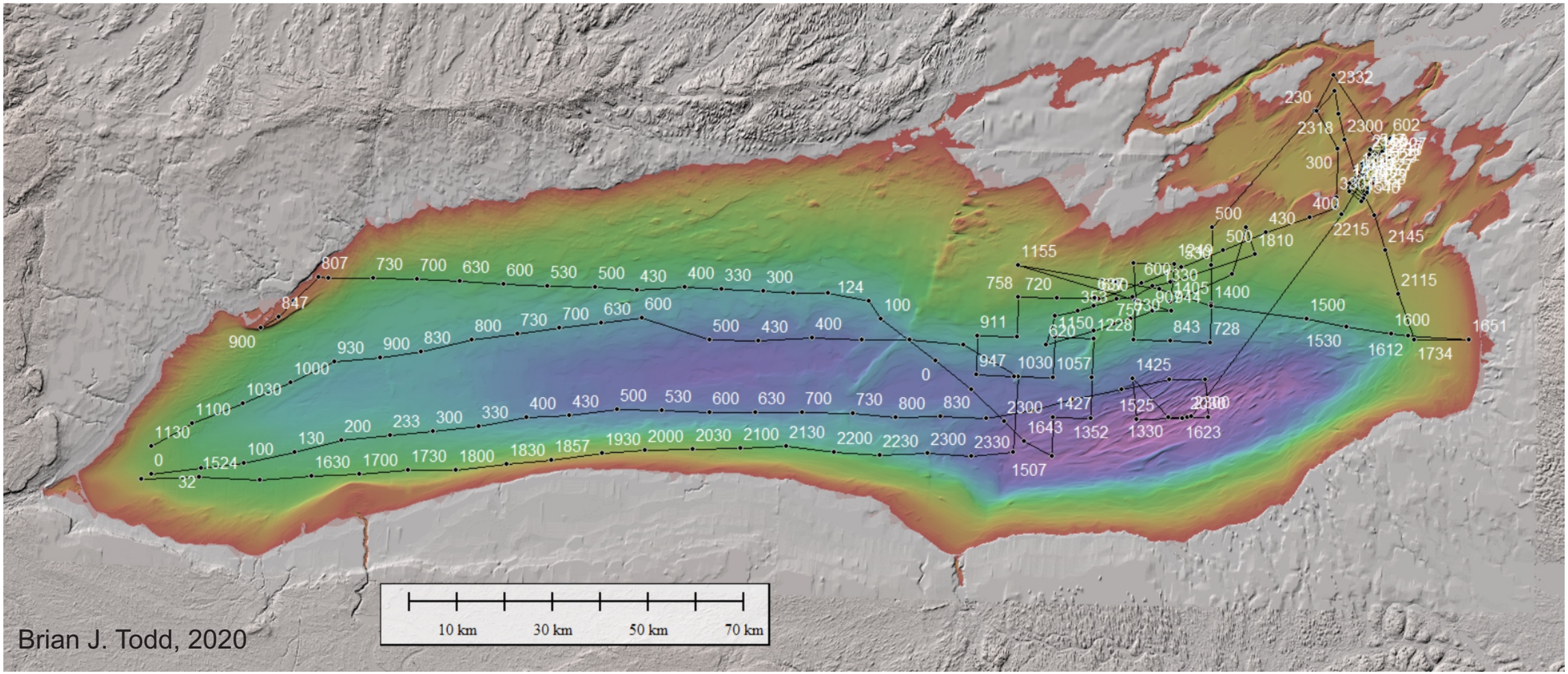
1968 Limnos 68-0-13 survey lines and fixes



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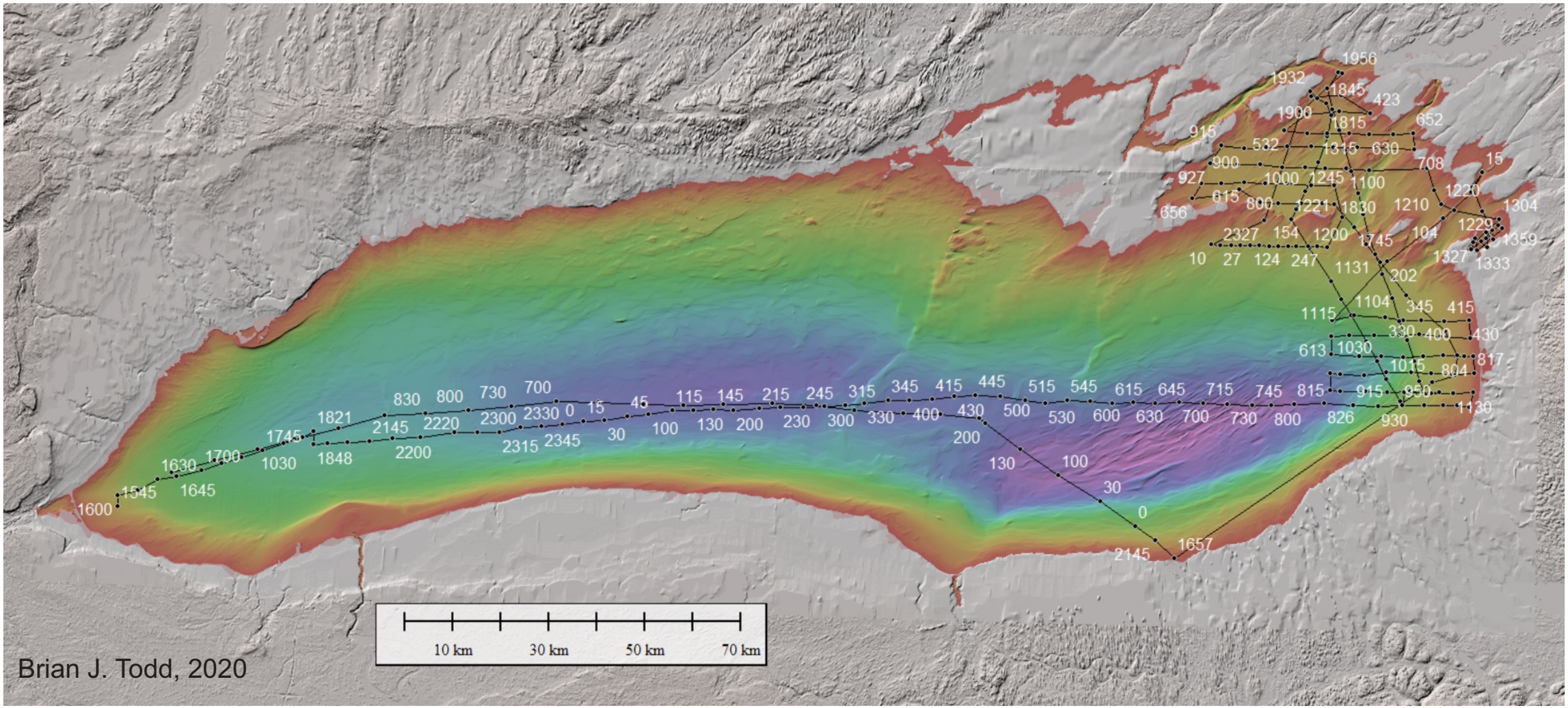
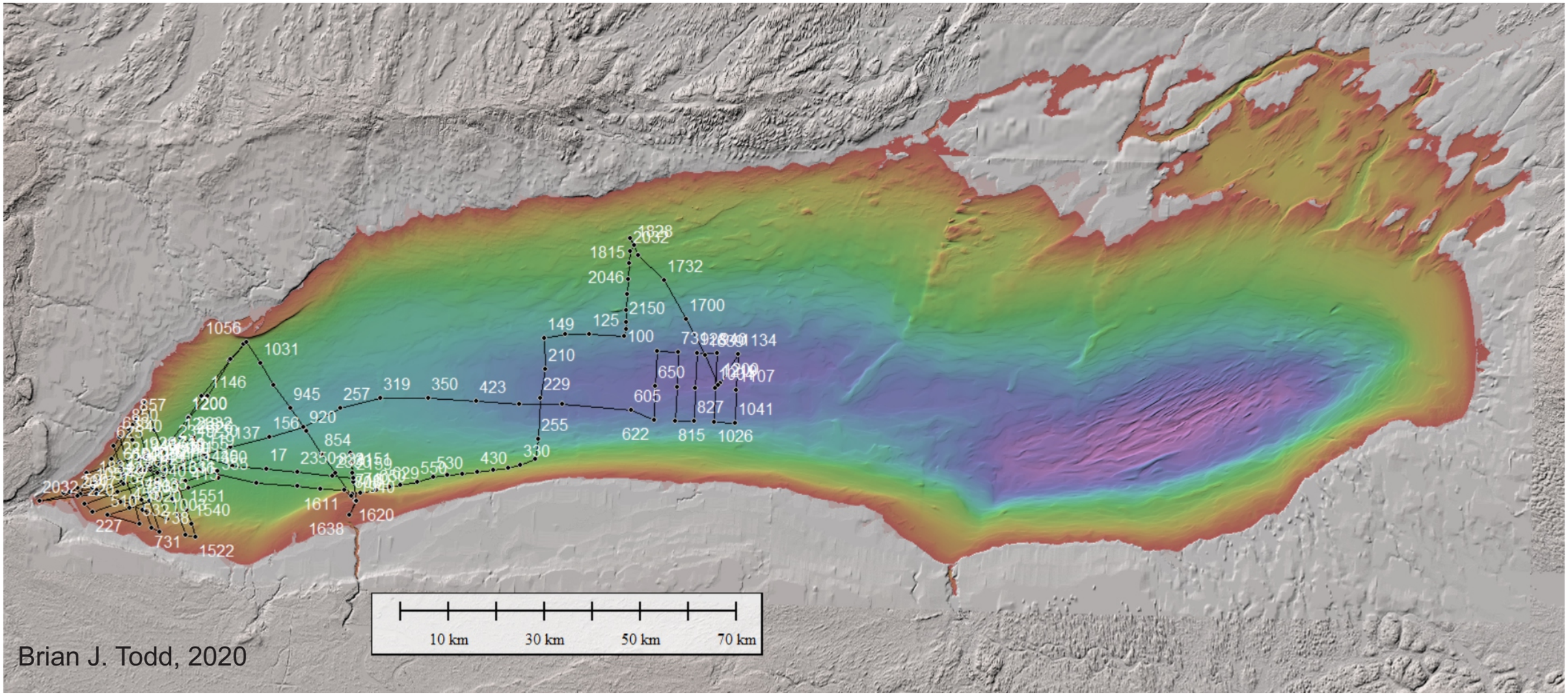
1968 Limnos 68-0-18 survey lines and fixes



Brian J. Todd, 2020

Lake Ontario
1968 Theron 68-0-17 survey lines and fixes



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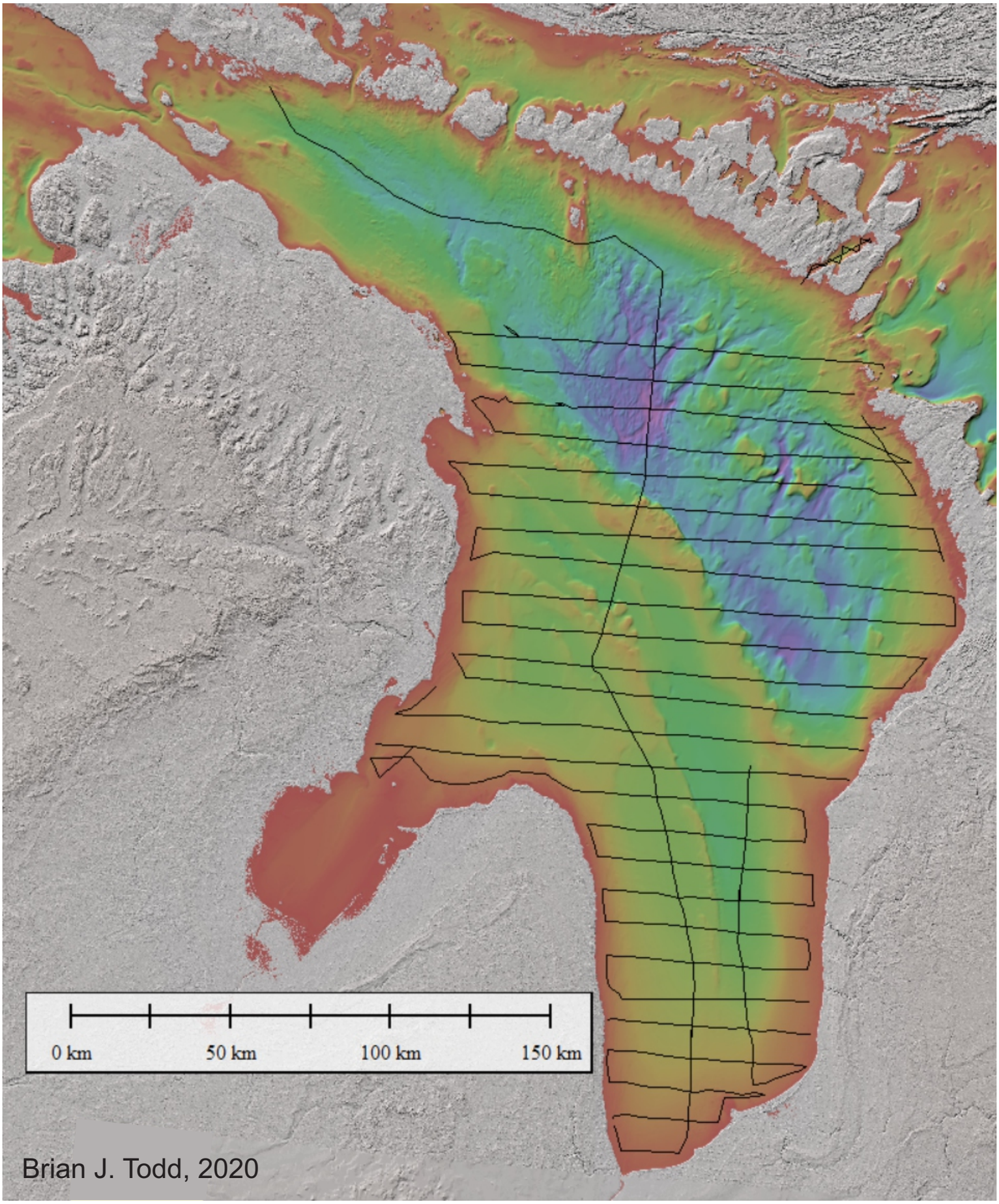

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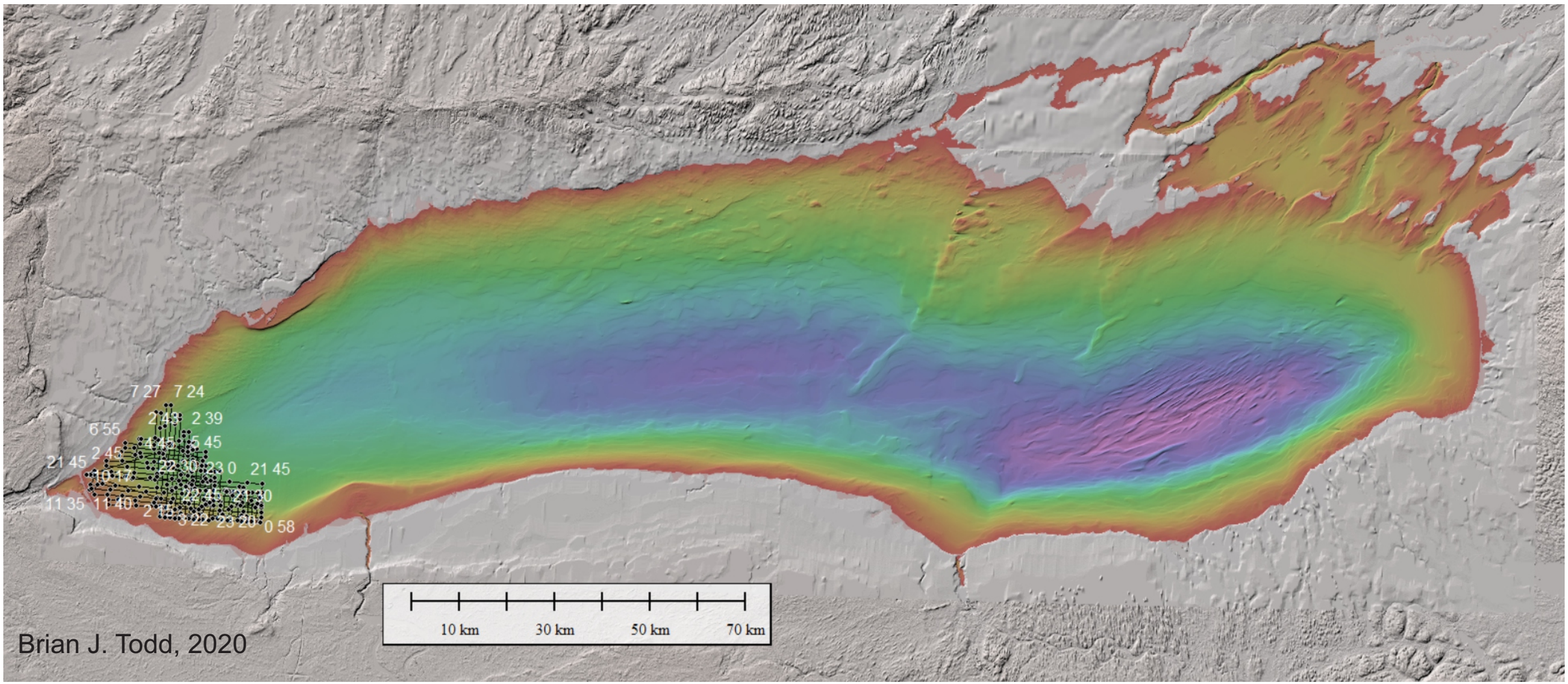

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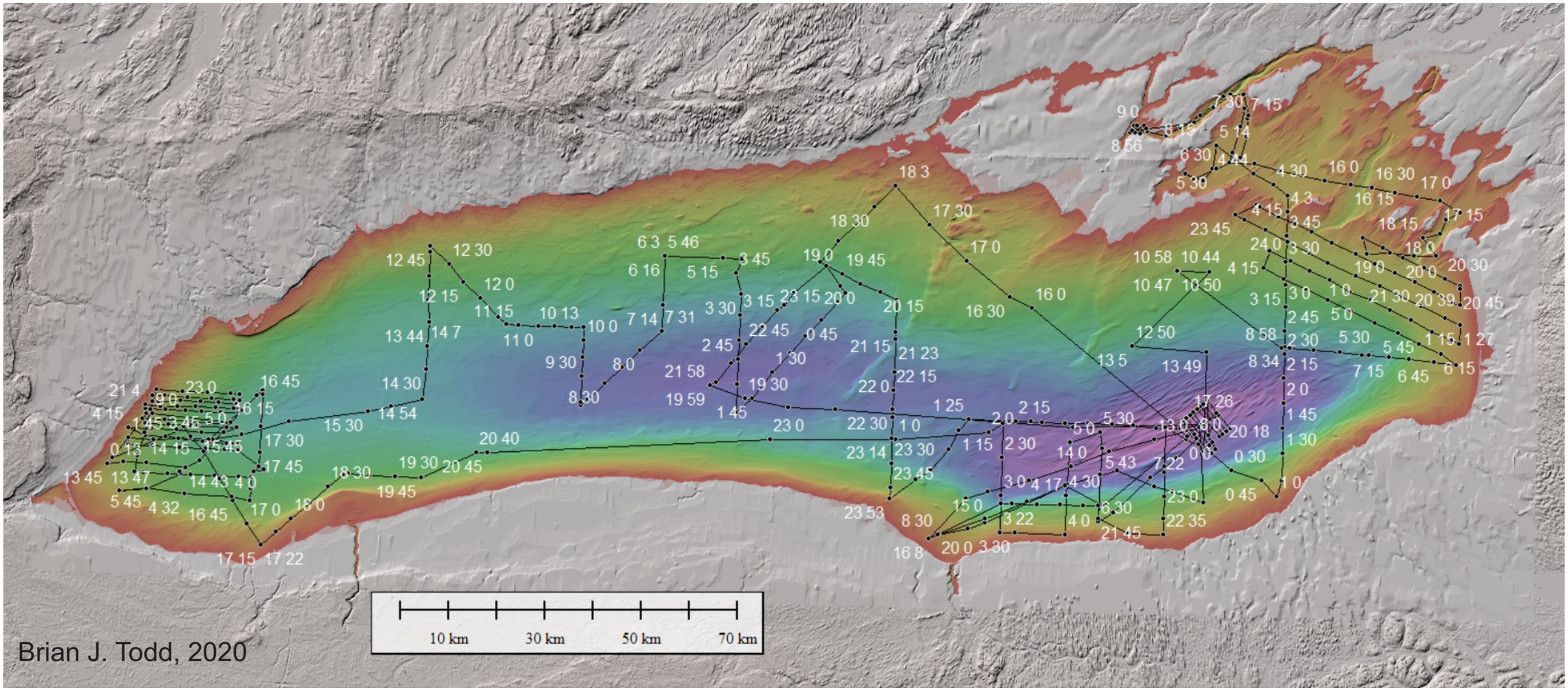

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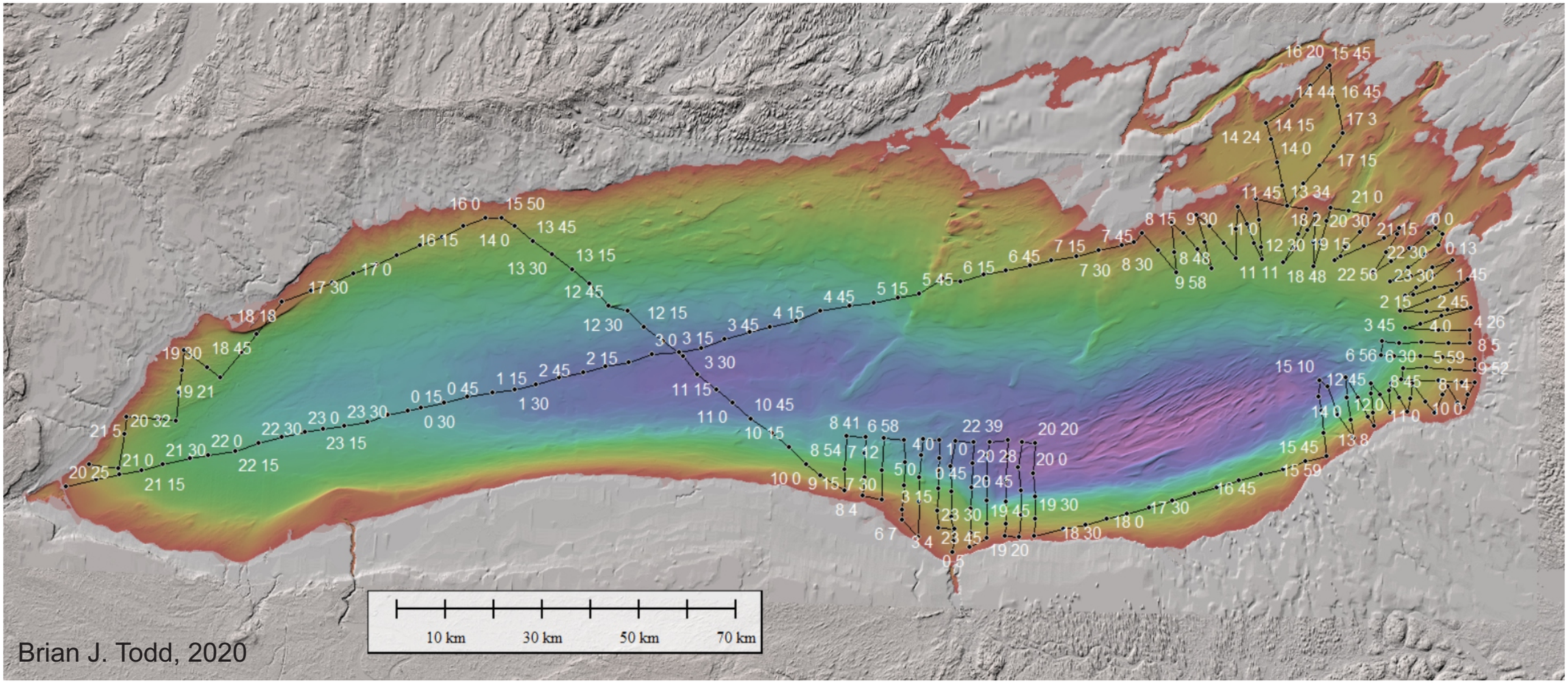

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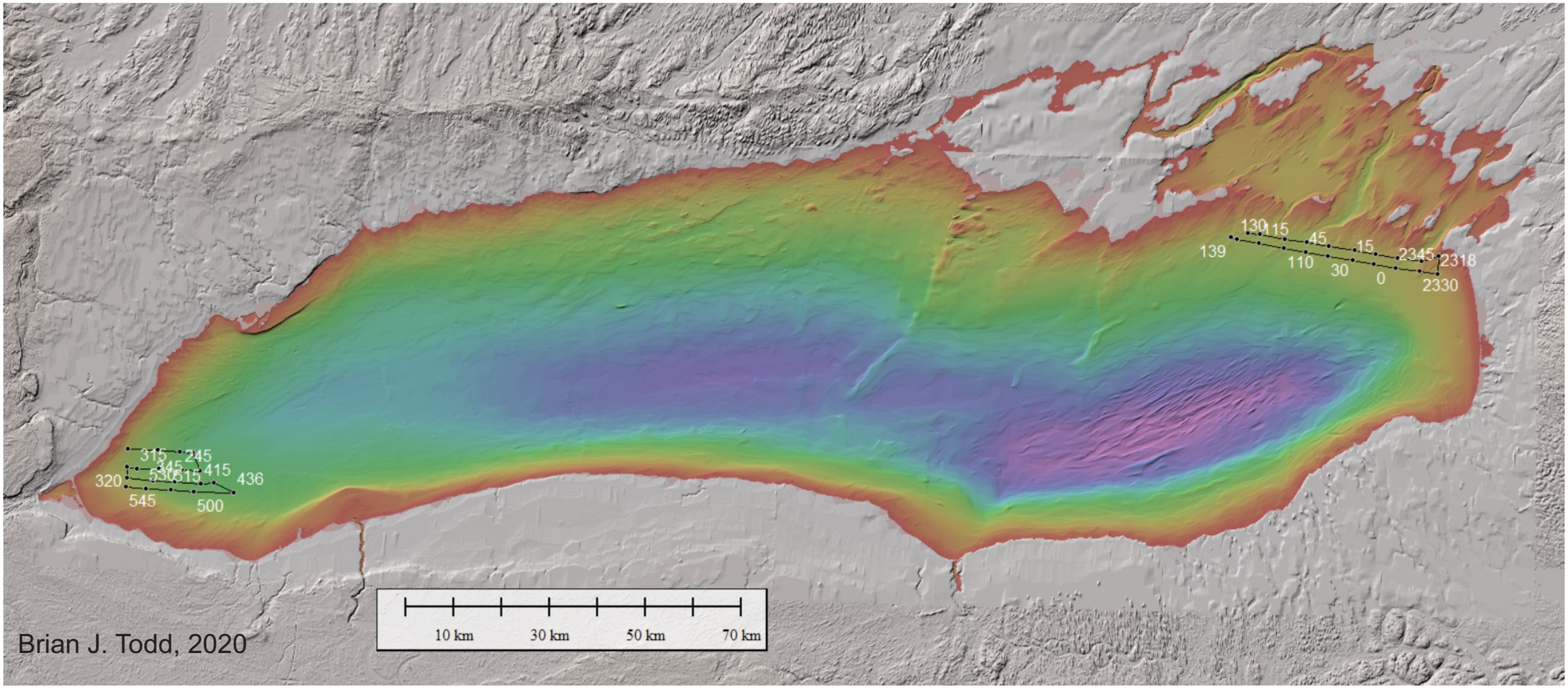

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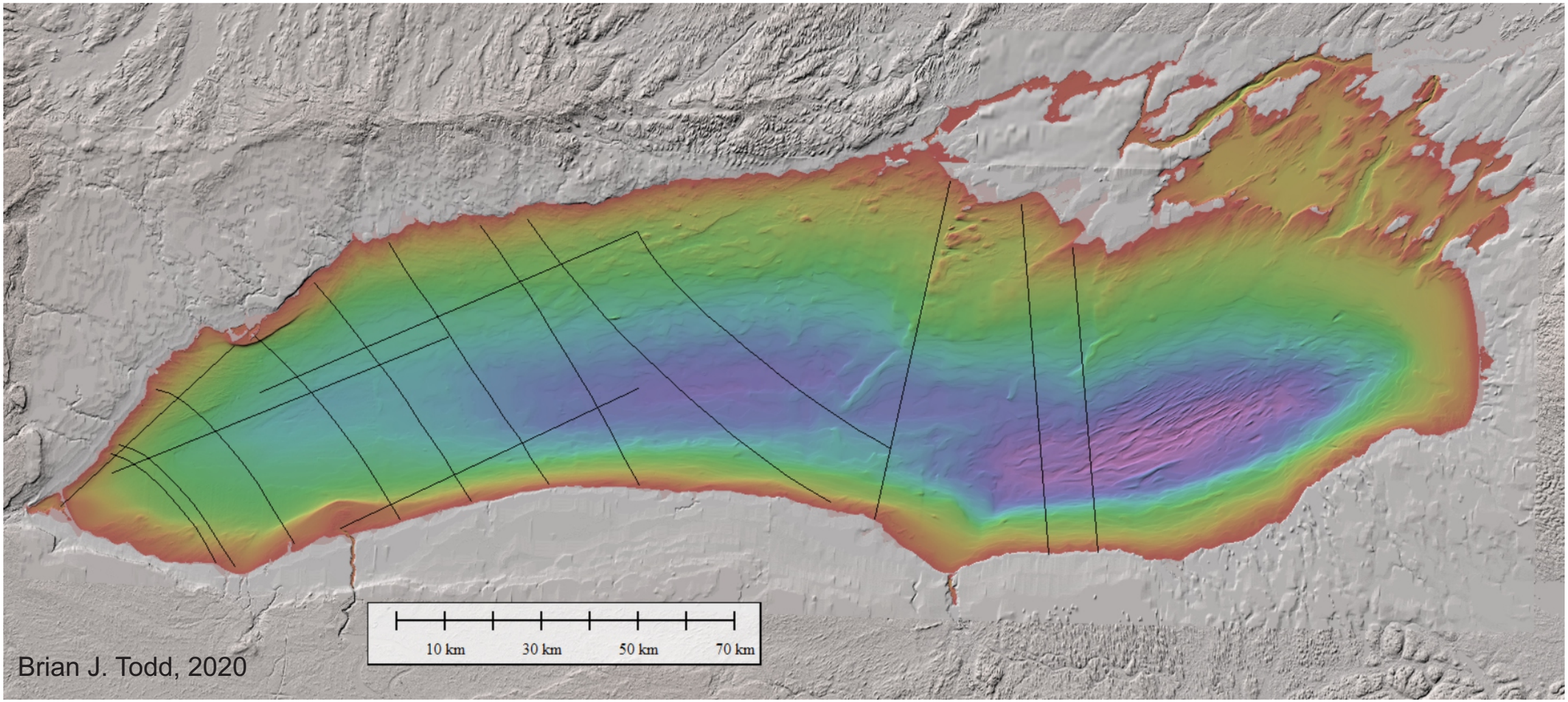
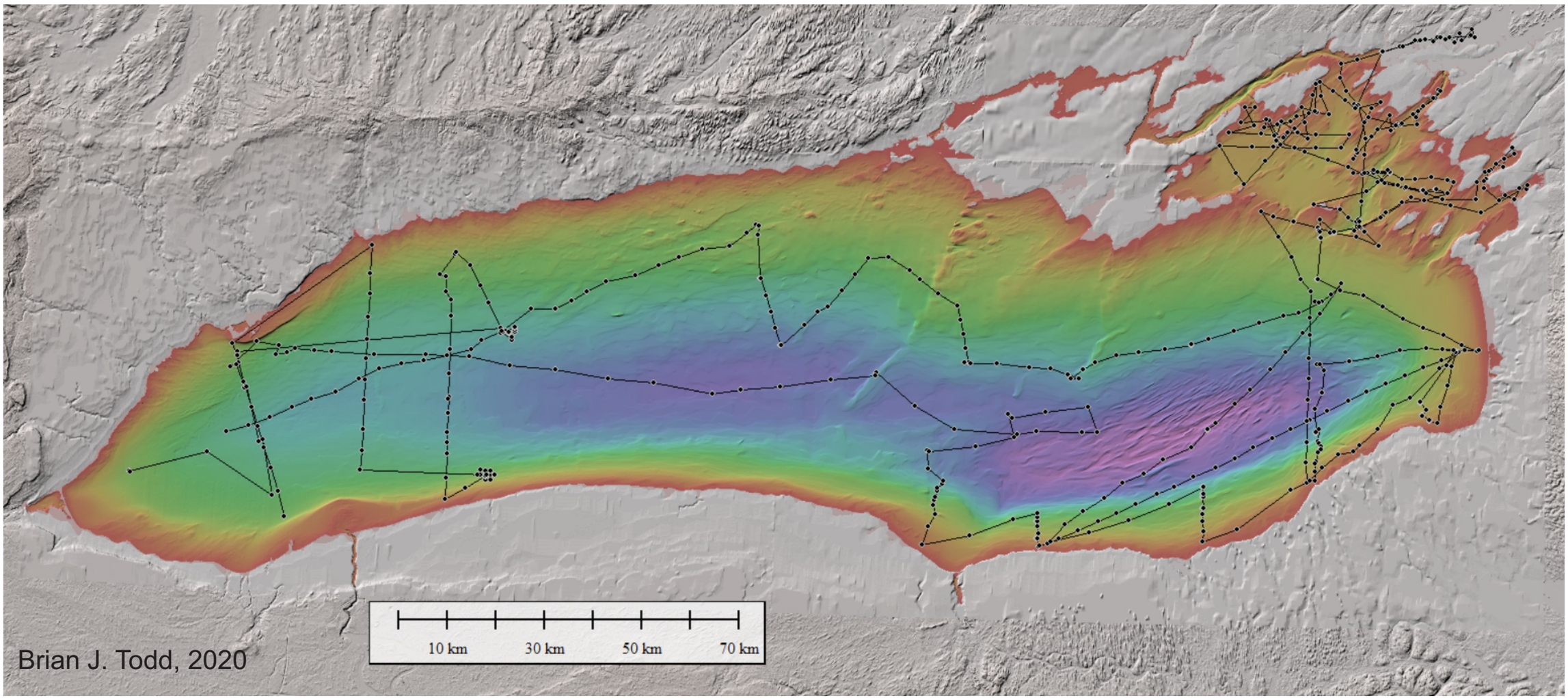
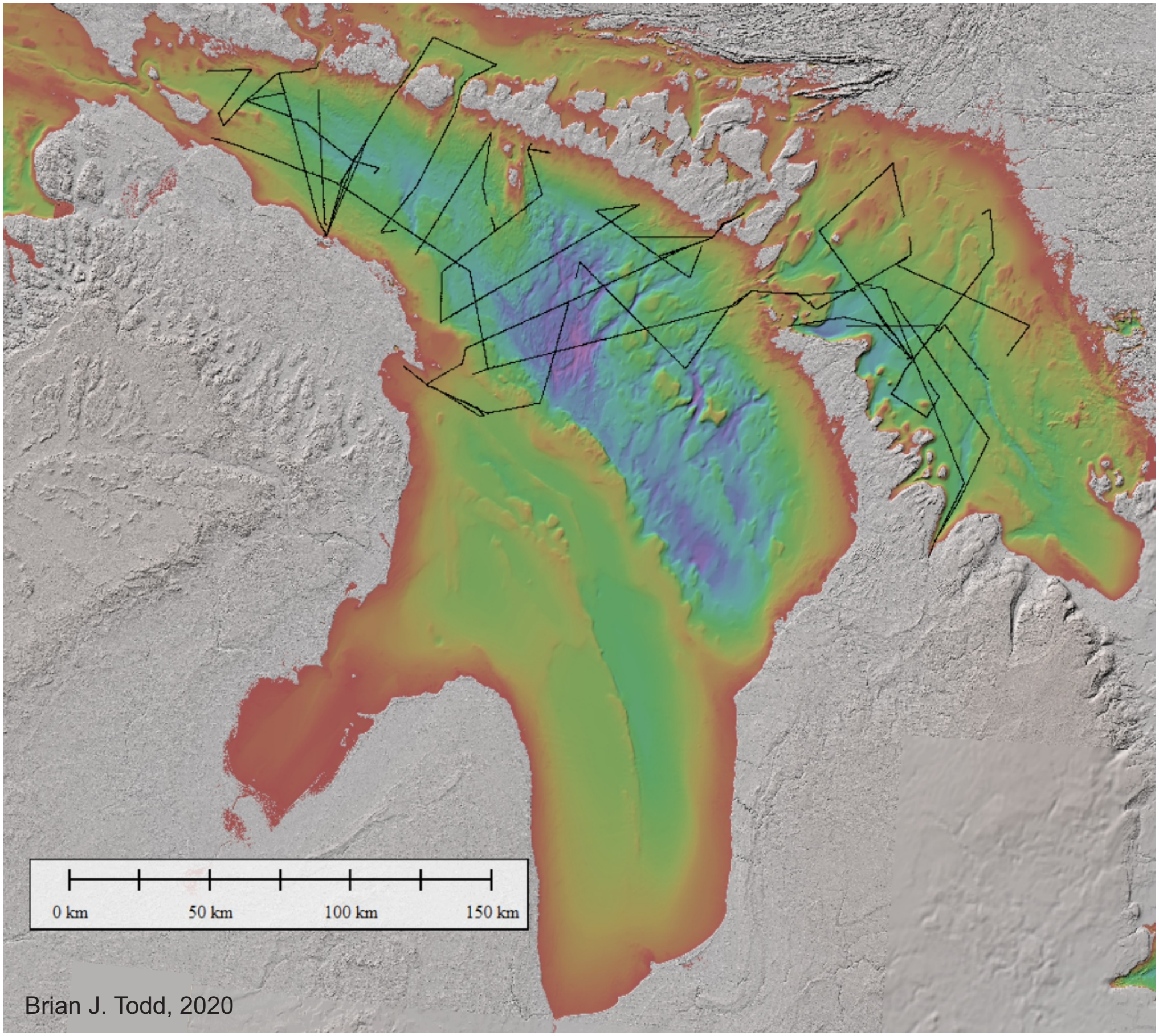


Lake Ontario
1974 Martin Kalrsen 74-00-102 survey lines and fixes



Lake Huron
1991 Laurentian 91800 survey lines



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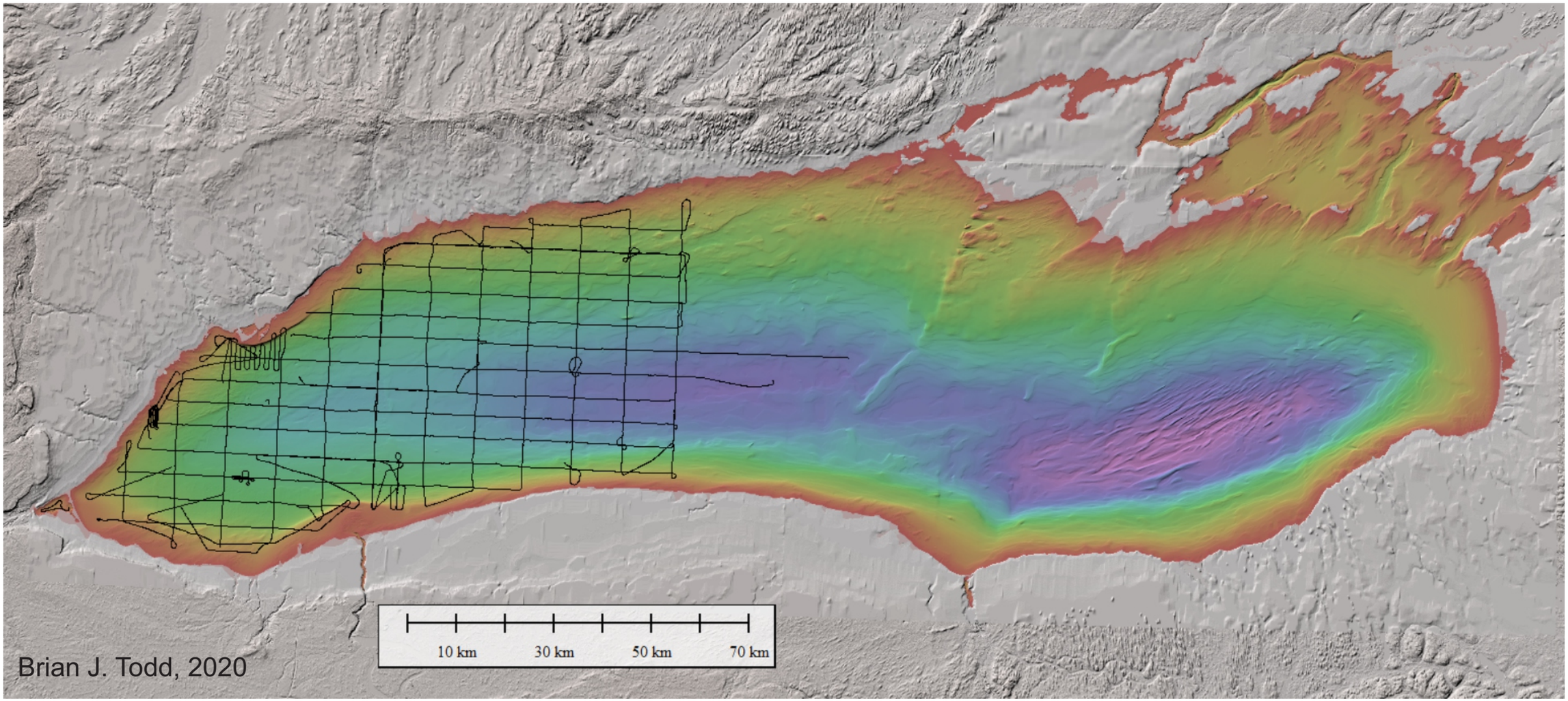
1992 Griffon 92800 survey lines



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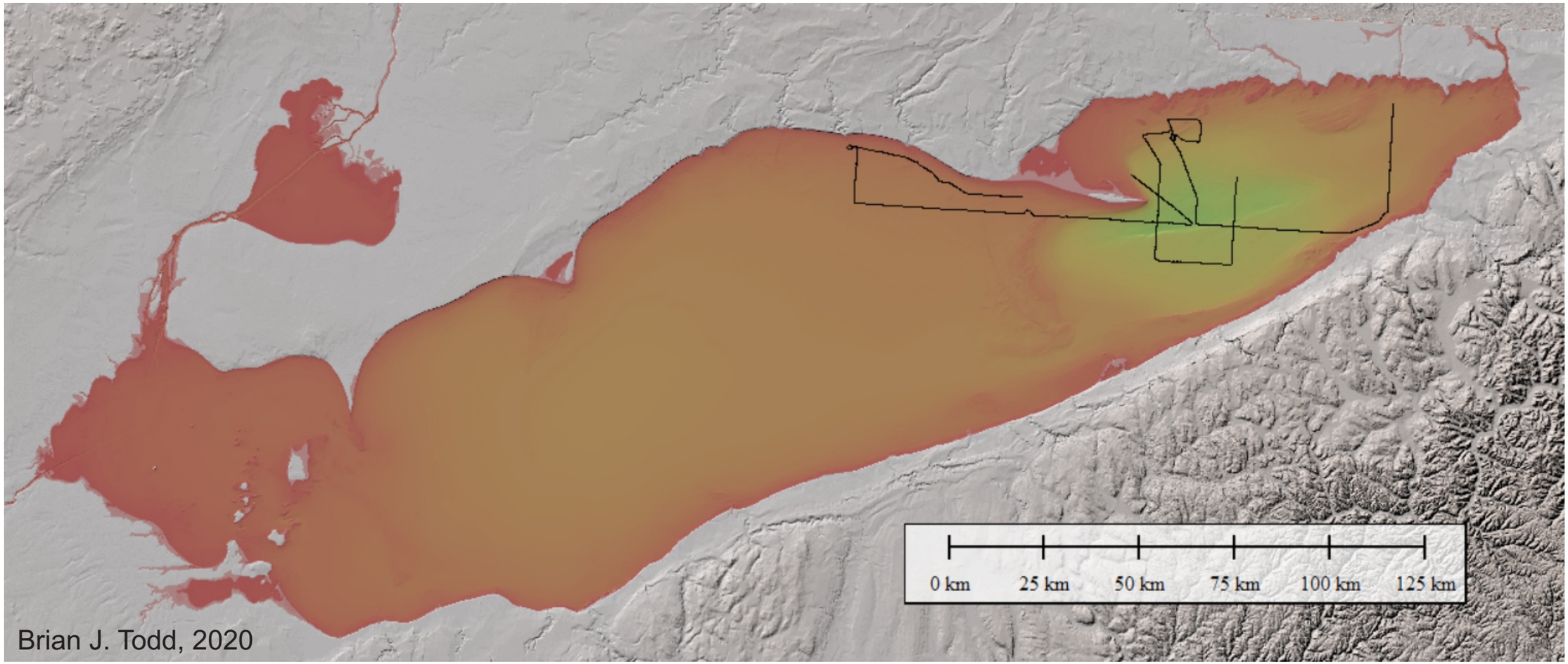

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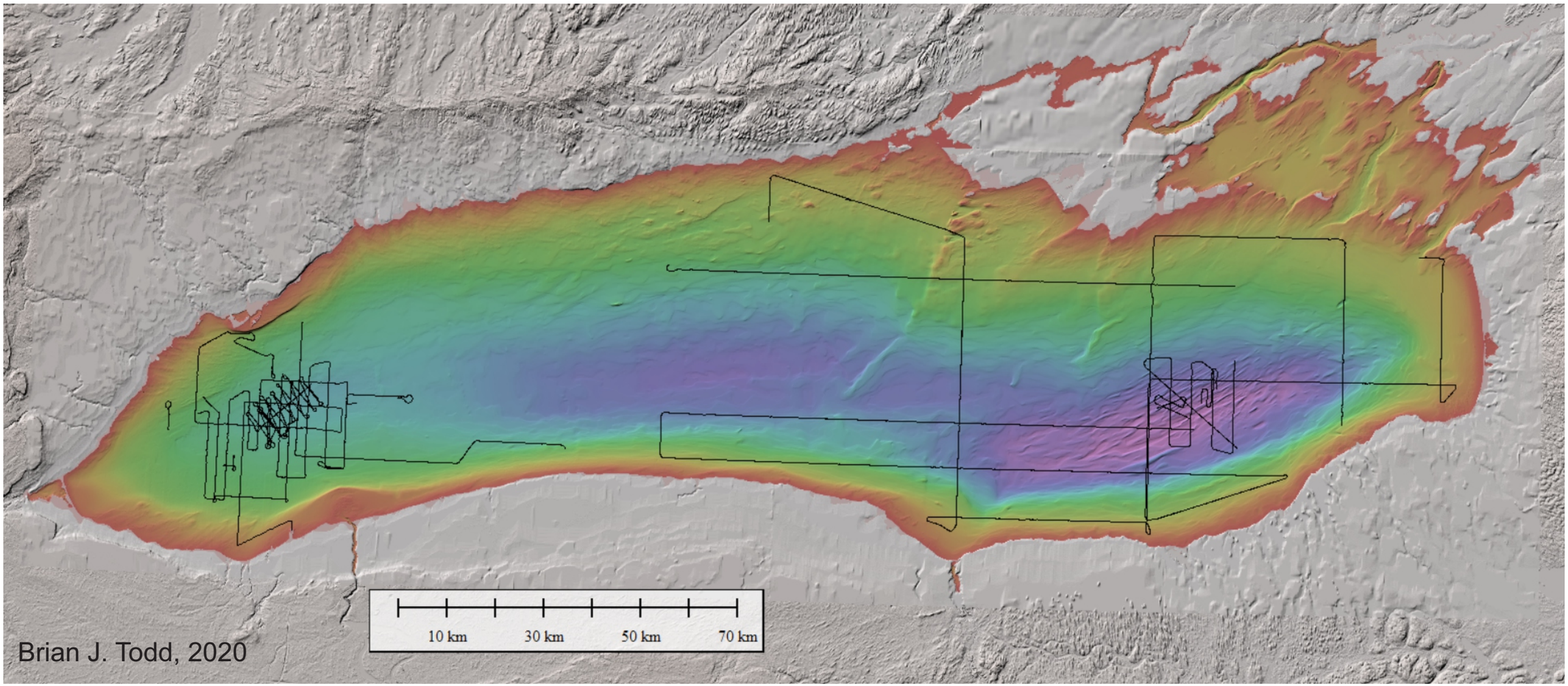
1993 Griffon 93800 survey lines



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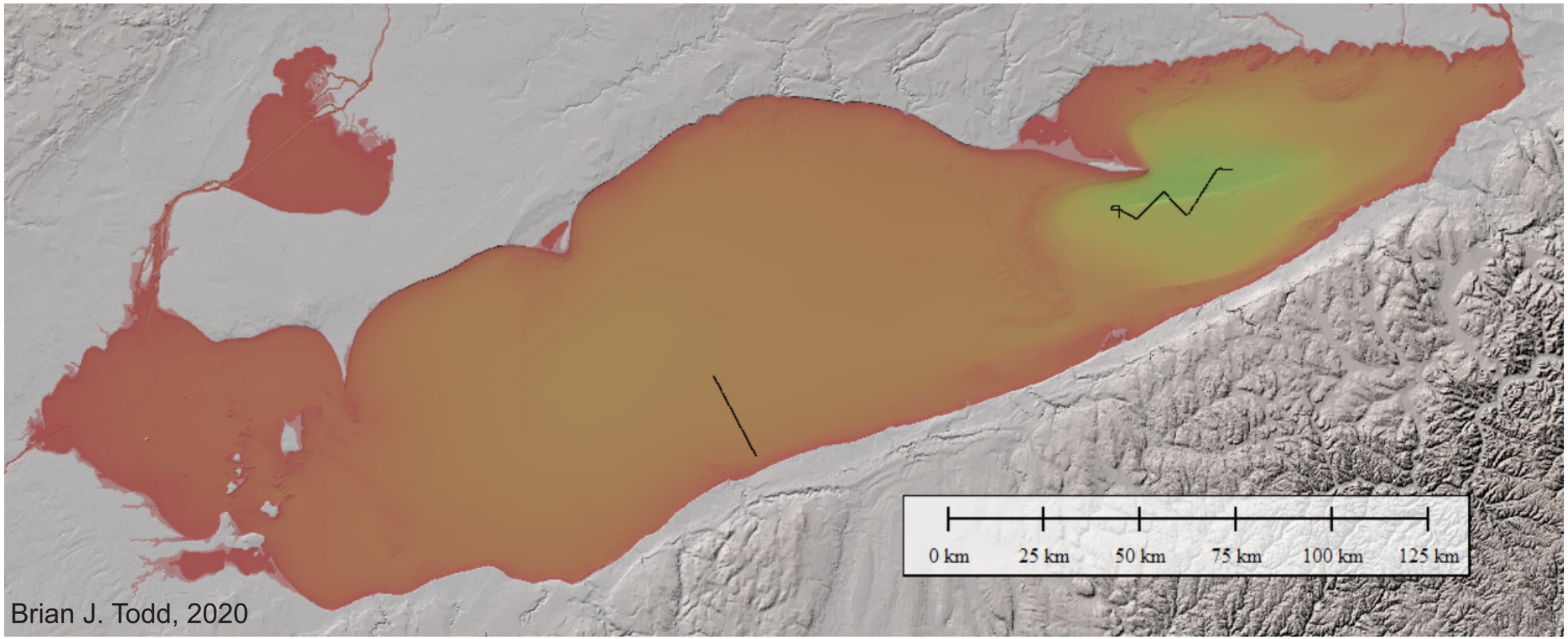
1994 Risley 94800 survey lines



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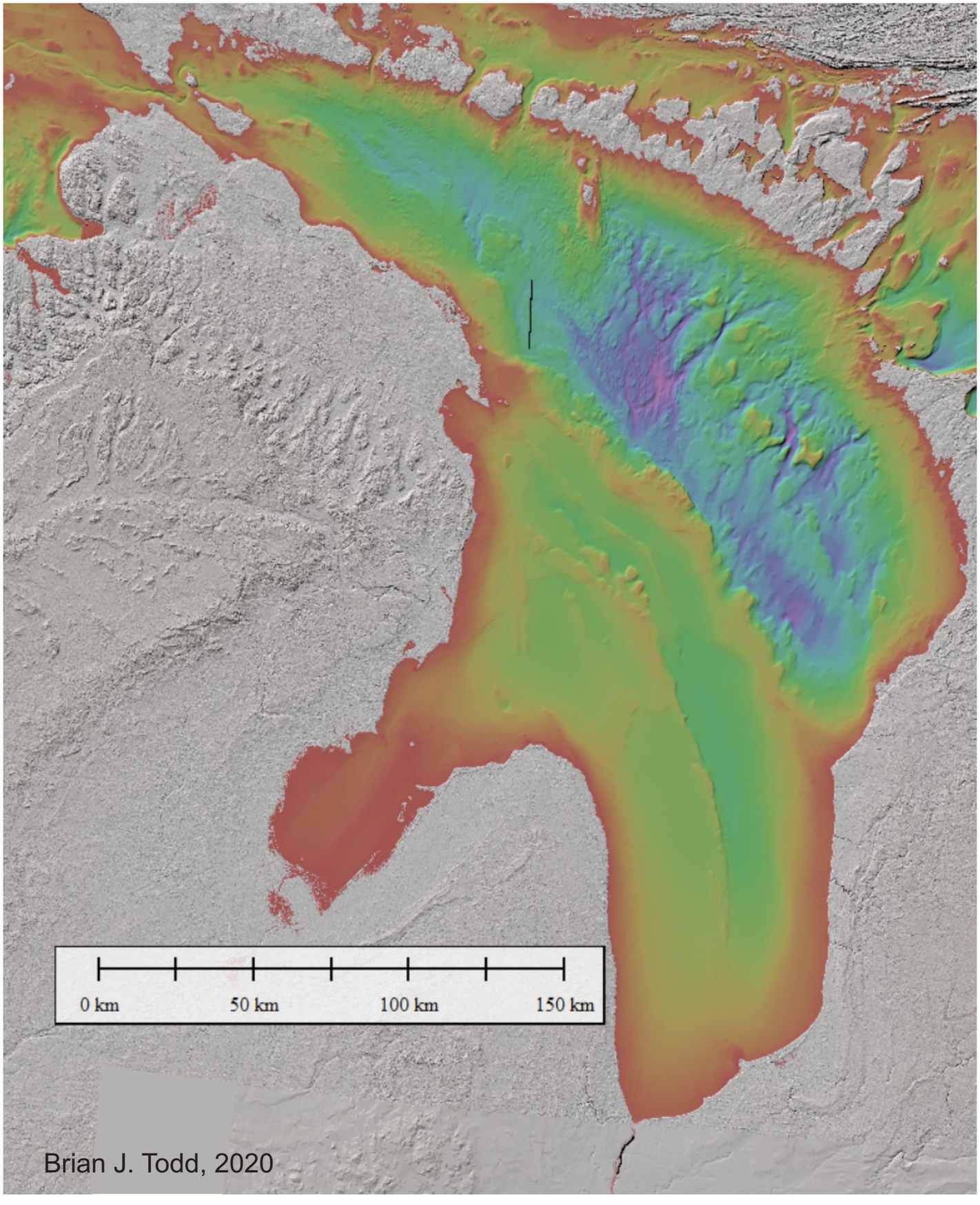

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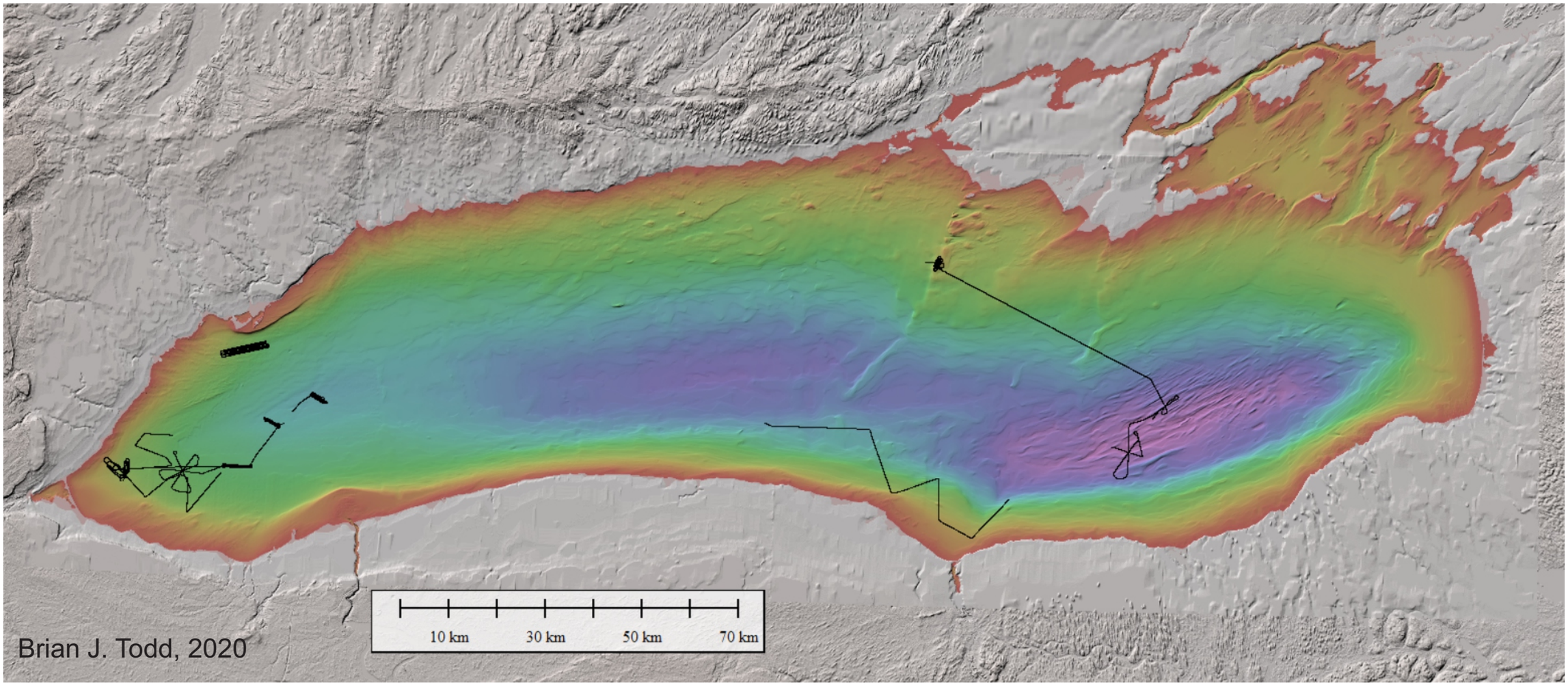

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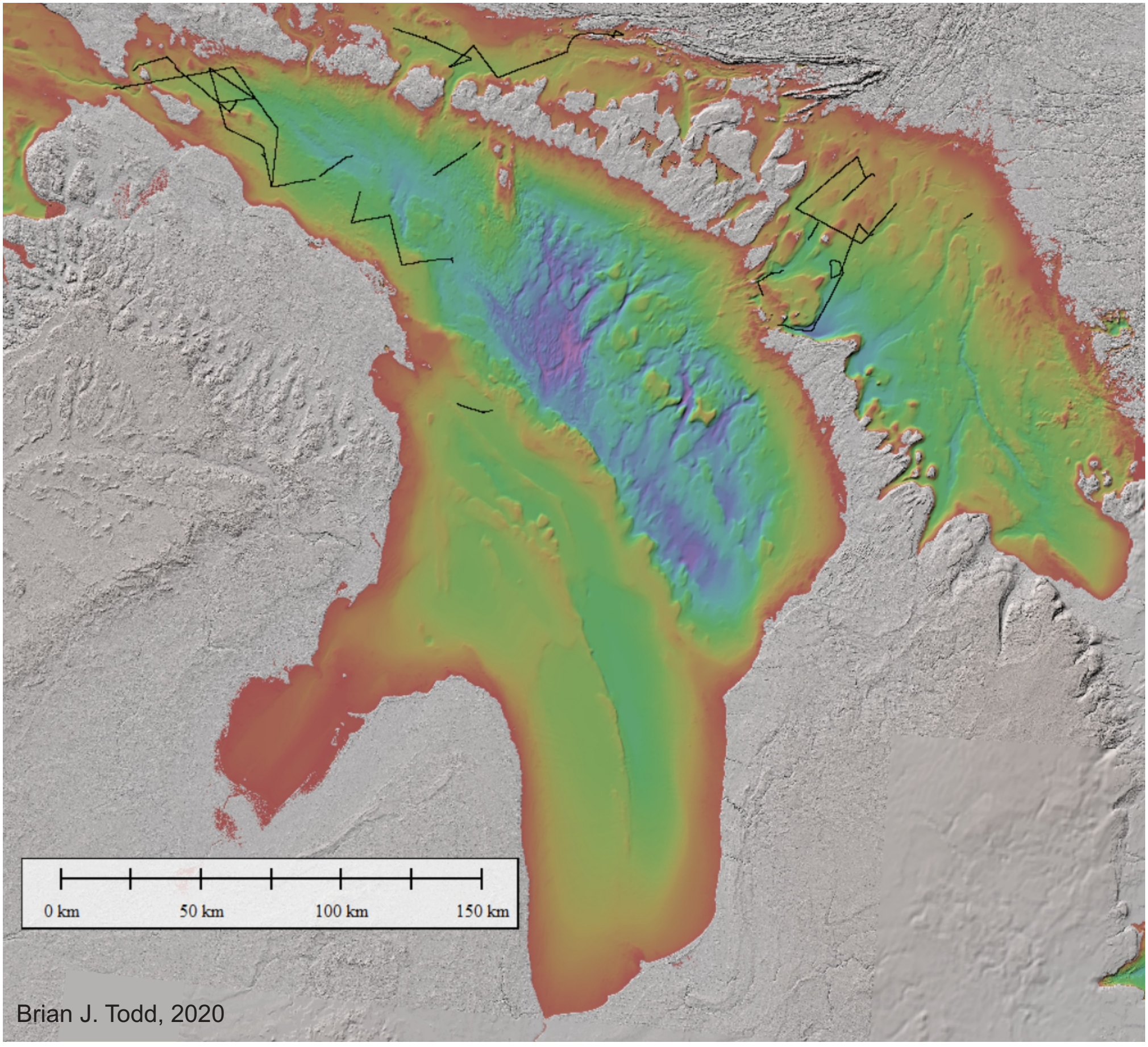

Lake Michigan
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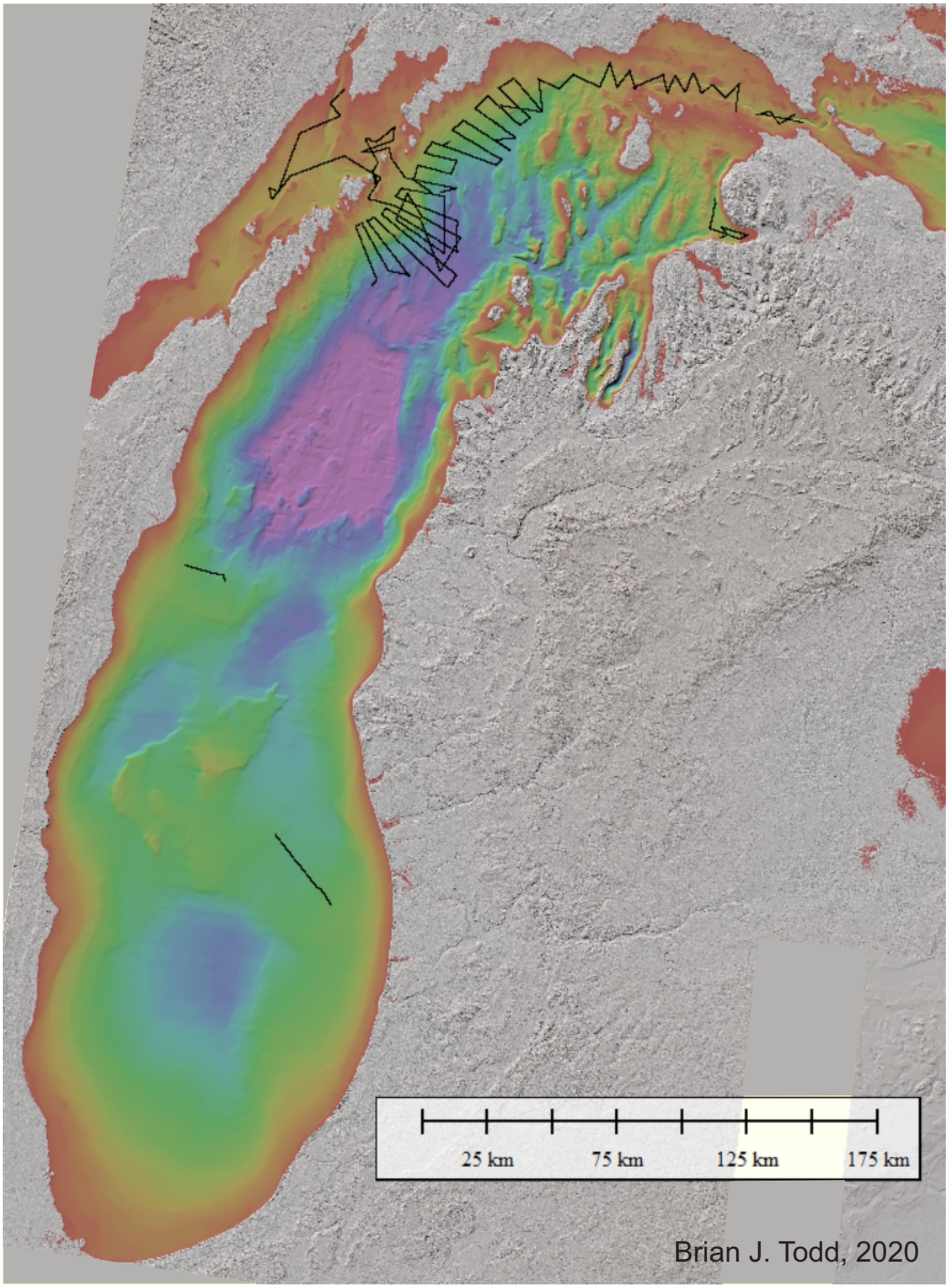
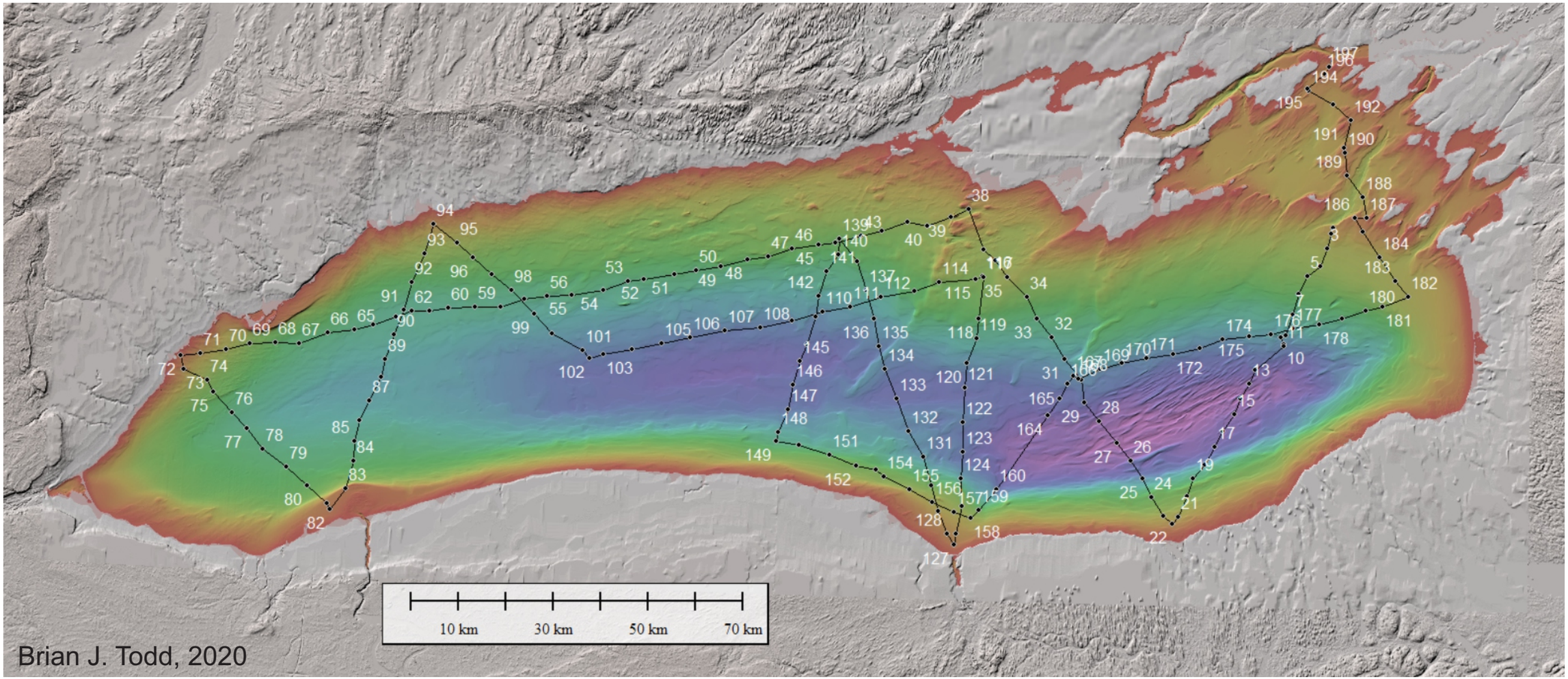
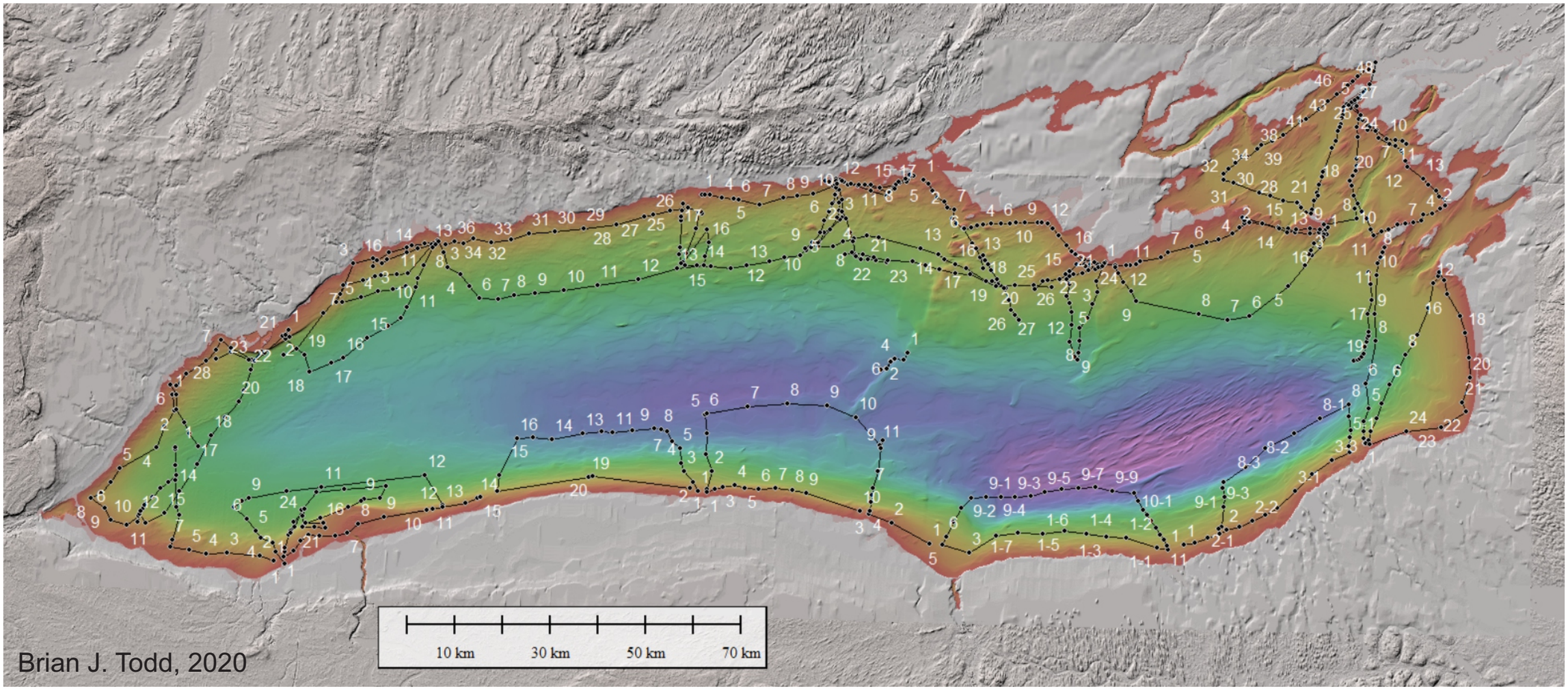


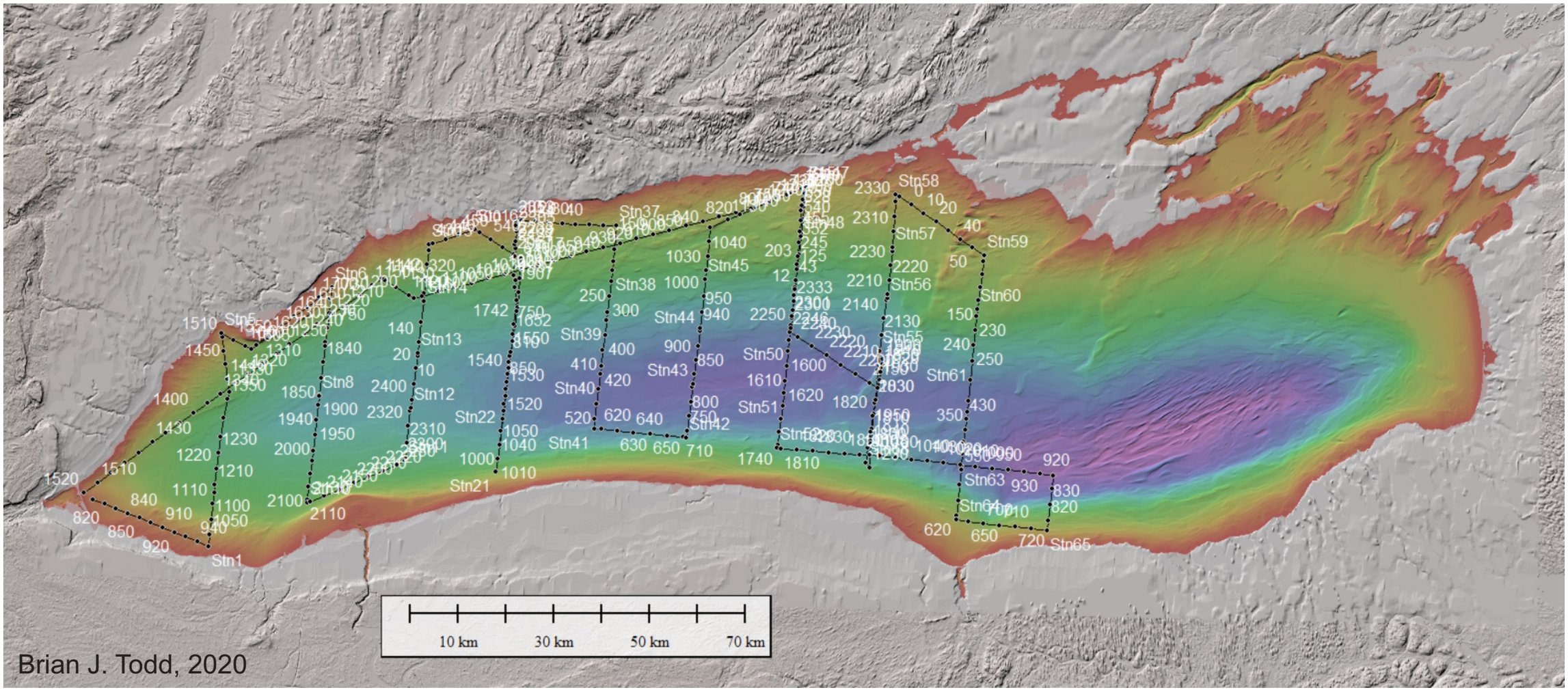
Lake Ontario
1966 Brandal survey lines and fixes



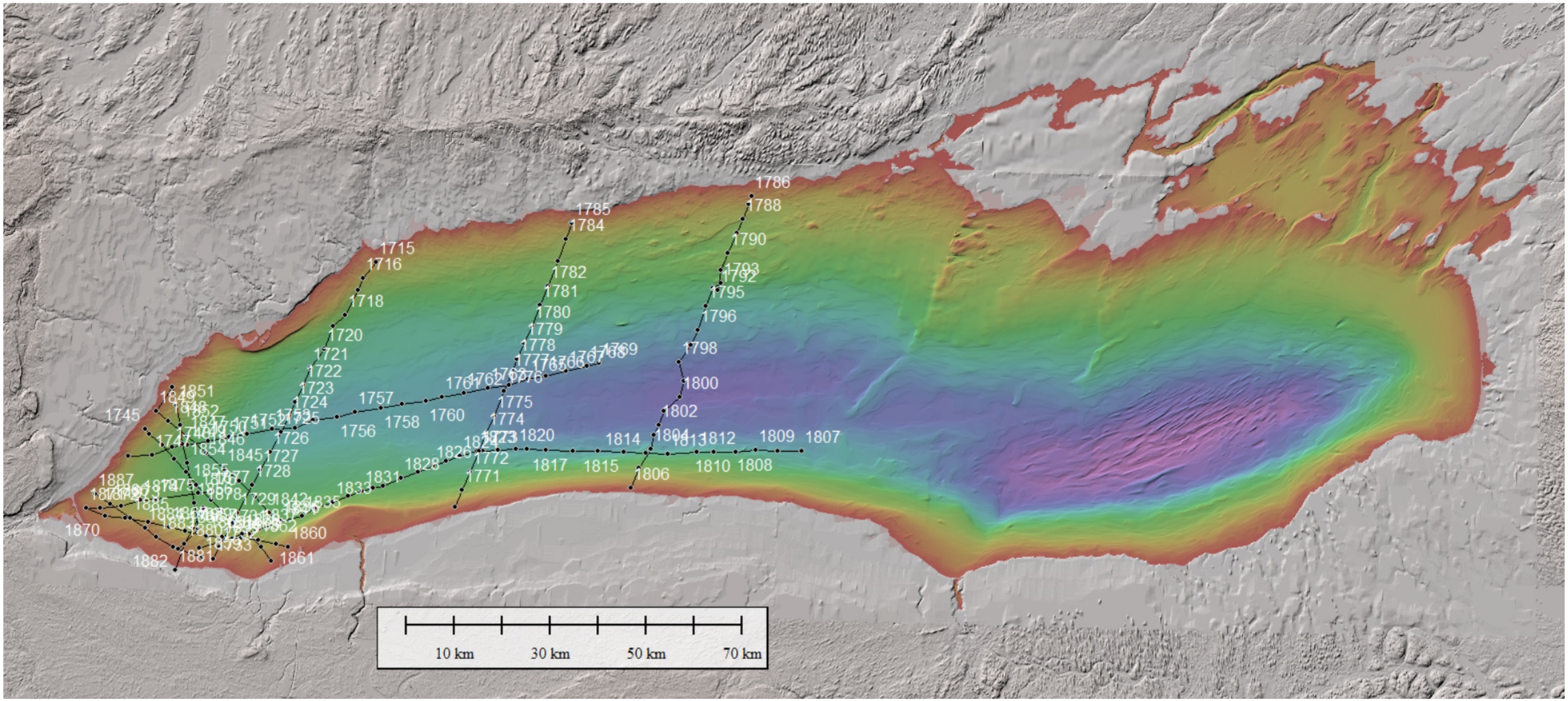
Lake Ontario
1966 Mandarin survey lines and fixes



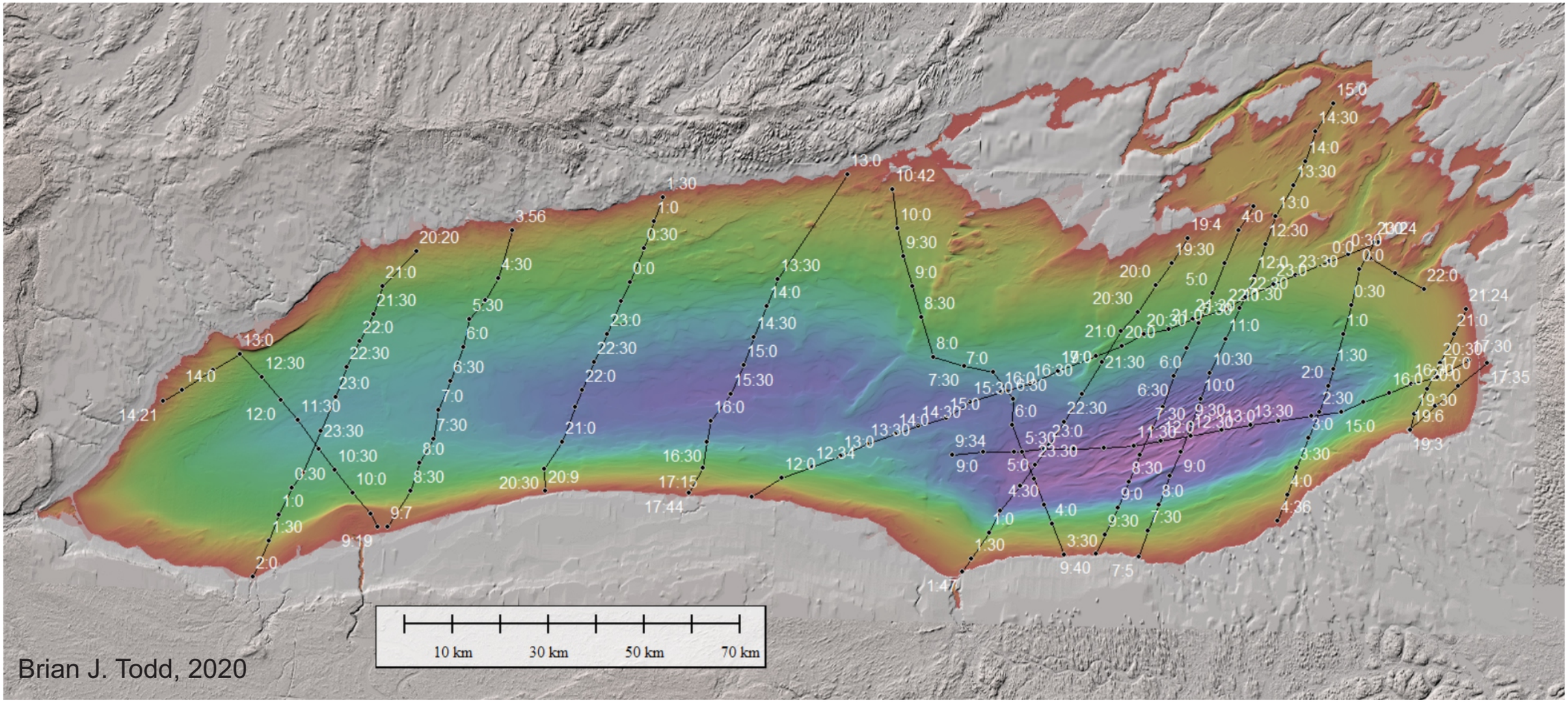
Lake Ontario
1967 Theron 67-0-06 survey lines and fixes



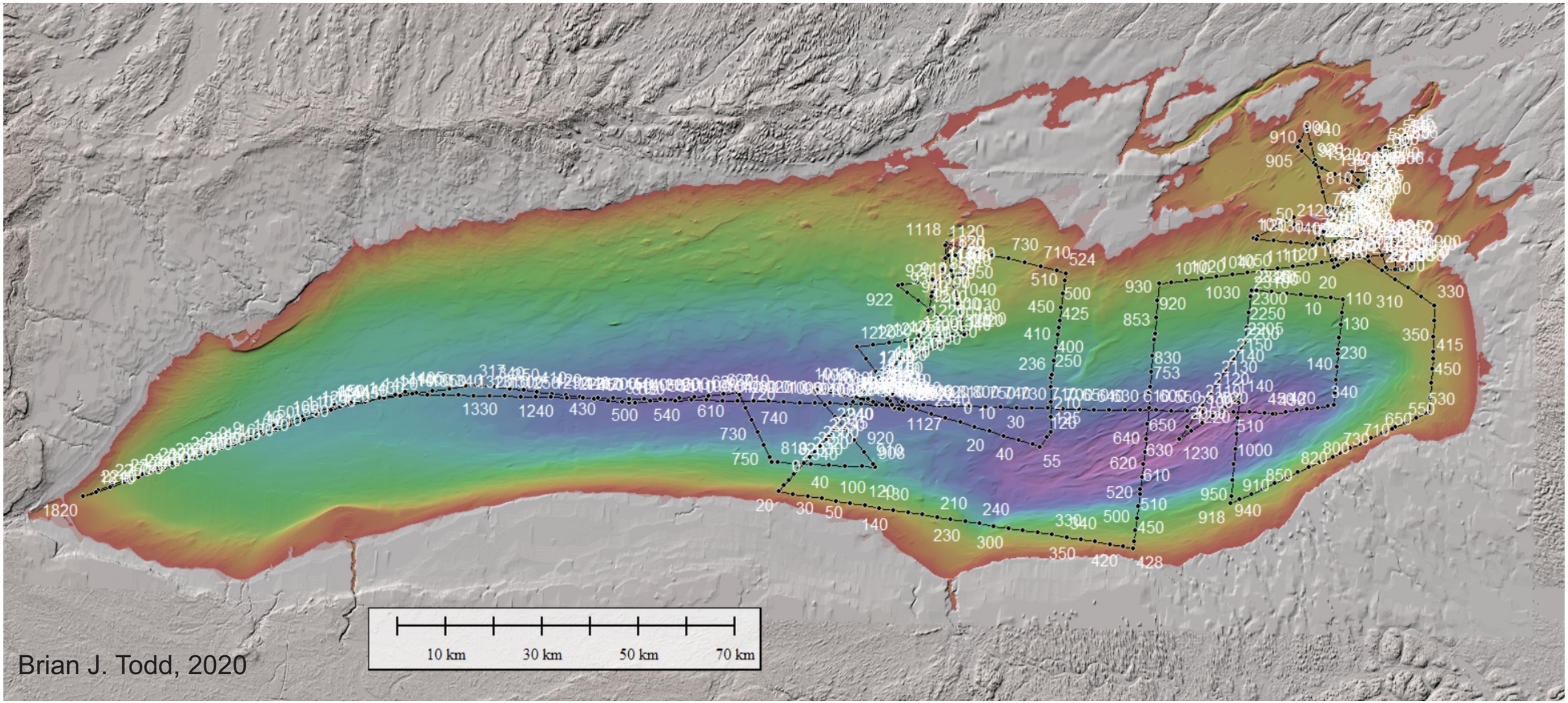
Lake Ontario
1967 Theron 67-0-08 survey lines and fixes



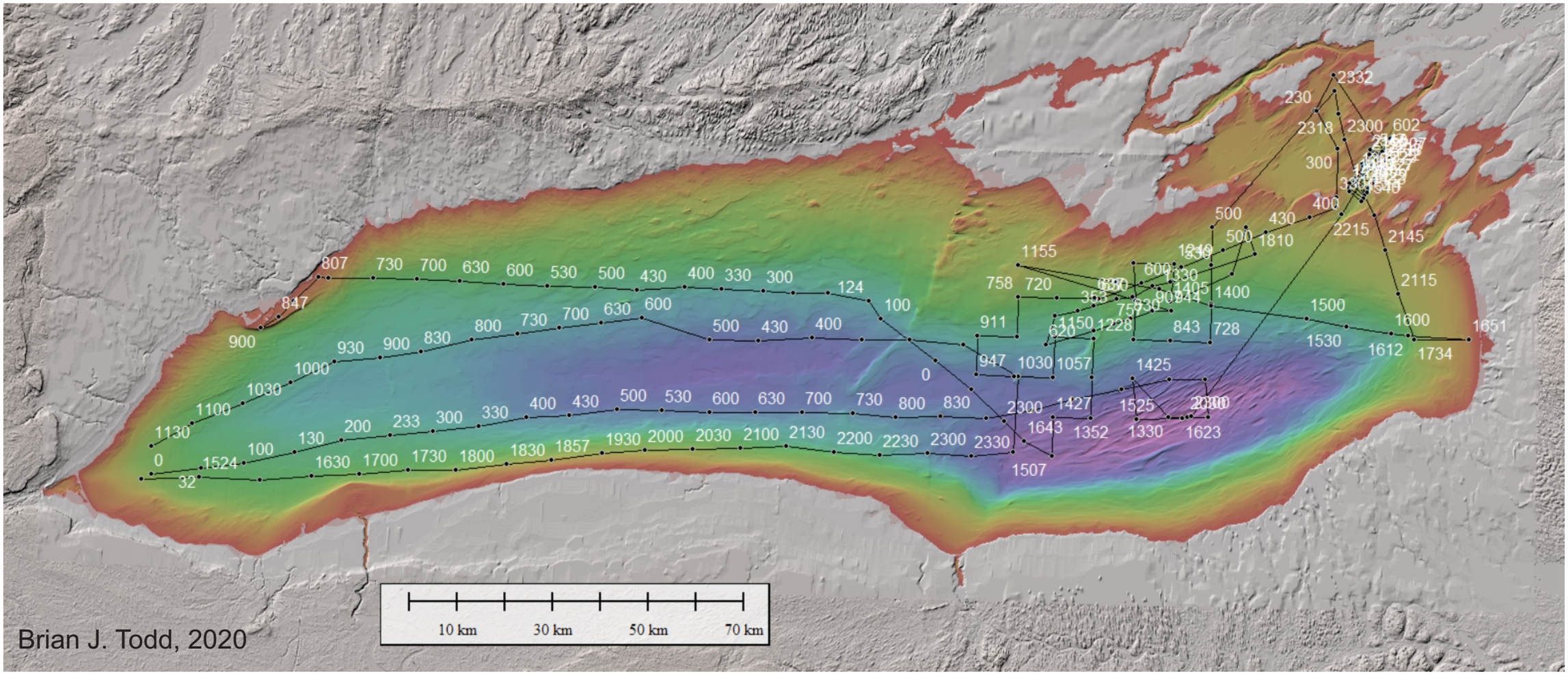
Lake Ontario
1967 Theron 67-0-14 survey lines and fixes



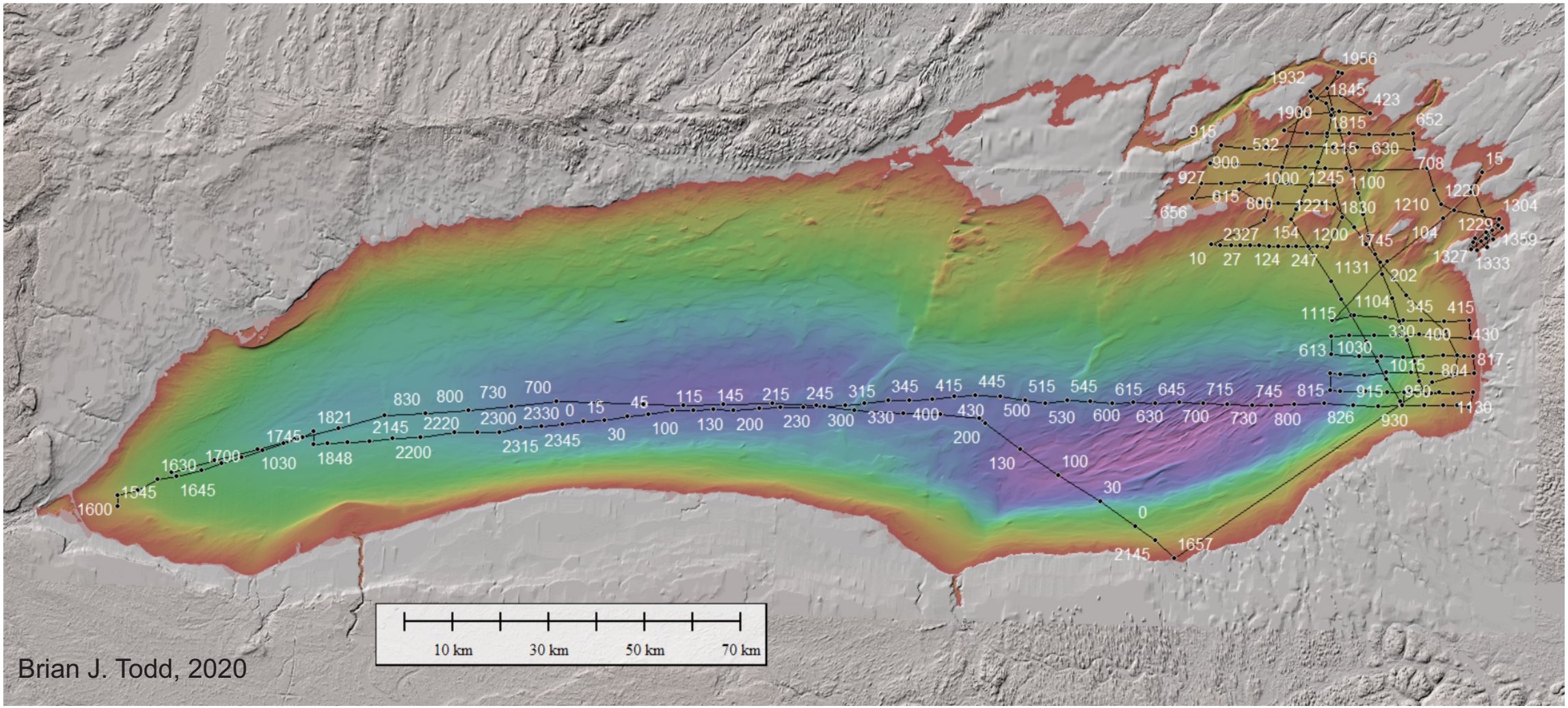
Lake Ontario
1967 Theron 67-0-18 survey lines and fixes



Lake Ontario
1968 Limnos 68-0-13 survey lines and fixes

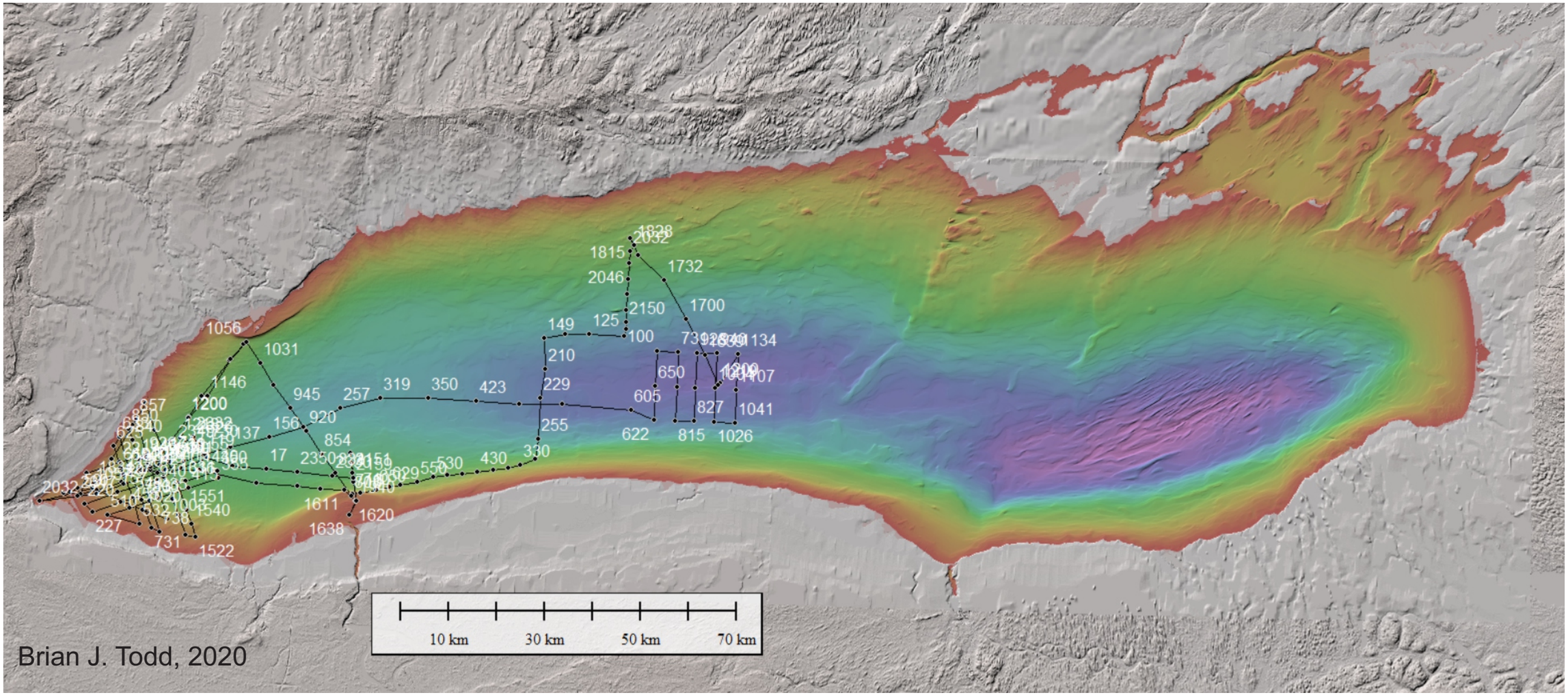


Lake Ontario
1968 Limnos 68-0-18 survey lines and fixes

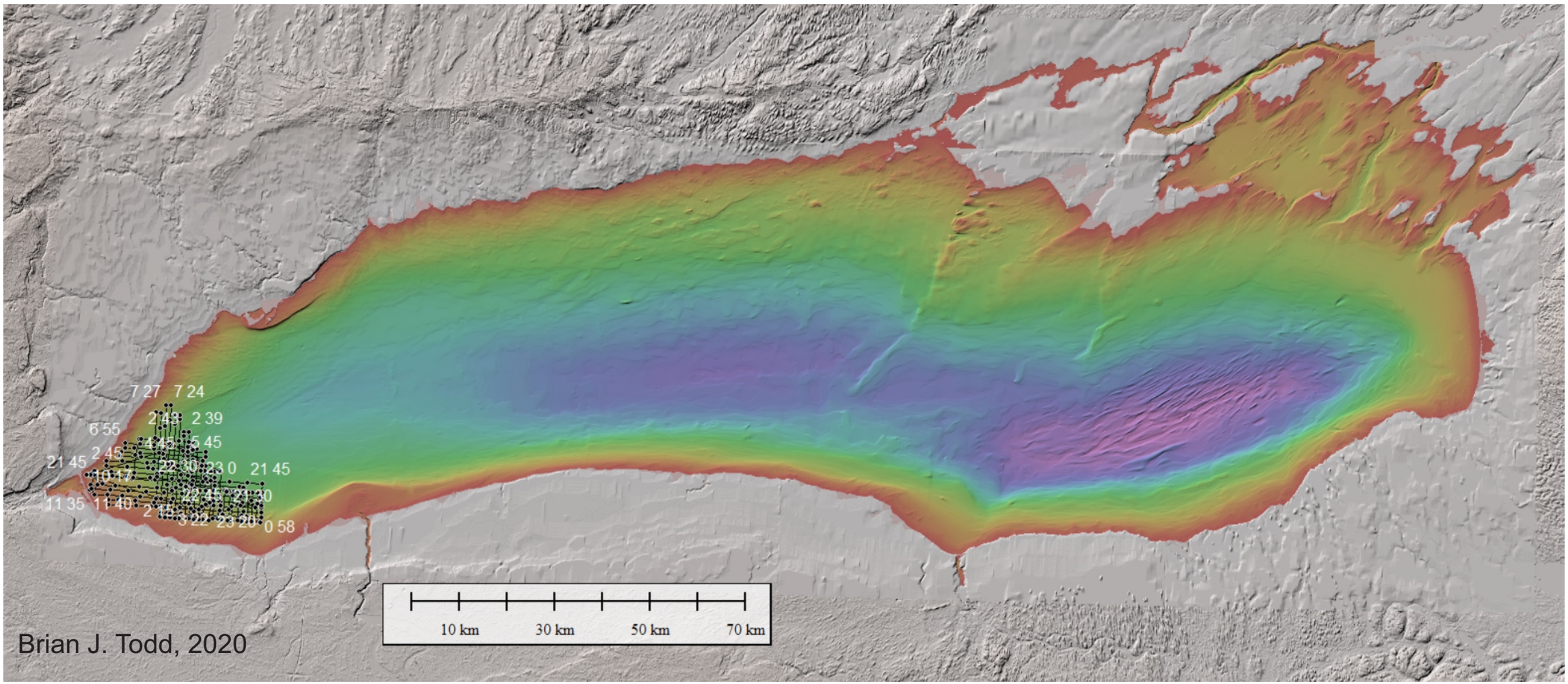


Brian J. Todd, 2020

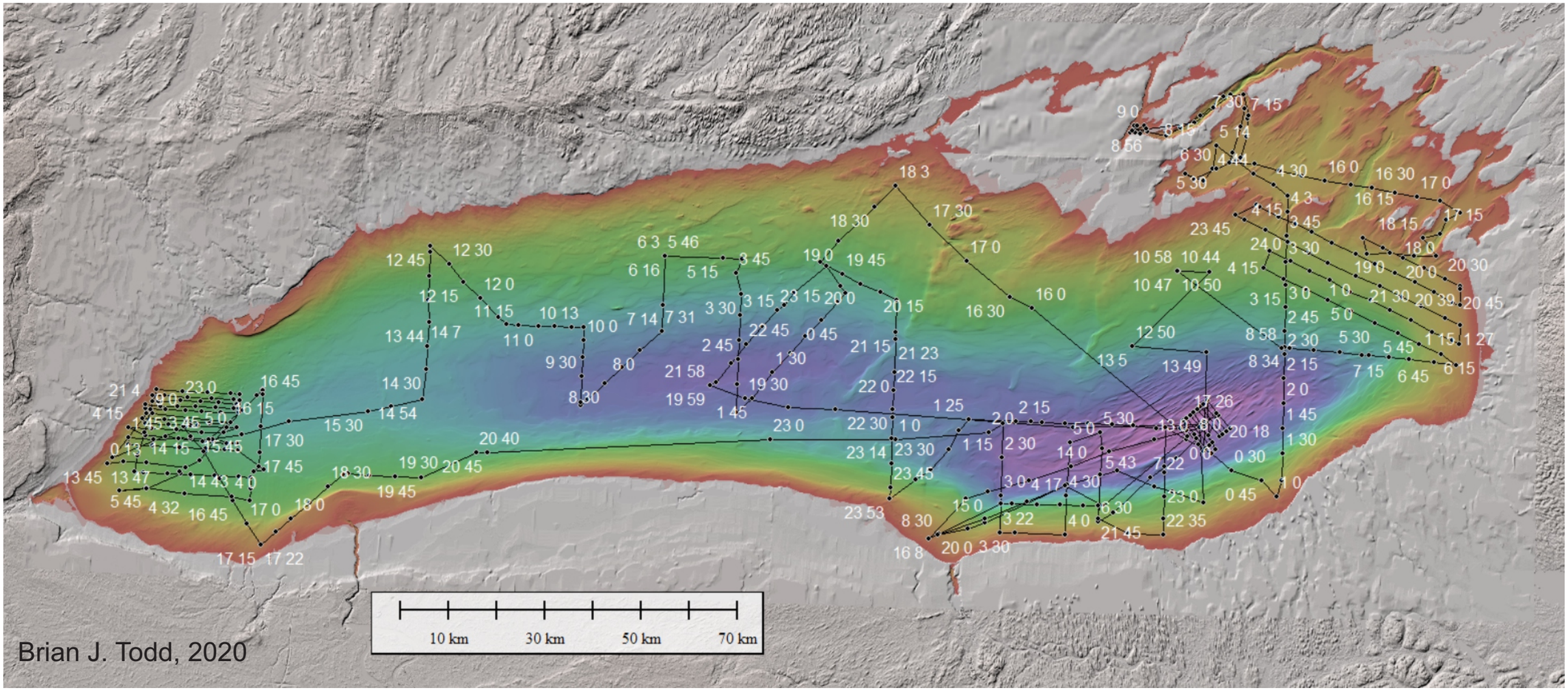
Lake Ontario
1968 Theron 68-0-17 survey lines and fixes



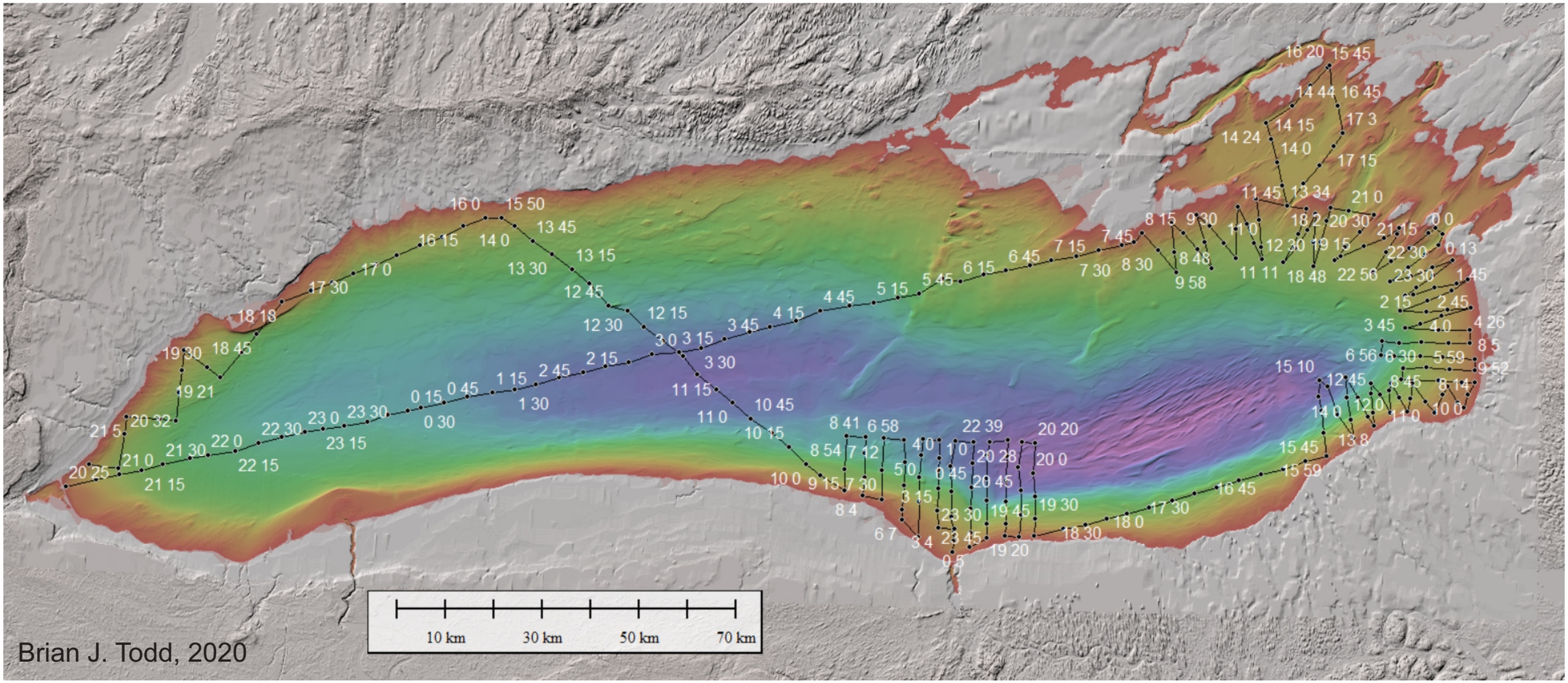
Lake Ontario
1969 Martin Karlsen 69-0-13 survey lines and fixes



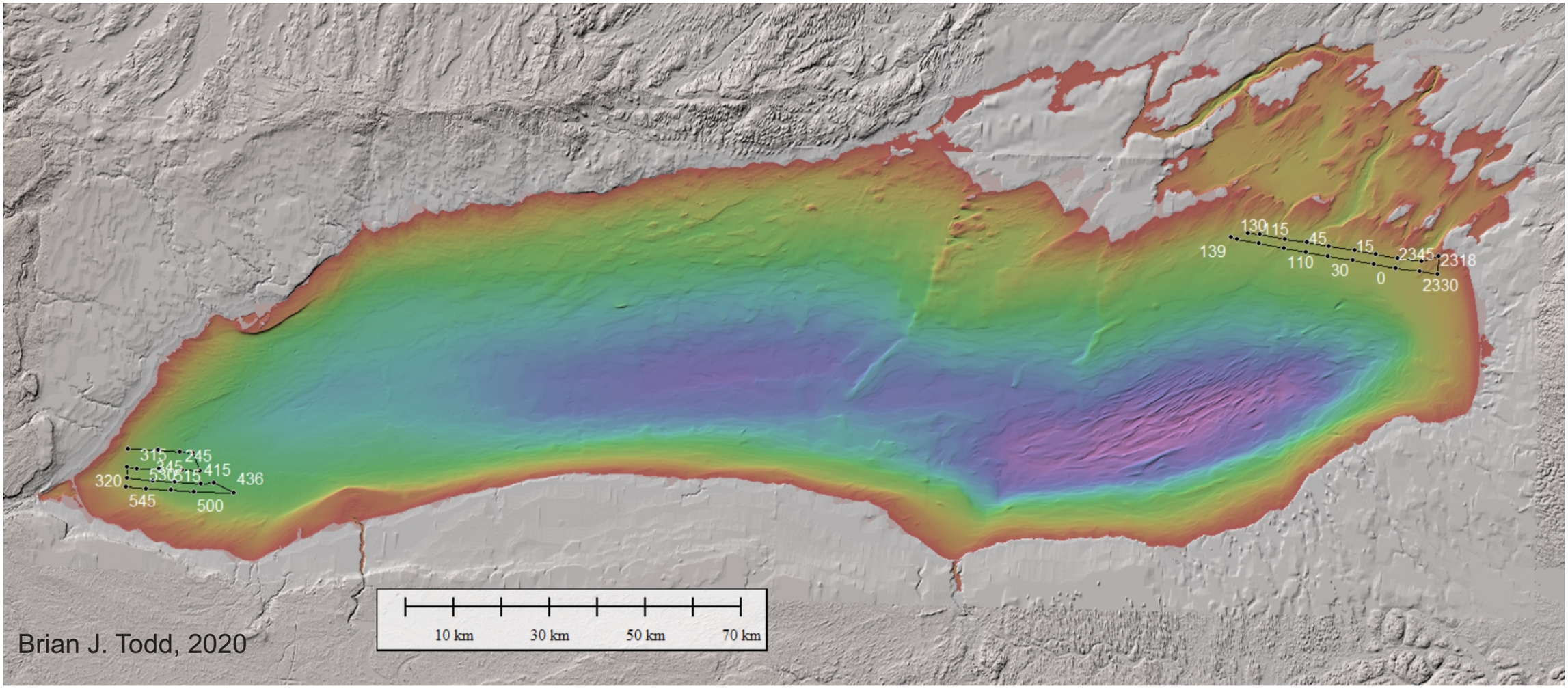
Lake Ontario
1969 Martin Karlsen 69-0-16 survey lines and fixes



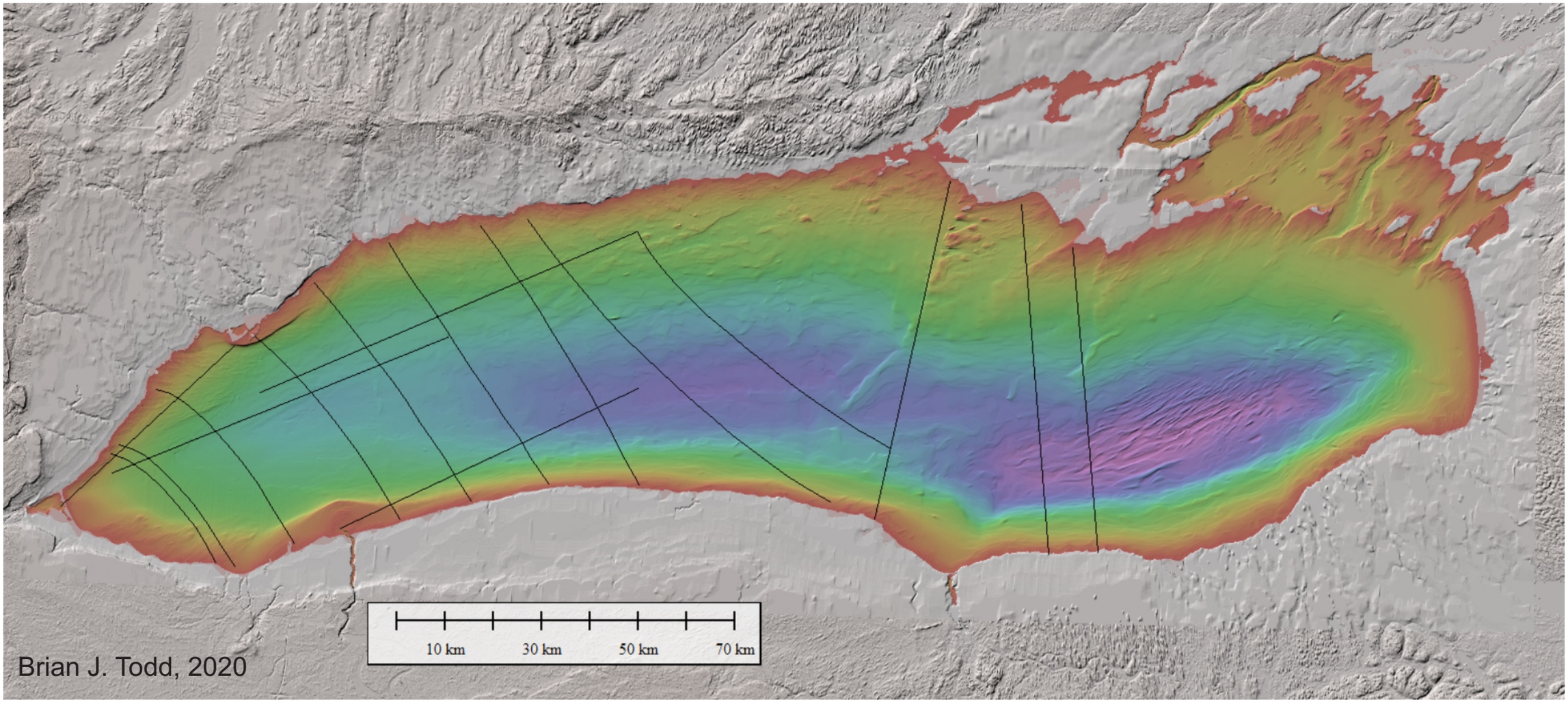
Lake Ontario
1970 Limnos 70-0-29 survey lines and fixes



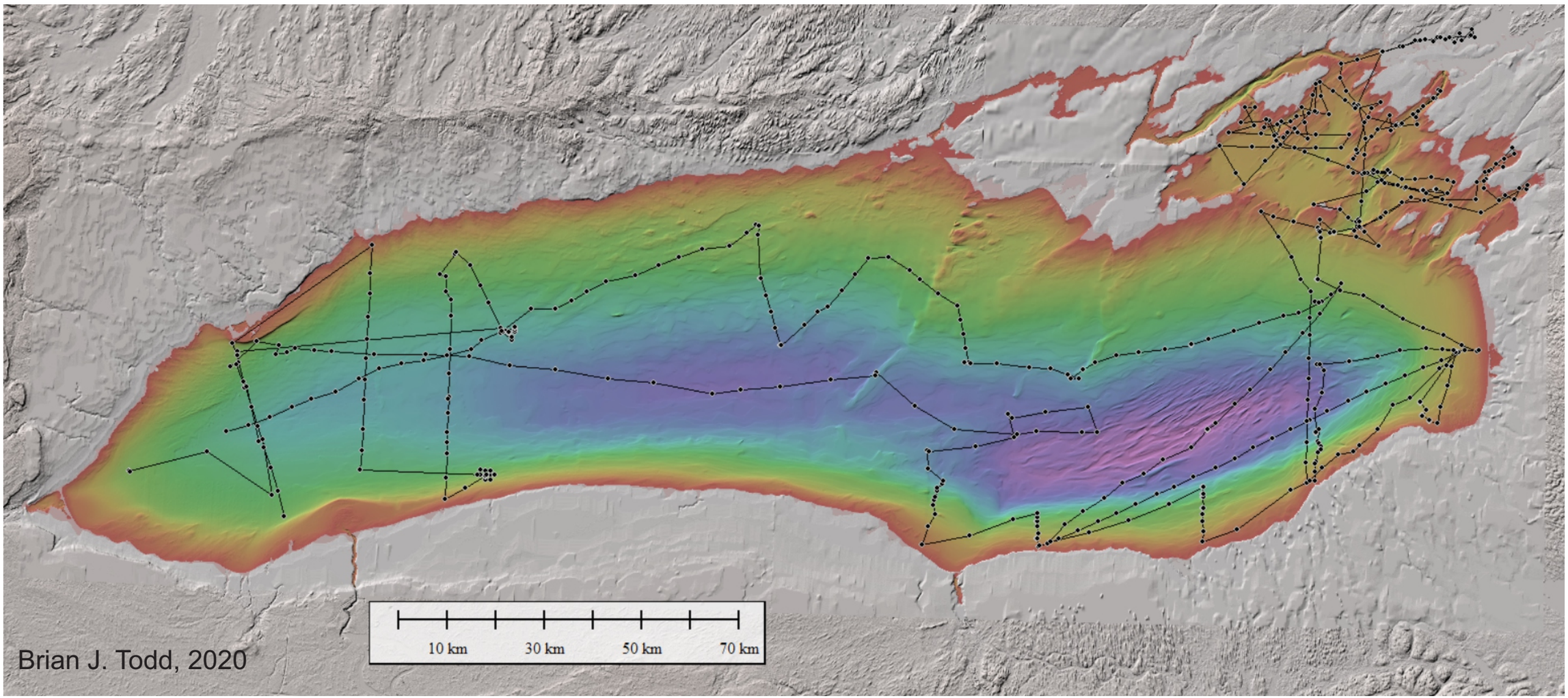
Lake Ontario
1970 Limnos 70-0-34 survey lines and fixes



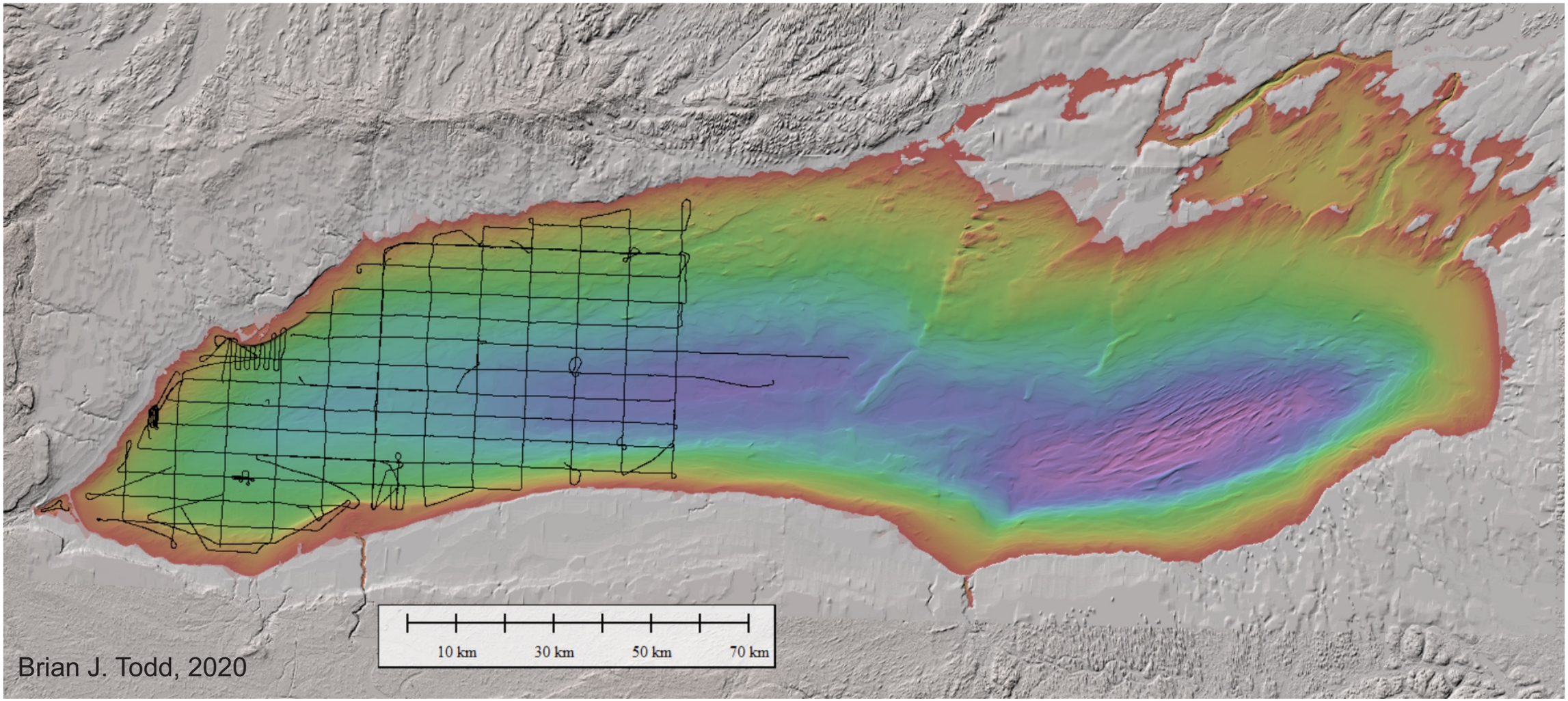
Lake Ontario
1972 Limnos 72-00-012 survey lines



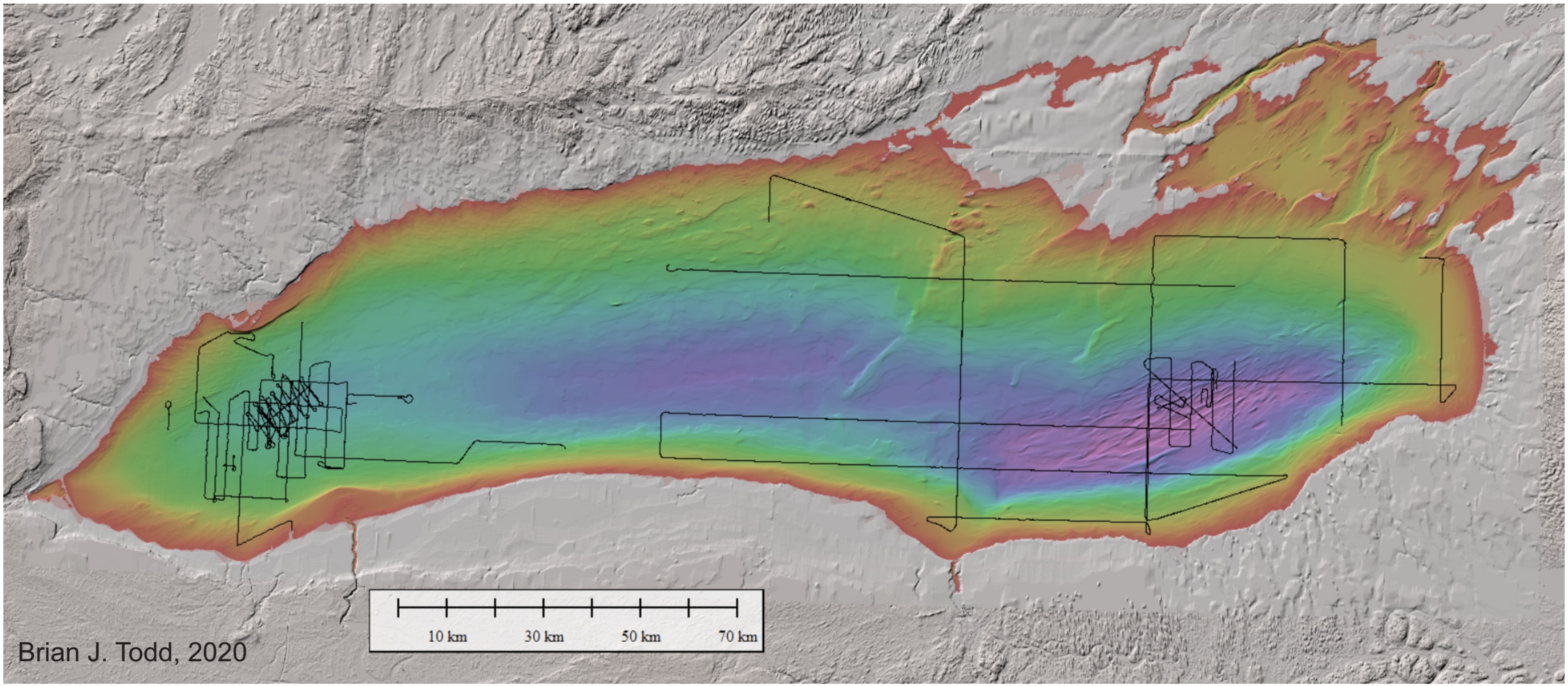
Lake Ontario
1974 Martin Kalrsen 74-00-102 survey lines and fixes



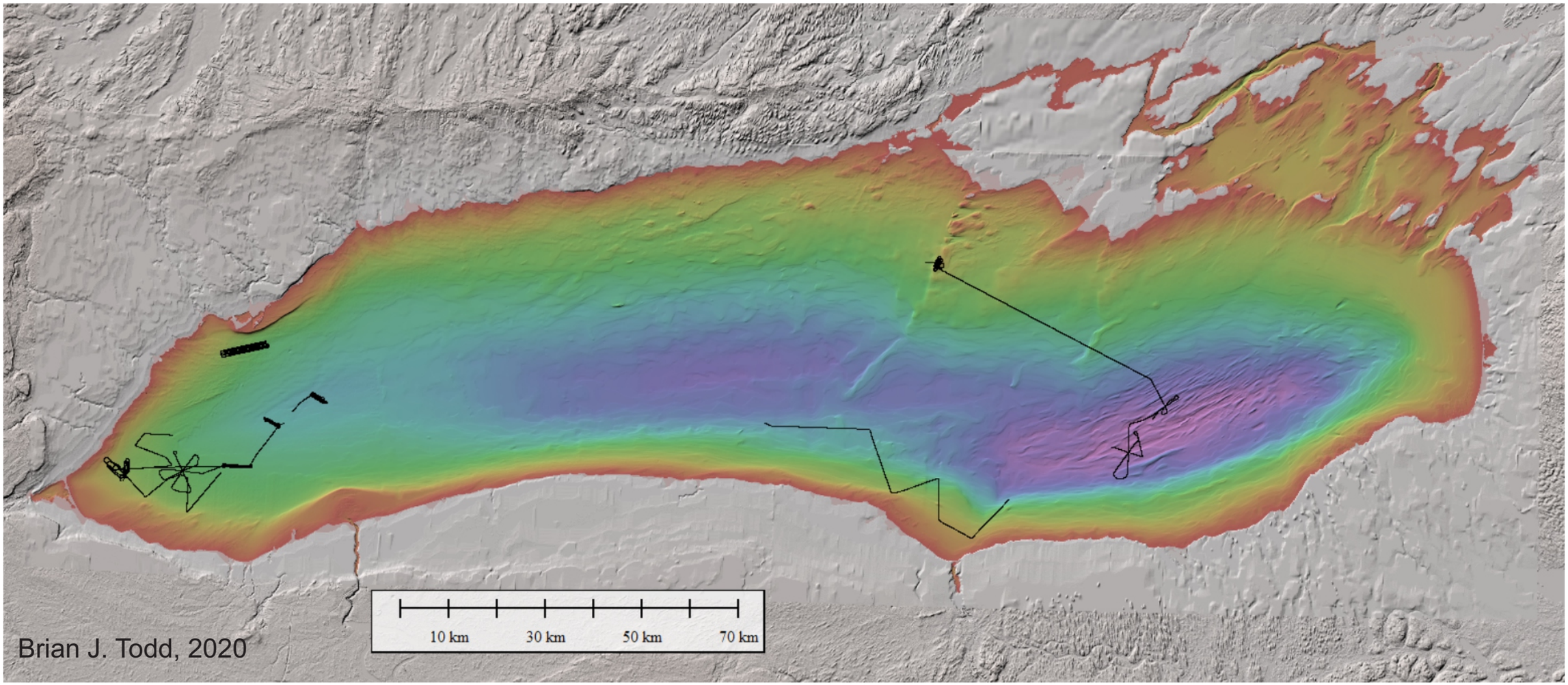
Lake Ontario
1992 Griffon 92800 survey lines



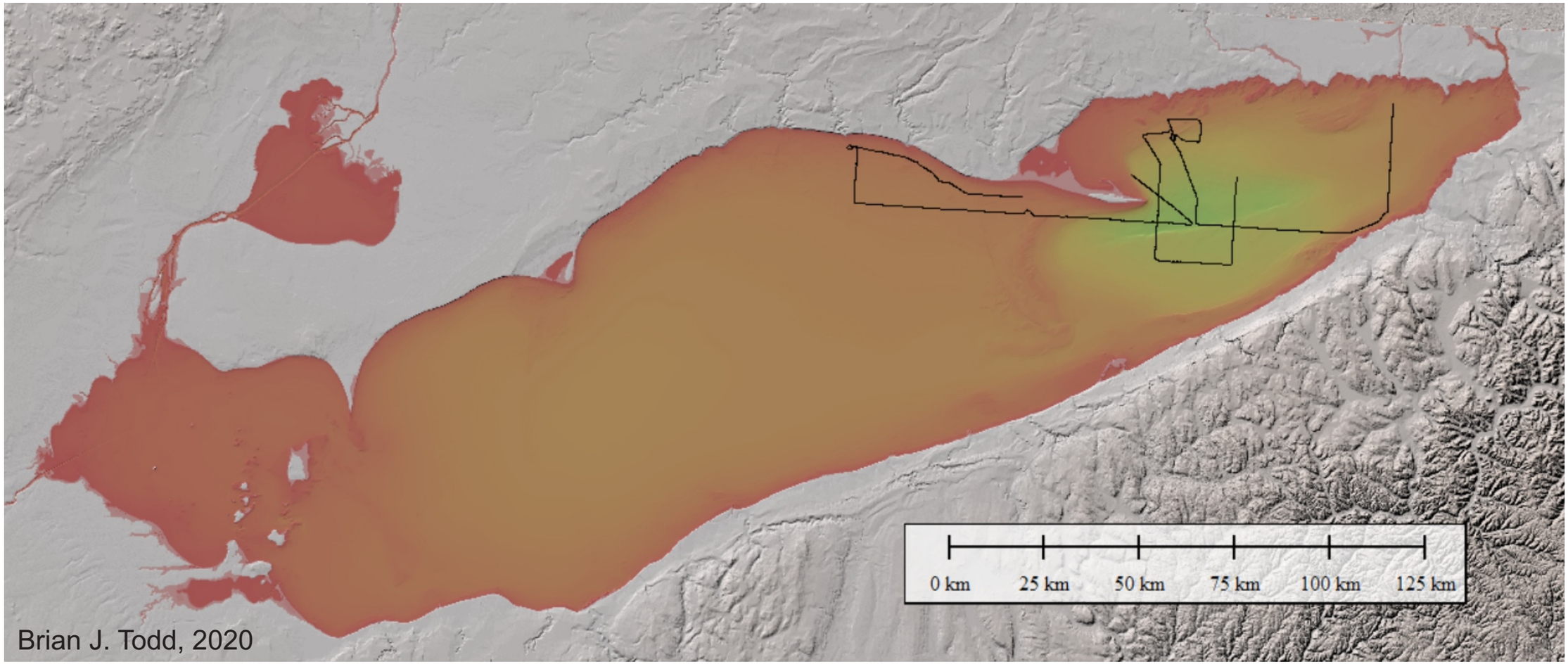
Lake Ontario
1993 Griffon 93800 survey lines



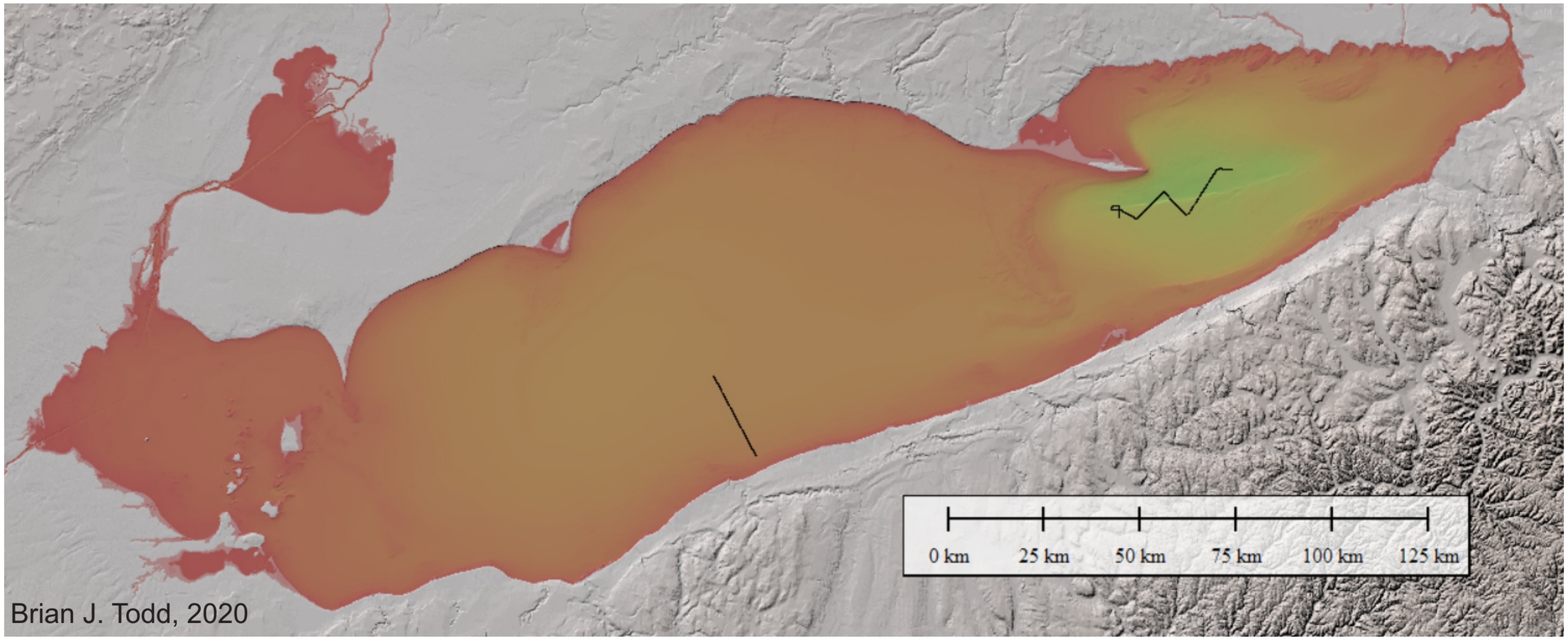
Lake Ontario
1994 Risley 94800 survey lines



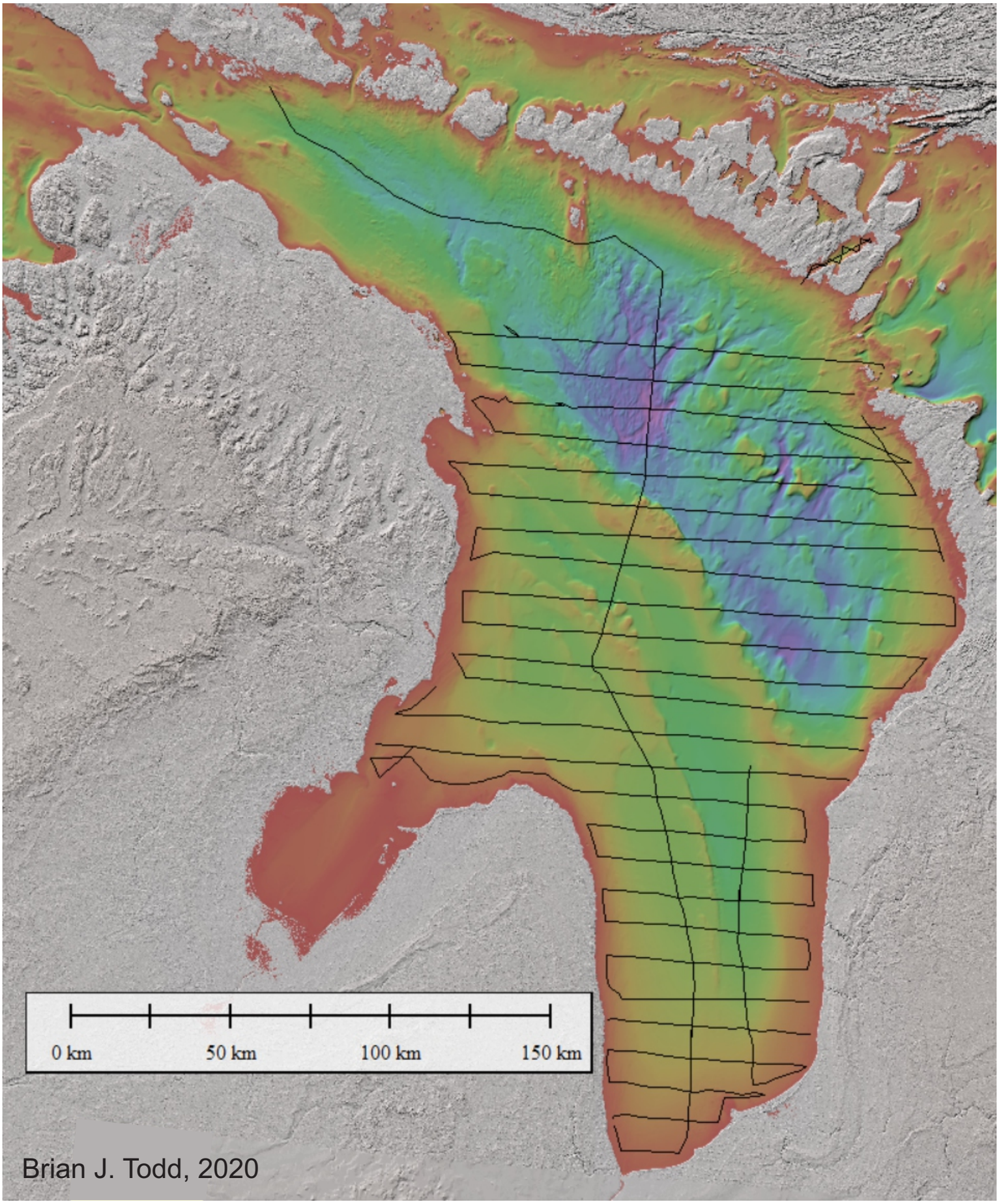
Lake Erie
1993 Griffon 93800 survey lines



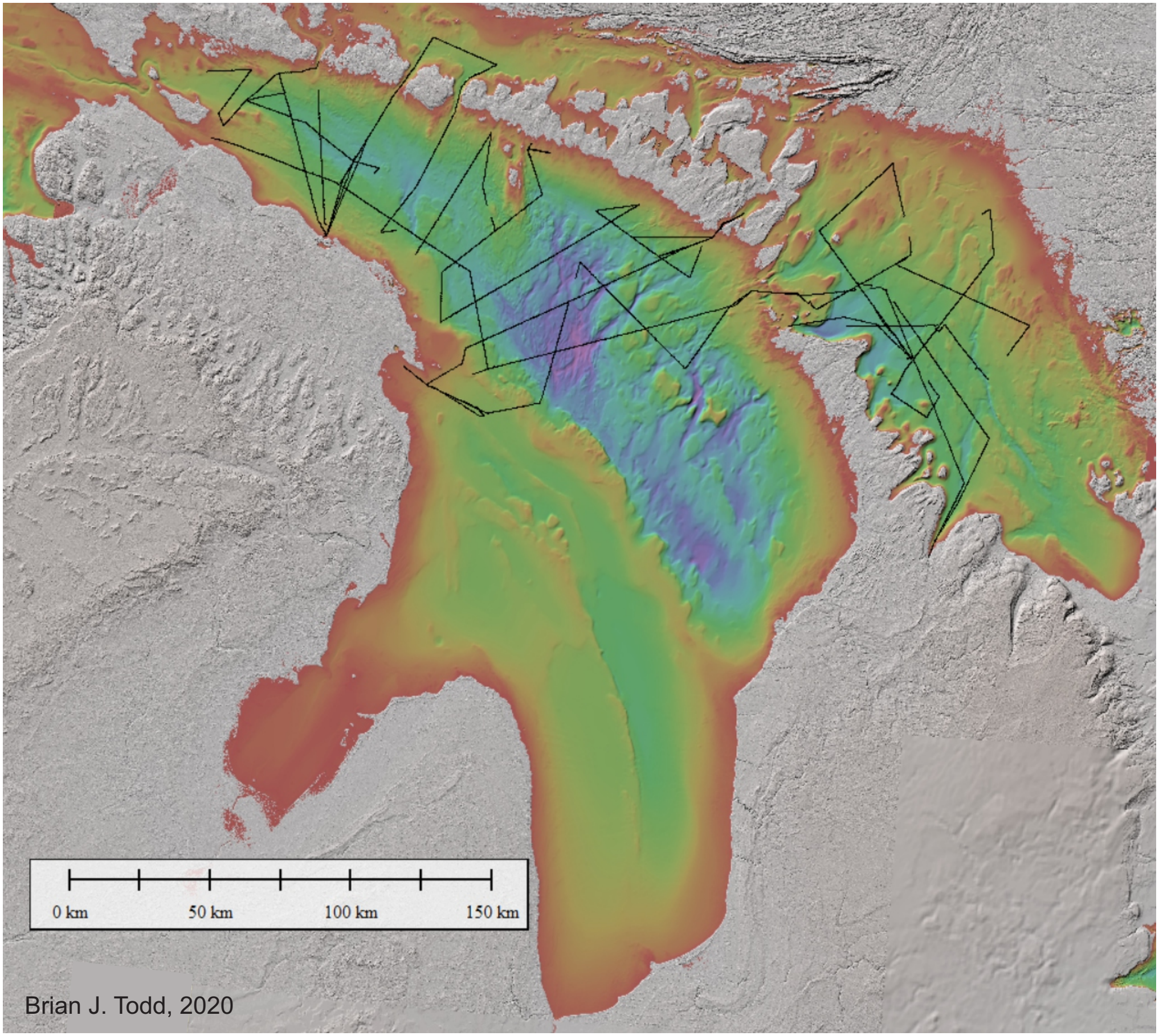
Lake Erie
1994 Risley 94800 survey lines



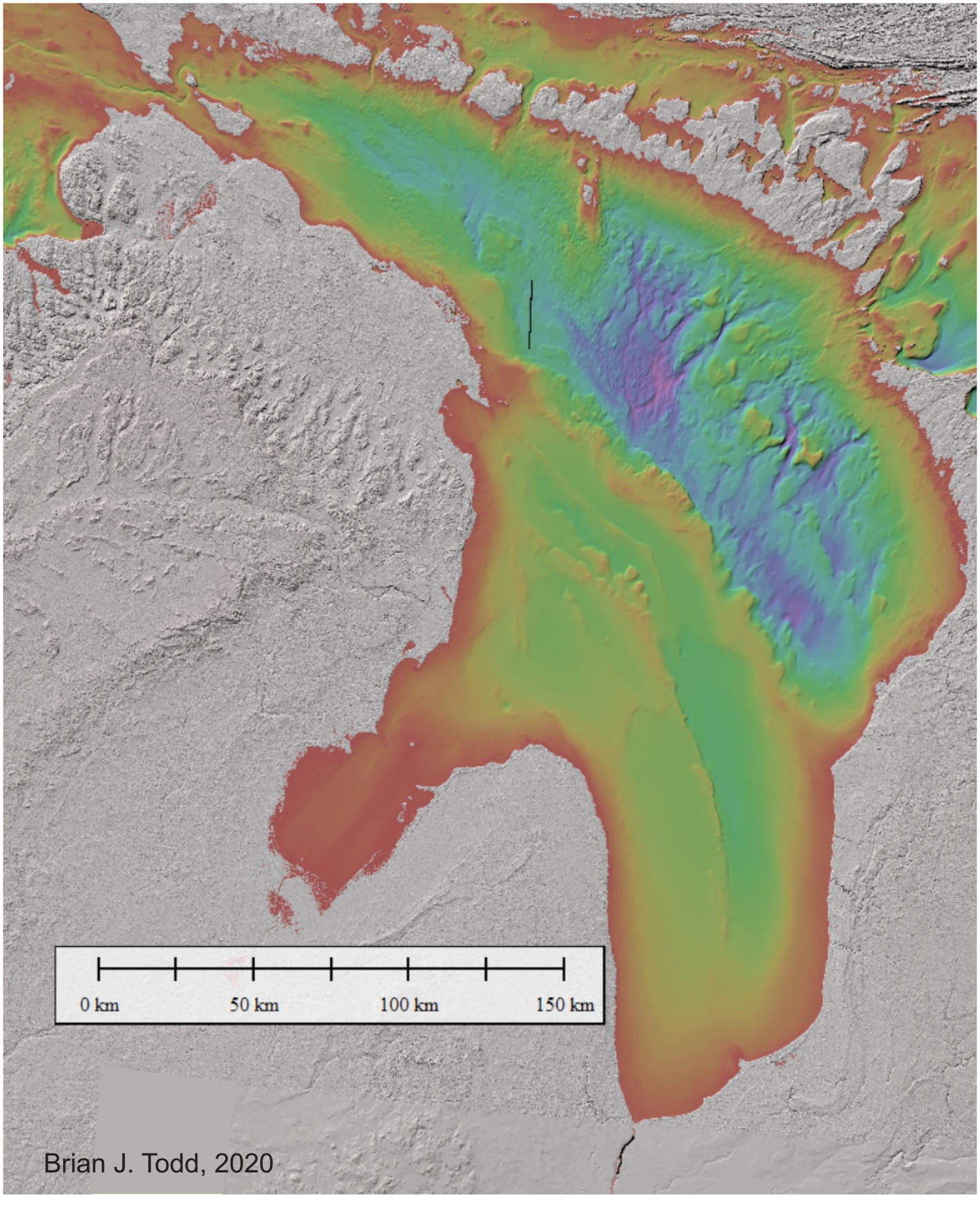
Lake Huron
1969 Limnos 69-2-01 survey lines



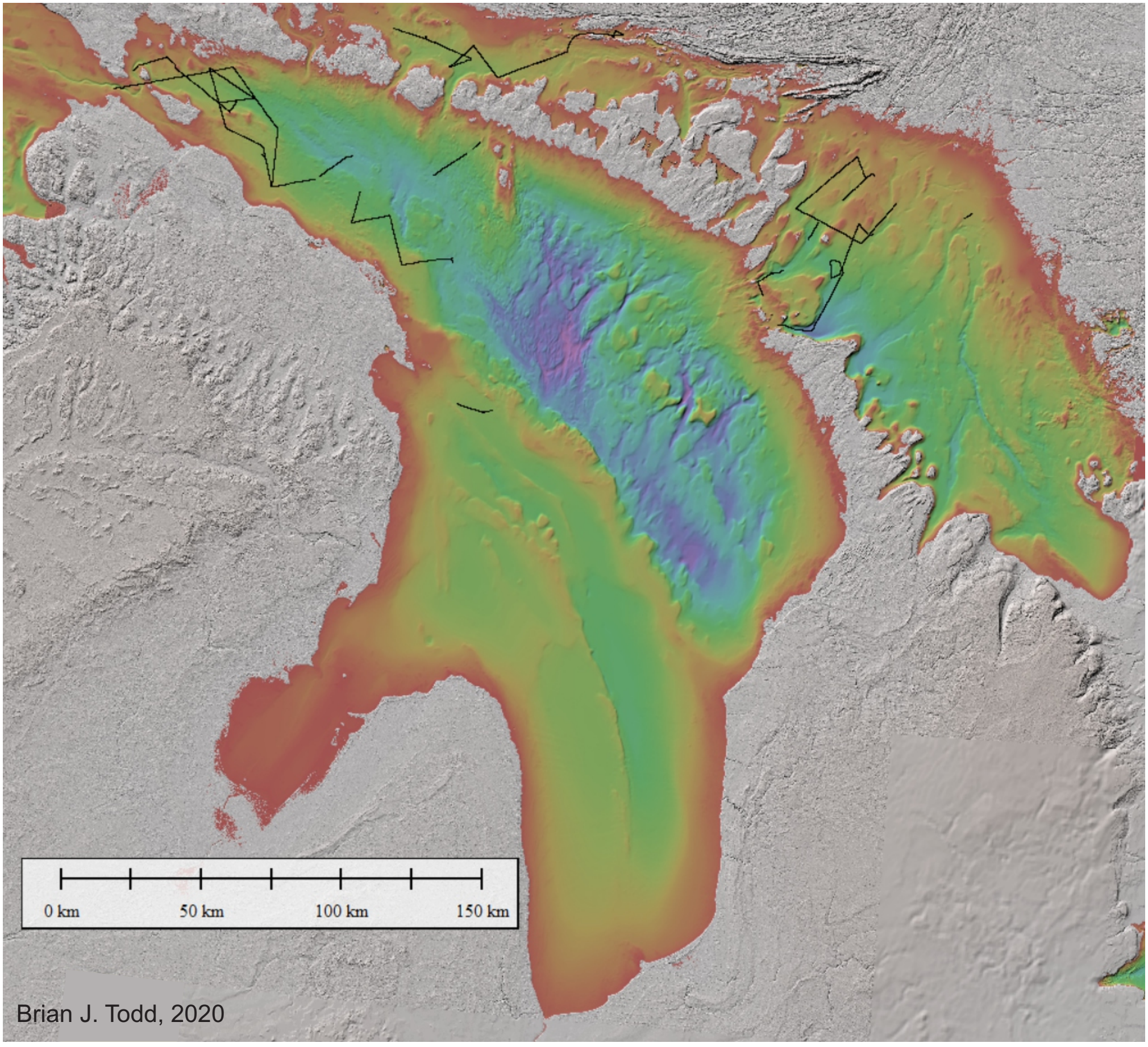
Lake Huron
1991 Laurentian 91800 survey lines



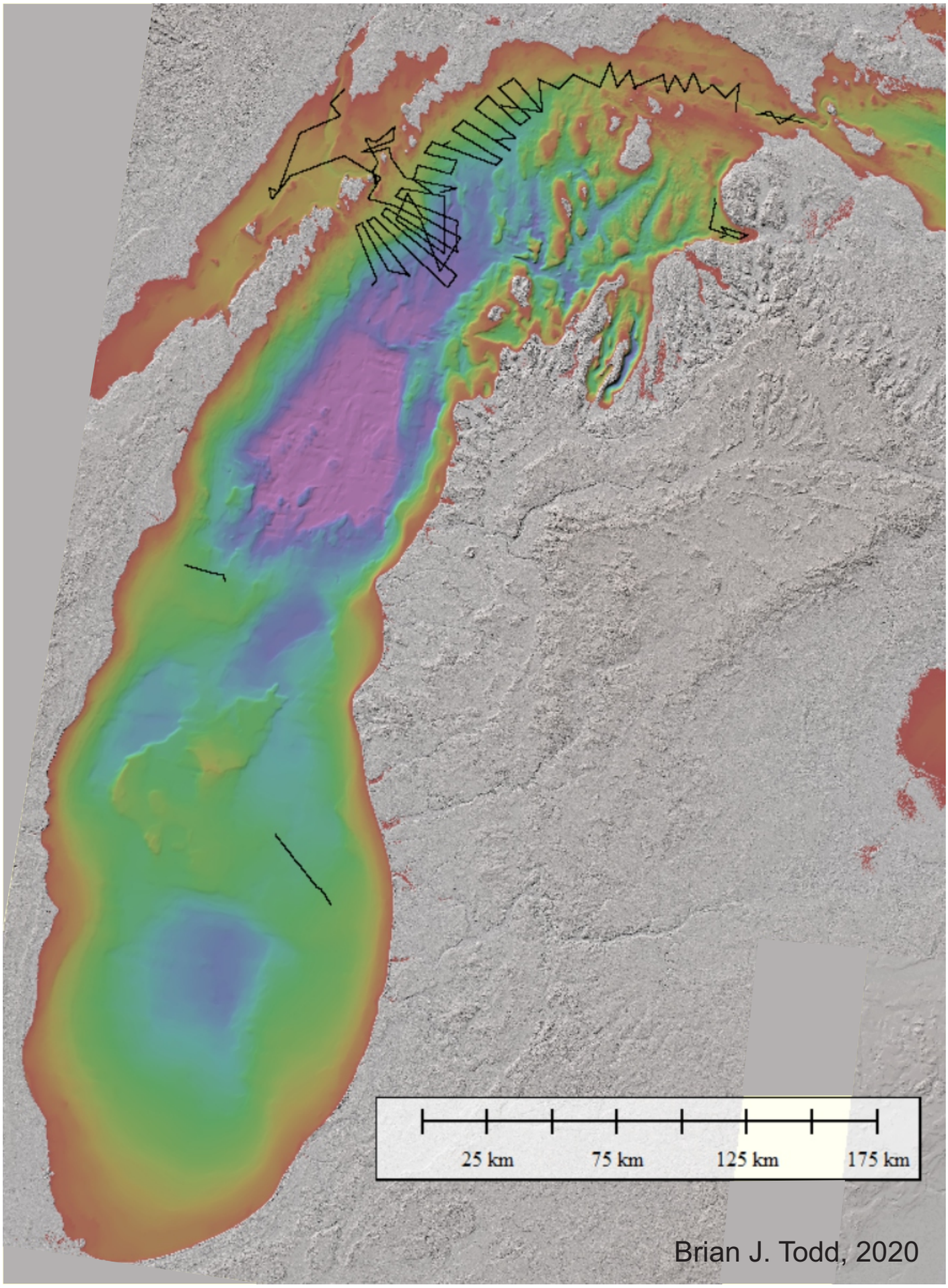
Lake Huron
1994 Risley 94800 survey lines



Lake Huron
1995 Laurentian 95800 survey lines



Lake Michigan
1995 Laurentian 95800 survey lines



MV Theron

Bridge Log

67—0–06

DATE _____

VESSEL _____

CRUISE NO. _____

	Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
	0000	1200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0950	1350	43° 13'	79° 27.7	112°	[illegible]		82	[illegible] ✓
	1042	1442	dip St. 1		004°		11	65	
2	1117	1517	43° 19'	79° 27.2		5.9	11	284	[illegible]
	1145	1605	dip St. 2.		004°		11	194	
3	1240	1640	43° 25.3	79° 23.6		6.3	11	341	[illegible] ✓
	1315	1730	dip St. 3.		004°		11	340	
4	1345	1755	43° 30.4	79° 25.8	004°	5.1	11	270	[illegible] ✓
	1430	1830	dip St. 4		355°		11	270	
5	1513	1913	43° 37	79° 22.3	—	6.4	10.5	92	[illegible] ✓
	1540	1940	dip St. 5.		115°		11	52	
	1605	2005			051°				
6X	1710	2110	~~43° 45~~ 43° 55	79° 10.6	115° 051°	15 [illegible]	11	71	[illegible] ✓
	1722	2122	dip St. 6.		184°	—	11		

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE [illegible] 16/67

VESSEL [illegible]

CRUISE NO. [illegible]

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt. no., station no. etc.)
1800	2200	43°38.5	79°11.1'	184°	5.9	—	350	[illegible]
1828	2228	Dep.	St. 7	185	—	11		
1902	2302	43°30.5	79°11.8	—	6.1	—	430	[illegible]
1934	2334	Arr.	St. 8.	183°	—	11	—	
2010	0010	43°24.4	79°12.2	—	6		375	[illegible]
2033	0033	Dep.	St 9	184°		11		
2113	0113	43°18.4	79°12.9	—	6		260	[illegible]
2120		changed	direction	engine				
2128	0128	[illegible]	10	003°		11		
2235	0335	43°23.2	78°57.5'	—	12.15'		340	[illegible]
2258	0258	Dep.	St 11	004°		11		
2331	0331	43°27.7	78°57.6		6		410	[illegible]
2355	0355	Dep.	St. 12.	004°		11		
0030	0430	43° 37-9	78 59-8	-	6.1	-	410	[illegible]
0135	15 46	Dep	St 13	004°		11		

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE
VESSEL
CRUISE NO.

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (St. no., station no. etc.)
0200	0600	43°41-5	78°42-4	104°	5-9.		544	
0305	0705	Dp St. 14.		004°		11	—	
0345	0745	43°48.	78°56.		6		140'	St. 15
0427	0827	Dp.	St. 15	066°	—	11		
0502	0902	43°50'	78°49'	—	5.3	—	92	St. 16
0526	0926	Dp.	St. 16.	119°	—	11	—	
0607	1007	43°47.	78°41.6'	—	6.1	—	242	St. 17
0637	1037	Dp.	St. 17	183°	—	11		
0717.		43°41.	78°42°	—	5.9	—	360	St. 18
0740	1140	Dp	St. 18	184°	—	11		
0815	1215	43°35.7	78°42.7		6		497	St. 19
0837	1237	Dp. St. 19		185°		11		
0916	1316	43°29'	78°43.3		6.1		483	
0943	1343	Dp. St. 20		155°		11		

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE

VESSEL

CRUISE NO.

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
1019	1419	43°32	78°41'	195°	6 mi.	11	325	21
								✓
1031	1431	dep	21	005°		11		
1100	1500	[illegible]					450	[illegible]
		43°27.5	78°43.5'		4.6			✓
1507	1907	dep	22					
1[illegible]	1955	43°32.5	78°43.	[illegible]	4 mi.			23.
								✓
1633	2033	dep	23	010°	—	11		
1652	2052	43°38.6	78°42.3'	—	2	—	416	on 24
								✓
1730	2130	dep of	24	004°		4		
1742	2142	43°39.6	78°42.2'	—	1	—	390	on 25
								✓
1807	2207	dep	25	005°		4	—	
1830	2230	43°42.5'	78°42'	—	2.6	—	300	26
								✓
1852	2252	dep	26	005°	—	11	—	
1907	2307	43°43.9	78°42.3'		1	—	320	[illegible]
								✓
1926	2326	dep	27.	007°		11		

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE _____

VESSEL _____

CRUISE NO. _____

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
1937	2337	[illegible]	78°47.4	[illegible]	[illegible]	-	[illegible]	[illegible]
2002	0002	dep. St. 28		035°				
2010	0010	43°45.1	78°42.6		1.2		260	arr. St. 29
2031	0031	dep. St 29		010°				
2057	0057	43°46.4	78°42.5		2.2		240	arr. St 30
2130	0130	dep St 30		010°				
2137	0137	43°48.1	78°42.5		0.75		208	arr. St 31
2152	0152	dep St 31		010°				
2208	0208	43°48.6	78°42.6		0.5		120	arr. St 32
2224	0224	dep St 32		010°				
2233	0233	43°49'	78°42.6		0.5		150	arr St 33
2245	0245	dep St 33		010°				
2305	0305	43°50'	78°42.5		1.0		120	arr St 34
2319	0319	dep St 34		010°				

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE _____

VESSEL _____

CRUISE NO. _____

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (St. no., station no. etc.)
2324	[illegible]	43°50.8	78°[illegible].6		0.7		[illegible]	[illegible]
2345	0345	dep. St. 35		010°				
2353	0352	43°51.3	78°42.6		0.5		60	on St. 36
0005	0405	dep St 36		085		10		
0120	0520	43°51.9	78° 27.		11.3		142	on St 37.
0140	0540	dep St 37		193°		11		
0217	0617	43°41.1	78°27.4		6.1		184	on St. 38.
0743	0143	dep St 38		193°		11		
0315	0415	43 40	78° 24		6.1		442	on St 40.
0350	0750	dep St 39		184°		11		
0424	0824	43°34.5	78-28.6	—	5.9	—	554	on St 40
0500	0900	dep. St. 40		184°	—	11	—	
0537	0937	43°28.3	78°29.2	—	6.2	—	[illegible]	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE _____

VESSEL _____

CRUISE NO. _____

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
0615	1015	Dep	St. #1	092°	—	11		
0712	1112	43°27.8	78°15	—	10.3	—	432	
0745	1145	dep	St #2	000°	—	11		
0822	1222	43°33.7	78°14.2		5.9		612	
0843	1243	dep	St #3	004°		11		
0921	1321	43°39.8	78°13.6		6.1		456	
0939	1339	dep. St	#4	004°		11		
1010	1410	43°45.5	78°12'		5.7		540	
1024	1424	dep. St	#5	004°		11		
1100	1500	43°51.4	78°12.4		6		150	
1117	1517	dep. St	#6	004°		11		
1233	1633	43°57	77°57.9		11.6		112	
1245	1645	dep St	#7	183°		11		
1322	1722	43°51	77°58.3		5.7		540	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE [illegible]

VESSEL [illegible]

CRUISE NO. [illegible]

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
1340	1740	dep St 48		145°		11		
1410	1810	43°45	77°58.5		5.8		380	Arr St 49
1445	1845	dep St 49		185°		11		
1520	1920	43°39	77°59.6		6 mi		536	Arr St 50
1552	1952	dep St	50	194°		11		
1628	2028	43°33	78°00	—	5.7	—	576	Arr St 51.
1700	2100	dep	St. 51	125°	—	11	—	
1743	2142	43°21.9	78°01	—	6.2	—	400	Arr St 52.
1807	2207	dep	St. 52	093°	—	11	—	
1905	2305	43°26.4	77°46.5	—	10.5	—	420	Arr St. 53
1933	2333	dep	St. 53	004°	—	11	—	
2007	0007	43°32.2	77°45.9		6		554	Arr St. 54
2028	0028	dep St. 54		005°		11		
2108	0108	43°38.2	77°45.3		5.8		502	Arr St 55

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE [illegible]

VESSEL [illegible]

CRUISE NO. [illegible]

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (St.no., station no. etc.)
2181	0131	dep. [illegible]		004°		11		
2151	0151	43°44.1	77°44.7		6		400	[illegible]
2207	0207	dep. [illegible]		004°		11		
2243	0243	43°50'	77°44'		5.8		218	[illegible]
2300	0300	dep. [illegible]		003°		11		
2335	0335	43°55.9	77°42.7		5.9		102	[illegible]
2347	0347	dep. [illegible]		124°		11		
0100	0500	43°49.2	77°29.7		12		176	[illegible]
0115	0515	dep. [illegible]		182°		11		
0155	0555	43°43.5	77°30		6		265	[illegible]
0225	0625	dep. [illegible]		184°		11		
0300	0700	43°37.4	77°29		6		400	[illegible]
0330	0730	dep. [illegible]		184°		11		
0355	0755	43°31.7	77°31.6		5.7		[illegible]	[illegible]

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE: [illegible]

VESSEL: [illegible]

CRUISE NO. [illegible]

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
[illegible]	0234	dep.	72. 62	184°	.	11		
0510	0910	43°25.5'	77°32.1'	—	6.2	—	[illegible]	[illegible] 63 ✓
0547	0947	dep	72. 63	184°	—	11	—	
0623	1023	43°18.5'	77°32.8	-	6.	-	132	[illegible] 64 ✓
0642	1042	dep.	72. 64.	095°	—	11		
0740	1140	43°18.6'	77°18.7'	—	10.3	—	153	[illegible] 65 ✓
0813	1213	dep.	71 65	004°		11.		
0849	1249	43°24.8	77°18°		6.2.		638	[illegible] 66 ✓
0911	1311	dep.	71 [illegible]	275°				[illegible] 67
1107	1507	43°26.4	77°46.6		20.6			[illegible] 68
1230	1630	43° 25.	77° 46.5		0.7.		350	[illegible] 69 ✓
1405	1805	43° 25-1	77° 46.4	354	0.2		350	[illegible] 70
1635	2035	43 25.6	77°46.9		1	-	[illegible]	[illegible] 68 ✓
1752	2152	dep	71 68	007°	—	11	—	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE [illegible]

VESSEL [illegible]

CRUISE NO. [illegible]

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt. no., station no. etc.)
1900	2300	43 35.6	77 45.6	o/c	165° l.o.	[illegible]	[illegible]	[illegible]
				125°	—	3		
1940	2340	43°34.	77°45.5		1.5		454	[illegible] 69
2117	0117	— . -	— . .				474	[illegible]
2145	0145	dep. st. 69		300°		11		
2245	0245			004°		5		
2301	0301	43°41.8	77°59.3		1.2		450	[illegible]
2320	0320	dep st 70		004°				
2333	0333	43°43.6	77°59.1		1.4		430	[illegible] 71
2354	0354	dep st 71		004°				
0012	0412	43°44.9	77°59°		1.2		390	[illegible]
0030	0430	dep st 72		004°				
0043	0443	43° 45.9	77° 58.9		1.1		360	[illegible] 73
0109	0509	dep st 73		004°				
0125	0525	43° 47	77° 58.8		1.1		330	[illegible]
0145	0545	dep st 74		004°				

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE: _____

VESSEL: _____

CRUISE NO. 7-__-__

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Sta. no., station no. etc.)
0203	0603	43° 47.8	77° 50.7		0.5		300	[illegible] ✓
0225	0625	dep [illegible]		004°				
0245	0645	43° 48.5	77° 58.6		0.8		240	[illegible] ✓
0320	0720	dep [illegible]		004				
0352	0752	43° 51.1	77° 58.5		1.6		240	[illegible] ✓
0433	0833	dep	[illegible]	340°	-	2		
0455	0855	43° 51.3	77° 58.5	-	1.2	-	240	[illegible] ✓
0520	0920	dep	[illegible]	000° 0040	-			
0540	0940	43° 52.7	77° 58.3	-	1.3	-	180	[illegible] ✓
0603	1003	dep	[illegible]	004°	-	3	-	
0628	1028	43° 54°	77° 58.2	-	1.2	-	144	[illegible] ✓
0643	1043	dep	[illegible]	018°	-	3	150	
0720	1120			244°		11.5		[illegible]
0745	1145			262°				

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE _____

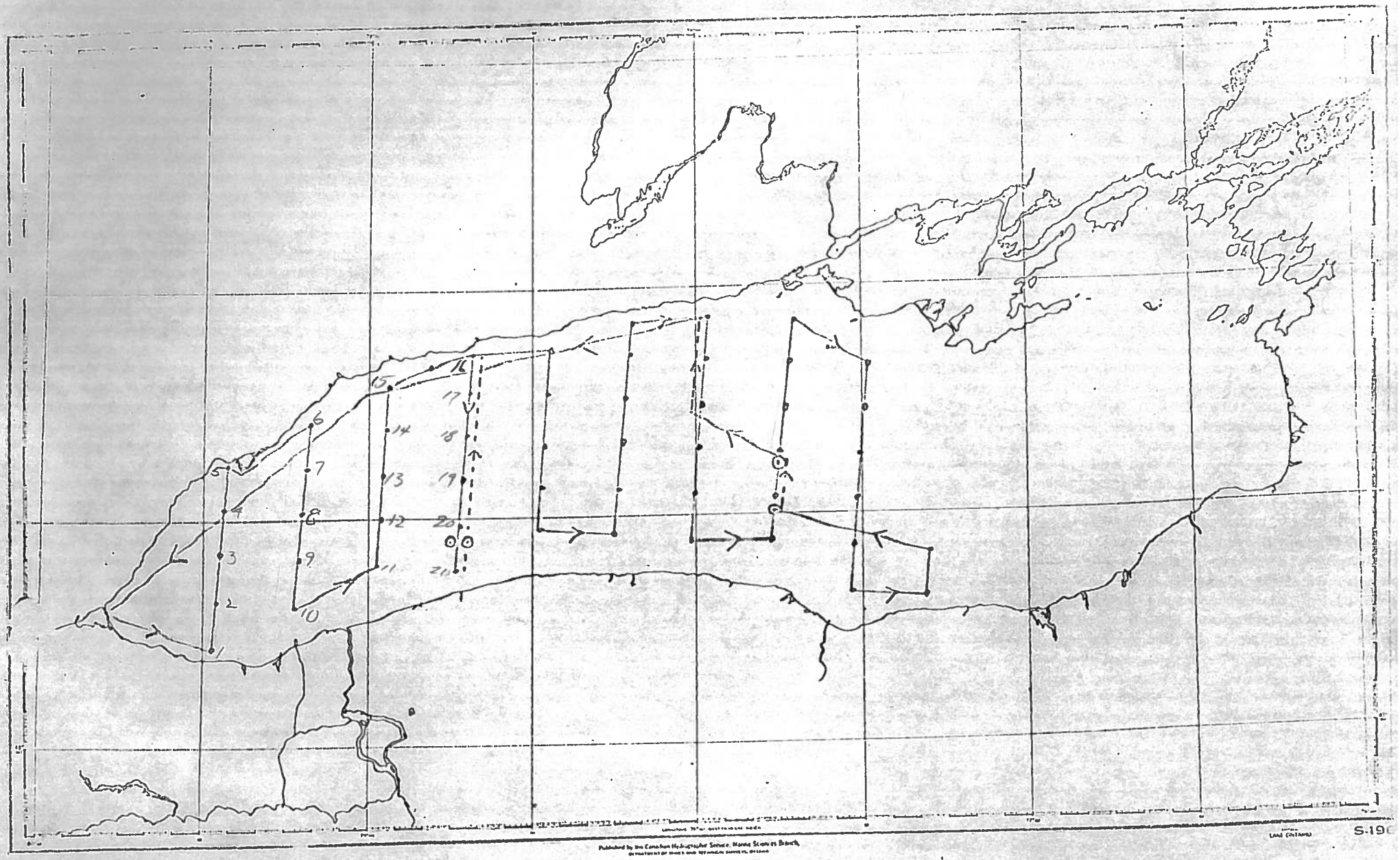
VESSEL _____

CRUISE NO. _____

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (St.no., station no. etc.)
1115	1515	43°42'	78°58'	300°	40.5			
1143	1543	43°44'	78°03'	230°	4.8	12		
1525	1925	Arrived R...						C.I.D. 67-0-06

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

TRACK CHART CRUISE 67-0-06



• GRID STATIONS

⊙ PISTON CORING STATIONS

DEPARTMENT OF ENERGY, MINES AND RESOURCES

GREAT LAKES STUDIES

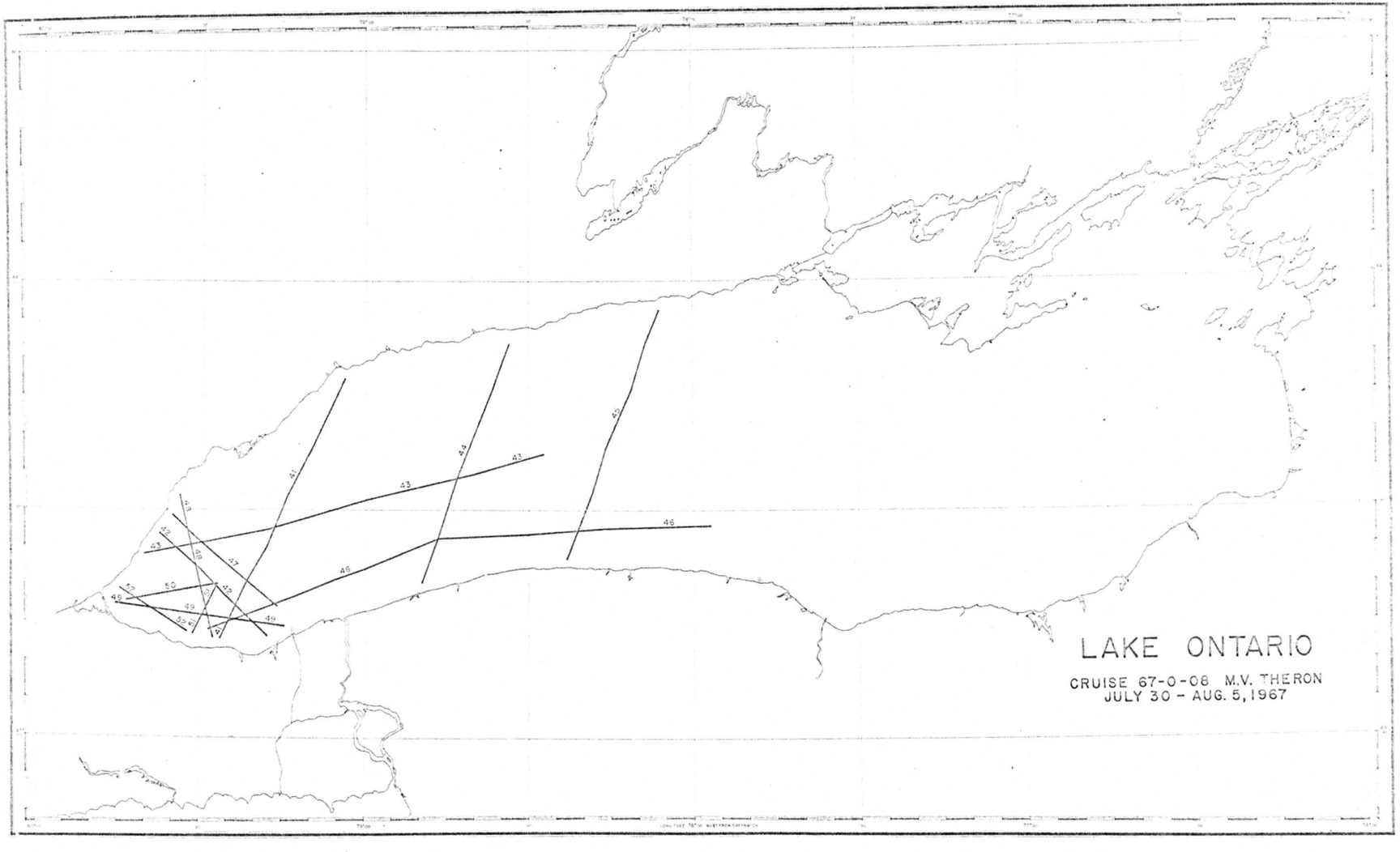
CRUISE 67-0-08

M. V. Theron

July 30-August 5, 1967

by

George D. Hobson


LAKE ONTARIO
CRUISE 67-0-08 M.V. THERON
JULY 30 - AUG. 5, 1967

GREAT LAKES STUDIES

CRUISE 67-0 08

Local Cruise Designation:	67-0-08 M. V. Theron
Vessels:	M. V. Theron
Dates:	July 30 - August 5, 1967
Area:	Lake Ontario
Responsible Agencies:	Inland Waters Branch (Geophysics section, Hydrologic Sciences Div.) and Geological Survey of Canada (Seismic section, Exploration Geophysics Div.)
Ship's Master:	Captain H. Maro
Scientific Party:	R. J. Donato G. Courtel P. D. Roy G. D. Hobson (Supervision)
Ship's Hydrographer:	R.A.C. Marshall

NATURE, QUANTITY & LOCATION OF DATA GATHERED

Approximately 90 hours of continuous marine seismic profiling were completed resulting in about 360 miles of profile at a ship's speed of 4 knots. Coverage was obtained west of 78°00 longitude in Lake Ontario filling in the reconnaissance program begun in 1966. A track chart is attached to this report.

PURPOSE OF CRUISE:

a) to investigate the nature, attitude and thickness of the unconsolidated sedimentary cover of the lake bottom, the underlying bedrock topography and the attitude and thickness of strata within bedrock.

EQUIPMENT & METHODS USED:

An E. G. & G. Boomer system was used as a repetitive source in the marine environment to generate energy for recording through a hydrophone, cable, filter and amplifier and helix-wire recorder system. The electronic equipment was installed in the forward deck house. The boomer was towed by suspension from the forward derrick boom on the starboard side while the two hydrophones were mounted on two small booms on the forecastle, one trailing on each side of the ship. The separation between the starboard hydrophone and the Boomer source was small resulting in the possibility that these two appendages could become entangled.

Equipment problems arose during this cruise. It was difficult for M.V. Theron to proceed slowly enough to reduce the noise level to a useable level; whenever the ship sailed above a certain speed an obvious pulse deterioration began. The onset was sharp and amounted to almost complete loss of signal. The boomer cable was not found to be under excess strain and the spark gap was functioning properly. Replacement of the electrodes, repair of a break in the trigger ionization wire and testing of the joints between Boomer cable and jumper leads made no improvement. The fault was finally localized to the Boomer itself; water flowing between the plates and the coil prevented full excursion of the plate during each cycle of energization. The remedy was simple. Two pieces of plywood were attached to the leading edge of the coil assembly and the source then operated satisfactorily.

A certain stickiness in the rotation of the helix drum in the recorder also gave trouble. The cradle supporting the drum was cleaned out with a vacuum cleaner resulting in an improved but not completely satisfactory operation. However, it became more apparent as time went on that the fault was more deeply seated, probably in the coupling from the motor through a variable speed gear box to the paper drive roller. Only temporary repairs were made during this cruise since complete repairs would have entailed dismantling a large part of the recorder.

Throughout this cruise the instruments were run off the main generator supply of the ship spreading the current drain over two circuits.

Navigation was by radar and the ship's echo sounder was used for detail in the top layers of sediment. Ship's speed was between 4 and 5 knots.

The ship was utilized for a 24-hour working day during this cruise.

RESULTS AND COMMENTS:

The following table shows the production on a daily basis; fixes were taken every half hour:

Day	Fix
31/7/67	1-14
1/8/67	15-55
2/8/67	56-78
3/8/67	79-117
4/8/67	118-159
5/8/67	160-168

The apparently haphazard selection of control lines is due to the fact that this cruise was primarily aimed at filling in areas of interest developed during the 1966 field season.

Record quality was generally good although definition between sediment and bedrock is not as clear as in Lake Erie. Sediment overlying bedrock is generally less than in Lake Erie.

It is a pleasure to acknowledge the cooperation of the officers and crew of M.V. Theron. They were always interested in the scientific work. The assistance and interest of R. Marshall, hydrographer, is also acknowledged.

DEPARTMENT OF ENERGY, MINES AND RESOURCES

GREAT LAKES STUDIES

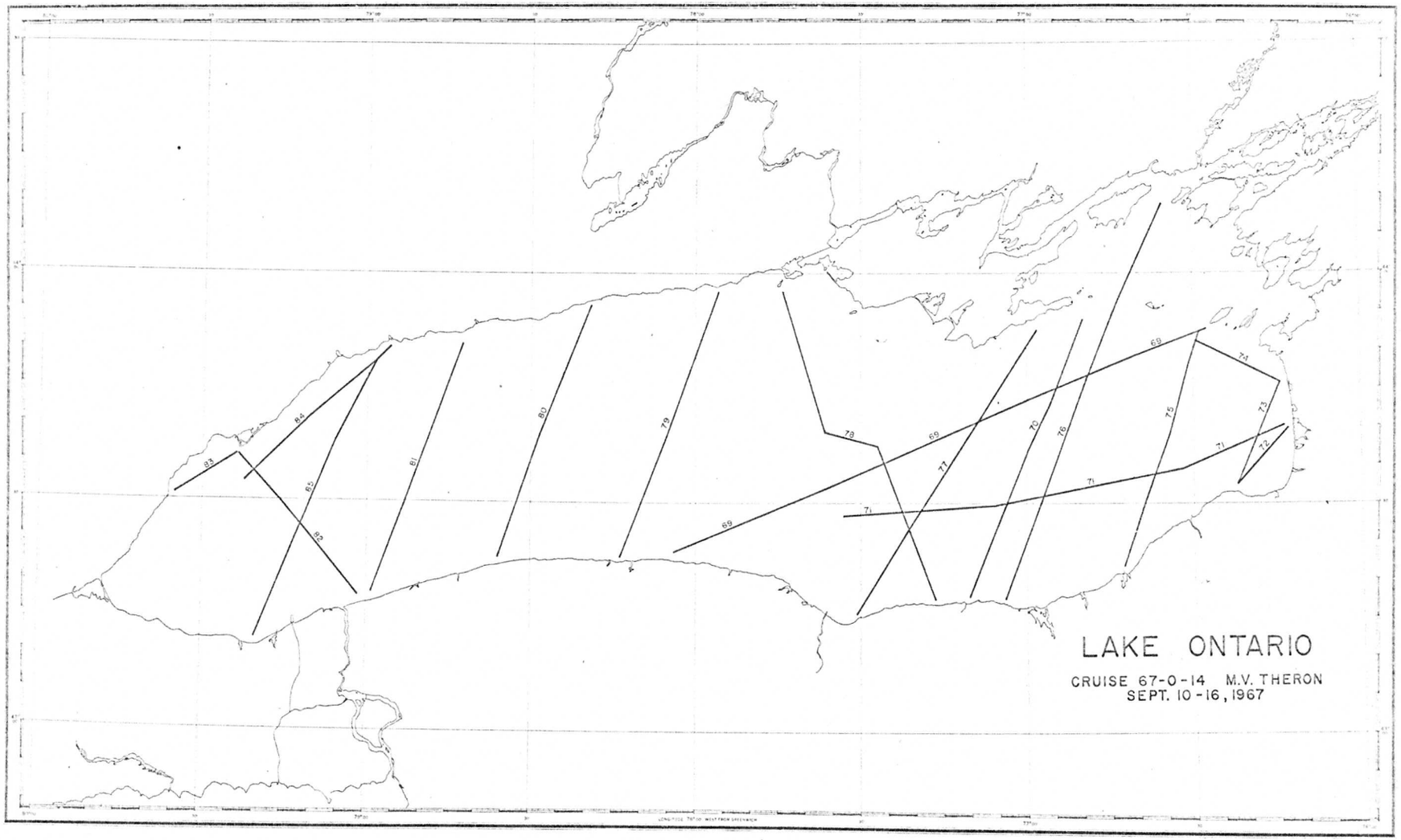
CRUISE 67-0-14

M. V. Theron

September 10-16, 1967

by

George D. Hobson


LAKE ONTARIO
CRUISE 67-0-14 M.V. THERON
SEPT. 10-16, 1967

GREAT LAKES STUDIES

Cruise 67-0-14

Local Cruise Designation:	67-0-14 M. V. Theron
Vessel:	M. V. Theron
Dates:	September 10 - 16, 1967
Area:	Lake Ontario
Responsible Agencies:	Inland Waters Branch (Geophysics Section, Hydrologic Sciences Division) and Geological Survey of Canada (Seismic Section, Exploration Geophysics Division)
Ship's Master:	Captain H Maro
Scientific Party:	R. J. Donato P. D. Roy D. Smith (E.G.& G. Intl.) G. D. Hobson (Supervision)
Ship's Hydrographer:	R. A. C. Marshall

NATURE, QUANTITY & LOCATION OF DATA GATHERED:

About 100 hours of continuous marine seismic profiling were completed resulting in about 650 nautical miles of profile at a ship's speed of 6.5 knots. Coverage was obtained in many parts of Lake Ontario filling in the reconnaissance program of 1966 and the program of cruise 67-0-08. A track chart is attached to this report.

PURPOSE OF CRUISE:

a) To investigate the nature, attitude and thickness of the unconsolidated sedimentary cover of the lake bottom, the underlying bedrock topography and the attitude and thickness of strata within bedrock.

b) To investigate the capabilities of an improved Boomer source, a high resolution Boomer, to supply the above information as a comparison to the Departmental Boomer source.

EQUIPMENT & METHODS USED:

The high resolution version of the E.G. & G. Boomer source was transhipped from M. V. Brandel (Cruise 67-1-10) to M. V. Theron on September 10. The details of the system are included in the report of cruise 67-1-10. The Boomer on the catamaran was towed from the amidships starboard derrick while the hydrophone was towed from a similar position on the port side. However, the hydrophone cable was not long enough to permit towing as far astern as desired resulting in relatively poor multiple rejection. On the other hand, the noise level was much lower than on M. V. Brandel.

This cruise again pointed up the inadequacy of the ship's wiring. It was necessary to bypass the main cut-out board and connect the seismic power unit to a separate fuse box normally used for running pumps.

Occassionally the signal from the hydrophone became weak. The fault was finally localized to the wire joint between the underwater preamplifier and the buoyant cable.

The long hydrophone cable acts as an antenna for radio signals much to the consternation of the operator. The ship transmits weather data on A.M. or F.M. at 8 hour intervals. The A.M. transmission is picked up on the hydrophone cable and marks the seismic record also being clearly heard on the loudspeaker monitor unit. Whether the breakthrough is a consistent or irregular phenomenon is unclear. The screen on the hydrophone is a wide mesh shield which has the relatively large impedance of 30 ohms over a 200 foot length. Perhaps by reducing this resistance the breakthrough could be reduced considerably. When the earth lead open circuited, the A.M. transmission pickup is sufficiently large to trigger the power unit at a rapid rate.

RESULTS AND COMMENTS:

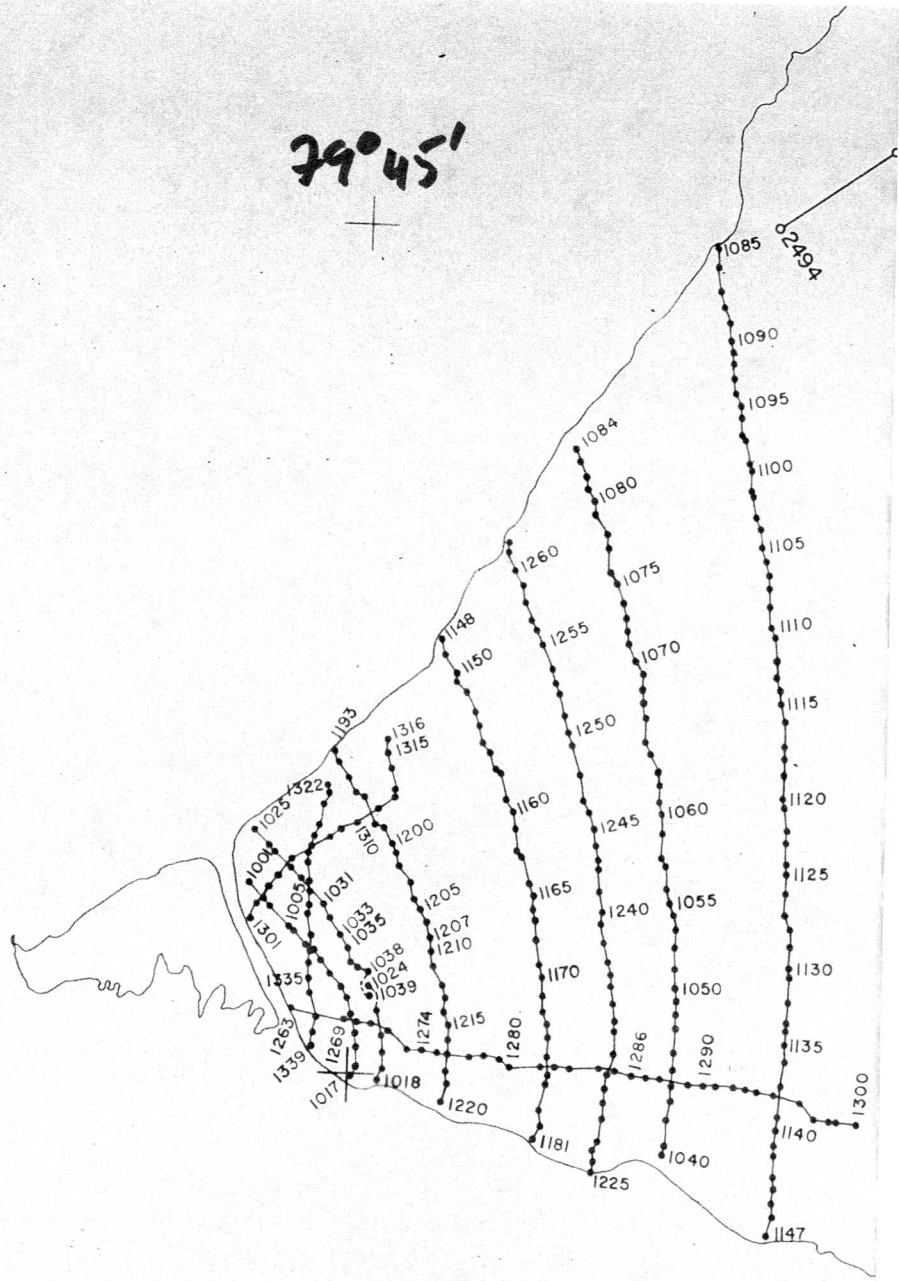
The following table sets out the fixes per day. Fixes were taken at half hour intervals.

Day	Fix
11/9/67	1-27
12/9/67	28-73
13/9/67	74-110
14/9/67	111-150
15/9/67	151-192
16/9/67	193-196

Record quality is generally good and once again the thickness of sediment overlying bedrock rarely exceeds 100 feet.

43° 30'

79° 45'



43° 15'

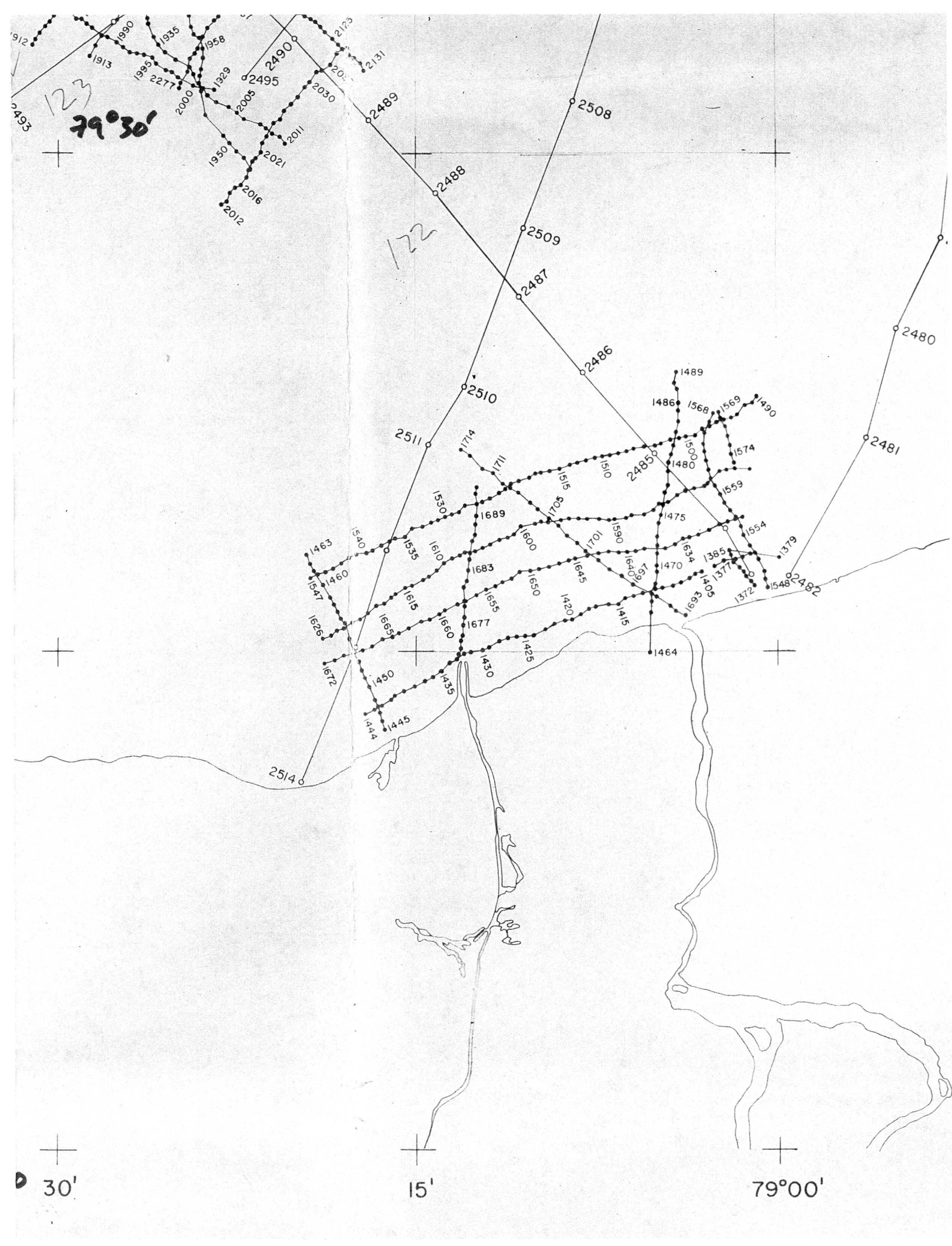
"EXPLORER" 1967

43° 00'

80° 00'

45'

79


79°30'
79°00'
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15'
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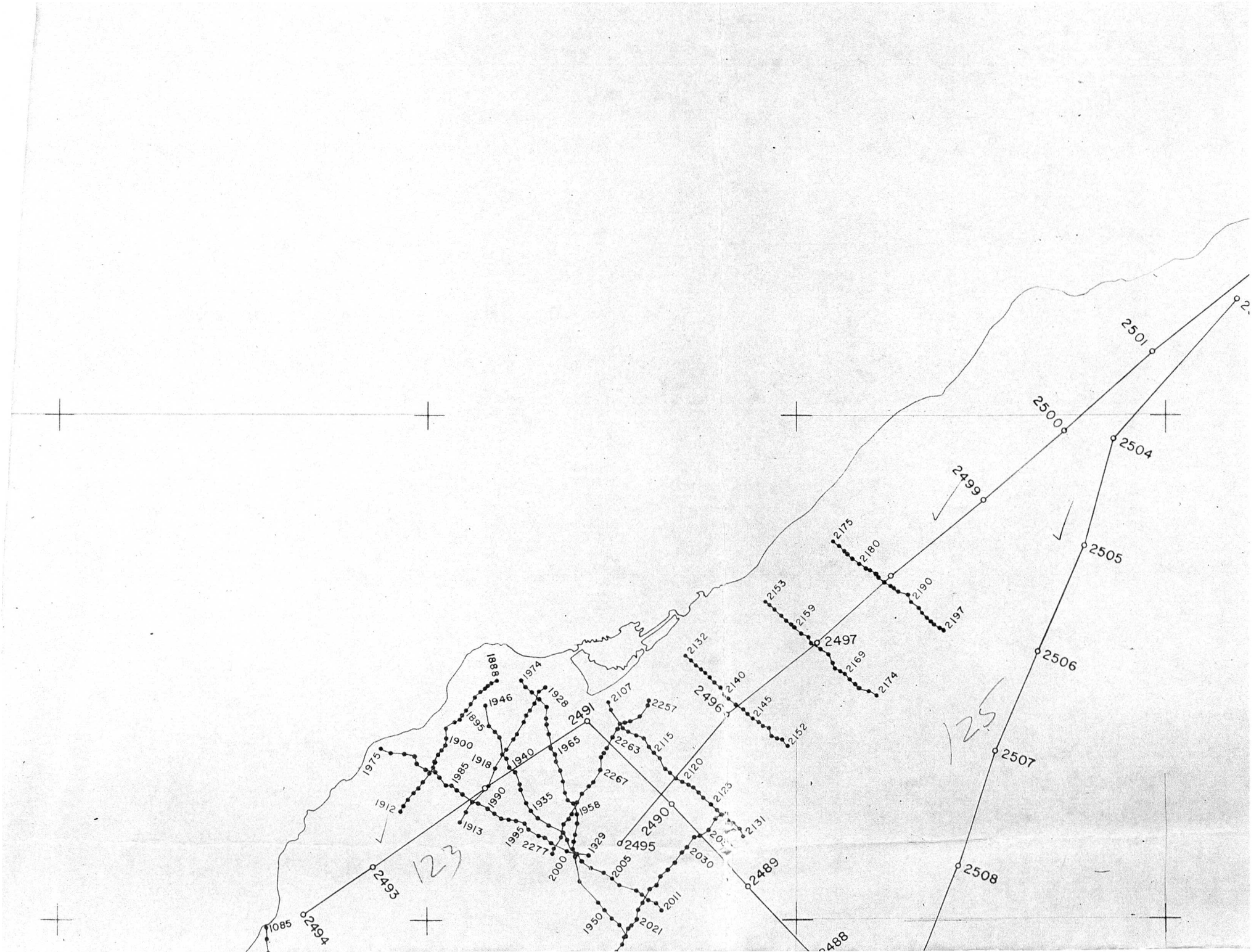
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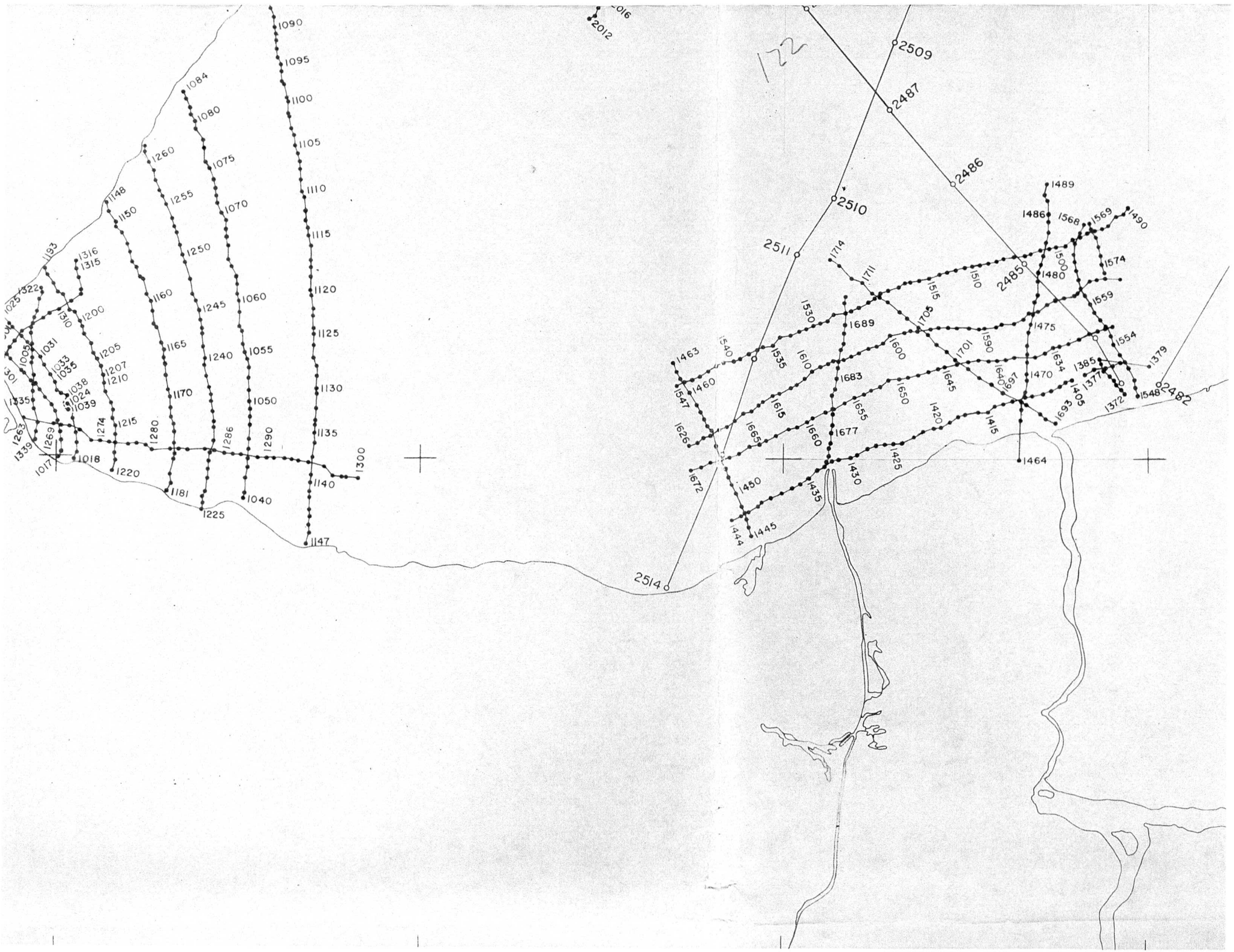
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1444
1445

MV Theron

Bridge Log

67–0–18

DATE Oct 6/67

VESSEL Tiam

CRUISE NO. 67-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
1810	2210	Left Burlington						
1823	2223	Causeway Buoy		Thermistor towed				
		Echo Sounder on		066°	—	—	—	
2009	0009	43°26.1	79°23		18.6		376	arr. St. # 4 ✓
2020	0020	dep. St. 4		068		11		
2130	0130	43°30.7	79°07.4		12.1		458	arr. St # 3 ✓
2149	0149	dep. St. 3		078°		11		
2317	0317	43°34'	78°46.5'		15.5'		493	arr. St # 5 ✓
2324	0324	dep. St 5		095°		11		
0116	0516	43°32.5	78°22.3		12.5'		582	arr St # 6. ✓
0126	0526	dep St 6		082°		10		
0240	0640	43°34.2	78°05.6		12.3		610	arr St # 2. ✓
0308	0708	dep St 2.		150		11		
A. 0404	0804	43°26.6	78°00'	091°	8.6	11	390	Arr. St. # 1 ✓

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct. 7/67

VESSEL "THERON"

CRUISE NO. 67-0-18

	Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
B	0508	0908	43°26.6	77°44'	317°	11.6	11	430	Arr. St. B. ✓
C.	0715	1015	43°35'	77°54.5'	103°	11.4	11	594	arr. St. C. ✓
D.	0727	1127	43°32.9	77°40'	322°	10.8	10.0	566	Arr. St. D. ✓
	0820	1220	43°39.8	77°47.7	082°	9.2		480	Arr. St. E ✓
	0838	1238			088°	4.0			a/c
	0930	1330	43°41.9	77°31'	245°	8.5	11	290	arr. St. F ✓
	1030	1430			142°	10.5	11		a/c
	1045	1445			182°		11		a/c
	1055	1455	43°33.8	77°42'	321°	4.0	11		a/c
	1115	1515	~~43 35.5~~ ~~43°35.4~~	~~77 44.5~~ ~~77°42.5~~	Stop. dropped				Station
									Station 10. ✓
	1158	1558	dry hook core		Pitlan Core 3501b			508	- " -
			43°35.5	77 44.5	Retrieved in	good	condition		✓
	1300		Preparing 1200 LB Core						
			W/L maintainance Station.						
	1657	2057	dropped Core # 2		Pitlan Core	1200lb		511	St. # 10
	1710	2010	Core recovered intact						
	1845	2245	Left St. #10		proceeding to #7				
					117°				
	1922	2322	43°33'	77°38'	-	6	11	580'	Arr. St # 7 ✓
	1930	2330	Dep	St. 7	107°	—	—	-	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct 7-67

VESSEL THERON

CRUISE NO. 67-C-12

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
2055	0055	43°29.2	77°19.3	107°	14.4	11	653	Arr. St. # 8 ✓ ✓
2111	0111	dep.	# 8	039°		11		
2125	0125	43°30.9	77°17.2		2.2		610	arr. St. # 11 ✓ ✓
2200	0200	dep.	# 11	003°		11		
2236	0236	43°37'	77°17.7		6		470	arr. St. 12 ✓ ✓
2347	0347	dep.	St. 12	008°		11		
Oct 8								
0025	0425	43°42.7	77°16.3		6		318	arr St #13 ✓ ✓
0045	0445	dep	St 13	006°		11		
0124	0524	43°48.8	77°15.4		6.1		92	arr St # 14 ✓
0254	0654	dep	St 14	279°		11		
0410	0810	43°51.7	77°34.4'	138°	14	11	84	Arr St. # I. ✓ ✓
0435	0835	43°48.4	77°30.4'	258°	5.5	11	180	Arr. St. H. ✓ ✓
0522	0922	43°46.8'	77°28.5'	125°	8.2	11	240	Arr. St G. ✓ ✓
0620	1020	43°41.5'	77°31'	346°	9.3	10	288	Arr. St. F. ✓ ✓
								Proceeding to St. I

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct. - 8/67

VESSEL "Theron"

CRUISE NO. 67-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
0718	1118	43°51.7'	77°34'	346°	10.4	11	120	Arr. St. I ✓✓
				183°				
0737	1137	43°49.2'	77°34.5'	202°	2.5	10	112	Arr. St. J. ✓✓
0757	1157	43°46.3	77°36.3'	188°	3.2	10	186	Arr. St. K. ✓✓
0819	1219	43°42.8	77°37'	207°	3.4	10	250	Arr St L. ✓✓
0840	1240	43°40'	77°39'	225°	3.3	10	394	Arr. St. M. ✓✓
0924	1324	43°33.9	77°46.3	106°	8.1	10	507	Arr. St. N. ✓✓
0947	1347	43°33'	77°40.8		4.5		570	Arr. St # 15 ✓✓
		Dropped anchor						
		Piston Coring Station						
		Preparing 1200 LB. core.						
1155	1555	dropped 1200 lb core					562	
1200		Recovered intact.						
		Extruding Core Marker Buoy					recovered	
1555	1955	Left St. #15						
1								
1630	2030	43 33.8	77 44.9	Marker Buoy dropped.				Station #16 ✓
1643	2043		Dropped	1200 LB. core.				
1650			Recovered Core intact.					
800	Marker Buoy recovered							
1804	2204	dep	St. 16	280°				

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct. 8/67

VESSEL 'Tiron'

CRUISE NO. 67-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
1814	2214	43°34.1'	77°42.2'	280°	1.7	11	568	Arr. St. N. ✓
				215°				
1845	2245	43°29.6'	77°51.5'	220°	5.5	11	512	Arr. St. O. ✓
			Slow speed to N.S.					
			Working on deck with towing gear & equipment.					
2020	0020	43°23.2	77°58.8	098°	8.4	5		Arr. St. P. ✓
			Proceeding to St # 17					
0028	0428	43°18.1	77°04.2		40	10	74	Arr St # 17 ✓
0045	0445	dep St # 17		005°				
0130	0630	43°23.9	77°03.1		5.9	11	544	Arr St # 18 ✓
0207	0607	dep St # 18		005°				
0250	0650	43°30.3	77°02.6		6.6	8	720	Arr St # 19 ✓
0320	0720	dep St # 19		005°				
0353	0753	43°36.3	77°03.3		6.		516	Arr St # 20 ✓
0420	0820	dep.	St. 20.	005°	—	—		
0453	0853	43°42.2'	77°01.8'	—	6	11	316	Arr. St. # 21. ✓
0511	0911	dep	St. 21	005°	—	—	—	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct-9/37

VESSEL "Thikonk"

CRUISE NO. 67-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
0540	0940	43°47.8	77°01.2'	005°	6.5	11	196	in sta. # 22 ✓✓
0602	1002	dep	sta # 22	080°	—	—	—	
0700	1100			081°				
0834	1234	43°52.1	76°25.8		16.4		44	
0852	1252	43°53.0	76°24.9		1,5		95	arr. sta. 23 ✓✓
		anchored on sta 23.						
0938		Pilot Core 1200 LB dropped						
0950		Recovered in tank. Extruding core.						
1258		1200 LB. Core dropped. Core #2 Station #23.						
1300		Core recovered in tank. Extruding core.						
1420	1820	anchor up. proceeded to sta 24						
1420	1820			180°				
1438	1838			090°	3		78	
1445	1845			0470	1,5		90	
1500	1900	43°51.6	76°20.7		2,3		110	arr. sta # 24 ✓✓
		anchored at sta 24						
1610	2010	Dropped Core 1200 LB sta 24						
1612		Core recovered in tank						
		Extruding Core.						
1835	2135	dep. # 24		226°				
1754	2154			270°	2.3			

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct 9-67

VESSEL Tuscarora

CRUISE NO. 67-O-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
				270°				
1809	2209			332°	2		12.1	
					3.6			
1836				Sd	go Anchor St. #25			
1928	2328		shipped Pnr.		1200 LBS.		1200	Bucket
		43°53.3	76°28.1					
1930		Cast recovered on deck						
		Extruding cores.						
2124	0124	disp. St. 25		234°		11		anchor up
2215	0215	43°50'	76°34.4	340°	5.6		153	arr. St. "A"
2239	0239	43°54'	76°36.4	100°	4.2	11	72	arr St. "B"
2305	0305	43°53.2	76°29.9	354	4.7	11	67	arr St "C"
2312	0312	43°54.8	76°30'	311°	1.1	11	101	arr. St. "D"
2333	0333	43°56.7	76°33.9	081°	3.7	11	78	arr. St "E"
2400	0400	43°57.4	76°27.1	312°	4.9	11	112	arr. St "F"
0028	0428	44°00.7	76°32.1	089°	4-9	11	73	arr St. "G"
0056	0456	44°00.8	76°25.4	328°	4-9	11	70	arr St. "H"

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct 10th 67

VESSEL THERON

CRUISE NO. 67-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
0116	0516	44°03.5	76° 27.8	087°	3.3	11	46	arr St. I ✓ ✓
0136	0536	44° 03.8	76° 23	335°	3.4	11	86	arr St. J ✓ ✓
0145	0545	44° 05	76° 23.8	219°	1.4	11	86	arr St. K ✓
0215	0615	44° 00.8	76° 28.4	239°	5.4	11	160	arr St. L ✓ ✓
0221	0621	44° 00.4	76° 29.2	189°	0.8	11	140	arr St. M ✓ ✓
0231	0631	43° 59	76° 29.6	201°	1.4	11	166	arr St. N ✓ ✓
0256	0656	43° 54.2	76° 32.2	234°	5.1	11	170	arr St. O. ✓ ✓
0310	0710	43° 53.1	76° 34.4	259°	2.6	11	0170	arr St P ✓ ✓
0324	0724	43° 52.6	76° 37.9	039°	2.5	11	136	arr St Q ✓ ✓
0349	0749			317°	4.2	11	96	
0353				263°	0.5	11		
0355				344°	0.5	11		
0451	0851	44°05.8	76°39°	196°	8.5		46	Arr. St. R. ✓ ✓
0505	0905			138°	2.0			
0521	0921	44°01.7'	76° 37.3'	138°	2.8		112	Cruising Station ✓
			Stopped Drifting	Awaiting Daylight				
0808	1208	Departed Station		Enroute to St. 26				✓
		44°01.7	76°37.2					

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct 10/67

VESSEL "THERON"

CRUISE NO. 67-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
0905	1305			Dropped 1200 LB Piston Corer				St. 26 ✓
0908				Corer recovered intact				
				Extending core				
1115	1515		Left Station #26					
1155	1555	43°58.9	76°29.7	dropped marker buoy on				St. # 27 ✓ ✓
1250	1650			Dropped 1200 LB Piston core				St. 27
1255	1255			Corer recovered intact				
				Extending core.				
1420	1820		Left Station # 27					
1540	1940	43 53.6	76 32.6	St # 28 Marker Buoy dropped				✓ ✓
1605	2005			Dropped 1200 LB corer			# 28	
1610				Recovered Corer intact				
				Extending core.				
1644	2044	dip	St 28	282°				
1720	2120			000			46	
1725	2125		Dropped Marker Buoy. 6.4					St. # 29 ✓ ✓
		43 55.4	76 40.8					
1835	2235			Dropped 1200 LB Corer				
1840	2240			Corer recovered intact.				
				Extending Core				

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct 15th 67

VESSEL THERON

CRUISE NO. 67-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
2035	0035	dep	st. 29	241°		11		
2103	0103	43°53'	76°46.6		41.8		110'	arr st # 30 ✓✓
2117	0117	dep.	st. 30	092°		11		
2214	0214	43°52.5'	76°32.3		10.4		74	arr st # 31 ✓✓
2222	0222	dep	st. 31	123°		11		
2330	0330	43°46'	76°18.3		12.0		122	arr. st # 32 ✓✓
2340	0340	dep.	st 32	183°		11		
0015	0415	43°40'	76°18.9		6.1		148	arr st # 33 ✓✓
0033	0433	dep	st 33	183°		11		
0110	0510	43°34	76°19.2		6		124	arr st # 34 ✓✓
0128	0528	dep st	34.	244°		11		
0200	0600	Stopped for eng trouble & ramp & surge st log 190°. 1-4 mi.						
0237	0637	eng trouble Repaired proceed.				11		
0337	0737	43°28.8	76°34.1		11.9		100	arr st # 35 ✓✓
0350	0750	dep.	st 35	244°		11		

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct 11/67

VESSEL "Tucker"

CRUISE NO. 67-0-12

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
0518	0918	43°23.5'	76°49.3'	340°	12.5	9	216	Arr. St. # 36 ✓✓
			Coord. Wh. & Ar. & Bl. Mk.					
0535	0935	dep	St. 36	005°	—	—	—	
0610	1010	43°29.5'	76°48.8'	—	6.1	11	630	Arr. St. # 37. ✓
0640	1040	dep.	St. 37	003°	—	—	—	
0715	1115	43°35.5'	76°48.3'	—	6.0	11	630	Arr. St. # 38 ✓
0734	1134	dep	St. 38	234°	—	—	—	
0830	1230	43°30.5'	76°57.5'		8.3		126 fm	Arr St. # 1 ✓
			Marker Buoy Grappled					
1058	1458	Dropped 36'		recd.	350	LB.		
1100	1500	Retrieved Core						
		Preparing 2nd Core						
1325	1725	Dropped #2		cored	350LB.			
1330	1730	Recovered Core						
		Extruding core						
1630	2030	Marker Buoy recovered.						
1640	2040	dep	St. 1.	032°				
1805	2205	43°41.5'	76°48'	032°	13.		426	Arr St. # 39 ✓✓
1840	2240	dep	St 39	003°	—	—	—	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE Oct. 11/67

VESSEL "Tursiops"

CRUISE NO. 67-O-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
1915	2315	43°47.3'	76°47.1'	003°	6	11		Arr. St. # 40 ✓
		Rough Sea & Swell.		Vessel	Rolling heavily at times			
1937	2337	Dep	St 40	094°	—	—	—	
2019	0019			099°				
2038	0038	43°46.7	76°32.9	-	10.4	11	194	Arr. St. # 41 ✓
2100	0100	Dep St. 41		184°		10		
2140	0140	43°40.8	76°33.3		6		380	arr. St # 42 ✓✓
2217	0217	Dep. St. 42		184°		10		
2300	0300	43°34.8	76°33.9		6		550	arr. St. 43 ✓✓
2335	0335	Dep.	St. 43	260°		9		
0032	0432	43°33.6	76° 43		6.7			arr St # 9 ✓✓
0045	0445	Dep	St 9.	270°		9		
0855	1255			263°	84.8			
1045	1445	43°30.7	79°07'		20.5		456	arr. St. 3 ✓
			Piston coring St.					
1058			Drilled 1200 LB Core.					
1100			Recovered Core intact					

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

DATE _____

VESSEL _____

CRUISE NO. _____

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Remarks (Bt.no., station no. etc.)
1112	1512	dep. St # 6		248°		11		
		proceeded Burlington						
1430	1830		Arrived	Burlington		Pier 29		

67-0-18 PC stations

10	350 lb pc, 1200 lb pc	508-541'
15	1200 lb pc	562-510'
16	1200 lb pc	?
23	1200 lb pc x2	95'
24	1200 lb p.c	110'
25	1200 lb pc	?
26	1200 lb p.c	142'
27	1200 lb p.c	?
28	1200 lb p.c	?
29	1200 lb p.c	?
1 3	350 lb p.c x2 / 1200 lb p.c	126 fm 456'

Copy p. 1 & last 2 pages for 6-0 barrier positions

~1910 6 Oct 1967 +

~1310 12 Oct 1967

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

CSS Limnos

Bridge Log

68–0–13

Local DATE Aug 6th/68

GMT DATE Aug 6th/68

VESSEL CSS LIMNOS

CRUISE NO. 68-0-13

	Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
	1000	1400	Slipped from							
1	1015	1415	Burlington Bay		abm	n/c	to 085°		Head	11.0
2	1046	1446	BT Unit out		Loran Lat	43°18'42"	79°38'48"			
	1124	1524	Fifty mile Point		Brg 227°	dist 8.0				
3			Echo Sounder turned on		Lat	43°19'12"	79°29'36"			
	1200	1600	Fort weller west breakwater		brg 132	dist 6.4			cc 082°	
4			Lat 43° 19'06"N		Long 79°20'24"W		Course 312		↑	✓
	1230	1630	Fort Weller West breakwater		brg 188°	dist 5.3			cc 082°	
5			Lat 43° 20'N		Long 79°18'18"W		Depth 23 ft			✓
	1300	1700	Fort Niagara		brg 210°	dist 4.45 mi			cc 082° A	09 on 8
6			Lat. 43°20'30"N		Long 79°05.00.					
	1330	1730	Fort Niagara		brg 221°	dist 7.0 mi			cc 082° A	48 on 4
7			Lat 43°21'00"N		Long 78°54'24"W		depth			
	1400	1800	Wilson Breakwater		brg 186°	dist 2.2 mi			↑ c080°	✓
			Lat 43°21'30"N		Long 78°50.00W.		A 48		42.2 depth 180 ft	
8	1430	1830	Olcott Breakwater		brg 201°	dist 1.7			↑ c078°	
9			Lat 43°22'15"N		Long 78°42'12"W		A 48		depth 110 ft	
	1458	1858	Olcott Breakwater		brg 246°	dist 6.1 mi			cc 078°	
10			Lat 43°23.00"N		Long 78°35'09"W		A 48		depth 103 ft	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Aug 6th 1968

GMT DATE Aug 6th 1968

VESSEL ALBATROSS

CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1530	1930	Thirty mile Pt		brg 213°	dist 1.6 mi		Δ 48		59.3
		Lat 43° 24' 03" N		Long 78° 27' 48" W	co 078°		depth		122 ft
1600	2000	Thirty Mile Pt		brg 249°	dist 6.35 mi		Δ 48		64.7
		Lat 43° 24' 48 N		Long 78° 21' 00 W	c/c 084°		depth		162 ft
1630	2030	Point Breeze		brg 148°	dist 3.2 mi		Δ 48		70.4
		Lat 43° 25' 00 N		Long 78° 13' 42 W	c/c 085°		depth		193 ft.
1700	2100	Point Breeze		brg 228°	dist 4.75 mi		Δ 48		76.0
		Lat 43° 25' 24 N		Long 78° 06' 12" W	c/c 87°		depth		255 ft
1730	2130	Devils Nose		brg 17N°	dist 3.5 mi		Δ 48		81.6
		Lat 43° 25' 48" N		Long 77° 59' 06" W	c/c 090°		depth		224 ft
1800	2200	Devils Nose		brg 234°	dist 5.8 mi		Δ 48		87.5
		Lat 43° 25' 45" N		Long 77° 51' 48" W	co 090°		depth		361 ft.
1830	2230	Bogus Pt brg 188° dist 4.8 miles					Δ 48		93.0
		Lat 43° 25' 03"		Long 77° 44' 36"	Co 090°		dpt:	392 ft	
1900	2300	Braddock Pt brg 214° dist 7.2 miles					Δ 48		98.8
		Lat 43° 25' 36"		Long 77° 37' 24"	Co. 090°		dpt	483 ft	
1930	2330	Forest Lawn Pt brg 178° dist 10.2 miles					Δ 49		04.4
		Lat: 43° 25' 4"		Long 77° 30' 18"	c/c to 080°				
1956	2356	Lat 43° 26.6 N		Long 77° 24 W	Δ 49	09.3	688	D 25	on station

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 7-8-68
GMT DATE 7-7-68
VESSEL C. L. Mowat
CRUISE NO. 68-0-13

	Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cong. Stn. No.	Monitor Stn. No.
33	0400	0800	D.R. Position		43° 36' 18"	Long 78° 48'	48" Δ	4975		✓
			co 260°		depth 467 ft					
34	0430	0830	Point Walker	brg 212°	dist 23		Δ	4974	depth	449 ft
			Lat 43° 34' 42"	Long 78° 56' 13"		co 260°				✓
	0500	0900	Gibraltar Point	brg 280°	dist 15.1		Δ	5000.1		
35			Lat 43° 33' 42"	Long 79° 02' 48"	co 260°			depth		437 ft
	0530	0930	Gibraltar Point	brg 290°	dist 10.0		Δ	5005.6		✓
36			Lat 43° 33' 00	Long 79° 09' 42"	co 242°			depth		422 ft
37	0600	1000	Gibraltar Point	brg 322°	dist 7.5		Δ	5011.1		✓
			Lat 43° 30' 30"	Long 79° 16' 12"	co 242°			depth		392 ft
38	0630	1030	Gibraltar Pt	brg 002°	dist 8.6		Δ	5016.9		
		Lat	43° 27' 53"	Long 79° 23' 36"	Co. 242°			depth 358		ft ✓
	0700	1100	BA oil Toronto	brg 321°	dist 5.8		Δ	5022.6		
5.0 3 bar			Lat 43° 25' 03"	Long 79° 31' 09"	Co 242°			Depth 308		✓
40	0730	1130	Lat 43° 22' 26"	Long 79° 37' 19"	Co 240°		Δ	5028.1	225 ft	✓
	0800	1200	Vessel Stopped	2 miles from	Toronto Island					
	0845	1245	Vessel all fast to	Pier 29	Toronto Is.					

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 6-8-68

GMT DATE 7-8-68

VESSEL CSS LIMNOS

CRUISE NO. 68-0-13

	Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
20	2020	0020	43°26'N	77°24	000°	Proceeding	10 kt	F25	D25	OFF Oswego
21	2100	0100	43 34	77 28 30	000°	Δ 4916.7	11.0	579 ft		
22	2105	0105	43°3440	77°2354	000	8.8	11.0	562	F25	on Stn
	2126	0126	43°3454"	77°23 30	000°	Proceeding	to G	25	F25	Fin Stn
	2146	Ceased	Station	Ptd	Engine	Hauling			Δ 4920.0	
	2230	Oswego	Point Log 036° dist 19.2		Engine			depth	4 ft	
23		Pier	Lat 43°37'54"	Long 77°32'06"	Δ	4928.0	Co. 270°T			
	2300	0300	Nicholson Pt Log 022° dist 17.7			Δ 4933.9				
24		Lat 43°38'12"	77°40'30"	Co. 270°T					depth 482 ft	
25	2330	0330	DR Posn Lat 43°38'N	Long 77°48'W	Δ	4939.4	depth			554 ft
26	2400	0400	D.R. Posn Lat 43°38'N	Long 77°55'54"	Δ	4944.8	depth			559 ft
27	0030	0430	D.R. Posn Lat 43°37'36	Long 78°04'00"W	Δ	4950.5	depth			550 ft
28	0100	0500	D R Posn Lat 43°37'30	Long 78°	11'42"	Δ 4956.2	depth			531 ft
29	0200	0600	Bouchette Pt Log 341°	dist 14.9 mi	Δ	4964.8	depth			484 ft
			Lat 43°39'72"N	Long 78°22'24"W	co	260°				
30	0230	0630	Bouchette Pt Log 359°	dist 14.8 mi	Δ	4972.4	depth			475 ft
			Lat 43°38'54"N	Long 78°28'36"W	co	260°				
31	0300	0700	Roby Head Log 338°	dist 15 mi	Δ	4978.0	depth			475 ft
			Lat 43°38'00	Long 78°35'00	co	260°				
	0330	0730	Roby Head Log.	356° dist 14.9	Δ	4983.5	depth			472 ft
32			Lat 43°37'06"	Long 78°41'30"	co	260°				

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 9-8-68
GMT DATE 9-8-68
VESSEL CSS KINNOS
CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1908	departed	Pier 29	Burlington.						
1920	Burlington F.W.	buoy abeam	a/c to 078°	11.0					
2000	Fifty miles Ft Lkg	185° dist 5.5	a/c to 076	depth 222					
5-0 bead		Lat. 43°19'18"	Long 79°37'00"	Δ 50	79.3				
	Arrived Burlington								
	Departed for mid point cruise.								

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 9-8-68

GMT DATE 10-8-68

VESSEL CSS LIMNOS

CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
6-0 beach									
2032	0032	Fifty mile Pt		brg 223½	dist	8.9	depth	296	Co 076°
		Lat 43 20' 12"		Long	79 29' 30"	△	5085.4		✓
2100	0100	Fort Weller breakwater		brg 133°	dist 9.3		depth	328	a/c to 072°
		Lat 43 21' 00"		Long 79° 23' 00"		△	5090.6		✓
2130	0130	Port Weller breakwater		brg 168°	dist 8.1		depth	360 ft	✓
		Lat 43 22' 34"		Long 79 15' 18"		△	5096.1		✓
2200	0200	Fours mile Pt		brg 176½	dist 8.6		depth	381 ft	
		Lat 43° 24' 06"		Long 79° 08' 06"		△	5101.9	a/c to	081° ✓
2233	0233	Fort Niagara Pt		brg 195°	dist 9.4 mi		depth	376 ft	
		Lat 43° 25' 00"		Long 79° 00' 30"		△	5107.8		✓
2300	0300	Wilson Wharf		brg 158°	dist 7.0 miles		depth	410 ft	
		Lat 43° 25' 48"		Long 78° 54' 00"		△	5113.0		✓
2330	0330	Olcott wharf		brg 157°	dist 6.6 mi		depth	443	
		Lat 43° 26' 30"		Long 78° 47' 00"					✓
2400	0400	Thirty mile Pt		brg 125½	dist 9.2 miles		depth	493	
		Lat 43° 27' 54"		Long 78° 39' 30"		△	5124.1		✓
0030	0430	Thirty mile Pt		brg 154°	dist 6.4 mi		depth	518 ft	✓
		Lat 43° 28' 18		Long 78° 33' 00		△	5129.5		
0100	0500	Thirty Mile Pt		brg 201°	dist 7.1 mi		depth	54[illegible] ft	
		Lat 43° 29' 09"		Long 78° 25' 15"		△	5135.3	a/c 088°	✓
0130	0530	Thirty Mile Pt		brg 229°	dist 10.2		depth	[illegible] ft	
		Lat 43° 29' 12"		Long 78° 18' 48"		△	5140.6		✓
0200	0600	Point Breeze		brg 181°	dist 6.9 mi		depth	532 ft	✓
		Lat 43 29' 18		Long 78° 11' 06		△	5146.2		

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 10-8-68
GMT DATE 10-8-68
VESSEL C.C.S. Li...
CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0230	0630	Devils Nose		brg 151°	dist 8.5 mi		depth	551 ft	
		Lat 43° 29' 36"		Long 78° 04' 06"			Δ 515 1.9		
0300	0700	Devils Nose		brg 189°	dist 7.7 mi		depth	552 ft	
		Lat 43° 29' 48"		Long 78° 57' 00"			Δ 5157.2	Ch	088°
0330	0730	Bogus Pt		brg 163°	dist 9.5 miles		depth	510 ft	
		Lat 43° 29' 45"		Long 77° 49' 30"			Δ 5162.8		
0400	0800	Bogus Pt		brg 193°	dist 9.25 miles		depth	531 ft	
		Lat 43° 29' 30"		Long 77° 42' 36"			Δ 5148.8		
0430	0830	Bogus Pt		brg 218°	dist 11.75 miles		depth	534 ft	
		Lat 43° 29' 48"		Long 77° 35' 30"			Δ 5173.8		
0500	0900	Bogus Pt		brg 172°	dist 13.7 miles		depth	574 ft	
		Lat 43° 29' 48"		Long 77° 28' 18"			Δ 5179.4	Ch	078°
0530	0930	Smoky Pt		brg 173°	dist 13.7 miles		depth	625 ft	
		Lat 43° 30' 72"		Long 77° 21' 12"			Δ 5185.0		
0400	1000	Smoky Pt		brg 191°	dist 15.1 miles		depth	601 ft	
		Lat 43° 32' 00"		Long 77° 15' 00"			Δ 5120.5		
0630	1030	DR Posn	Lat 43° 33' 00"		Long 77° 08' 54"		Δ 5196.3	depth	628 ft
0700	1100	DR Posn	Lat 43° 34' 48"		Long 77° 00' 00"		Δ 5201.5	depth 625	F29
0720	1120		—	090°	—	—	—	F29	off station
0750	1150	DR 43° 34' 48"	76° 54' 48"	090°	4.3	11	620	F30	on
0800	1200	—	—	180°	—	11.0			off sta.

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 10-8-68
GMT DATE 10-8-68
VESSEL CSS Limnos
CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0840	1240	43°30'24"	76°54'00"	180	4.2	11.0	73 fms	E30	E30 ✓
0900	1300	—	—	270°	—	—	—	"	" 30
0930	1330	43°30'24"	77°00'00"	270	4.2	11.0	73 fms	E29	E29 ✓
0952	1352	—	—	216	—	—	—	"	" 29
1025	1425	DR 43°34'48"	77°05'48"	316	6.0	11.0	94 fms	E28	E28 ✓
1100	1500	—	—	180	—	—	—	"	" 28
1125	1525	DR 43°30'06"	77°00'00"	180°	4.2	11.0	128 fms	E27	E27
1151	1551	—	—	090	—	—	—	E28	E28
1623	1623	43°30'30"	76°58'00"	089°	6.1	11.0	130 fms	Cruising Stn	No. 1 ✓
1630	2030	43°30'38"	76°51'18"	2nd Mark Buoy			130 fms	" "	" 1
1900	2300	43°30'36"	76°56'55"				122 fms	2nd Cruising Stn	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 11-8-67

GMT DATE 11-7-67

VESSEL [illegible]

CRUISE NO. 67-C-15

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0100	0500	Gallo Island		Leg 096° dist 5.2		depth	136 ft		Pos. A
		Lat 43° 53'42"	Long 76° 22'48"	Δ 52 67.0		cor 034°	Speed 11 Kts		
0133	0533	Yorkshire Island		Leg 239° dist 4.3 mi		depth 173 ft			Pos. B
		Lat 43° 58'06"	Long 76° 30'12"	Δ 52 72.5		a/c 023°			
0147	0547	Grenadier Island		Leg 069° dist 4.3 mi		depth 102 ft			Pos. C.
		Lat 44° 00'33"	Long 76° 28'24"	Δ 52 75.1		a/c 062°			
0153	0553	Grenadier Island		Leg 071° dist 3.4 mi		depth 100 ft			Pos. D.
		Lat 44° 00'54"	Long 76° 27'24"	Δ 52 76.1		a/c 025°			
0202	0602	Grenadier Island		Leg 079° dist 2.6 mi		depth 136			Pos. E.
		Lat 44° 02'24"	Long 76° 26'12"	Δ 52 77.9		a/c 210°			
		returning to Pos. B.							
0230	0630	Stopped at Position B.		Δ 52 8.0					
0806	1206	Yorkshire 2d leg		221° x 4.9		a/c to 113°		99 ft	Pos. F
0825	1225	"	"	Leg 240 x 5.8		a/c to 207		116 ft	Pos. G
0832	1232	"	"	" 243° x 5.4		a/c to 199		105 ft	Pos. H
0855	1255	"	"	" 224 x 4.5		a/c to 203		104 ft	Pos. I
0903	1303	"	"	" 226 x 3.8		a/c to 113		104 ft	Pos. J
0927	1327	"	"	" 247 x 5.0		a/c to 211		89 ft	Pos. K
0937	1337	"	"	" 252° x 4.5		a/c to 304		100 ft	Pos. L
0945	1345	Stopped to clear traffic							
1001	1401	Yorkshire 2d leg		228 x 3.7		a/c to 205		142 ft	Pos. M
1010	1410	"	"	" 332 x 3.1		a/c to 124		130 ft	Pos. N
1029	1429	"	"	" 256 x 3.9		a/c to 205		128 ft	Pos. O
1033	1433	"	"	" 261 x 3.8		a/c to 304		130 ft	Pos. P

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 11-8-68
GMT DATE 11-8-68
VESSEL CSS LIMNOS
CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1048	1448	Yorkshire Bldg		233 T	2.7 a/c to 205		106 ft		Pom Q
1055	1455	"	" "	234 T	2.2 a/c to 124		106 ft		Pom R
1109	1509	"	" "	268 T	3.4 a/c to 205		134 ft		Pom S
1114	1514	"	" "	276 T	3.3 a/c to 304		138 ft		Pom T
1126	1526	"	" "	246 T	1.8 a/c to 205		123 ft		Pom U
1129	1529	"	" "	255 T	1.6 a/c to 124		118 ft		Pom V
1140	1540	"	" "	284 T	3.0 a/c to 190		151 ft		Pom W
		End of Line off Sounding							
1240	1640	43 58 12	76 29 36	At Anchor			157 ft	Casing	Stn No. 2
16 1445	2145	"	"						N° 2 OFF
16 1459	2159	CHARLIE SHL 4/40		020° T	2.2'	to 125°	134'		TP 'X'
1722	2122	"	" 4/0	343° T	3.4	to 215°	110 ft		TP 'Y'
1738	2138	"	" "	337° T	3.05 mi	a/c 305°	108 ft		TP Z
1758	2158	"	" "	016° T	1.75 mi	a/c 035°	138 ft		TP AA
1803	2203	"	" "	009° T	1.22 mi	a/c 025°	99 ft		TP BB
1817	2217	"	" "	331° T	2.8	a/c 035	105 ft		TP CC
1827	2227	"	" "	319° T	2.6	a/c to 332	96 ft		TP DD
		Ceased Line off Soundings							
1935	2335	BT cast Taken		44 09.3	72° 35.4				

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 11-8-68

GMT DATE 12-8-68

VESSEL C[illegible] Limnos

CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2258	0258	44°05'06"	76°38'04"	145	BT Surface Unit				
0100	0500	43 52'00	76 54 00	257°	Δ5382.2	11.0	122		J-30 ✓
0110	0510	—	—	—		—	—	off Stn	J-30
0135	0535	43°47'40"	76°54'00"	180°	Δ5386.9	11.0	236 ft	on Stn	I-30 ✓
0200	0600	—	—	180°	—	—	—	OFF Stn	I-30
0226	0626	43°43'20	76°54 00	180°	Δ5391.5	11.0	338	ON Stn	H-30 ✓
0302	0702	—	—	180°	—	—	—	OFF Stn	H-30
0328	0728	43°38'54"	76°54'00	180°	Δ5396.0	11.0	515 ft	ON Stn	G-30 ✓
0418	0818	—	—	270°	—		—	OFF Stn	G-30
0443	0843	43°39'00	77°00'00	—	Δ5400.4	11.0	502 ft	ON Stn	G-29 ✓
0533	0933	—	—	270°	—		—	off Stn	G-29
0558	0958	43 37'00	77°05 42	—	Δ5404.8	11.1	420 ft	ON Stn	G-28 ✓
0633	1033	—	—	000	—	—	—	off Stn	G-28
0702	1102	43°43'12	77°05'36	—	Δ5409.6	11.0	292 ft	on Stn	H-28 ✓
0735	1135	—	—	000°	—	—	—	off Stn	H-28
0805	1205	43°47'39"	77°06'00	—	Δ5414.3		161	on ✓	I 28 ✓
0825	1225	—	—	090°	—	—	—	off Stn	I 28
0849	1249	43°47'39"	76°59'54"	—	4.4	11.0	205	on Stn	I 29 ✓
0920	1320	—	—	180°	—	—	—	off	I 29
0935	1335	Reduced to slow speed Preparing							
1005	1405	43°43'16"	77°00'07"	180°	4.4	5.0	318	on Stn	H 29 ✓
1120	1520	—	—	085	5422.9			off	H 29
		Proceeding to Coring Station							
1220	1620	Main Duck Is West End bng		325° dist 12.75 mi			338 ft	on 340°	T.P. FF
1331	1731	" " " "		" " 063° " 8.5 mi			142 ft	—	T.P. FF.
1410	1810	43°49'00	76°44'16	At Station			198 ft	Coring Stn.	H 30 ✓
		Main Duck Island (West End) bng 043° dist 9.4 miles.							
1910	2310	—	—	252	—	—	—	off Stn	H 30

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 12-8-68
GMT DATE 13-8-68
VESSEL CSS LIMNOS
CRUISE NO. 68-0-13

TEMPERATURE GAUGE

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2010	0010	43 45 45	77° 00 16"	252	9.9	11.0	256	Stn 14	on Stn.
2054	0054	—	—	252	—	—	—	Stn 14	off Stn
2110	0110	43 45 03	77° 02 58"	—	2.1	11.0	258	Stn 15	on Stn
2132	0132	—	—	252	—	—	—	Stn 15	off Stn
2145	0145	Reduced to slow speed for traffic							
2158	0158	43 43 56	77 06 00	239	2.4	5.0	280	Stn 16	on Stn
2221	0221	—	—	260	—	—	—	Stn 16	off Stn
2238	0238	43 43 39	77 08 49	260	2.1	11.0	266	Stn 17	on Stn
2300	0300	—	—			—	—	Stn 17	off Stn
2318	0318	43 42 42	77 12 00	248	2.45	11.0	320	Stn 18	on Stn
2340	0340	—	—	252	—	—	—	Stn 18	off Stn
2353	0353	43 42 00	77 14 48	252	2.2	11.0	314	Stn 19	on Stn
0048	0448	—	—	252°		—	—	Stn 19	off Stn.
0102	0502	43 41 20	77° 18' 00	—	2.35	11.0	346	Stn 20	on Stn.
0207	0607	—	—	180°		11.1		Stn 20	off Stn
0220	0620	D.R. position 43° 38 00	77° 19' 12	—	2.7	—	410	Stn 21	on Stn
0248	0648	—	—	072°	—	11.0	—	Stn 21	off Stn.
0318	0718	D.R. 43° 39' 54	77° 12' 00"	—	5.3	—	333	Stn 22	on Stn.
0345	0745	—	—	072°	—	11.0	—	Stn 22	off Stn
0357	0757	D.R. 43 40 42	77° 09 00	—	2.3		339	Stn 23	on Stn
0416	0816	—	—	072°	—	11.0	—	Stn 23	off Stn
0430	0830	D.R. 43° 41' 12	77° 06' 12"	—	2.8		345	Stn 24	on Stn
0454	0854	—	—	072	—	11.0	—	Stn 24	off Stn
0507	0907	D.R. 43° 42' 12	77° 02' 54"	—	2.3	—	342	Stn 25	on Stn
0530	0930	—	—	072		11.0	—	Stn 25	off Stn
0547	0947	D.R. 43 42 24	77° 00 -00	—	2.3	—	349	Stn 26	on Stn
0612	1012	—	—	286	—	—	—	Stn 26	off Stn
		Proceeding to Coburg for Radar repairs							

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 13-8-68

GMT DATE 13-8-68

VESSEL C&S Limnos

CRUISE NO. 68-0-13

	Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
	0755	1155	43 47 N	77 24 W	286°	Radar in	work	16 fms	a/c to 098	
	✓	to Post	43°40	76 23 00						
	0900	1300	43°49'48"	77°08'48"	098°	11.0	10.0	225 ft	—	— ✓
	0930	1330	43°48'54"	77°01'54"	098°	5.0	10.0	296 "		✓
FIXES	1000	1400	43°43'00"	76°54'00"	098°	6.0	11.0	354 "		✓
	1100	1500	43°41'54"	76°39'00"	098°	10.5	10.5	394 "		✓
	1130	1530	43°41'00"	76°32'30"	098	5.0	10.0	436 "		✓
	1200	1600	43°40'12"	76°25'36"	095°	6.0	11.0	357 "		✓
	1212	1612	nine mile PT	brg 175° dist	8.6 miles				a/c to 093°	Pos GG
	1222	1622	"	" "	"					
	1251	1651	"	" "	"	216° dist	10.2 miles		Tow	HH
	1334	1734	43°39'57"	76°22'15"	at Anchor			260 ft		Stn No 1 ✓
	1445	2045	Depart Anchor Pos		340°	—	11.0	260 ft		
	1715	2115	Stony Pt brg	042° dist	1.75 miles			163 ft	a/c 340°	
	1745	2145	" " "	085 "	6.5 miles			127 ft	a/c 340°	
	1815	2015	Yorkshire Jet brg	282° dist	8.2 miles			124 ft	a/c 340	
	1830	2030	" " "	242 dist	3.2 miles			169 ft	a/c 340	
	1900	2100	Bear Pt brg	054 dist	6.1 miles			102 ft.	a/c to	346° TP
	1918	2118	44°05	76°34'30"	Thermister unit	in		106 ft		
	1932	1932	Horse Shoe Jet brg	066° dist	3.0 miles			94 ft	346°	
	2135	Thermister	unit	out	departing	Kingston				

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 13-8-68
GMT DATE 14-8-68
VESSEL CSS LIMNOS
CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2205	0205	Sounding started	Mellinkt	Knol	Lmoc	Co. 17	2°		
2230	0230	Long Point Lng	081° dist 4.2	Co 17	2° Depth 110 ft				
2300	0306	East Charity Shoal	Lt Lng	073° dist	4.3 mi	depth 116 ft	Co 17 2		
2330	0330	East End Maine Duck	298 Lng	278° X	2.8 mi	dept 94 ft	Co 17 2		
2336	0336	" "	" "	" Lng	319° X	1.4 mi	depth	122 ft q/c	to 249°
2400	0400	West "	" "	" Lng	005° X 2.6 mi	depth	174 ft	Co. 249°	
0030	0430	" "	" "	" Lng	049° X 6.6 mi	depth	162 ft	Co 249°	
0100	0500	Gravelly Pt Lng	231° dist 6.15 mi		depth	205 ft	Co 249°		
0130	0530	Point Petre Lng	290° dist 8.35 mi		depth	229 ft	Co 249°		
0200	0600	" " Lng	326° dist 6. mi		depth	262 ft	Co 249°		
0230	0630	" " "	010° " 7.1 mi		"	288 ft	Co 249°		
0237	0637	43 43 20	77° 12 00	—	—	11.0	304	H27	ON Stn
0253	0653	—	—	270°	—	11.0	—	H27	off Stn
0320	0720	43°43'26	77° 18'00	"	4.3	11.0	299 ft	H26	ON Stn
0331	0731	—	—	270°	—	—	—	H26	OFF Stn
0358	0758	43°43'20	77°24'00	"	4.4	11.0	252	H25	on Stn
0413	0813	—	—	180	—	11.0	—	H25	OFF Stn
0439	0839	43°39'00	77°24'00	—	4.4	—	424	G25	ON Stn
0451	0851	—	—	270°	—	11.0	—	G25	OFF Stn
0511	0911	43°39'00	77°30 00	—	4.2	—	408	G24	ON Stn
0523	0923	—	—	180		11.0	—	G24	OFF Stn
0547	0947	43°34'36"	77°30'00	—	4.4	—	570	F24	ON Stn
0610	1010	—	—	090	—	—	—	F24	OFF Stn
0630	1030	43°34'12	77°24'12	090	4.2	11.0	558	Co 090	———
0657	1057	43°34'36	77°18'24	090	8.8	11.0	558	F26	ON STN
0720	1120	—	—	090	—	—	—	F26	OFF STN
0750	1150	43°39'00	77°18'00	000	4.8	11.0	412	G26	ON STN
0802	1202	—	—	090	—	—	—	G26	OFF STN

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 14-8-68

GMT DATE 14-8-68

VESSEL CSS Limnos

CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0828	1228	43°39'00"	77°11'54	—	4.3	11.0	412ft	G 27	ON STN
0843	1243	—	—	180°	—	—	—	G 27	OFF STN
0910	1310	43°34'42	77°12'0"	—	4.0	11.0	530	F 27	ON STN
0926	1326	—	—	180	—	—	—	F 27	OFF Stn
0952	1352	43°30'00	77°12'06	180	4.6	11.0	677	E 27	ON STN
1003	1403	—	—	270	—	11.0	—	E 27	OFF STN
1027	1427	43°30'00	77°18'00	—	4.2	11.0	655	E 26	ON STN
1040	1440	—	—	180°	—	—		I 26	OFF STN
1107	1507	43°25'54	77°18'	—	4.2	11.0	700	D 26	ON STN
1128	1528	Finished Sample	Stations						
1138	1538	Comm	line of Canandaigua Co. 301°			depth	116 fms	from D26	
1145	1545	Smoky Pt Lt	178°	x 9.8 miles		depth	111 fms		
1155	1555	Glen Haven Range	221°	x 15.8 miles		depth	113 fms	Co 301°	
1200	1600	"	"	218	x 15.7 miles	depth	113 fms	"	"
1205	1605	"	"	216	x 15.6 miles	depth	107 fms	IP II	
1243	1643	"	"	220°	x 15.7 miles	114 fms	Coring Sta no 5.		
1840	2240	43°32'.06"	77°22'36"	309°			Finished Coring Sta	No. 5	
1900	2300	43°29'24	77°25'54	309	2.8	11.0	102 fms	Co 309°	
1930	2330	43°32'54	77°31'00	309	5.2	10.4	596ft	Co. 309°	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 14-8-68
GMT DATE 15-8-68
VESSEL CEELIMNOS
CRUISE NO. 68-0-13

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2000	0000	43°36'00	77°36'36	309°	5.5	11.0	528		✓
2100	0100	43°40'18	77°45'03	309°	7.8	7.8	740		✓
2040	Reduced Speed on Stbd Engine due to trouble.								
2100	Stbd Engine stopped								
2124	0124	43°42'12	77°47'02	309	2.6	8.0	450 ft	a/c to	270° TP
2200	0200	43°43'00	77°53'36	270	4.1	8.5	459 ft		✓
2230	0230	43°42'54	77°59'00	270	4.0	8.0	470 ft		✓
2300	0300	43°43'00	78°04'36	270	4.0	8.0	450 ft		✓
2330	0330	43°43'00	78°10.0	270	4.1	8.2	455 ft		✓
2400	0400	43°43.0	78°15'54	270	4.1	8.2	434 ft		✓
0030	0430	43°42'36	78°23'24"	270°	5.3	10.6	404 ft		✓
0100	0500	43°42'42	78°29'48"	270°	4.6	9.2	375 ft		✓
0130	0530	43°42'42	78°37'12"	270°	5.2	10.4	342 ft		✓
0200	0600	43°42'42	78°44'00	270°	5.0	10	360 ft		✓
0230	0630	43°42'48	78°50'48"	270°	5.1	10.2	342 ft		✓
0300	0700	43°42'54	78°57'30	268°	4.9	9.8	329 ft		✓
0330	0730	43°42'39	79°04'24"	268°	5.05	10.1	278 ft		✓
0400	0800	43°42.28	79°11'06	270°	4.75	9.5	78 ft		✓
0407	0807	43°42'28	79°12'51"	270°			46 ft	a/c 223° T.P.	
0430	0830	43°39'42	79°16'30°	223°	5.15	10.3	46 ft		✓
0447	0847	43°37'45	79°18'57	223°			45 ft	a/c 231° T.P.	✓
0500	0900	43°36'22	79°21'20	231°	4.9	9.8	100 ft		
0513	0913	Gibraltar Pt. Southern Red Lt			lug 011°	dist 1.6 mile		a/c 264°	Pass FJ
0517	0917	"	"	"	" 038°	" 2.1 "		a/c 050° depth 182	" K.K
0530	0980	"	"	"	" 000°	" 5.5 cables		a/c 320°	Pass L.L.
0534	0934	Gibraltar Pt. S. Red Lt			lug 073°	dist 3 cables	depth 94	a/c 230°	" M.M.
0545	0945	"	"	"	" 054°	" 2.3 miles	" 150	a/c 293°	" N.N
0550	0950	"	"	"	065°	" 2.6 "	" 134	a/c 050	" O.O

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 15-8-68

GMT DATE 15-8-68

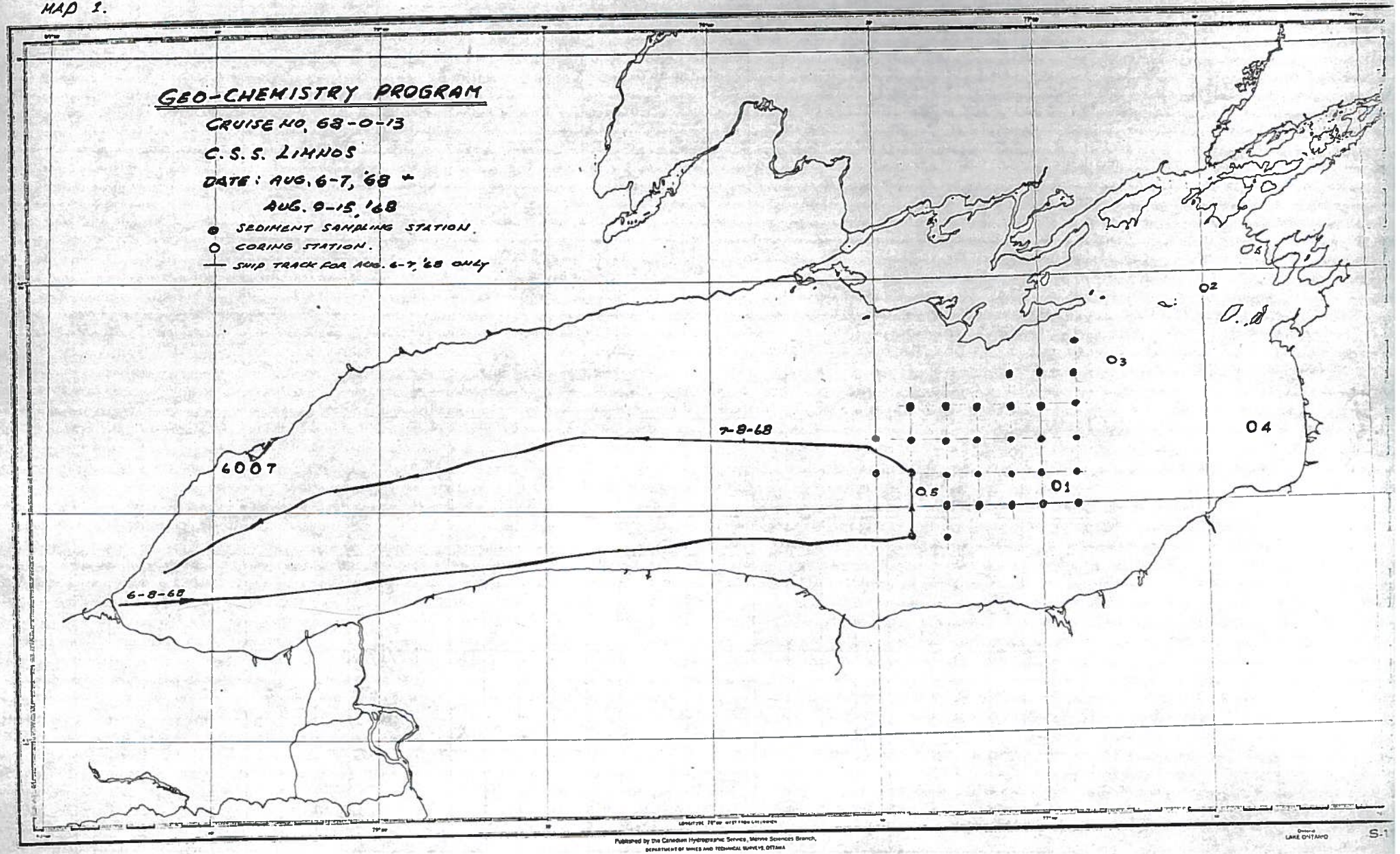
VESSEL [illegible]

CRUISE NO. 68-0-12

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0604	1004	Gibraltar Pt. S. Rod Lt.		brg. 119	dist 0.7		30 ft	[illegible]	Pt. EP
0608	1008	Toronto Western Gap Entrance		" 038	" 0.54		22 ft	at 220°	" QQ
0623	1023	" "	" "	" 047	" 2.05		122 ft	[illegible]	" RR
0627	1027	Toronto FW Buoy		054	" 2.6		80 ft	a/c 150	" SS
0645	1045	Toronto Western Gap entrance		078	" 0.66		40 ft	a/c 3	" TT
0649	1049	"	" "	092°	" 1.23		45 ft	a/c 230	" UU
0701	1101	MIMICO Point		brg 251°	dist 1.12		a/c to	223°	TP
0705	1105	MIMICO	Point 342° T		dist 0.88		40 ft	a/c [illegible]	" VV
0709	1109	" "	" 306°		dist 0.35		44 ft	a/c 165	" WW
0716	1116	Toronto Western Gap entrance		brg 083°	2.06		50 ft	a/c to 155°	" XX
0735	Anchored on Coring Pos'n		43° 35' 38"	79° 25' 51"			149 ft	Coring Stn	No. 6
0915	1315	Anchored on Coring Pos'n	43° 35' 36"	79° 23' 49"			188 ft	Coring Stn	No. 7
1245	1645	Left Anchorage at Coring Pt. No. 7.						ca. 320°	
1318	1718	Toronto Black Channel		Buoy abm to port				ca. 220°	✓
1345	1745	43 34' 00	79° 29' 18	220°	4.3	10.0	100 ft		✓
1415	1815	43° 30' 09	79° 33' 46"	220°	5.05	10.1	91 ft		✓
1445	1845	43° 26' 09"	79° 38' 00	220°	5.05	10.1	107 ft		✓
1515	1915	43° 22' 42"	79° 42' 26"	220	5.05	10.1	39 ft		✓
1544	1944	43 18' 45"	79° 46' 30	220°	4.65	10.0	67 ft		✓
1550	Entering	Burlington	Canal						

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

MAP 1.


GEO-CHEMISTRY PROGRAM
CRUISE NO. 68-0-13
C.S.S. LIMNOS
DATE: AUG. 6-7, '68 &
AUG. 9-15, '68
SEDIMENT SAMPLING STATION.
CORING STATION.
SHIP TRACK FOR AUG. 6-7, '68 ONLY
7-8-68
6-8-68
6007
01
02
03
04
05
LAKE ONTARIO
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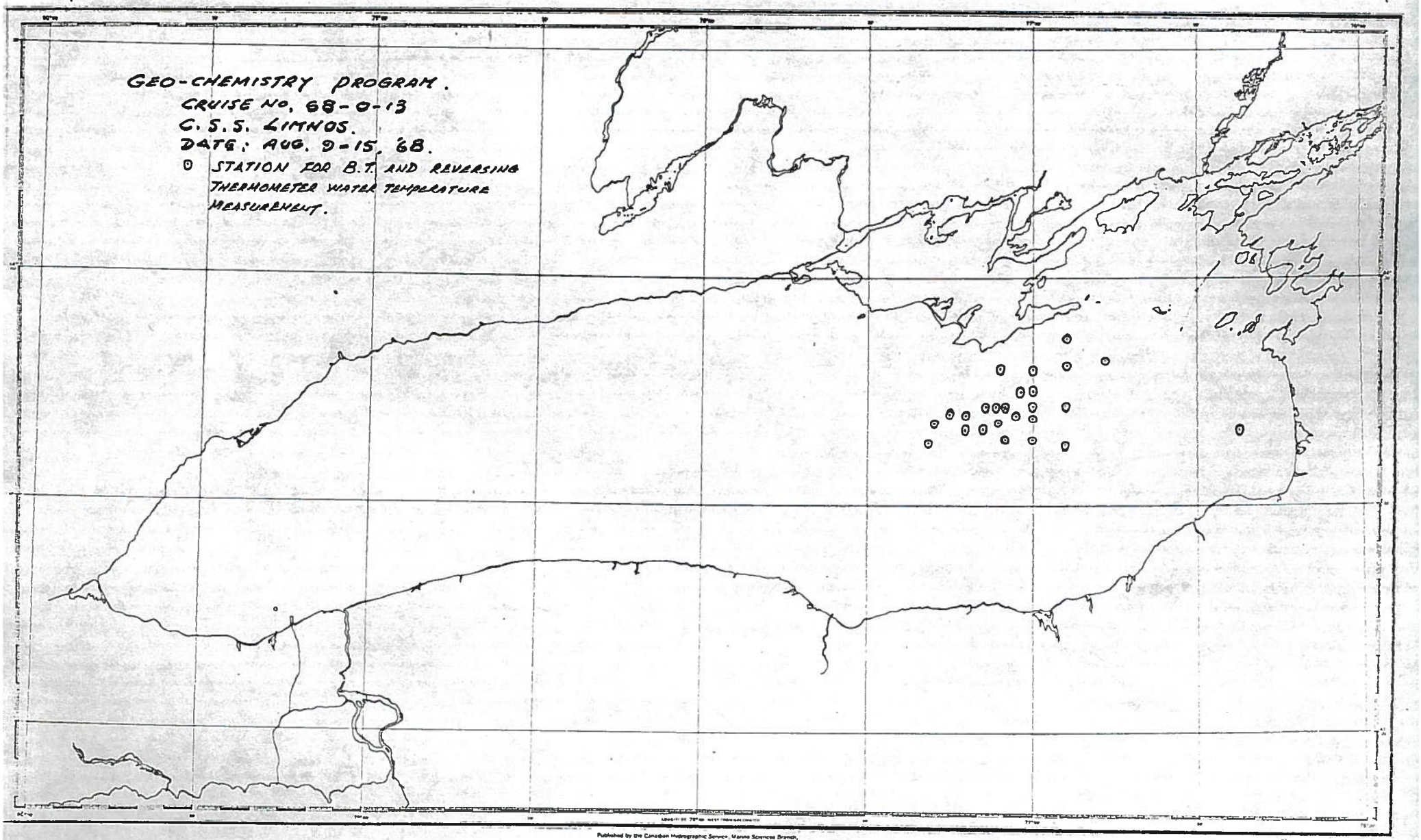
S-1

MAP 2.



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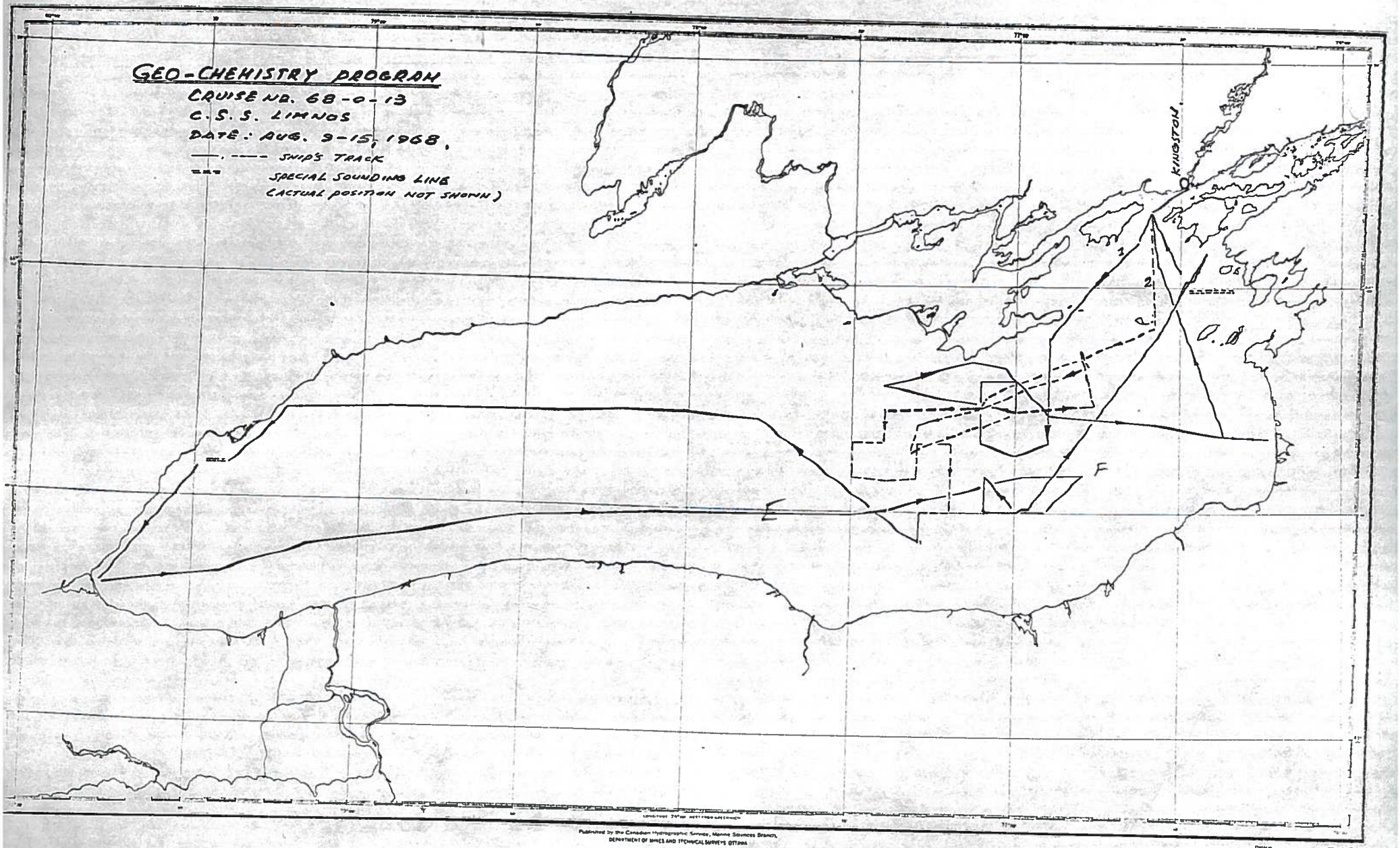
LAKE ONTARIO

MAP 3



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DEPARTMENT OF MINES AND TECHNICAL SURVEYS OTTAWA

LAKE ONTARIO

S-196

MV Theron

Bridge Log

68–0–17

Local DATE Sept. 9-68

GMT DATE

VESSEL Hero

CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1020	1420		Lap Beaucoup Island 29						
		Proceeding west to Hamilton Hbr. and Survey.							
1028	1428	43°17.7'	79°48.2'	abeam of buoy				FIX #1	Speed 4k
1032	1432	43°17.4'	79°48.2'	steering 262			44'	FIX #2	"
1036	1436	43°17.35'	79°48.6'	"	"		42'	FIX #3	"
1043	1443	43°17.15'	79°49.6'	"	"		62'	FIX #4	"
1048	1448	43°17.1'	79°50.12'	"	"		58'	FIX #5	"
1051	1451	43°16.96'	79°50.6'	"	"		54'	FIX #6	"
1054	1454	43°16.98'	79°51.25'	"	"		54'	FIX #7	"
1058	1458	43°16.9'	79°51.77'	"	"		44'	FIX #8	"
1101	1501	43°16.85'	79°52.18'	"	"		40'	FIX #9	"
1103	1503	43°16.7'	79°52.63'	changing to 44°			33'	FIX #10	"
1110	1510	43°16.55'	79°52.4'	steering 44°			31'	FIX #11	"
1115	1515	43°16.8'	79°52.1'	steering 44°			41'	FIX #12	"
1118	1518	43°16.95'	79°51.83'	"	"		49'	FIX #13	"
1121	1521	43°17.1'	79°51.6'	"	"		57'	FIX #14	"
1126	1526	43°17.54'	79°51.1'	changing to 115°			60'	FIX #15	"
1130	1530	43°17.34'	79°50.5'	steering 115°			68'	FIX #16	"
1133	1533	43°17.27'	79°50.2'	"	"		73'	FIX #17	"
1136	1536	43°17.1'	79°49.8'	changing to 009°			74'	FIX #18	"
1140	1540	43°17.34'	79°49.72'	steering 009°			64'	FIX #19	"
1143	1543	43°17.67'	79°49.68'	"	"		60'	FIX #20	"
1147	1547	43°18.2'	79°49.5'	changing to 135°			50'	FIX #21	"
1151	1551	43°18.06'	79°49.22'	steering 135°			50'	FIX #22	"
1157	1557	43°17.68'	79°48.8'	"	"		46'	FIX #23	"
1201	1601			GOING THRU BURLINGTON CANAL				FIX #24	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 6-7-71

GMT DATE

VESSEL THE KON

CRUISE NO. SD-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
12 11	16.11	abeam - fairway buoy outside	eastside	067°		11.		Fix 25	
1250	1650	43°21.5	79° 38.1'	067°		11	232'	Fix 26	
1311	1711	43°22.5	79° 33.7'	067°		11	273	Fix 27	
13.30	17.30.	43°24.0	79° 28.6'		15.0.		322	1 am.	STI.
13.40	17.40	Put marker buoy out.							
13.50	17.50	Started with small gravity core.							
14.32	18.32	4 samples taken, and one with the Petite bucket.							
15.10	19.10	Piston core lowered down.							
15.24	19.24	Piston core back aboard.						nbr. I.	
		B.T. Taken. #1							
		Preparing. Core # 2 (Piston)					322		
1800	2200	Core Swung out.							
1812	2212	Core dropped, and in bed					322	28 Fix	28
		43°24.0	79° 28.6'						
1820	2220			Core on deck.					
1855	2255			Drinker Bum arrived.					
1926	2326	43°24.2'	79°29.5'	325°		11	321	29 "	29
1932	2332	43°24.7'	79°29.7'	247°	0.6	11	318	30 "	30
1945	2345	43°23.7'	79°32.7'	—	2.4		292	31 "	31
2000	2400	43°22.8'	79°36.0'	—	2.5	11	240	32 "	32
2022	0022	43°21.5'	79°40.2'	"	3.2	11	168	33 "	33

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept 9 10-68

GMT DATE

VESSEL "TYPON"

CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2042	0042	43°20.1'	79°45.3'	198°	3.9	11	61	34 Fix	34
2059	0059						43	Fix # 35	
2059	0059	43°17.5'	79°46.3'	067°	2.8	11	43	35 "	35 T.P±
2111	0111	43°18.3'	79°43.3'	-"-	2.4		89'	FIX #	36
2127	0127	43°19.1'	79°40.2'	-"-	2.4	11		FIX #	37
2135	Stop Eng. Sounder Not working properly.								
Sept 10									
0444	0800	Drifting in lake, sounder not working.							
0646	1046	43°21.7'	79°37.2'	090°			235	38 Fix	38
0700	1100	43°21.7'	79°34.6'	247°	1.8	8	248	39 "	39 ✓
0717	1117	43°20.8'	79°37.2'	247°	2.1		236	40 "	40 ✓
0730	1130	43°20.2'	79°39.8'	067°	2.0	8	197	41 "	41 ✓
0748	1148	43°20.7'	79°37.8'	-	1.6		227	42 "	42 ✓
				Stopped, Core		8k "	2		STN #2
			Small Core	Taken.					
0924	1324		Core dropped and ... Contact.						
0945	1345		Marker buoy on deck.						
0950	1350		Proc. Niagara Harb.						
0950	-"-			093°	-	-			

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

near Niag. R.

Local DATE [illegible] 16-68

GMT DATE

VESSEL "T. STON"

CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1011	1411	43 20.4	79° 33.0	093°	3.5	11		43 Fix	43 ✓
1040	1440								44
1040	1440	43 20.1'	79° 22.8'	— " —	3.7	11	298	44 "	44 ✓
1112	1512	43 19.8'	79° 19.0'	— " —	6.4	11		45 "	45 ✓
1140	1540	43° 19.6'	79° 12.8'	— " —	4.5	11	294'	46 "	46 ✓
1156	1556	43° 19.5	79° 09.2'	— " —	2.6	11	245'	47 "	47 ✓
1211	1611	43. 19.4	79° 05.7'	a/c to 129°	2.6	11	36	48 "	48 ✓
1220	1620		a/c	207	1.9	11			
					20.		30		
1238	1638	43. 16.5	79° 05. 1'	anchored	at Niagara	River	49 Fix	49 ✓	
4.00	4.00	repairs	man aboard	from					
15.26	19.26	anchor	up to	036°	and				
15.40	19.40		a/c	000	1.9	11			
16.00	20.00		a/c	180°	3.3	11			
1635	0635		stopped &	F.O. Sta.	Wheeler	ent.			
			went ashore	with	Technician,	Toronto	Sounder	repaired	
16.54	20.54			030°		11			
17.01	21.01		a/c	350	1.1	11			

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept. 10. 68

GMT DATE

VESSEL HU. RON

CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1720	2120	43°21.1'	79°04.4'	350°	2.9	11	281	50 Fix	50 ✓
1732	2132	43°22.9'	79° 04.7'	350°	2.0	"	342	51 "	51 ✓
1737	2137	43°23.9'	79° 05.0'	168°	0.9	"	360	52 "	52 ✓
1751	2151	43°22.0'	79° 04.5'		1.9	"	315	53 "	53 ✓
1759	2159	43°21.2'	79° 04.2'		0.95		285	54 "	54 ✓
	←	ARRIVE	CORING STN	No 3					
1824	2224			PISTON CORE No 1 LOWERED			286	STN No 3	
1833	2233			PISTON CORE No 1 BACK ON DECK					
1913	2313	PT #3		Recovered marker buoy					
1917	2317		dep. Core St	#3 Com. Screw line Track Radar Fix					
				275°		11			
1930	2330	43°21.4'	79° 07.2'	275°	2.2		311	55 Fix	55 ✓
1950	2350	43°21.7'	79°12.7'		3.5	"	332	56 "	56 ✓
2017	0017	43°22.0	79°17.7'	—	3.9			57 "	57 ✓
		2035	Start	Eng. Ahead					
		2036	Full	Eng. Ahead		65°			
2042	0042	43°22.1'	79°22.8'	275°	3.7	8	320'	58 "	58 ✓
2055	0055	43°22.5	79°26.2'	247°	2.5	11	320	59 "	59 ✓

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE

GMT DATE

VESSEL

CRUISE NO. 17

	Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
G-O beach	2115	0115	43°21.2	79°30.6'	247°	3.4				60 ✓
	2133	0133	43°19.9'	79°34.6'	—"—	3.2	"			61 ✓
	2157	0157	43°18.2	79°40.2'	—"—	4.4	"	135		62 ✓
	2220	0220	43°16.7'	79°45.3'	120°	4.0	"	42		63 ✓
	2227	0227	43°16.0	79°44.0'	067°	1.2	"	53'		64 ✓
	2246	0246	43°17.2'	79°40.0'	—"—	3.1	"			65 ✓
G-O beach	2309	0309	43°19.0	79°34.6'	—"—	4.3	"	235'		66 ✓
	2331	0331	43 WB 20.2' 43 22.2'	79°30.1'	—"—	3.5	"	286'		67 ✓
	2350	0350	43°21.6'	79°25.6'	155°	3.5	"	318		68 ✓
	2355	0355	43°20.7	79°25.0	247°	1.0	"	313		69 ✓
G-O beach	0015	0415	43°19.3	79°29.6'	247°	3.6	"	282	70 —"—	70 ✓
	0035	0435	43°17.9	79°34.1'	"	3.6	"	231	71 —"—	71 ✓
	0055	0455	43°16.5'	79°38.6'	"	3.6	"	89	72 "	72 ✓
	0110	0510	43°15.5'	79°41.8'	246°	2.5	"	53	73	73 T.D.

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept. 11/68

GMT DATE

VESSEL THERON

CRUISE NO. 68-0-17.

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0132	0532	43°14.8'	79°36.5'	a/c 337°	3.9	11	47	74 Fix	74 TP
0149	0549	43°17.6'	79°38.1'	337°	3.0	11	149	75 "	75 ✓
0210	0610	43°20.9'	79°40.0'	337°	3.5	11	192	76 "	76 ✓
0225	0625	43°23.3	79°41.4'	a/c 033°	2.6	11	46	77 "	77 TP
0233	0633	43°24.3'	79°40.5'	a/c 157°	1.2	11	67	78 "	78 TP
0254	0654	43°21.0	79°38.6'	157°	3.6	11	225	79 "	79 ✓
0313	0713	43°17.7'	79°36.7'	"	3.6	11	178	80 "	80 ✓
0331	0731	43°14.5	79°34.9'	a/c 104°	3.4	11	63	81 "	81 TP
0338	0738	43°14.2'	79°33.2'	a/c 337°	1.2	11	47	82 "	82 TP ✓
0400	0800	43°17.5'	79°35.1'	337°	3.6	11	191	83 "	83 ✓
0420	0820	43°20.9	79°37.0'	337°	3.6	"	240	84 "	84 ✓
0440	0840	43°24.0'	79°38.8'	337°	3.8	"	174	85 "	85 ✓
0450	0850	43°25.3'	79°39.8'	038	1.5	"	90	86 "	86 TP
0457	0457	43°26.4'	79°38.6'	157°	1.2	11	77	87 "	87

F-0 barrier

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept 11-68

GMT DATE

VESSEL "THERON"

CRUISE NO. 68-C-17

	Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
G-O berrian	0520	0920	43-22.6'	79-36.5'	157	4.0	11	237	88 Fix	88 ✓
	0540	0940	43°19.3'	79°34.6'	157°	3.6	11	240	89 "	89 ✓
	0603	1003	43°18.5'	79°32.4	288°	4.1		103	90 "	90 Fix
					Proceeding to Burlington					
	0620	1020	43°16.4'	79°36.3'	288°	3.1	11	70	91 "	91 ✓
	0657	1057	43°18.3'	79°44.3'	288°	6.1	11	70	92 "	92
	0710	1110			ab. Toronto Buoy. Remaining in Canadian Pos 29					
	0730	1130			Tied up at Burlington Can Pos 29					
	1530	1930			Dept. Pos 29 heading in bay.					
					257					
	1544	1944	43°17.53'	79°49.40'	"		3		93 Fix	
	1546	1946	43°17.45'	79°49.69'	"		3		94 "	
	1548.5	1948.5	43°17.38'	79°50.10'	"		3		95 "	
	1551	1951	43°17.20'	79°50.57'	"		3		96	
	1554	1954	43°17.22'	79°50.96'	"		3		97	
	1556.3	1956.3	43°17.20'	79°51.10'	"		3		98	

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept. 11. 68

GMT DATE

VESSEL

CRUISE NO. 7

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1558	1958	43°17.20'	79°51.24'	257		3		99	
1600	2000	43°17.19'	79°51.39'	"		3		100	
1601	2001	43°17.16'	79°51.50'	"		3		101	
1603	2003	43°17.14'	79°51.63'	235		3		102	
1605	2005	43°17.07'	79°51.80'	"		3		103	
1607	2007	43°17.00'	79°51.96'	"		3		104	
1610	2010	43°16.84'	79°52.24'	"		3		105	
1611	2011	43°16.79'	79°52.37'	"		3		106	
1613	2013	43°16.67'	79°52.59'	"		3		107	
1616	2016	43°16.61'	79°52.72'	055		3		108	
1618	2018	Ship turning		"					
1624	2024	43°16.67'	79°52.57'	"		3		109	
1632	2032	Marker Buoy out Core Station #4							
		Gravity Core lowered							

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE [illegible]

GMT DATE

VESSEL

CRUISE NO.

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1744	2144			Piston Core lowered					
174									
1748	2148	43°16.5	79°52.2'	Piston Core brought on deck					
1749	2149			BT taken					
1835	2235			Piston Core #2 dropped.		4	44	Fix	
1840	2240			Core on deck.					
1906	2306			Drop of Coring St. Proceeding with hbw.				110 "	110
1910	2310	43°16.91	79°51.7'	076°			49	111 "	111
1913	2313	43°17.03	79°51.2'	076°			65	112 "	112
1915	2315	43°17.1'	79°50.95'	076°			71	113 "	113
1920	2320	43°17.2'	79°50.25	076°			76	114	114
1923	2323	43°17.2	79°49.7'	"			66	115	115
1927	2327	43°17.4	79°49.13'				53	116	116
1931	2331	43°17.5'	79°48.5'	"	4.		46	117	117
				End of line.					
1936	2336			Going through Buzzards Bay Canal under bridge					
1									

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept. 11- 68

GMT DATE

VESSEL THERON

CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1947	2347	43°17.5'	79°46.3'	067°	1.0	11	312	118	118 ✓
2000	0000	43°18.2'	79°43.6'	067	2.1	11	80	119 "	119 ✓
2020	0020	43°19.4'	79°39.4'	-"-	3.4	11	264'	120 "	120 ✓
2042	0042	43°20.9'	79°34.8'	"	3.7	11	418'	121 "	121 ✓
2101	0101	43°22.0'	79°30.8'	"	3.2	11	308'	122 "	122 ✓
2119	0119	43°23.2'	79°27.4'	71°	3.8	11	324'	123 "	123 ✓
2137	0137	43°24.0'	79°23.5'	"	3.0	11	344'	124 "	124 ✓
2156	0156	43°25.1'	79°17.9'	"	4.2	"	376'	125 "	125 ✓
2228	0228	43°26.7'	79°12.3'	"	4.4	"	397'	126 "	126 ✓
2257	0257	43°28.8'	79°06.8'	65°	4.4	"	443'	127 "	127 ✓
2319	0319	43°30.2'	79°00.7'	87°	4.1	11	470'	128 "	128 ✓
2350	0350	43°30.6'	78°53.5'	87°	5.3	11	462'	129 "	129 ✓
0023	0423	43°30.4'	78°45.7'	"	4.8	10.5	486'	130 -"-	130 ✓
0053	0453	43°30.4'	78°39.1'	"	5.6	10.5	522'	131 -"-	131

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept. 12/68

GMT DATE

VESSEL THERON.

CRUISE NO. 68 o - 17.

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0120	0520	43°30.6'	78°32.7'	087°	4.6	10.5	549'	132 Fix	132 ✓
0205	0605	43°30.1'	78°22.2'	a/c 128°	7.7	10.5	576'	133 Fix	✓133 T.P.
0222	0622	43°29.0'	78°18.5'	a/c 090°	3.3	10.5	[illegible]	[illegible] F.	134 T.P. ✓
0250	0650	43°33.0'	78°18.5'	000°	4.0	9.9	600'	135 Fix	135 ✓
0318	0718	43°37.0'	78°18.5'	a/c 090°	4.0	9.9	535'	136 Fix	✓ 136 T.P.
0331	0731	43°37.0'	78°15.3'	a/c 180°	2.3	10.4	558	[illegible] F.	✓137 T.P.
0354	0754	43°33.0'	78°15.3'	180°	4.0	10.5	600	138 F	138 ✓
0415	0815	43°29.0'	78°15.3'	090°	4.0	10.5	528	139 F	✓139 T.P.
0427	0827	43°29.0'	78°12.3'	000°	2.3	10.5	504	140 "	✓140 T.P.
0454	0854	43°33.0'	78°12.3'	000	4.0	9.5	612	141 "	141 ✓
0500	0900			Slow speed due fuel and long.		to traffic			
0528	0928	43°37.0'	78°12.3'	090°	4.0	8.5	570	142 "	142 T.P.
0540	0940	43°37.0'	78°09.1'	180°	2.3	10.5	576	143	✓143 T.P.
0604	1004	43°33.0'	78°09.1'	180°	4.0	10.5	624	144	144 ✓
0626	1026	43°29.0'	78°09.1'	090°	4.0	10.5	510	145	✓145 T.P.

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 8-12-68

GMT DATE

VESSEL M.V. Theron

CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0641	1041	43°29.0'	78°06.0'	000°	2.3	10.5	504	146	✓146 T.
0									
0707	1107	43°33.0'	78°06.1'	000	4.0	9.	618	147	147 ✓
0734	1134	43°37.0'	78°06.0'	210°	4.0	9.	568	148	✓148 T.
0800	1200	43°33.4'	78°08.8'	210°	4.0	10.	620	149	149 ✓
0808	1208			030°					
0810	12	Half							
0819	12 19	43°33.4'	78°09.0'	Stop					150
		Core St. #5.		0900	Grab x Sand		522	Fathoms.	STN #5
				0940	Comp. Work on		SS Board Side		
		BT #5		0955	Lowering Bag		#1.		
				1007	Core on deck		- -		
				11 42	Lowering Big Core		5 2		
				11 55	Cor. on deck		- -		
1210	1610		Marker	Buoy	Picked	Up			
1220	1620			332°	Left	9.5	Position #5.		
1239	1639	43°36.8'	78° 11.0'	332°	3.5.	9.5	578'	151 Fix	151 ✓
1300	1700	43°40.4'	78° 14.0'	332°	4.0	9.5	487	152 "	152 ✓
1332	1732	43°44.8'	78° 17.3'	332°	4.8	9.5	252	153 "	153 ✓
1401	1801	43°47.9'	78°22.2'		4.7		256	154	154 ✓

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept 12-68

GMT DATE

VESSEL Thomas

CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1405	1805	43°49.6'	78°23.3'	S/C 152° half speed	4.9	7.5	212	155 Fix	155 TP
1428	1828	43°48.8'	78°23.1'		0.9	7.0	250	approx.	approx. #6
1435	1835	MARKER BUOY DROPPED							
1440	1840	Dropped gravity core			# I				
1445	1845	Dropped gravity core			" II				
1449	1849	DROPPED GRAVITY	CORE		# III				
1455	1855	DROPPED GRAVITY	CORE		# IV				
1458	1858	DROPPED GRAVITY	CORE		# V				
1503	1903	BT LOWERED.			#6				
1513	1913	PISTON CORE LOWERED			Nº 1				
1524	1924	Piston Core on deck			"				
1615	2015	Marker Buoy picked up							
1632	2032	43°48.5'	78°22.3'	180°	-	10.5	261	156 Fix	156
1638	2038			half Spd Eng. 8.					
1646	2046	43°46.6'	78°22.3'	180°	1.8	8	284	157	157
1659	2059	43°44.9'	78°22.3'	180°	1.8	8	325		158
1713	2113	43°43.3'	78°22.3'	180°	1.7	8	375	159 Fix	159
1726	2126	43°41.3'	78°22.3'	180°	2.0	8	406	160 F	160
1734	2134	43°40.0'	78°22.3'	180°	1.3	8	470	161	161

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept 12 · 68

GMT DATE

VESSEL THOMAS C. W.

CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1743	2143	43°39.3'	78°22.3' at 000°	180°	0.8		485	162 Tx	162
1750	2150	43°40.0'	78°27.3'		0.7		470	163	163
1800	2200	Gravity Core lowered		Core Stn 7.					
1842	2242	Piston Core dispatched							
1855	2255	Piston Core on deck							
1930	2330	Chamber Bay Recovered.							
		drifting on Cor Station							
		Dismantle Piston core.							
2053	0053	Full ahead Eng. Revs. 2[illegible]							
2100	0100	43°38.7'	78°23.9'	270°		11			164 ✓
2125	0125	43°38.3'	78°29.0'	270°	4.0	11	465		165 ✓
2137	0137	43°38.3'	78°32.5'	"	2.3		467'		166 ✓
2149	0149	43°38.0'	78°36.0'	184°	3.2	11	470'	167"	167 ✓
2210	0210	43°34.3'	78°35.3'	184°	3.7	11	520'	168 "	168 ✓
2229	0229	43°31.1'	78°36.0'	"	3.3	11	536'	169"	169 ✓
2255	0255	43°26.7'	78°36.1'	"	4.5	11	440'	170 "	170

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 12-11-64

GMT DATE

VESSEL "T/V RON"

CRUISE NO. 6-64-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2307	0307	43°24.2'	78° 36.3'	256	2.4	4	256'	171 FIX	171 ✓
		SOUNDING PATTERN BROKEN OFF DUE TO BAD							
			WEATHER.	SLOW AHEAD					
2330	0330	43°23.8'	78° 38.6'	256°	1.7	4	238'	172 FIX	172 ✓
2350	0350	43°23.3'	78°40.7'	260°	1.5	4	225'	173 "	173 ✓
0009	0409	43°23.1'	78°42.9'	256°	1.7	4.9	233'	174 "	174 ✓
0030	0430	43°22.8'	78°45.3'	"	1.7	4.9	238'	175 "	175 ✓
0050	0450	43°22.3'	78° 47.5'	"	1.7	4.9	246'	176 "	176 ✓
0111	0511	43°22.1'	78°49.9'	"	1.7	4.9	248'	177 "	177 ✓
0130	0530	43°21.7'	78° 51.9'	"	1.6	4.9	237'	178 "	178 ✓
0150	0550	43°21.1'	78°54.3'	"	1.8	4.9	227'	179 "	179 ✓
0211	0611	43°20.7'	78°56.6'	"	1.7	4.9	208'	180 "	180 ✓
0229	0629	43°20.5'	78°58.5'	"	1.5	4.9	202'	181 "	181 ✓
0250	0650	43°20.1'	79° 01.0'	"	1.9	4.9	184	182 "	182 ✓
0310	0710	43°19.4'	79° 03.2'	"	1.7	4.9	53'	183 "	183

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept 13-68

GMT DATE

VESSEL Hero

CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
03.16	07.16			Stopped down bound in Niagara River at Capt. orders			drifting in lake		
0408	0808	43°19.1'	79°04.5'	BT taken	—		44	B.T.	St 8 ✓
0410	0810	43°19.1'	79°04.5'	322	—	10.	44	dep	St. 8
0431	0831	43°21.5'	79°07.0'	—	3.0	"	318	Arr.	St. 9 ✓
0437	0837			322	—	—	—	dep	St 9
			BT # 9						
0454	0857	43°23.9'	79°09.5'		3.		370	Arr	St. 10 ✓
		BT # 10							
0500	0900	—	—	322°	—	—	—	dep	St 10
0520	0920	43°26.2'	79°12.1'		3.0		416'	ARR. STN Nº 11	
			BT # 11						
0526	0926	—	—	322°				DEP STN Nº 11	
0545	0945	43°28.6	79°14.5'	—	3.0		430	ARR STN Nº 12	
			BT # 12						
0550	0950			322°	—	—	—	DEP STN Nº 12	
0608	1008	43°31.0'	79°17.1'	—	3.0		378	Arr.	St. 13 ✓
			BT # 13						
0612	1012	—	—	322°	—	—	—	dep	St. 13

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE Sept. 13-68
GMT DATE
VESSEL "THERON"
CRUISE NO. 68-0-17

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0631	1031	43°33.4'	79°19.6'	322°	3.0	10.	310	Cen	St. 14
			BT # 14						
0635	1035	-	-	322°	-	-	-	dep	St 14
0656	1056	43°35.7	79°22.0'	-	3.0	"	218	Cen.	St. 15
			BT #15						
0702	1102	-	-	214°	-	-	-	dp	St 15
0720	1120	43°33.3'	79°24.5	214°	3.0		230	"	184 ✓
0746	1146	43°29.5'	79°27.9'	214°	3.4		258	Fix	185 ✓
0800	1200	43°27.0'	79°30.1'	214°	2.8	12.5	306	Fix	186 ✓
0818	1218	43°24.1'	79° 32.8'	214°	3.5	"	281	"	187 ✓
0839	1239	43°20.9'	79° 35.5'	214°	3.7	"	246	"	188 ✓
0854	1254	marker buoy out (on stn)							Stn 8 ?
0858	1258	Comm. Coring on St.							8.
0920	1320	Comp. —	" —	—				#16	—
0938	1338	Securing Big Core		111.					
0943	1343	Core on deck.		— — .					
		→ core taken 600' from marker buoy on st. 1 core							of 48°
1021	1421	Marker Buoy on Deck		070°					
—	—								

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 7/ 17 /08

GMT DATE /

VESSEL T[illegible] V

CRUISE NO. [illegible]

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1021	1421	43°20.9'	79°35.5'	070°	—	—	240'	coring STN	# 8
								conv. also	# 16
1027	1427	43°21.2'	79°34.2'	157°	1.0	11	257	FIX	189 ✓
1040	1440	43°20.0'	79°33.3'	157°	1.4	11	255'	FIX	190 ✓
1051	1451	43°17.6'	79°31.9'	157°	2.6	11	234'	FIX	191 ✓
1100	1500	43°15.7'	79°30.6'	157°	[illegible]	11	170'	[illegible]	192 ✓
1115	1515	43°13.6'	79°29.8'	105°	2.2	11	62'	"	193 ✓
1122	1522	43°13.3'	79°28.2'	337	1.2	11	64'	STN	# 17 arr
				BT # 17	taken				
1128	1528	—	—	337°	—	11	64'	depart	STN # 17
1140	1540	43°14.8'	79°28.8'	337°	1.6	11	96'	FIX	# 194 ✓
1151	1551	43°14.3'	79°29.9'	—	1.8	"	181'	✓ Arr	STN # 18
				BT # 18					
1155	1555	—	—	337°	—	11	181'	DEP	STN # 18
1216	1616	43°19.3'	79°31.7'	337°	3.3	11	257	arr. ✓	STN # 19 BT
			BT # 19						
1221	1621	—	—	337°	—	11	—	DEP	STN 19
1239	1639	43°22.3'	79°33.0'	337°	3.3	11	262	arr. ✓	STN # 20
			BT # 20						

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE
GMT DATE
VESSEL
CRUISE NO.

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Hamilton Stn. No.
12 46	16.46			337°		11		Dep.	# BT STN 20
13.06	17.06	43° 25.3'	79° 35.1'		3.3	11	214	arr.	# BT. STN. 21.
		BT # 21							
1310	1710	—	—	337.	—	11	—	Dept.	STN 21. BT
13.30	17.30	43°28.3'	79° 36.8'		3.3		58'	arr STN	# 22 BT.
		BT # 22							
1335	1735	—	—	a/c 210°	—	11	—	dept STN	# 22 BT.
13.51	17.51	43° 25.8'	79° 38.7'	210°	2.9	11	101'	Fix 195	195
14.16	18.16	43° 21.8'	79° 41.6'		4.5	11	115'	Fix 196	196.
14.34	18.34	43° 19.3'	79° 44.0'	a/c 244°	3.1	11	114'	Fix 197	197
14.45	18.45		abm. fairway buoy Burlington				canal	0.4 m.	off.
1450	1850		ENTERING	CANAL					
1451	1851		UNDER	BRIDGE					
15.15	19.15	Vessel secured at Pier 29 Burlington.							
		Total dist. Steamed on Cruise 68-017 513 miles.							

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

CSS Limnos

Bridge Log

68–0–18

done

Copy p 10 - p 14 for
G-O barrier positions
at 1230 + 1245 + 0730 - 0800
16 Sept 68 21 Sept 68

Local DATE
GMT DATE 16-9-68
VESSEL Limnos
CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1115	1515	Dep't Pier 29		Burlington					
1125	1525	Clear	Burlington	Canal, Res...			set	a/c to 157°	
1127	1527	Burlington Canal Pier		brg 320	x 1.4 n/c	to 067°	5 min		
1145	1545	Shell oil	wharf	brg 016	x 5.0	miles	52 ft		
1200	1600	"	"	"	brg 342	x 3.9 miles	132 ft		
1215	1615	"	"	"	brg 310	x 4.5 miles	205 ft		
1230	1630	"	"	"	brg 291	x 6.0 miles	256 ft	a/c 066°	
1245	1645	"	"	"	brg 280°	x 8.1 miles	296 ft	a/c 060°	
1300	1700	St Lawrence Cement	wharf	brg	321°	x 8.95 miles	336 ft	a/c 066°	
1315	1715	"	"	"	brg	301° x 10.0 miles	340 ft	a/c 068°	
1330	1730	"	"	"	brg	297° x 11.3 miles	358 ft		
1345	1745	Port Weller Pier		brg	155 x 11.0	"	382 ft	a/c 064°	
1400	1800	"	"	"	"	168 x 11.1 miles	414 ft	a/c 061°	
1415	1815	"	"	"	"	179 x 11.85	"	431 ft	a/c 063°
1421	1821	43° 27' 42"	79° 11' 54"	—			434 ft	stopped	
1448	1848	43° 26' 12"	79° 12' 05"	Head	Spit	buoy	426 ft	Casing	Stn #1
		Four Mile Point		brg	163° x	11.1 miles			
1700	2100			085°				Comp Stn #1	
1715	2115	Four Mile Point		brg	174° x 10.7		422 ft		
1730	2130	"	"	"	brg	186° x 10.8	412 ft		
1745	2145	"	"	"	brg	198° x 11.5	448 ft	a/c 052°	
1800	2200	Wilson	wharf	brg.	139.5°	10.0	422 ft		
1820	2220	"	"	brg	156 x 8.8		445 ft		
1845	2245	"	"	brg	182° x 8.6		472 ft		
1900	2300	Oswego	wharf	brg	168° x 8.0		470 ft		
1915	2315	"	"	brg	180° x	7.8	490 ft	a/c to 080°	
1930	2330	Thirty mile Pt		brg	130°	x 10.0 miles	529 ft		
1945	2345	"	"	brg	141°	x 8.4 miles	549 ft		

NOTE: Indicate time of every stop and start, speed if different from normal Cruising speed.

Local DATE 16-9-68
GMT DATE 17-9-68
VESSEL C.S.S. LIMNOS
CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2000	0000	Thirty mile Pt	bg	156° x	7.5 miles		570 ft		
2015	0015	"	" " bg	174° x	7.3 miles		582 ft		
2030	0030	"	" " bg	191° x	7.8 miles		592 ft		
2045	0045	"	" " bg	207° x	9.1 miles		588 ft		
2100	0100	Point Breeze	bg 143° x	10.7 miles			597 ft		
2115	0115	Point Breeze	bg	157° x 10.0	miles		594 ft	a/c 085°	
2130	0130	"	" bg	171° x 9.3	miles		594 ft		
2145	0145	"	" bg	185° x 9.4	miles		600 ft		
2200	0200	"	" bg	199° x	10.0 miles		590 ft		
2215	0215	Devils Nose	bg	161° x 10.6	miles		611 ft		
2230	0230	"	" bg	174° x 10.3	miles		604 ft		
2245	0245	"	" bg	189° x 10.5	miles		584 ft		
2300	0300	"	" bg	201° x 11.3	miles		556 ft		
2315	0315	Bogus	Point bg	168° x	12.8 miles		568 ft		
2330	0330	"	" bg	177° x	12.7 miles		540 ft		
2345	0345	"	" bg	190° x	13.1 miles		584 ft		
2400	0400	"	" bg	199° x	13.9 miles		592 ft		
0015	0415	"	" bg	208° x	15.0 miles		596 ft		
0030	0430	"	" bg	215° x	16.5 miles		601 ft		
0045	0445	"	" bg	221° x	18.1 miles		562 ft	a/c 090°	
0100	0500	Lygonia	Point bg	180° x	18.0 miles		567 ft		
0115	0515	Fairbanks	Pt bg	150° x	19.4 miles		562 ft		
0130	0530	"	" bg	156° x	18.2 miles		554 ft		
0145	0545	"	" bg	164° x	17.5 miles		538 ft		
0200	0600	"	" bg	172° x	17.0 miles		529 ft		
0215	0615	"	" bg	180° x	16.8 miles		565 ft		
0230	0630	"	" bg	189° x	17.0 miles		558 ft		
0245	0645	"	" bg	197° x	17.6 miles		649 ft		

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 17-9-68

GMT DATE 17-9-68

VESSEL C&GS "Lonsdale"

CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0300	0700	East Sag Pt. bg		169° x 16.1 miles			636 ft		
0315	0715	" "	" bg	178° x 16.3 miles			676 ft		
0330	0930	West Nine Mile Pt	bg	134° x 13.4 miles			654 ft		
0345	0745	" "	" "	143° x 11.6 miles			718 ft	aft 087°	
0400	0800	" "	" " bg	153° x 10.4 miles			698 ft		
0415	0815	" "	" " bg	167° x 9.7 miles			701 ft		
0426	0826	43°34'24	76°36'06				614 ft	F33	ON Stn
0452	0852	—	—	090°	—	—	—	F33	off Stn
0515	0915	Oswego Main	bg	178° x 5.9 miles			454 ft		
0530	0930	"	" bg	201° x 6.35 miles			204 ft		
0550	0950	43°34'24	76°24'00				217 ft	F35	ON Stn
0555	0955	—	—	328°	—	—		F35	off Stn
0600	1000	Nine Mile Pt	bg	151° x 3.25 miles			234 ft		
0615	1015	" "	" bg	150° x 6.4 miles			382 ft		
0630	1030	" "	" bg	150° x 8.8 miles			400 ft		
0645	1045	Stony Point	bg	044° x 12.3 miles			360 ft		
0704	1104	Yellow Island	bg	023° x 9.8 miles			274 ft		
0715	1115	"	" bg	034° x 8.8 miles			216 ft		
0731	1131	"	" bg	050° x 8.1 miles			181 ft		
0755	1155						142	A/C 095° T	
0800	1200	Main dock 2nd	west End bg	005° x 3.9 miles			144	A/C 327° T	
0821	1220	"	" "	" bg	071° x 2.48		110 ft	a/c to 024°	
0830	1230	"	" "	" bg	105 x 1.8		118 ft		
0845	1245	"	" "	bg	162° x 2.55		112 ft		
0915	1315	Vessel Anchored on Coring Station			44°01'42		76°37'30	Dept 134 ft	Stn
1357	1757			184°					off Stn
1415	1815	Pidgeon Island		101° x	2.6		112 ft		
1430				147.5 x	3.5		88 ft		

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 17-9-68

GMT DATE 17-9-68

VESSEL C.S.S. Dawson

CRUISE NO. 68-018

Local Time	GMT	POSITION Lat. N.	Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1432	1832	Pidgeon	Island	151° x 3.7	miles			TP of	309°
1445	1845	Yarmouth	Pt	065 x 2.42	miles		73 ft		
1500	1900	"	"	084 x 3.15	miles		70 ft		
1532	1932	44°09'24"	76°39'03"	—	—	—	48 ft	AT Lt. Stn	No 3
1610	2010	Proceeding 050° along							
1613	2013	44°09'25"	76°39'02"	050°	300 ft		51 ft		Stn #4
1622	2022	44°09'27"	76°38'56"	050°	—		52 ft		Stn #5
1631	2031	44°09'30"	76°38'52"	050°	—		52 ft		Stn #6
1650	2050	44°09'33"	76°38'46"	050°	—		52 ft		Stn #7
1656	2056	44°09'28"	76°38'50"	212°	—		52 ft		Stn #8
1704	2104	44°09'26"	76°38'51"	212°	—		54 ft		Stn #9
1748	2148	44°09'24"	76°38'56"	310°	—		53 ft		Stn #10
1836	2236	44°09'25"	76°38'57"	043°	—		52 ft		Stn #11
1847	2247	44°09'27"	76°38'54"	052	—		54 ft		Stn #12
1855	2255	44°09'29"	76°38'50"	045°			53 ft		Stn #13
2									

NOTE: Indicate time of every stop and start, speed if different from normal.

Local DATE 17-9-68
GMT DATE 18-9-68
VESSEL CSS LIMNOS
CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2006	0006	44° 09 25	76° 39 04	295	—	—	48 ft		#14
2019	0019	44° 09 20	76° 39 06	310	—		40 ft		#15
2055	0055	44° 09 18	76° 39 05	040			52 ft		#16
2112	0112	44° 09 16	76° 39 03				55 ft		#17
2132	0132	44° 09 18	76° 39 00	040	—		55 ft.		#18
2223	0223	44° 09 20	76° 38 55	075			59 ft		#19
2307	0307	44° 09 23	76° 38 56				55 ft		#20
2322	0322	44° 09 20	76° 39 02				53 ft		#21
2333	0333	Finished Coring Station.							
2340	0340	Nine mile Pt. Lig		089° x	4.0 miles, a/c to 090		dpt 58 ft		A
2400	0400	Nine mile Pt. Lig		083° x	0.5 miles a/c to		122° dpt 64 ft		B
0023	0423	Long Pt Lig		173° x 0.8	miles a/c 270°		dpt 59 ft		C
0040	0440	"	"	106° x 3.7	"		92 ft a/c 261°		
0105	0505	"	"	095° x 8.2	miles		65 ft a/c 218°		"D"
0122	0522	Emeric Pt Lig		026° x 1.3	miles		88 ft a/c 090°		"E"
0132	0532	Reduced speed to slow speed for ship crossing							
0143	0543	Resume full speed.							
0145	0545	Emeric Pt	Lig	302° x 2.33	miles		54 ft		
0200	0600	"	" Lig	286° x 4.5	miles		114 ft		
0215	0615	Long Pt	Lig	060° x 2.73	miles		36 ft		
0230	0630	"	" Lig	358° x 1.4	miles		10 ft		
0245	0645	Bear Pt	Lig	331° x 0.96	miles		81 ft		
0252	0652	Wilson Pt	Lig	074° x 1.0	miles		75 ft a/c 180°		"F"
0308	0708	"	" Lig	023° x 2.4	miles		70 ft a/c 270°		"G"
0330	0730	Bear Pt	Lig	028° x 2.76	miles		54 ft		
0345	0745	Long Pt	Lig	029° x 3.5	miles		81 ft		
0400	0800	Pigeon Island	Lig	065° x 1.75	miles		93 ft		
0415	0815	Emeric Pt.	Lig.	321° x 3.9	miles		98 ft		

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 18-9-68

GMT DATE 18-9-68

VESSEL CSS "Limnos"

CRUISE NO. 68-0-18.

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0430	0830	Emeric	St beg.	005° X 3.1 miles			72 ft		
0445	0845	La Force	Island beg	340° X 3.0 miles			91 ft		
0500	0900	" "	" beg	025 X 3.2 miles			91 ft		
0515	0915	" "	" beg	055° X 4.9 miles			70 ft		"H"
0527	0927	" "	" beg	047° X 1.0 miles			94 ft		"I"
0545	0945	Cape Vesey	beg	292 X 2.9 miles			100 ft		
0600	1000	La Force	Island beg	356° X 4.7 miles			99 ft		
0615	1015	Duck Island W End	beg	145° X 6.15 miles			160 ft		
0630	1030	Main Duck Isl	" " beg	169° X 5.1 miles			110 ft		
0645	1045	" "	" " beg	194 X 5.2 miles			114 ft		
0700	1100	York Shire	Island beg	194 X 5.2 miles			54 ft		
0715	1115	" "	" beg	074° X 5.0 miles			94 ft		
0755	1155	Fox Isl	beg 004° X 1.1 miles				31 ft	a/c to 158°	"J"
0810	1210	Point Peninsula	beg 118° X 1.8 miles				78 ft		
0820	1220	"	" beg	058° X 1.16 miles			65 ft	a/c to 110°	
0829	1229	"	" beg	342° X 1.2 miles			52 ft	a/c to 097°	
0845	1245	Pillar	Point beg	022° X 2.0 miles			73 ft		
0904	1304	Pore Tot	43° 55' 25"	Long 76° 09' 06"			22 ft	a/c to 228	K
0927	1327	Pore Tot	43° 52' 50"	76° 13' 06"			27 ft	a/c to 200°	L
0933	1333	Tot	43° 52 03	76° 13 30			28 ft	a/c to 048	M
0958	1358	43° 54' 49"		76° 09' 12"			26 ft	a/c 155	N
1001	1401	43° 54' 25"		76° 08' 28"			22 ft	a/c 228°	"O"
1024	1424	43° 52' 00"		76° 12' 38"			32 ft	a/c 349°	"P"
1042	1442	43° 53' 17"		76° 13' 00"			22 ft	a/c 115°	"Q"
1059	1459	43° 52' 15"		76° 11' 15"			37 ft	a/c 356°	"R"
1115	1515	43° 53' 58"		76° 11' 20"			35 ft	a/c 156°	"S"
1122	1522	43° 53' 32"		76° 11' 00"			40 ft	a/c 228°	"T"
1136	1536	43° 52' 54"		76° 12' 07"				a/c 42°	"U"

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE
GMT DATE
VESSEL
CRUISE NO.

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1150	1550	43°53'41"	76°11'08"	Anchored on Course Stn 22			38 ft		"V" 22
1735	2135	Departed Y age.			on 335°				
1742	2142	43°53'58"	76°11'20"		0.4		35 ft	#23	ON Stn.
1811	2211	—	—	181		—	—	#23	OFF STN
1818	2218	43°53'20"	76°11'20"	—	0.62	—	41 ft	#24	ON stn
1905	2305	—	—	107°		—	—	24	OFF
1910	2305	43°53'06	76°10'15"	002°	0.82		34 ft	TP V	
1915	2315	43°54'07	76°10'14"	285°			36 ft	TP W	
1934	2334	43°56'20"	76°12'00"	822° 332°	3.05	10.0	74 ft	K37	ON STN
1945	2345	—	—	344	—			K37	OFF STN
2003									

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 18-9-68

GMT DATE 19-9-68

VESSEL C.S.S. LIMNOS

CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2003	0003	43°59'02"	76°13'03"	025	2.8	10.0	Tow	- mi	
2015	0015	44°00'40"	76°12'00"	—	1.8	10.0	46 ft	L 37	ON STN
2023	0023	—	—	205	—	—	—	L 37	OFF STN
2040	0040	43°58'24"	76°13'30"	237	2.5	10.0	Tow	- mi	
2104	0104	43°55'18"	76°18'00"	—	3.88	10.5	76 ft	K 36	ON STN
2112	0112	—	—	226°	—	—	—	K 36	OFF Stn
	Proceeding to	Sounding	Toledo	Mexico	Bay				
2202	0202	43°50'30"	76°26'30"	224°	8.9	9.0	99 ft		
2230	0230	Nine mile Point		Lig 156°	x 16.9 miles		178 ft		
2255	0255	Nine mile Point	Lig	143° X	15.7	10.0	284 ft	c/c to 090°	A A
2310	0310	"	"	Lig	156° X	14.7	—	266 ft	-
2330	0330	"	"	" Lig	163° x	13.1	10.2	216 ft	
2345	0345	"	"	" Lig	173° x	12.5	10.2	170 ft	
2400	0400	"	"	" Lig	183° x	12.5	8.5	122 ft	
0015	0415	"	"	" Lig	194° X	12.5	9.6	113 ft	
0030	0430	"	"	" Lig	206° X	13.8	10.5	50 ft	c/c 170°	"B B"
0041	0441	"	"	" Lig	210° X	12.2 miles	10.5	49 ft	c/c 270°	"C C"
0100	0500	"	"	" Lig	195° X	11.0 miles	10.2	124 ft		
0115	0515	"	"	" Lig	182° X	10.7 miles	10.0	164 ft		
0130	0530	"	"	" Lig	170° X	10.9 miles	10.0	258 ft		
0145	0545	"	"	" Lig	157° X	11.7 miles	10.0	321 ft		
0200	0600	Oswego	Piers	Lig	177° X	13.7 miles	10.0	352 ft.		
0213	0613	"	"	Lig	168° X	13.8 miles	10.0	361 ft	c/c 180°	"D D"
0226	0626	"	"	Lig	165° X	11.9 miles	10.0	452 ft	c/c 090°	"E E"
0245	0645	"	"	Lig	181° X	11.5 miles	10.0	327 ft.		
0300	0700	Nine mile Pt.		Lig	155° X	9.3 miles	10.0	378 ft		
0315	0715	"	"	" Lig	170° X	8.5 miles	10.0	340 ft		
0330	0730	"	"	" Lig	186° X	8.5 miles	10.0	185 ft		

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 19-9-68

GMT DATE 19-9-68

VESSEL C.S.S. "Limnos"

CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0345	0745	Nine mile Pt.	bag	200° x 9.	1 miles	10.0	125 ft		
0400	0800	"	" bag	213° x 10.	1 miles	10.0	73 ft		
0404	0804	"	" bag	217° x 10.	7 miles	10.0	42 ft	c/c 177°	"FF"
0417	0817	"	" bag	225 x 9.	3 miles	10.0	44 ft	c/c 270°	"GG"
0430	0830	"	" bag	213 x 7.	75 miles	10.0	110 ft		
0445	0845	"	" bag	196° x 6.	85 miles	10.0	166 ft		
0500	0900	"	" bag	175 x 6.	65 miles	10.0	292 ft		
0515	0916	"	" bag	154° x 7.	3 miles	10.0	438 ft		
0530	0930	Oswego	W. Pier bag	185° x 9.	5 miles	10.0	455 ft		
0545	0945	"	" " "	171° x 9.	6 miles	10.0	491 ft		
0554	0954	"	" " bag	163° x 10.	0 miles	10.0	546 ft	c/c 180°	"HH"
0606	1006	"	" " bag	159° x 8.	1 miles	10.0	568 ft	c/c to 090°	II
0615	1015	"	E Pier bag	168° x 7.	75 miles	9.8	552 ft		
0630	1030	"	" " bag	187° x 7.	6 miles	9.8	460 ft		
0645	1045	Nine mile	Point bag	145° x	5.4 miles	9.8	326 ft		
0700	1100	"	" " bag	171° x	4.5 miles	9.8	223 ft		
0715	1115	"	" " bag	202° x	4.88 miles	9.8	160 ft		
0730	1130	Little Salmon	River Pt bag	176° x	4.4 miles	9.8	82 ft		
0743	1143	"	" " bag	204° x	4.9 miles	9.8	44 ft	c/c to 193	JJ
0752	1152	"	" " bag	208 x 3.	3 miles	9.8	50 ft	c/c to 270	KK
0800	1200	"	" bag	187° x 3.	0 miles	7.2	80 ft		
0815	1215	"	" bag	154 x 3.	32 miles	7.2	108 ft		
0830	1230	nine mile	Point bag	201° x 3.	2 miles	8.0	147 ft		
0845	1245	"	" bag	153 x 3.	3 miles	9.8	222 ft	c/c to 344	LL
0900	1300	43°35.7'	76°25.8' bag	156° x 4.	85 miles	Coring	stn	ON STN	25
1041	1441	—	—	090°	—	—	—	OFF STN	25
1112	1512	43° 36' .0	76 18' 2"	—	4.5	9.8	146 ft	on stn	26
1140	1540	—	—	270	—	—	—	off stn	26

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 19-9-68
GMT DATE 19-9-68
VESSEL CSS LIMNOS
CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1150	1550	43° 55' 56"	76° 20' 12"	—	1.3		178 ft	on stn	#27
1207	1607		Depat. Stn #27 for	Amherst Island				338°.	
1215	1615	Nine Mile Pt		brg 186° x	5.7 miles	10.0	192 ft		
1230	1630	"	"	brg. 179° x	7.9 miles	10.0	252 ft		
1245	1645	"	"	brg	174° x 10.5 miles	10.0	224 ft		
1300	1900	"	"	brg.	171.5 x 12.6 miles	10.0	174 ft		
1315	1915	"	"	brg.	169.5 x 15.3 miles	10.0	161 ft		
1330	1930	Gallow Island (Lt)		brg.	003.5° x 4.2 miles	10.0	151 ft		
1345	1945	"	"	brg.	029° x 2.2 miles	10.0	77 ft		
1400	1800	"	"	brg	099.5 x 1.88 miles	10.0	47 ft		
1415	1815	"	"	brg	134.5 x 3.8 miles	10.0	152 ft	ofc 343°	
1430	1830	"	"	brg	147° x 6.0 miles	10.0	99 ft		
1445	1845	Pigeon Island		brg.	354° x 3.3 miles	10.0	77 ft		
1500	1900	"		brg	049° x 1.1 miles	10.0	87 ft		
1515	1915	"	"	brg.	138° x 1.7 miles	10.0	106 ft		
1530	1930	"		brg.	152.5° x 4.0 miles	10.0	94 ft		
1544	1944	Nine Mile Pt		brg	108° x 2.34 miles	10.0	80 ft	ofc 031°	TP
1556	1956	"	"	brg	156° x 2.6 miles	5.0	30 ft	ofc 078°	TP
1603	2003	"	"	brg	163° x 2.5 miles	5.0	54 ft	ON Stn	#28.
1652	2052	44° 11' 30"	76° 34' 24"	Crs 225°				OFF Stn	28
1715	2115	Nine Mile Pt		brg.	094° x 3.0 miles	10.0	74 ft		
1735	2135	Emeric Pt		brg	225° x 1.41 miles		58 ft	on Stn	#29.
1809	2209	44° 07' 09"	76° 40' 42"	197°	—	—	—	off stn	#29.
1927	2327	43° 55' 00"	76° 46' 10"	247	12.4	10.0	Turning Point		

NOTE: Indicate time of every stop and start, speed if different from normal.

Local DATE 19-9-68

GMT DATE 20-9-68

VESSEL CSS LIMNOS

CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2010	0010	43°52'00	76°54	—	6.6	10.0	120	J 30	ON STN
2019	0019	—	—	090	—	"	—	J 30	OFF STN
2027	0027	43°52'00	76°52'50"	090	1.1	"	120	J 30 A	ON STN
2034	0036	—	—	090	—	—	—	J 30 A	OFF STN
2045	0045	43°52'00	76°51'00	—	1.1	"	146	J 30 B	ON STN
2049	0049	—	—	090	—	—	—	J 30 B	OFF Stn
2057	0057	43°52'00	76°49'50	—	1.1	—	130	J 30 C	on stn
2115	0115	—	—	090	—	—	—	J 30 C	off stn
2124	0124	43°52'00	76°48'00	—	1.1	—	136	J 31	on stn
2132	0132	—	—	090	—	—	—	J 31	off stn
2142	0142	43°52'00	76°46'50	—	1.1	—	133	J 31 A	on stn
2145	0145	—	—	090	—	—	—	J 31 A	off stn
2154	0154	43°52'00	76°45'00"	—	1.1	—	132	J 31 B	on stn
2205	0205	—	—	090	—	—	—	J 31 B	off stn
2212	0212	43°52'.0	76°43'50	—	1.1	—	138	J 31 C	on stn
2228	0228	—	—	090	—	—	—	J 31 C	off stn
2247	0247	43°52	76°42	—	1.1	—	132	J 32	on stn
2313	0313	—	—	090	—	—	—	J 32	off stn
2322	0322	43°52	76°40'50	—	1.1	—	145	J 32 A	on stn
2325	0325	—	—	090	—	—	—	J 32 A	off stn
2336	0336	43°52	76°39	—	1.1	—	148	J 32 B	on stn
2340	0340	—	—	090	—	—	—	J 32 B	off stn
2349	0349	43°52	76°37'50"	—	1.1	—	128	J 32 C	on stn
0012	0412	—	—	090	—	—	—	J 32 C	off stn
0018	0418	43°52'	76°36'00				108	J 33	on stn
0027	0427	—	—	023	—	—	—	J 33	off Stn
0052	0452	Yarlet lined aboard		brg 290° x 0.8 miles		10.0	98 ft	ak 347°	T.P.
0112	0512	"	"	brg 179° x 3.1 miles		10.0	92 ft	ak 270°	T.P.

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 20-9-68
GMT DATE 20-9-68
VESSEL C.S.S. Limnos
CRUISE NO. 68-C-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0130	0530	Yorkshire Island		138.5° x 4.2 miles		10.0	118 ft		
0145	0545	False Duck Island Lt.	Lrg	242° x 4.6 miles		10.0	124 ft.		
0200	0600	Limber Island Lt.	Lrg	244° x 3.3 miles		10.0	106 ft		
0215	0615	"	" Lrg	200° x 1.55 miles		10.0	108 ft		
0230	0630	Point Lawrence	Lrg.	162 x 2.2 miles		10.0	118 ft		
0245	0645	Half Tree Island Pt	Lrg	204 x 2.7 miles		10.0	84 ft	ak 208°	"L"
0256	0656	"	" " Lrg	194° x 0.8 miles		10.0	65 ft	ak 081°	"M"
0315	0715	"	" " Lrg	249° x 3.25 miles		10.0	94 ft		
0330	0730	Limber Island	Lrg	177° x 0.5 miles		10.0	119 ft	ak 122°	"N"
0347	0747	False Duck Island Lt	Lrg	265° x 0.9 miles		10.0	72 ft	ak 090°	"O"
0400	0800	" "	" " Lrg.	210° x 2.88 miles		10.0	111 ft		
0415	0815	Main Duck Island (West end)	Lrg	130 x 1.85 miles		10.0	118 ft		
0430	0830	Yorkshire Island	Lrg	129° x 1.86 miles		10.0	104 ft		
0439	0839	"	" Lrg	178° x 1.2 miles		10.0	104 ft	ak 141°	I.P.
0500	0900	"		305° x 2.72 miles		10.0	174 ft		
0515	0915	Galloo Island	Lrg	070° x 2.34 miles		10.0	125 ft		
0530	0930	"	" Lrg	013° x 2.88 miles		10.0	106 ft		
0545	0945	"	" Lrg.	350° x 4.7 miles		10.0	136 ft		
0600	1000	Stony Point	Lrg	049° x 5.25 miles		10.0	145 ft		
0615	1015	"	" Lrg	021 x 5.85 miles		10.0	138 ft		
0630	1030	Nine mile Pt	Lrg	191° x 11.4 miles		10.0	132 ft		
0655	1055	43° 40	76° 15 24	140		10.0	92 ft	# 30	on stn
0731	1131	—	—	194		5.0	—	# 30	off stn
0758	1158	43° 37 56	76° 15' 54"	—	2.0	-	104 ft	# 31	on stn
0831	1231	—	—	230°	—	—	—	# 31	off stn
0856	1256	43° 36	76° 19' 12"	—	3.1	-	162 ft	# 32	on stn
0923	1323	—	—	241	—	—	—	# 32	off stn

Proceeding to Sodus Bay

NOTE: Indicate time of every stop and start, speed if different from normal.

Local DATE 20-9-68
GMT DATE 20-9-68
VESSEL CSS LIMNOS
CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1257	1657	43° 16' 19"	76° 58' 24"	142°		5.0	21 ft		"A"
1302	1702	43° 16' 00"	76° 58' 04"	—	0.4	—	40 ft	at 230°	"B"
1310	1710	43° 15' 31"	76° 58' 50"	230°	0.75	—	24 ft	at 007°	"C"
1315	1715	43° 15' 48"	76° 58' 48"	007°	0.27	—	24 ft	at 142°	"D"
1333	1733	43° 14' 28"	76° 57' 25"	142°	1.66	6.0	25 ft	at 56°	"E"
1337	1737	43° 14' 37"	76° 57' 07"	056°	0.26	—	25 ft	at 322°	"F"
1350	1750	43° 15' 51"	76° 58' 32"	322°	1.56	7.0	27 ft	at 080°	"G"
1353.5	1753.5	43° 15' 59"	76° 58' 11"	080°	0.19	5.0	43 ft	at 142°	"H"
1411	1811	43° 14' 00"	76° 56' 10"	142°	2.42	9.0	19 ft	at 322°	"I"
1414.5	1814.5	43° 14' 11"	76° 56' 21"	322°	0.23	5.0	22 ft	at 339°	"J"
1419	1819	43° 14' 40"	76° 56' 48"	339°	0.51	8.0	25 ft	at 356°	"K"
1421	1821	43° 14' 56"	76° 56' 38"	356°	0.3	5.0	22 ft	at 270°	"L"
1433	1833	43 14' 56"	76° 58' 04"	270°	1.06	5.0	29 ft	at 085	"M"
1441	1841	43 15' 02"	76° 57' 28"	Ot X	0.5		37 ft	on STN	# 33
1736	2136	—	—	165° T				OFF STN	# 33
1740	2140	43 14 51	76° 57' 18"	—	0.2	—	32 ft	ON STN	# 34
1758	2158	—	—	128° T	—	—	—	OFF STN	# 34
1815	2215	43° 14' 14"	76° 56' 29"	—	0.74	5.0	16 ft	ON STN	# 35
1843	2243	43 14 44	76 56 56	233	0.50	—	27 ft	TP	N
1846	2246	43 14 34	76 57 15	322	1.30	—	23 ft	TP	O
1858	1858	43 15 41	76 58 17	273	0.17	—	29 ft	TP	P
1906	2306	43° 15 35	76° 58 37	—	2.37	—	19.0	on stn	# 36
1912	2312	Proceeding to Burlington					—	off stn	# 36
1945	2345	48° 18' 42	77° 01' 36	303	3.0	10.0	119 ft		
2000	2400	Fairbanks Pt Lg		227° x 3.9	2.8	10 0	226 ft		

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 20-9-68
GMT DATE 21-9-68
VESSEL CSS LIMNOS
CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
2030	0030	Fairbanks Pt	bg	166° x	5.5 miles	9.8	5127		
2100	0100	Lyons Pt	bg	216° x 11.5	miles	10.1	114fms		
2130	0130	Rochester (wharf)	bg	218 x	16 miles	10.3	104fms		
2200	0200	Braddock Pt	bg	222° x 16.1	miles	10.2	590ft		
2206	0206	" "	" bg	219° x 16.0	miles a/c to		270°		
2230	0230	Bogus Pt	bg	215° x 14.1	miles	10.2	600ft		
2300	0300	" "	" bg	196 x 12.2	miles	10.0	595ft		
2332	0332	" "	" bg	170 x 12.2	miles	9.8	490ft		
2400	0400	Devils nose	bg	196° x 11.0	miles	9.8	582ft		
0030	0430	"	" bg	169.5 x 10.65	miles	9.8	604ft		
0100	0500	Point Breeze	bg	191 x 10.3	miles	10.0	69ft		
0130	0530	Thirty mile Pt	bg	227° x 14.2	miles	9.5	624ft		
0200	0600	" "	" bg	211° x 11.4	miles	9.5	613 ft		
0230	0630	"	" bg	185° x 9.9	miles	10.0	588 ft	a/c 266°	
0300	0700	" "	" bg	158° x 10.2	miles	9.8	563 ft		
0330	0730	Olcott	bg	187° x 10.9	miles	10.0	53[illegible] ft		
0400	0800	Wilson Piers	bg	189° x 11.4	miles	10.0	499 ft		
0430	0830	"	" bg	164° x 11.2	miles	10.2	479 ft		
0500	0900	"	" bg	144° x 12.9	miles	9.8	459 ft	a/c 251°	
0530	0930	Port Weller Piers	bg	191° x 13.9	miles	10.2	450 ft		
0600	1000	" "	" bg	179 x 11.85	miles	10.0	430 ft		
0630	1030	" "	" bg	156 x 11.4	miles	10.2	387 ft		
0700	1100	" "	" bg	133 x 13	miles	9.2	339 ft		
0730	1130	Fifty mile Point	bg	203 x 8.9	miles				
0735	1135	" "	" bg	198 x 8.5	miles	9.5	262 ft	a/c to 247°	
0808	1203	Shell oil wharf	bg	313 x 3.2	miles		200 ft		
0829	1229	Burlington	wharf "	255 x 1.79	miles		72 ft		
0838		43° 17' 54"	79° 47' 49"				421 turning		

20 Sept local → 21 Sept local

G.O. beach

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 21-9-68

GMT DATE 21-9-68

VESSEL CSS LIMNOS

CRUISE NO. 68-0-18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0900	1300	43°17'30	79°47'54	—	—	—	55 ft	HHC/9	on stn
0929	1329	—	—			—		HHC/9	off stn
0937	1337	43 17 00	79 47 54	—	0.5	—	70 ft	HHB/9	on stn
0950	1350	—	—	—	—	—		HHB/9	off stn
1000									
1008	1400	43°17'00	79°48'34				48 ft	HHB8	ON
									OFF
1020	1420	43°17'09	79°49'36	281°	0.77		69 ft	ck 230°	T.P.
1024	1424	43°17'00"	79°49'51	230°	0.3		82 ft	HHB/6	ON Stn
1032	1432	—	—	240°	—	5.0	—	HHB/6	off Stn
1037	1437	43°16'45"	79°50'32"	—	0.5	—	43 ft	ck 197	T.P.
1041	1441	43°16'30	79°50'39	197°	0.25	5.0	31 ft	HHA/5	ON Stn
1053	1453	—	—	000°	—	—	—	HHA/5	OFF Stn
1059	1459	43°17'00	79°50'38"	—	0.5	5.0	59 ft	HHB/5	ON Stn
1112	1512	—	—	270°			—	HHB/5	OFF Stn
1118	1518	43°17'00	79°15'19"	—	0.5	5.0	66 ft	HHB/4	ON Stn
1128	1528	—	—	239°	—	—	—	HHB/4	off Stn
1135	1535	43°16'42"	79°52'00	—	0.58	5.0	45 ft	ck 180°	T.P.
1140	1540	43°16'30"	79°52'00	180°	0.21	5.0	41 ft	HHA/3	ON Stn
1158	1558	—	—	270°	—		—	HHA/3	off Stn
1206	1606	43°16'30	79°52'40"	—	0.5	5.0	32 ft	HHA/2	ON Stn
1238	1638	—	—	045°	—	—	—	HHA/2	OFF Stn
1246	1646	43°17'00	79°52'00	—	0.7	5.0	51 ft	HHB/3	ON Stn
1310	1710	—	—	044°	—	—	—	HHB/3	OFF Stn
1318	1718	43°17'30"	79°51'20	—	0.71	5.0	46 ft	HHC/4	ON Stn
1337	1937	—	—	090°	—	—	—	HHC/4	OFF Stn
1343	1743	43°17'30"	79°50'38"	—	0.5	5.0	74 ft	HHC/5	ON Stn
1355	1955	—	—	090°	—	—	—	HHC/5	OFF Stn
1359	1759	43°17'30"	79°49'54"	—	0.5	5.0	74 ft	HHC/6	ON Stn
1411	1811	—	—	090°	—	—	—	HHC/6	OFF Stn

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 21 - 9 - 68
GMT DATE 21 - 9 - 68
VESSEL CSS. Limnos
CRUISE NO. 68 - 0 - 18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
1417	1817	43° 17' 30"	79° 49' 16"	—	0.5	5.0	65 ft	HHC/7	ON Stn
1451	1851	—	—	090°	—	—	—	HHC/7	off Stn.
1457	1857	43 17' 30"	79° 48' 35"	—	0.5	5.0	52 ft	HHC/8	ON Stn.
1504	1904	—	—	315°	—	—	—	HHC/8	off Stn
1515	1915	43° 18' 00	79° 49' 16	—	0.72	5.0	58 ft	HHD/7	ON Stn.
1523	1923	—	—	270°	—	—	—	HHD/7	off Stn
1528	1928	43° 18' 00	79° 49' 57"	—	0.5	5.0	63 ft	HHD/6	ON Stn
1538	1938	—	—	060°	—	—	—	HHD/6	off Stn
1545	1945	43° 18' 20"	79° 49' 10"	—	0.68	5.0	44 ft	at [illegible]	T. P.
1547	1947	43° 18' 30"	79° 49' 19"	332°	0.2	5.0	33 ft	HHE/7	ON Stn.
1557	1957	—	—	090°	—	—	—	HHE/7	off Stn.
1604	2004	43 18' 30"	79° 48' 35.5"	—	0.5	5	22 ft	HHE/8	ON Stn
1612	2012	—	—	195°				HHE/8	off Stn
		Vessel proceeding to Pier 29. Ru[illegible] to							
1640	2040	Vessel secured to Pier 29.							

NOTE: Indicate time of every stop and start, speed if different from normal

Local DATE 7 - 9 65

GMT DATE 7 6

VESSEL

CRUISE NO. 5 - 0 - 18

Local Time	GMT	POSITION Lat. N.	POSITION Long. W.	Ships Course	Miles Steamed	Ships Speed	Depth in feet	Cons. Stn. No.	Monitor Stn. No.
0821	1221	Depart	Pier 29.	Back clear	Pier co	253°			
0845	1245	43°17'16"	79°50'40"	253	1.95	5.0	80 ft	#37	on Stn
1242	1642	—	—	100°	—	—		#37	off Stn
1254	1654	43°17'00"	79°48'35"	—	1.55	7.0	49 ft	#38	ON Stn
1345	1745	—	—	333°	—	—		#38	off Stn
1400	1800	43°18'00"	79°49'14"	—	1.11	5.6	51 ft	#39	ON Stn
1428	1828	—	—	220°	—	—	—	#39	off Stn
1439	1839	43°16'54"	79°50'32"	—	1.43	7.0	50 ft	#40	ON Stn
14555	18555	—	—	064°	2.1			#40	off Stn
		Vessel proceed to		Back clear	Pier 29.				
1530	1930	Vessel secured		side tie at	Pier 29.				

NOTE: Indicate time of every stop and start, speed if different from normal

69-0-13

VESSEL: Alpena KARLSEN DATE (GMT): Aug 12 1969

CRUISE NO: 69--0-13 " (LOCAL):

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
1350	0950	Departed James Pier 29								
1356	0956	S Jay Jays Bridge								
1403	1003	Entering Buoy								
1406	1006	The intake in water								1
1417	1017	43 17 12	79 40 36	Var	10.0	3.0	38	Coring	STN 01 Aug 12	
		-	-	Stopped to bucket				sample Water		
1535	1135	-	-	Bathy		Bathy done				
1540	1140				-	-			Water	
1600	1200	43 18 00	79 44 42	Anchored in edge of water						
						3.0				
2000	1600	Instituting Bathy		and		bathy finished				
		To Toronto								
		Proceeding into								
GMT	August 13th	1969								
0020	2030	Boston	Whaler							
0050	2050		Boarded							
2110	2110	Boston	Whaler	Left						
Start 0145	2145	43 18 45	79 46 30	Commenced						
0200	2200	43 18 45	79 40 12	090						
0215	2215	43 18 45	79 42 12	090						
0230	2230	43 18 45	79 38 36	090						
0245	2245	43 18 45	79 32 54	090						
0300	2300	43 18 45	79 29 12	090						
	2304									
0315	2315	43 18 54	79 30 48	270						
0330	2330	43 18 54	79 34 06	270	10	"	"	"	"	

Dep. Sault Ste Marie ... may have started turn

VESSEL: Marion Karlsen DATE (GMT): Aug 13th 1969

CRUISE NO: 69-0-13 " (LOCAL): 12th 1969

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
0345	2345	43 18 54	79 37 30	270	10					
0400	2400	43 18 54	79 41 12	270	10	23.5				
Local	Aug 13th 1969									
0415	0015	43 19 54	79 43 27	270	10					
0430	0030	43 19 14	79 46 12	a/c 023°	6				T.P.	
0445	0045	43 19 24	79 43 30	a/c 090	10				T.P.	
0500	0100	43 19 24	79 40 00	090	10					
0515	0115	43 19 24	79 36 22							
0530	0130	43 19 24	79 32 38	"	"					
0545	0145	43 19 24	79 29 00	a/c 000	"				T.P.	
0548	0148	43 20 00	79 29 00	a/c 270	10				T.P.	
0600	0200	43 20 00	79 31 15							
0615	0215	43 20 00	79 34 36	"	"					
0630	0230	43 20 00	79 38 46	"	"					
0645	0245	43 20 00	79 41 04	"	"					
0700	0300	43 20 00	79 44 18	a/c 030	6				T.P.	
0705	0305	43 20 36	79 44 18	a/c 090	10				T.P.	
0715	0315	43 20 36	79 41 48	"	"					
0730	0330	43 20 36	79 38 04	"	"					
0745	0345	43 20 36	79 34 12	"	"					
0800	0400	43 20 36	79 30 24	"	"	35.6				
0815	0415	43 21 10	79 31 00	270	10					
0830	0430	43 21 10	79 35 30	"	"					
0845	0445	43 21 10	79 38 55	"	"					
0900	0500	43 21 10	79 42 10	"	"					
0915	0515	43 21 40	79 39 10	90°	"					
0930	0530	43 21 40	79 35 35	"	"					
0945	0545	43 21 40	79 31 50	"	"					
1000	0600	43 22 10	79 26 00	"	"					
1015	0615	43 22 10	79 32 35	"	"			"		
1030	0630	43 22 10	79 37 00	"	"			"		

79°29'00" seems more reasonable. Unlikely

NOTE: Indicate time of every stop and start.

VESSEL: M. KRIEGSEN

CRUISE NO: 69-0-13

DATE (GMT): Aug 13th 1969

" (LOCAL):

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
1055	0655	43° 22.40	79° 41.30		10.5					
1115	0715	43° 22.40	79° 37.10		"					
1130	0730	43° 22.40	79° 31.35		"	Ignore 0730		???		
1145	0745	43° 22.40	79° 31.25		"					
1200	0800	43° 23.12	79° 33.10		"	40.0				
1215	0815	43° 23.12	79° 36.18	270	"					
1230	0830	43° 23.12	79° 39.30	270	"					
1245	0845	43° 21.24	79° 40.00	180	"					
1258	0858	43° 18.48	79° 40.00	180	"					
1303	0903	43° 18.48	79° 41.00	270	"	10.0	150	Stopped for Coring		
1414	1014	43° 18.54	79° 41.00		Put out Marker Buoy -			#2		Coring Stn ROLL 2
1745	1345	~			Piston Corer over side					
1805	1405	~			"			brought in -		Sample taken
		~								
1845	1445	~			Shipped bucket sample taken -					
1914	1514	~			Coring completed - Marker buoy in position on a 270 course for stn 3					Coring Stn
1945	1545	43°18.54	79°43.12		Anchored in		110 ft of water		on Stn	#3 ROLL 2
						1.6				
2115	1715	~			Piston coring completed					
2135	1735	~			Shipped bucket sample taken					
2200	1800	~			Steaming -					on a 270 course
2212	1812	43°18.54	79°46.00		Anchored in		115 ft of water -		on	#4 ROLL 2
2240	1840	~			Shipped bucket sample taken					
2333	1933	~			Piston corer taken					
2400	2000	~			Piston coring completed					
						2.0				
GMT Aug 14th										
0038	2038	~			Stopped					pending
						Times	for the night			

NOTE: Indicate time of every stop and start.

VESSEL: M. KARLSEN

CRUISE NO: 69-0-13

DATE (GMT): Aug 14th 1969.

" (LOCAL): Aug 13th 1969.

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
0051	2051	43° 17.48	71° 46.38	090	8.0					
0100	2100			"	8.0					
0115	2115 2145			"	Stopped to adjust angle of transducer on side-boom					
0214	2214				Started recording on sounding line					
0230	2230	43° 17.48	71° 39.00	090	8.0					
0245	2245	43° 17.48	71° 36.18	"	"					
0300	2300	43° 17.48	71° 34.00	"	"					
0315	2315	43° 17.48	71° 31.00	"	"					
0330	2330	43° 17.48	71° 25.48	"	"					
0337	2337	43° 17.48	71° 27.30	"	"					T.P.
0345	2345	43° 17.18	71° 27.36	VAR.	"					
0400	2400	43° 17.18	71° 30.00	270	"	17.5				
0015	0015	43° 17.18	71° 32.24	270	8.0					
0030	0030	43° 17.18	71° 35.06	"	"					
0045	0045	43° 17.18	71° 37.56	"	"					
0500	0100	43° 17.18	71° 40.40	"	"					
0515	0115	43° 17.18	71° 43.30	"	"					
0530	0130	43° 17.18	71° 46.24	150	"					T.P.
0537	0137	43° 16.42	71° 45.54	090	"					T.P.
0545	0145	43° 16.42	71° 43.54	090	"					
0600	0200	43° 16.42	71° 41.30	"	"					
0615	0215	43° 16.42	71° 38.42	"	"					
0630	0230	43° 16.42	71° 36.18	"	"					
0645	0245	43° 16.42	71° 33.42	"	"					
0700	0300	43° 16.42	71° 31.01	"	"					
0715	0315	43° 16.42	71° 28.54	"	"					
0718	0318	43° 16.42	71° 27.24	a/c 180	"					T.P.
0722	0322	43° 16.12	71° 27.24	a/c 240	"					T.P.
0730	0330	43° 16.12	71° 28.36	"	"					
0745	0345	43° 16.12	71° 31.15	"	"					
0800	0400	43° 16.12	71° 34.00	"	"					

NOTE: Indicate time of every stop and start.

VESSEL: M. KARLSEN

CRUIS NO: 69-0-13

DATE (GMT): Aug 14th 1969.

" (LOCAL): " " "

should be 43°16'42"

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
0815	0415	43° 16.12	77° 36.35	270	8.0					
0830	0430	43° 16.12	77° 31.30	"	"					
0845	0445	43° 16.12	77° 42.10	"	"					
0853	0453	43° 16.12	77° 43.40	180	"				T.P.	
0900	0500	43° 15.40	77° 43.40	090	"				T.P.	
0915	0515	43° 15.40	77° 41.25	"	"					
0930	0530	43° 15.40	77° 39.20	"	"					
0945	0545	43° 15.40	77° 37.00	"	"					
1000	0600	43° 15.40	77° 35.00	"	"					
1015	0615	43° 15.40	77° 32.40	"	"					
1030	0630	43° 15.40	77° 30.52	286	"				T.P.	
1200	0800	43° 18.55	77° 47.00	"						
1215	0815	43° 18.54	77° 46.42	"	Anchored in 60 ft of water - Core Str. #5				#5	ROLL 4
						10.0				
1225	0825	~	~	Shipek bucket sample taken						
1307	0907	~	~	Piston Core equipment						
1315	0915	~	~	anchor up - proceeding to stn #6 anchorage						
1325	0925	43° 18.54	77° 47.18	anchored in 40 ft water - Str. #6					#6	ROLL 4
1427	1027	~	~	Shipek bucket sample taken						
		~	~	Several gravity cores taken						
1545	1145	~	~	Piston coring completed						
				Anchor up						
1710	1310			Proceeding to coring stn #7						
				067	8.5	0.3				
1840	1440	43° 22.06	77° 34.24			8.0	anchored in 24 ft water			
							coring stn #7		#7	ROLL 4
1900	1500						shipek bucket and gravity sample taken			
1904	1504						piston core taken			
1915	1515						piston core hauled aboard			
1955	1555						Proceeding to coring stn #8 anchor up			
				136	8.0					

NOTE: Indicate time of every stop and start.

VESSEL: Martin Karlsen DATE (GMT): August 14/69

CRUISE NO: 69-0-13 " (LOCAL):

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
2100	1700	43 20 36	79 34 59	anchor out						st #8
2212	1812			Piston core taken						
2215	1845			STN #8	completed					
2255	1855			Anchor aboard						
2301	1905							90°		
2329	1929	43° 19.25	79.31 40	On St		#9				
2340	1940			anchor out						
G.M.T. Aug. 15th						4.2				
0017	2017	"	"	Piston coring completed						
0030	2030	"	"	Weight adjustment						
0057	2057	"	"	Anchor aboard - underway to position.						
0121	2121	43 18 54	79 27 30	on line	#10		T.P.			start
0130	2130	43 18 54	79 25 12		10.5					
0145	2145	43 18 54	79 22 24							
0157	2157	43 18 54	79 20 00	090	10.5		T.P.			
0200	2200	43 17 18	79 20 12	270						
0215	2215	43 17 18	79 23 24	270	"					
0230	2230	43 17 18	79 26 36	270	"					
0235	2235	43 17 18	79 27 36	270	"		T.P.			
2240	2240	43 16 42	79 27 24	165	"					
2255	2255	43 16 42	79 26 24	090	"					
2300	2300	43 16 42	79 23 00	090	"					
2315	2315	43 16 42	79 20 00	090	"			T.P.		
2320	2320	43 16 12	79 20 00	180	"			T.P.		
2330	2330	43 16 12	79 22 42	270	"		Impossible!!			
2345	2345	43 16 12	79 26 18	270	"					
2350	2350	43 16 12	79 27 24	270	"			T.P.		
2400	2400	43 16 00	79 29 12	257	"	31.5				

NOTE: Indicate time of every stop and start.

VESSEL: Martin Karlsen DATE (GMT): August 15/69

CRUISE NO: 69-0-13 " (LOCAL):

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
		AUG. 15 (Local Time)								
0410	0010	43° 15' 40"	79 30 50	a/c 090	10					T.P.
0415	0015	43 15 40	79 29 45	"	"					
0430	0030	43 15 40	79 26 24	"	"					
0445	0045	43 15 40	79 22 42	"	"					
0458	0058	43 15 40	79 20 00	a/c 180	"					T.P.
0503	0103	43 15 06	79 20 00	a/c 270	"					T.P.
0515	0115	43 15 06	79 22 12	"	"					
0530	0130	43 15 06	79 25 42	"	"					
0545	0145	43 15 06	79 29 06	"	"					
0600	0200	43 15 06	79 32 27	"	"					
0614	0214	43 15 06	79 35 30	a/c 180	"					T.P.
0623	0223	43 14 36	79 35 30	a/c 090	"					T.P.
0630	0230	43 14 31	79 33 09	"	"					
0645	0245	43 14 35	79 30 06	"	"					
0700	0300	43 14 32	79 26 42	"	"					
0715	0315	43 14 36	79 23 3-	"	"					
0730	0330	43 14 36	79 20 30	"	"					
0734	0334	43 14 36	79 20 01	a/c 270	"					T.P.
		arrive Cities Service Dock Yorktown								
0345	0345	42 16 27	79 20 01	000°	10					
0355	0355	42 17 52	79 20 00	a/c 270	"					T.P.
0359	0359	43 17 52	79 20 24	a/c 180	"	35.9				T.P.
0815	0415	43 14 31	79 20 50	270	10	Lat probably 43° 15' 36"				T.P.
0820	0420	43 14 36	79 21 24	a/c 000	"	"				T.P.
0830	0430	43 16 56	79 21 36	000	"					
0835	0435	43 17 52	79 21 31	270	"					
0840	0440	43 17 52	79 22 10	180	"					
0900	0500	43 14 50	79 22 10	180	"					
0908	0508	43 14 36	79 22 15	270	"					
0915	0515	43 15 15	79 22 52	000	"					
0930	0530	43 17 52	79 22 35	270	"					

NOTE. Indicate time of every stop and start.

VESSEL: Martin Karlsen DATE (GMT): Aug 15th 1969

CRUISE NO: 69-0-13 " (LOCAL):

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
0935	0535	43 17 52	79 23 39	180	10.0					
0945	0545	43 16 26	79 23 39	180						
0958	0558	43 14 36	79 23 48	270						
1003	0603	43 14 36	79 24 36	000						
1015	0615	43 16 07	79 24 36	000						
1025	0625	43 17 52	79 24 30	270						
1029	0629	43 17 52	79 25.6	180						
1045	0645	43 15 48	79 25.6	180						
1051	0651	43 14 36	79 25.6	270						
1055	0655	43 14 36	79 25 54	000						
1100	0700	43 15 14	79 25 54	000						
1115	0715	43 17 52	79 25 54	280						
1147	0747	43 18 24	79 31 12	090		40.5				
				at anchor in 248 fathoms water						
1218	0818	43 18 30	79 31 18	On station.				11	10	Roll 6.
1255	0855	"	"	Piston core in mud.						Stn #11
				21 cores samples taken &						
1315	0915	"	"	gravity coring completed						
1436	1036	"	"	2nd Piston coring completed						
1454	1054	"	"	took up anchor & proceeded						
				on with cruise plan.						
1500	1100	43 18 24	79 30 54	090	10.5					
1515	1115	43 18 24	79 27 24	"	"					
1530	1130	43 18 24	79 23 36	"	"					
1534	1134	43 18 24	79 22 54	"	"				T.P.	
1537	1137	43 17 54	79 22 54	270	"				T.P.	
1548	1142	43 17 54	79 24 12	270	"				Stn #11	Roll 6
1800	1200	43 17 54	79 25 30	270	at anchor in 248 fathoms					
						9.0				
1635	1235			Stuck brake wire jammed						
1652	1252			pipe on winch broke						
1713	1313			gravity core engine stopped						

NOTE: Indicate time of every stop and start.

VESSEL: Martin Karlsen DATE (GMT): August 15-16 60

CRUIS NO: 69-0-13 " (LOCAL):

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
1714	1314	43 17 48	79 25 30			Coring Sta.		#11	completed	
1727	1327			090	9	Dept for coring Sta.				#12
1742	1342	43 17 51	79 22 54	g/c 180						T.P
1812	1412	43 16 18	79 23 18	anch		coring pos		#12	anchor in 218 ft	
						5.6			(ROLL 6)	
1837	1437	42 16 18	79 23 18			piston core taken				
						gravity core taken				
						Shipek sample taken				
1900	1500					coring at #12 completed				
1905	1505			080	8.5	heave anchor - depart				
						for coring Sta. #13				
1915	1515	43 16 42	79 20 42	g/c 180						
				anch		2.0				T.P
1955	1555	43 16 15	79 21 00			anchored in 225 ft depth				
						coring at		#13	ROLL 6	
2013	1613					piston core taken				
2043	1649	"	"	305	10	Depart Sta.			#13	
2112	1712	43 17 28	79 24 36	308	10					
2220	1820	43 22 54	79 34 20	270		anchored in 270 ft			Sta.	#14
2239	1839					piston core taken				
2305	1905					Depart Sta. #14				ROLL 6
2343	1943	43 20 00	79 26 32	180	10					
2400	2000	43 16 48	79 26 42	180	10					
G.M.T										
0015	2015	43 16 42	79 26 42	180					T.P	
0043	2043	43 16 42	79 27 30	270					T.P	
0052	2052	43 16 42	79 27 30	090						
0115	2115	43 19 18	79 27 30	"						
0128	2128	43 20 00	79 27 30	"					T.P	
0152	2152	43 20 00	79 28 06	"					T.P.	

NOTE: Indicate time of every stop and start.

VESSEL: Dr. J. L. Kulsea

CRUIS NO: 69-0-13

DATE (GMT): Aug. 14th 1969

" (LOCAL): " 15th "

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
0100	2100	43 18 54	79 28 06	180	10.5					
0115	2115	43 16 30	79 28 06	180	"					
0126	2126	43 14 30	79 28 06	"	"				T.P.	
0130	2130	43 14 30	79 28 54	270	"				T.P.	
0145	2145	43 16 42	79 28 54	000	"					
0200	2200	43 19 12	79 28 54	"	"					
0207	2207	43 20 38	79 28 54	"	"				T.P.	
0210	2210	43 20 38	79 29 36	270	"				T.P.	
0215	2215	43 20 03	79 29 36	180	"					
0230	2230	43 17 48	79 29 36	"	"					
0245	2245	43 15 06	79 29 36	"	"					
0249	2249	43 14 30	79 29 36	"	"				T.P.	
0253	2253	43 14 30	79 30 24	270	"				T.P.	
0300	2300	43 15 24	79 30 24	000	"					
0315	2315	43 18 00	79 30 24	"	"					
0330	2330	43 20 48	79 30 24	"	"					
0339	2339	43 22 30	79 30 24	"	"				T.P.	
0343	2343	43 22 30	79 31 48	270	"				T.P.	
0345	2345	43 22 18	79 31 36	180	"					
0400	2400	43 19 48	79 31 24	180	"	42.0				
August 14	local time				"					
0415	0015	43 17 18	79 31 01	180	10.0					
0430	0030	43 14 48	79 31 24		"					
0432	0032	43 14 32	79 31 03	315 270	"				T.P.	
0436	0036	43 14 32 ~~43 15 16~~	79 31 48	315 000	"	*			T.P.	
0445	0045	~~43° 16' 18"~~ ~~43 17 12~~	79 31 48	"	"					
0520	0100	~~43° 18' 10"~~ ~~43 21 30~~	79 31 48	"	"					
0515	0115	~~43° 22' 03"~~ ~~43 22 12~~	79 31 48	"	"					
0524	0124	43 23 12	79 31 48	315 270	"				T.P.	
0530	0130	43 23 12	79 33 24	"	"					
0545	0145	43 23 12	79 36 27	"	"					
0556	0156	43 23 12	79 39 12	315 270	"				T.P.	
0600	0200	43 22 39	79 39 12	315 090	"				T.P.	

* NOTE CHANGES IN LAT. N.

Turning point on grid

0122

NOTE: Indicate time of every stop and start.

VESSEL: Dr. Fridtjof Nansen DATE (GMT): August 16/69

CRUISE NO: 69-0-13 " (LOCAL):

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
0615	0215	43 22 34	79 35 38	090	10.0			Turn given at 0230	T.P.	Bathythermograph.
0631	0231	43 22 39	79 31 48	a/c 000	"					
0639	0239	43 24 18	79 31 48	a/c 270	"				T.P.	
0643	0243	43 24 18	79 31 48	a/c 180	"				T.P.	
0645	0245	43 23 48	79 32 34	"	"					
0700	0300	43 21 00	79 32 34	"	"					
0715	0315	43 18 20	79 32 34	"	"					
0730	0330	43 15 42	79 32 34	"	"					
0736	0336	43 14 30	79 32 34	a/c 270	"				T.P.	
0740	0340	43 14 30	79 33 18	a/c 000	"				T.P.	
0745	0345	43 15 30	79 33 18	"	"					
0800	0400	43 18 00	79 33 18	"	"					
0815	0415	43 20 26	79 33 18	000	"					
0830	0430	43 23 12	79 33 18	"	"					
0845	0445	43 25 43	79 33 18	"	"					
0849	0449	43 26 08	79 33 18	270	"					
0852	0452	43 26 08	79 34 00	180	"					
0900	0500	43 25 04	79 34 00	180	"					
0915	0515	43 22 36	79 34 08	"	"					
0930	0530	43 20 12	79 34 00	"	"					
0945	0545	43 17 33	79 34 00	"	"					
1000	0600	43 15 00	79 34 00	"	"					
1002	0602	43 14 31	79 34 00	"	"				T.P.	
1005	0605	43 14 31	79 34 00	000	"				T.P.	
1015	0615	43 15 42	79 34 48	"	"					
1030	0630	43 18 12	79 34 00	"	"					
1045	0645	43 20 37	79 34 00	"	"					
1100	0700	43 22 54	79 34 00	"	"					
1115	0715	43 25 30	79 34 48	"	"					
1124	0724	43 27 12	79 34 00	270	"					
1127	0727	43 27 12	79 35 33	180	"					
1145	0745	43 24 48	79 35 33	"	"					

Probably is 79 32 34

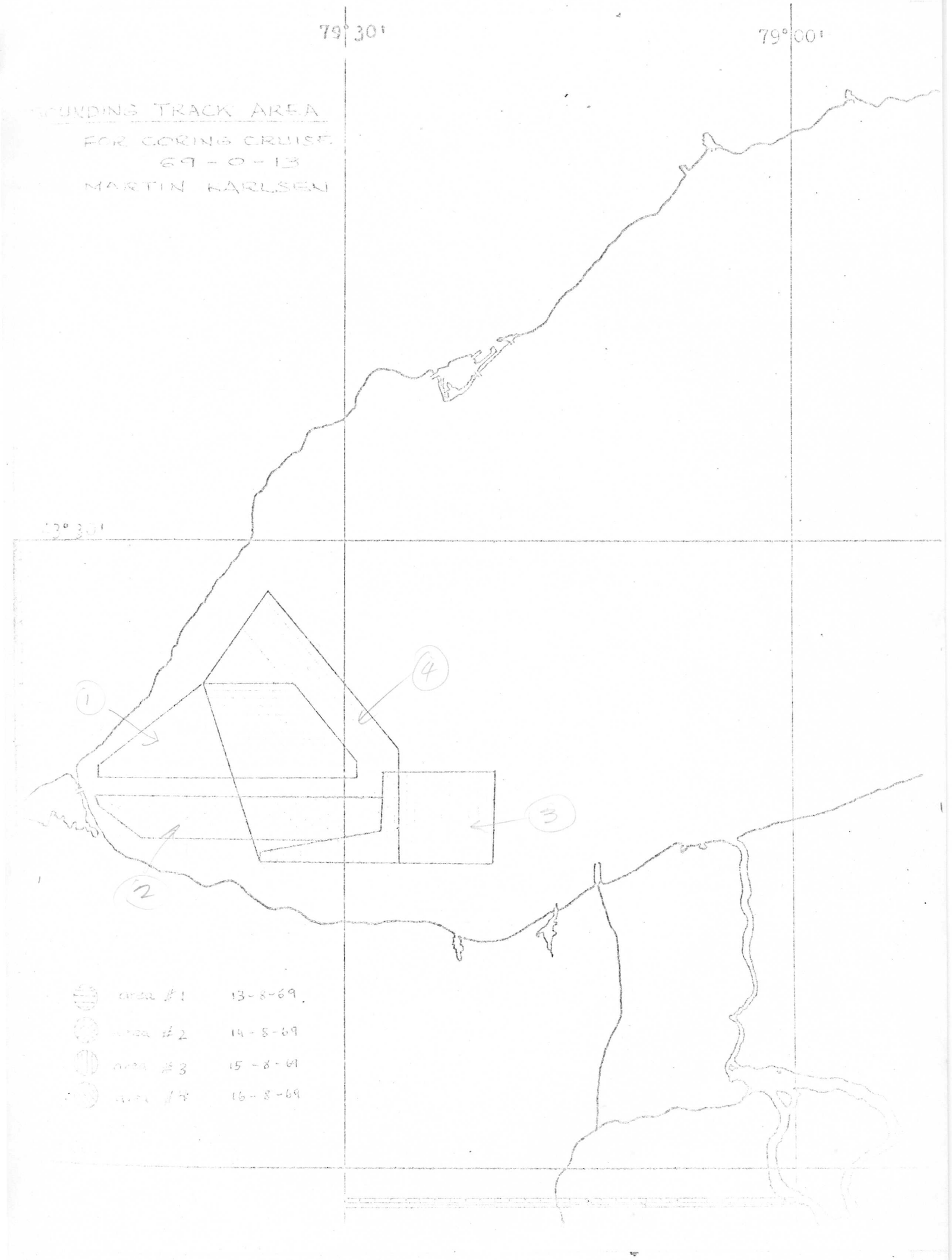
NOTE: Indicate time of every stop and start.

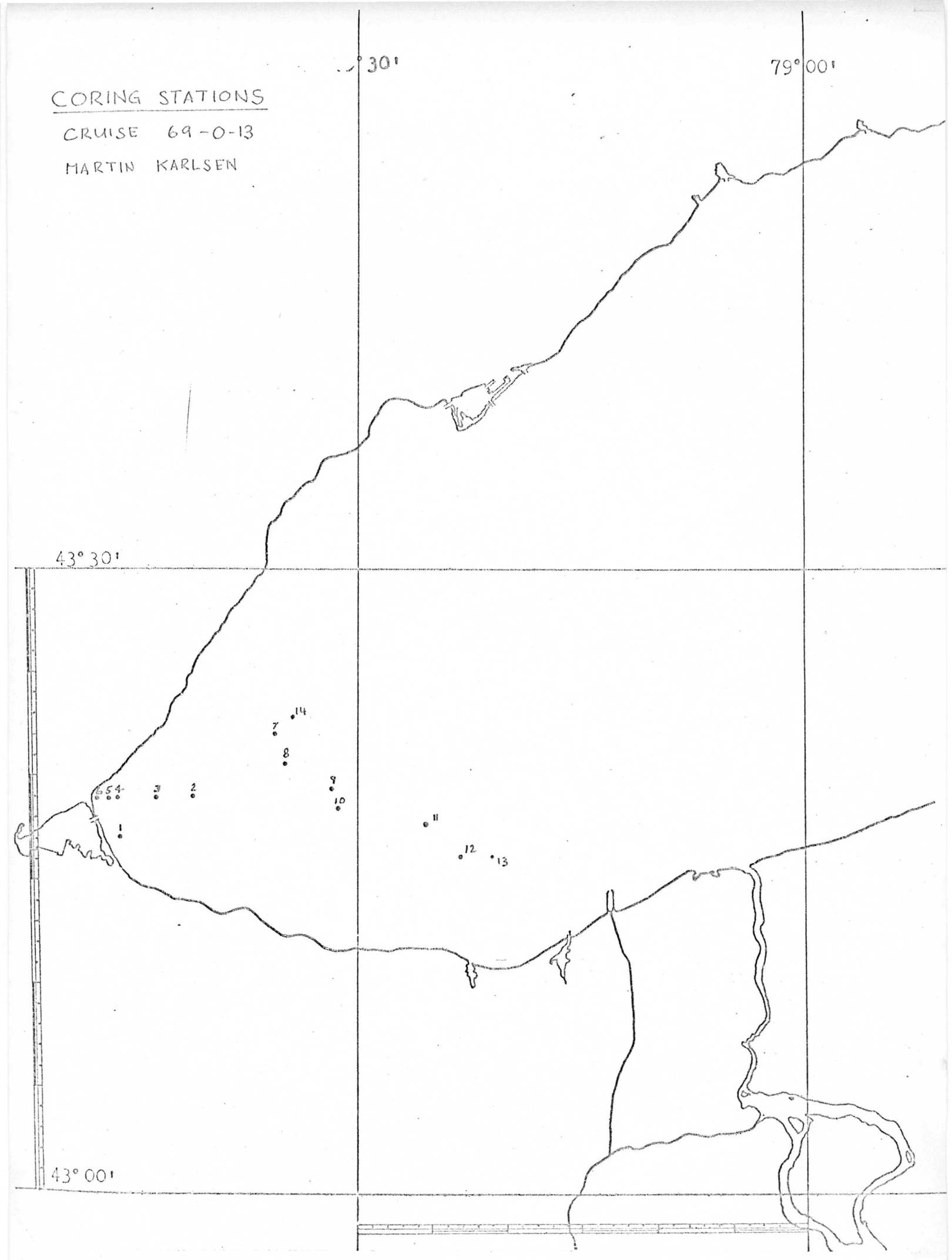
VESSEL: Martin Karlen DATE (GMT): Aug 16th 1969

CRUISE NO: 69-O-13 " (LOCAL):

TIME: (GMT)	TIME: (LOCAL)	POSITIONS Lat. N.	POSITIONS Long. W.	SHIPS COURSE	SHIPS SPEED	MILES STEAMED	DEPTH IN FEET	CONS. STN. NO.	MON. STN. NO.	STATIONS (OTHERS)
1200	0800	43 22 14	79 35 33	180	10	39.1				
1215	0815	43 19 30	79 35 36	"	"					
1230	0830	43 16 34	79 35 34	"	"					
1235	0835	43 15 42	79 35 36	"	"				T.P.	
1240	0840	43 15 42	79 36 18	270	"				T.P.	
1245	0845	43 16 34	79 36 18	000	"					
1300	0900	43 19 06	79 36 18	000	"					
1315	0915	43 21 48	79 36 18	"	"					
1330	0930	43 24 36	79 36 18	"	"					
1339	0939	43 26 18	79 36 18	"	"				T.P.	
1344	0944	43 26 18	79 37 00	180	"				T.P.	
1400	1000	43 23 24	79 37 00	"	"					
1415	1015	43 20 42	79 37 00	"	"					
1420	1020	43 20 00	79 37 00	"	Dead	Stopped engines drifting				
				264	Lines	overboard trawling towards				
					Burlington					
1510	1110		Passed in	by	Eastern	Gravel Co barge				
						with	Lines	up.		
1525	1125		"	"	"	Both	lines			
1540	1140		Lines	at	Pier	# 29	Burlington			
						38.5				
		Total	distance	steamed	in	Course				
			69-O-13	=	531.9	N miles				

NOTE: Indicate time of every stop and start.


79° 30'
79° 00'
SOUNDING TRACK AREA
FOR CORING CRUISE
69 - 0 - 13
MARTIN KARLSEN
1
2
3
4
AREA #1 13-8-69
AREA #2 14-8-69
AREA #3 15-8-69
AREA #4 16-8-69


CORING STATIONS
CRUISE 69-0-13
MARTIN KARLSEN
79° 30'
79° 00'
43° 30'
43° 00'
1
2
3
4
5
6
7
8
9
10
11
12
13
14

1969

Statistics - Monthly Summary Month of AUG. Vessel M. KARLSEN

Descriptions	Ontario	Erie	Huron	Superior	To
Monitor cruises					
Mooring cruises					
Limnogeology cruises					
Gravity cruises					
Special cruises → CORING	V				
Miles steamed	1504				
Moorings established					
Moorings retrieved					
Monitor stations occupied					
Reversing therm. observations					
Bathythermograph casts					
Water Samples collected					
Chemical Analyses					
Bacteriological analyses					
Plankton hauls					
Grab samples	13				
Cores (Piston & Gravity)	27				
Drift cards released					
Drogues tracked					
Gravity observations					
Weather observations (D.O.T.)	33				
Cont. recordings (days) Air temp.	V				
Rel. humidity	V				
Near surf. water temp.	V				
Solar radiation	V				
Chlorophyll					

Other Observations:

STN #1 IMPACT CORE
NOT COMPLETE (DIDN'T WORK)

CANADA CENTRE FOR INLAND WATERS
GREAT LAKES DIVISION

CRUISE 69-0-16

TRANSMITTAL AND RECEIPT FORM

TO	FROM
DATA PROCESSING Mr. W. NAGEL	M. KARLSEN OPERATIONS

MEANS OF TRANSMITTAL

RECEIVED BY (Signature)	DATE RECEIVED	SENT BY (Signature)	DATE SENT
J. M Byrne	30/10/69	MK Carlsen	30/10/69

ITEMS SENT

QUANTITY	DESCRIPTION
2	ROLLS AIR TEMP. & HUMIDITY
3	ROLLS WATER TEMP
	BRIDGE LOG & Copy KS
	STATION & TRACK CHARTS
	STATISTICS
	WEATHER OBS DOT
	Navigational charts KS

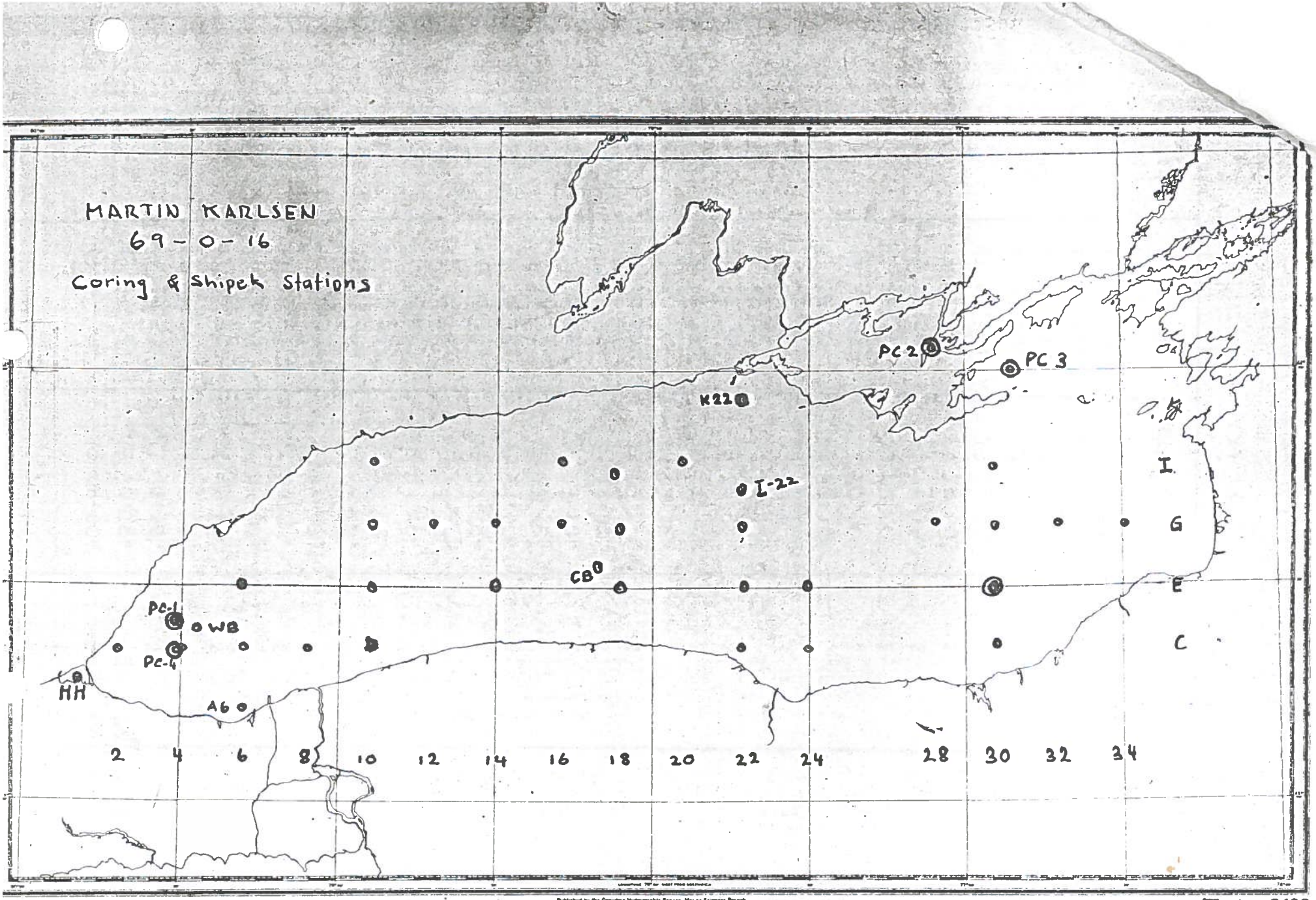
Copy 1st 6 pages
+ last 5 pages
+ map of western L. Ont.

1969

tics Summary

Cruise: 69-0-16 Date: OCT 30 Vessel MARION KARLSEN

Descriptions	Ontario	Erie	Huron	Superior	Total
Monitor cruises					
Mooring cruises					
Limnogeology cruises					
Gravity cruises					
Special cruises (CORING & SHIPEK)	1				
Miles steamed	1,346				
Moorings established					
Moorings retrieved					
~~Monitor~~ stations occupied	44				
Reversing therm. observations					
Bathythermograph casts					
Water Samples collected					
Chemical Analyses					
Bacteriological analyses					
Plankton hauls					
Grab samples (Shipek)	81				
Cores (Piston & Gravity) 1200lbs Alpine	6				
Drift cards released					
Drogues tracked					
Gravity observations					
Weather observations (D.O.T.)	48				
Cont. recordings (days) Air temp.	8				
Rel. humidity	8				
Near surf. water temp.	8				
Solar radiation	8				
Chlorophyll					
Other Observations:					
Benthos Cores	17				



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DEPARTMENT OF ENERGY AND TECHNICAL SURVEYS, OTTAWA

LAKE ONTARIO

S-196

MARTIN KARLSEN

69-0-16

Station No	Latitude	Longitude	Shipeks	Benthos	PC
HH	43 I6'54"	79 50'06"	3	I	
C-2	43 2I'25"	79 42'00"	2		
C-4	43 2I'24"	79 30'00"	2		
E-6	43 30'I8"	79 I8'54"	2		
C-6	43 2I'46"	79 I8'08"	2	2	
A-6	43 I3'00"	79 I8'00"	2		
C-10	43 2I'24"	78 54'00"	2		
C-8	43 2I'24"	79 06'00"	2		
C-24	43 2I'24"	77 30'20"	I		
PC-I	43 26'00"	79 30'42"			I
PC-2	44 03'06"	77 06'I8"		I	I
PC-3	43 59'45"	76 5I'03"		I	I
G-34	43 38'30"	76 28'54"	2		
G-32	43 39'I3"	76 4I'54"	2		
I-30	43 47'30"	76 53'48"	2		
G-28	43 39'00"	77 05'25"	2		
G-30	43 38'30"	76 54'00"	2		
E-30	43 30'I2"	76 53'58"	5	3	3
E-30I	43 30'42"	76 53'45"		I	
E-302	43 30'36"	76 54'00"		I	
E-303	43 30'30"	76 54'I8"		I	
E-304	43 30'I8"	76 54'33"		I	
E-305	43 30'08"	76 54'48"		I	
C-30	43 2I'42"	76 53'54"	2		
K-22	43 56'I2"	77 42'39"	2		
I-20	43 47'24"	77 54'00"	I		
I-22	43 43'23"	77 42'00"	2		
G-22	43 39'00"	77 42'00"	2		
E-22	43 30'I8"	77 42'00"	2		
C-22	43 2I'08"	77 42'00"	2		
E-24	43 30'20"	77 30'20"	2		
CB	43 33'05"	79 30'I8"	5	2	
E-I8	43 30'I2"	78 06'00"	2		

Station No	Latitude	Longitude	Shipeks	Benthos	P C
G-I8	43 38'I5"	78 06'00"	2	I	
I-I8	43 45'46"	78 06'48"	2		
I-I6	43 47'24"	78 I8'00"	2		
G-I6	43 39'00"	78 I8'00"	I		
E-I4	43 30'I5"	78 30'00"	I		
G-I4	43 39'00"	78 30'00"	I		
G-I2	43 39'00"	78 42'00"	I		
I-IO	43 47'24"	78 54'I2"	2		
G-IO	43 38'48"	78 53'48"	2		
E-IO	43 30'I2"	78 54'I8"	2		
WB	43 24'32"	78 26'45"	7	I	
PC-4	43 20'48"	79 30'54"		I	I

69-22-032

(1)

DATE 22 – OCT. – 1969

VESSEL MARTIN KARLSEN

CRUISE NO. 69 – 0 – 16

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
												times, depths for H.H. on sounding paper
1225										56'	HH	OFF ship in stop position, awaiting incoming ship.
												additional info on sounding chart
1330	1730					055°			10.5	130'		
1331	1731			43'21'25	79'42'00			7.4		128'	C2	ON
1345	1740			"	"					116'		
1347	1747			"	"						↓C2	OFF
1400	1800			43°21.5	79°39.7	093°			10.5	214'		+80, phase to range 4
1415	1815			43°21'5	79°36'1				10.5	256'		
1430	1830								10.5			1927 radar malfunction no position possible
1443	1843			43 21.24"	79.30.00"			8.8		310'	C4	ON, fix on R.I. radar, position in question. POSITION REJECTED
1445	1845			43 21 42	79 30 40					311'		43°21'42" N, 79°29'6 Estimated Position
1500	1900									310'		
1503	1903											alter position, steering West
1507	1907											
1515	1915									305'		
1521	1921			43.21.24	79.30.00"					310'	C4	ON CORRECT MIRAY for station C4'
1530	1930											
1532	1932					042°			10.5	310'	↓C4	OFF
1545	1945			43°22'08"	79°28'03"	042°			10.5	330'		
1600	2000			43°24'36"	79°26'06	042°			10.5			+80, on range 5
1615	2015			43°26.55	79°23.55	042°			10.5	378'		
1630	2030			43°27.9	79°21.9	042°			10.5	381'		
1645	2045			43°29.75	79°19.8	042°			10.5	386'		
1648	2048			43°30.4	79°18.9			12.1	0	385'	E-6	ON LONG Range from SHOULD BE 18.

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed Knots	Depth in feet	STN. No.	Remarks
1700	2100			43°30.3	79°18'.9				0	382'	E-6	
1702	2102			43°30.3	79°18'.9				0	382'	E-6	END OF STN E-6
1713	2113					180°			10.5	420'		CHANGE TO RANGE 5 +80
1715	2115			43°29.9	79°18'.85	180°			10.5	427'		
130	2130			43°26.25	79°18'.87	180°			10.5	422'		
1731	2131											CHANGE TO RANGE 5 -80
1745	2145			43°23.36	79°18'.90	180°			10.5	364'		
1757	2157			43°21.78	79°18.86			8.5	0	339'		ON STN # C-6
1800	2200			43°21.78	79°18'.86				0	339'		
1815	2215			43°21.2	79°19'.59				0	346'		IN WRONG POSITION
1830	2230			43°21.2	79°19'.59				0	343'		ALSO WAITING FOR SOME
1839	2239			"	"				0	343'		ENGENE REPAIRS. TURN OF RECORDER
1903	0003			"	"					338'		LEAVING INCORRECT POSITION OF C-6
						354						AND HEADED FOR NEW POSITION
						"		NOW	10.5			RECORDER ON
2015	0015			43°21.46'	79°18.09'	"			0	345'	C-6	ON STN. C-6
2030	0030			"	"	"			0	346'	"	
2045	0045			"	"	350			0	346'	"	
2100	0100			"	"	340			0	346'	"	
2115	0115			"	"	330			0	346'	"	
2132	0132			"	"	260			0	346	"	
2145	0145			"	"	300			0	346	"	
2200	0200			"	"	280			0	346	"	
2217	0217			"	"	300			0	346	"	
2230	0230			"	"	310			0	346	"	
2245	0245			"	"	360			0	346	"	

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
2300	0300			43°21.46'	79°18.09'	330			0	346	C-6	
2315	0315			43°21.46	79°18.09'	305			0	346	C-6	
2330	0330			"	"	320			0	348	C-6	
2343	0343			"	"	360			0	349	C-6	
2352	0352			"	"	310			5	350	C-6	ANCHOR OFF, HEADING FOR (N.W.) SOUNDING.
2400	0400					300			10.5	356		
0015	0415					310			10.5	358		BEARING NOT TAKEN, DECISION TO WA
0017	0417			43°23.50	79°22.18'	270			09	359	LINE #1	BEARING OBTAINED, ON LINE
0030	0430			43°23.45	79°24.24'	270			10.0	351		
0045	0445			43°23.47	79°27.20'	270			10.0	344		-80, PHASE 4 at 0044,
0100	0500			43°23.47	79°31.13'	270			10.0	311		
0112	0512								"	267		-80, to PHASE 3, 0112
0115	0515			43°23.47	79°35.27'	270			10.5	252		
0128	0528								"	184		-80 to RANGE 2
0130	0530			43°23.47	79°39.00'	270			"	164		
0136	0536								10.5	104		-80 to Range 1
0137	0537					033			"	90	LINE #1	T.P. #1 (Precise T.P. not on Sounder Survey) END LINE #1
0140	0540					090			"	79	LINE #2	T.P. #2 ON LINE #2
0143	0543					090			"	130		+80 to RANGE 2
0145	0545			43°24.20	79°39.06'	090			10.5			
0151	0551					"			"	274		+80 to RANGE 3
0200	0600			43°24.20	79°35.27'	"			"	256		
0205	0605					090			"	270		+80, to RANGE 4
0215	0615			43°24.20	79°31.41'				"	308		
0230	0650			43°24.20	79°27.54'				"	348		
0235	0635								"	350	CONT'D	+80, to RANGE 5

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed KNOTS	Depth in feet	STN. No.	Remarks
0245	0645			43°24'.28	79°24'.03'	090			10.5	357	LINE #2 CONT'D	
0258	0653					360			"	364	LINE #2	T. P. #3 END LINE #2 estimation of distance betw T.P.#3-T.P.#4
0257	0657					270			10.5	374	LINE #3	T. P. #4 ON LINE #3 done on time speed basis - Lat-Long plo
0300	0700			43°24'54"	79°22'45"	270			"	374		
0315	0715			43°24'54"	79°26'12"	270			"	358		
0330	0730			43°24'54'	79°29'50'	270			"	332		-80 to RANGE 4,
0345	0745			43°24'54"	79°33'33"	270			10.5	284		
0349	0749					270			"	266		-80 to RANGE 3
0400	0800			43°24'54"	79°36'55"	270			"	208		
0405	0805					270°			"	174		-80 to RANGE 2
0411	0811					033°			"	114'		T.P. #5 END OF LINE 3
0415	0815			43°25.91'	79°39.1'	090°			10.5	104'	ON LINE #4	T.P. #6 BEGINNING OF LINE 4
0424	0824					090°			"			+80 TO RANGE #3
0430	0830			43°25.41'	79°35.55'	090°			"	224'		
0438	0838					090°			"	274'		+80' CHANGE TO RANGE #4
0445	0845			43°25.41'	79°31.7'	090°			"	300'		
0500	0900			43°25.41	79°23.00'	090°			"	343'		
0506	0906				JN3	090°			"	356'		+80° CHANGE TO RANGE #5
0515	0915		X	43°25.41	79°24.50'	090°			10.5	368'		
0524	0924					001°			10.5	377'		T.P. #7 END OF LINE 4
0528	0928					270°			"	392'	ON LINE #5	T.P #8 BEGINING LINE 5
0530	0930			43°25.97'	79°22.55'	270°			"	386'		
0545	0945			43°24.05'	79°25.95'	270°			"	360'		
0555	0955					270°			"	337		-80° CHANGE TO RANGE 4
0600	1000			43°25.95'	79°29.82'	270°			"	327		
0615	1015			43°25.95'	79°33.10'	270°			"	278		

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
0622	1022					270			10.5	226'		-80' CHANGE TO RANGE 3
0630	1030			43°25.95'	79°36.65'	270			"	180'		-80 CHANGE TO R-2
0637	1037					033			"	110'		TP #9 END OF LINE #5
0642	1042					090			"	98	ON LINE #6	TP #10 BEGINING LINE #
0645	1045			43°26.50'	79°37.13'	090			"	126'	"	
0652	1052					090			"	181'	"	CHANGE RANGE TO R-3
0700	1100			43°26.50'	79°33.70'	090			"	243'	"	
0703	1103					090			"	270'	"	CHANGE RANGE TO R-4
0715	1115			43°26.50'	79°30.28'	090			"	316'	"	
0730	1130			43°26.50'	79°26.78'	090			"	352'	"	CHANGE RANGE TO R-5
0745	1145			43°26.50'	79°23.50'	090			"	391'	"	
0752	1152					CHANGING TO 270°			"	410	END #6	TP #11 END OF LINE #
0800	1200					270			"		ON LINE #7	TP #12 BEGINING LINE #
0815	1215			43°26'89	79°24.67'	270			"	356	"	
0830	1230			43°27'10	79°31.60'	270			"	312	"	
845	1245					270			"	221	"	
0900	1300			43°27'04	79°35'60	270			"	104	"	HEADING SSW. PICK UP HARRY
0903	1303			43°27'04	79°36'50	200			"	82	ON #7	T.P. #13, CHANG RANGE END OF LINE #7
0910	1310					200			"	110		CHANG R (80-200)
0930	1330					207			"	146		HEADING FOR PICK UP HARRY
0935	1335					239			2	140		Reduce Speed
0938	1337			43°21'88	79°41'36	-			0	132		STOP. HARRY ON BOTT ACHO SOUNDING
1005	1405			43°26.00'	79°29'30	62			10.5	158		HEADING FOR NE. 062°
1008	1408					61			"	195		CHANG R → (160-280)
1018	1418					62			"	219		
1030	1430					62			H	248		

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
1032	1432					62°			10.5	255'		CHANG RANGE TO (240 – 360)
1043	1443					62°			"	282		
1058	1458			43°26'00	79°29'70	90°			"	318	ON LINE #5	HEADING EAST ON LINE #5
1105	1505			43°26'00	79°28.50	270°			"		"	HEADING WEST ON LINE #5
1128	1528					90°			3		"	HEADING EAST ON LINE #7
1135	1535					60°			0	324'	PC-1	REDUCE SPEED STOP. ANCHOR DOWN
1145	1545					–			0	326'	"	STOP. START ECHO SOUNDING
1156	1556			43°26'00"	79°30'42"	–			0	"	"	FINISH ANCHOR DOWN.
1550	1950	0							3	312'		ANCHOR UP PROCEEDING TO A-6
1553	1953					145°			8	315'		INCREASE SPEED,
1600	2000	MIN.		43°24'45"	79°29'30"	145°			10.5	334'		to A-6
1615	2015			43°23'09"	79°27'24"	145°			10.5	332'		
1630	2030	SEC.		43°21'09"	79°24'48"	145°			10.5	320'		
1645	2045	FROM		43°17'48"	79°22'36"	145°			10.5	282'		
1654	2054	NOW		"	"	145°			10.5	235'		CHANGE TO RANGE TO 160 – 29
1700	2100	ON		43°15'18"	79°20'12"	145°			10.5	168'		
1703	2103					145°			10.5	142'		CHANGE RANGE 20' – 210
1707	2107					145°			10.5	106'		CHANGE RANGE 0' – 130
1708	2108					145°			10.5	115'		CHANGE RANGE BACK TO 2
1715	2115			43°13'00	79°18'00"	195°			10.5	078'		CHANGE RANGE TO 0' – 130
1722	2122			43°13'00"	79°18'00"				0	65'		ON A-6
1730	2130			43°13'00"	79°18'00"				0	65'	A-6	
1731	2131			43°13'00"	79°18'00"				3	65'		Off - A-6 Proceeding to
1745	2145			43°19'36"	79°15'42"	045°			10.5	76'		PROCEEDING TO STN C-8
1800	2200			43°16'06"	79°13'36"	045°			10.5	100'		
1803	2203					045°			10.5	105'		CHANGE TO RANGE 70 – 210

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Local Time	GMT	POSITION D. R Lat. N.	POSITION D. R Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
1813	2213					095°			10.5	204'		CHANGE RANGE 150'-290
1815	2215			43°18'05"	79°10'48"	045°			10.5	207'		
1830	2230			43°19'54"	79°08'07"	095°			10.5	266'		
1834	2234					"			"	290'		CHANGE RANGE 230-37
842	2242			43°21'29"	79°06'00"				0	322'		ON STN # C-8
1855	2255			"	"	086°			0	324'		OFF " C-8
1900	2300			43°21'30"	79°05'12"	090°			10.5	326		HEADED FOR C-10
1915	2315			43°21'24"	79°01'54"	090°			"	310'		" " "
1930	2330			43°21'24"	78°58'00"	090°	} CORRECTION FOR MIN.		"	300'		" " "
1945	2345			43°21'24"	78°54'00"	110°			0	246'		ON STN # C-10
												ALSO CHANGED DEPTH TO RANGE 150'-290
1956	2356					085			10.5	240'		OFF C-10 AND
						085			"	"		HEADED FOR E-3
2015	0015					084			"	182'		
2020	0020					082			"	166'		CHANG R to (80-200)
2025	0025					000			"	170		T.P. TURN TO NORTH
2030	0030					000			"	230		CHANG R to (160-280)
2033	0033					000			"	278		CHANG R to (240-360)
2038	0038					082			"	350		" " " (320-440)
2040	0040			43°24'34"	78°45'36"	082			"	353		T.P. HEADING FOR E. 082°, HEAD TO E-3
2045	0045			43°24'36"	78°44'00"	082			"	356		
2100	0100					082			"	362		
2115	0115					080			"	368		
2130	0130					078			"	376		
2145	0145					078			"	390		

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
2200	0200					083			10.5	366'		
2216	0216					083			"	338'		
2230	0230					083			"	342'		
2245	0245					084			"	341'		
2300	0300	43°27'18"	78°10'42"			086			"	348'		
2315	0315					081			"	370'		
2330	0330					082			"	410'		
2343	0343					081			"	440'		CHANG R TO R6 (400-520)
2400	0400					090			"	468'		
0030	0430					090			"	458'		
0100	0500	43.2745"	77°41'30"			090			"	500'		
0107	0507					090			"	503'		+80, to RANGE 7
0143	0543					053			"	568'		
0150	0550					053			"	600		+80, to RANGE 8
0200	0600	43°28'51"	77°27'12"			053			"			-80, to Range 7
0211	0611					053			"			Paper Runout
0212	0612	43°27'00	77°25'00			180			10.5			T.P.
0227	0627	43°26'12"	-77°25'00"			180			"	680'		Range 8 — position at 0230
0237	0637					180			"	670'		Range 7
0240	0640					180			"			Range 7
0243	0643					"			"			RANGE 8
0259	0659					"			"			Range 7
0300	0700	43°21'50"	77°25'00"			"			"	500'		
0303	0703					"			"			RANGE 6
0307	0707					"			"			5
0312	0712					"			"			4

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
0313	0713					180			10.5			Range 3
0317	0717					180			10.5	174'		2
0322	0722	43 17 43	77°25' 00"			089			10.5	114'		T.P. #1
0330	0730	43°17'43"	77°22'42"			090			10.5	90'		Range 1
0345	0745					090			"	92'		
0400	0800	43°17'43"	77°15'00"			360			10.5	106'		T.P. #2
0401	0801					360			10.5	106'		+80, Range 2 (80-200
0407	0807					360			"	197'		+80 RANGE (150-290
0415	0815					"			"	279'		+80' RANGE (240-370
0419	0819					"			"	362'		+80' " (310-450
0423	0823					"			"	458'		+80' " (390-530
0425	0825					"			"	518'		+80' " (470-610
0430	0830	43°22'05"	77°15'00"			"			"	602'		+80' " (550-690
0437	0837					"			"	686'		+80' " (630-750
0441	0841					"			"	—		-80 " (550-690
0445	0845					360			"	730'		+80 " (630-750
0500	0900	43°28'00"	77°14'42"			360			"	690'		
0507	0907					090			"	675'		TP #3
0511	0911					090			"	640'		-80 RANGE (550-690
0515	0915					"			"	660'		
0518	0918					"			"	670'		+80 RANGE (630-750
0522	0922					"			"	648'		-80 " (550-690
0525	0925					180			"	—	TP 4	+80 " (630-750
0530	0930	43°29'12"	77°10'00"			"			"	705		
0543	0943			43°27'30"	77°09'42"	4				710		

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed Knots	Depth in feet	STN. No.	Remarks
0600	1000			43°24'30"	77°09'48"	180°			10.5	626'		-80' RANGE (550-690
0607	1007					"			"	515'		-80' " (470-610
0608	1008					"			"	476'		-80' " (390-530
0612	1012					"			"	400'		-80' " (310-450)
0615	1015					"			"	324'		-80' " (230-370
0621	1021					"			"	242'		-80' " (150-290)
0630	1030			43°19'18"	77°10'00"	"			"	156'		-80' " (70-210)
0631	1031					047°			"	142'		T.P.S. HEADED FOR E-30
0637	1037					047°			"			
0639	1039					047°			"	206'		+80 (150'-290'
0645	1045			43°20'18"	77°07'42"	045			"	250		
0649	1049					045			"	292		(240-360) +80
0655	1055					"			"	346		(320-440) +80
1100	1100					"			"	415		"
0702	1102					"			"	420		400-520 +80
0709	1109					"			"	514		+80 (470-610)
0715	1115			43°24'18"	77°02'06"	"			"	588'		
0722	1122					"			"	662'		+80 (560-690)
0730	1130			43°26'36"	76°58'18"	"			"	644'		
0736	1136					"			"	685'		+80' (640-750)
0740	1140					"			"	696'		-80 (560-690)
0744	1144			43°28'48"	76°55'18"	"			"	704'		+80 (640-750)
0800	1200					010			(DEAD SLOW) 1	OFF SCALE		OFF SCALE DEPTH >710' REDUCE SPEED
0815	1215					310			2	"		>710'
0818	1218					"			0	"		>710' STOP, MARK BUOY OUT
0823	1223					300			4	"		>716'

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
0827	1227								0	>710'	E-30	ON – E 30
0845	1245			(43°30'12"	76°54'00")	this position from cruise	plan		0	>716'	"	"
0900	1300								0	762'	(127	SCALE TO FATHOM. FATHOMS)
0948	1348								0	CORRECT		DEPTH, ECHO
1042	1442								0	762'	E-30	OFF SOUNDER !
1046	1446								0	762'	"	• DISTON CORE ON ECHO SOUNDER
1110	1510								0	762'	"	
1130	1530								0	762'	"	
1157	1557								0	762'	"	
1217	1617								0	762	E-30	MARKER BUOY TAKEN UP
1221	1621					245°			10.5	756		PROCEEDING TO ROCHESTER
1234	1634					252			10.5	756		AND C-24
1300	1700			43°28'40	77°01'45"	252			10.5	738		
1315	1715					252			"	714		
1330	1730					252			10.5	774		
1332	1732			43°27'12"	77°08'36"	252			10.5	774		
1400	1800			43°25'18"	77°14'25"	250			10.5	672		
1430	1830			43°23'39"	77°20'50"	250			10.5	660		
1500	1900			43°22'15"	77°27'00"	250			10.5	504		phase to range 1 (0-120) recording in fathoms
1515	1915			43°21'24"	77°30'20"				10	420	C-24	ON C-24
1526	1926					224			10.5	408	C-24	OFF C-24 proceeding to Rochester
1530	1930					224			10.5	316		range 4 (240-360)
1533	1933					224			10.5	262		range 3 (160-280)
1543	1943					224			10.5	178		range 2 (80-200)
1600	2000					224			10.5	180		range 1 (0-120)
1608	2008			43°16'48"	77°35'54"					052		STOP OFF OF ROCHESTER, N.Y. TO FIX RADAR.

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1930
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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
949												SOUNDER ON
1949	2349									44'		LEAVING ROCHESTER.
						061°			10.5			HEADED FOR SOUNDING
												LINES, THEN KINGSTON
1949	2349					061°			10.5			BASIN. (SAT. MORNING
2000	0000			43°17'24"	77°34'24"	061°			"	95'		
2008	0008					"			"	124'		CHANGE R TO 80-200
2017	0017					"			"	200'		" " 160-280
2024	0024					"			"	285'		" " 240-360
2028	0028					"			"	345'		" " 320-440
2035	0035					"			"	448'		" " 400-520
2039	0039			43°21'00	77°25'00	090°			"	452'		T.P.
2048	0048					"			"	400'		(2045 EDT. 43°21'.0 77°23'.3) CHANG R TO 320-440
2100	0100			43°21'00	77°19'5	"			"	362'		.
111	0111					"			"	320'		CHANG R TO 240-360
2115	0115			43°21.0	77°15'9	"			"	316		
2130	0130			43°21'.0	77°12'3	"			"	298		
2136	0136			43°21'.0	77°10'.0	180°			"	282		T.P.
2139	0139 (2145 EDT)			(43°19'6	77°10'.0)	"			"	234		CHANG R TO 160-280
2146	0146					"			"	175		
2148	0148					"			"	148		CHANG R TO 80-200
2153	0153					"			"	80		" " 0-120
2154	0154			43°18'0	77°10'0	090			"	68		T.P.
2200	0200			43°18'0	77°08'9	"			"	70		2215 EDT < 43°18'.0
2217	0217					"			"	74		77°05'.4
2230	0230			43°18°0	77°01'.6	"			"	80		

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Local Time	GMT.	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
2235	0235			43°18'0	77°00'0	0			10.5	89'		T.P.
2236	0236					"			"	94'		CHANG R to 80-200
2245	0245			43°19'8 (8)	77°00'0	"			"	190'		" " 160-280
2300	0300			43°22'3	77°00'6	"			"	292		" " 240-360
2302	0302					"			"	350'		" " 320-440
2303	0303					"			"	450'		" " 400-520
2308	0308					"			"	510		" " 480-600
2315	0315			43°24'9	77°00'0	"			"			
2318	0318					"			"	648		CHANG R to 560-680
2324	0324					"			"	>720'		OFF SCALE >720'
2326	0326					"				120 FATHOM		CHANG SCALE TO FATHO
2330	0330			43°25'6	77°00'0	"				122F		
2339	0339					345°	?			126F		T.P.
2345	0345			43°30'0	77°00'4	120° 120°				128F		T.P.
2400	0400			43°28'7	76°56'7	120°				120F		
0015	0415			43° 27'15	76°52'48"	120°			10.5	109F		
0030	0430			43° 25' 30"	76°49'40	120°			"	69F		
0031	0431					"			"	372F		to 320-440 range 5
0035	0435					"			"	326H		240-360 range 4
0042	0442					120°			10.5	250		range 3
0045	0445			43°24"30"	76°45'06"	120°			10.5	230		
0051	0451					"			"	174		range 2
0100	0500			43°22'54"	76°42'45"	"			"	100		range 1
0104	0504					000			"	92		T.P.
0108	0508					000			"	0206	10	range 2

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0115	0515			43°24'18"	76°42'00"	000°			10.5	174		
0117	0517					"			"	178		160-280 Range 3
0127	0527					"			"	270		Range 4
0130	0530			43°27'22"	76°42'00	"			"	330		5
0134	0534					"			"	436		400-520 Range 6
0139	0539					"			"	510		Range 7
0145	0545			43°30'10"	76°42'00	"			"			
0153	0553					000°			10.5	554		Paper out - 1
0158	0558					"			10.5	108		Paper IN | FATHOMS
0200	0600			43°33'00"	76°42'00"	000°			10.5			
0215	0615			43°35'45"	76°42'00	000°			10.5	106		
0230	0630			43°38'30"	76°42'00"	000°			10.5	90		
0235	0635					"			"	510		480-600 range 7
0237	0637					"			"			Range 6
0245	0645			43°41'04	76°42'00"	000			"	448		
0249	0649					"			"	408		Range 5
0300	0706			43°43'48"	76°42'00"	000			"			
0301	0701					"			"	326		Range 4
0315	0715			43°46'15"	76°42'00"	"			"	252		Range 3
0330	0730			43°48'50"	76°42'00"	000			"	204		
0339	0739					"			10.5	176		range 2
0345	0745			43°51'42"	76°42'00	000			10.5	154		
0355	0755								10.5	88		range 1
0400	0800								5	60		HALF SPEED
0403	0803			43°54'24"	76°41'58"				5	134'		" R-2
									10.5			

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed KNOTS	Depth in feet	STN. No.	Remarks
0412	0812					306°			10.5	121'		CHANGE COURSE
0415	0815			43°56'12"	76°41'54"	306°			10.5	120'		
0430	0830			43°57'28"	76°44'12"	306°			10.5	110'		
0444	0844			43°58'38"	76°47'20"	306°			10.5	78'		R-1
0449	0849					306°			10.5	114'		R-2
0500	0900			44°00'00"	76°50'00"	"			"	108'		
0514	0914			44°01'42"	76°53'12"	180°			"	104'		CHANGE COURSE.
0530	0930			43°59'05"	76°53'42"	"			"	106'		
0537	0937			43°57'03"		305°			"	094'		T.P. CHANGE COURSE
0545	0945			43°57'45"	76°55'00"	"			"	080'		CHANGE RANGE #1
0553	0953					211°			"	070'		T.P. CHANGE COURSE.
0600	1000			43°58'24"	76°57'55"	211°			"	068		
0604	1004					068°			"	66'		T.P. CHANGE COURSE.
0615	1015			43°57'57"	76°56'36"	063°			"	75'		
0630	1030			43°59'08"	76°53'03"	063°			"	108'	R-2	CHANGE RANGE TO 80-200'
0645	1045			44°00'24"	76°49'24"	"			"	108'		
0647	1047					005°			"	108'		T.P. CHANGE COURSE
0700	1100			44°02'48"	76°48'30"	000°			"	99'		
0707	1107								5			SLOW DOWN
0712	1112								5	88'		CHANGE TO R-1
0715	1115			44°04'45"	76°48'24"	000°			0	90'		STOPPED.
0730	1130			44°05'03"	76°48'21"	000°			10.5	90'		UNDER WAY
0745	1145			44°07'30"	76°49'06"	301°			"	97'		
0749	1149					230°			"	174'		R-2 CHANGE COURSE.
0800	1200			44°07'08"	76°52'12"	230°			"	152'		

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	Actual Lat. N.	Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
0815	1215	44°05' N	76°55' W			230°			10.5	140'		
0819	1219					"			"	132'		
0830	1230	44°03' N	76°58' W			"			10.5	112'		
0842	1242					345°			"	82'		CHANG R to 0-12
845	1245	44°02' N	77°01' W			266°			"	78'		
0855	1255					325			"	65		T. P
0856	1256	→ 44°03' N	77°03.9									
0900	1300	44°03'2	77°04' W			332°			"	41'		T. P
0901	1301					240°			"	43'		
0911	1311	→ 44°02'19	77°06' W			033°			"	37'		T. P
0912	1312					"			"	35'		
0915	1315					138°			"	35'		T. P
0917	1317	→ 44°03' N	77°06' W									
0918	1318					044°			"	46'		T. P
0924	1324	→ 44°02.8	77°05' W									
0925	1325					244°			"	49'		T. P
0928	1328	→ 44°03' N	77°04' W									
0929	1329					"			"	45'		
0930	1330					015			"	42'		T. P
0937	1337	44°02' N	77°05' W									
0943	1343	44°03.2	77°05' W			060			0	38'		STOP.
0945	1345					225			10.5	39'		T. P.
0950	1350					220			"	42'		
0952	1352					"			0	39'		STOP.
0953	1353					"			0	40'	ON PC-2	ANCHOR DOWN
1000	1400	44°03' N	77°06' W			"			0	40'	"	
1030	1430	"	"			"			0	39'	"	PISTON CORE DOWN
1054	1454	"	"			"			0	39'	"	CLEANED PEN 30 SECOND
1056	1456	"	"			"			0	38'	"	STOP RECORDING
1107	1517	"	"			"			0	38'	"	TURN ON "
1117	1517	"	"			"						TOOK BUCKET SAMPLE

← START

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
1130	1530			44°03'	77°06'	220			0	38'	PC-2	STOP RECORDING
1133	1533					102			10.5	38'	OFF PC-2	ANCHOR ON BOAT
1155	1555					65°			"	68'		TURNING TO 65°
1200	1600					"			"	90'		
1208	1608					"			"			RECORDER STOP, TRAFFIC ON RADIO
1209	1609					52			"			
1212	1612					52			8	118		Range 2 (80-200)
1215	1615			44°04'11"	76°56'42"	"			8	126		
1230	1630	44°05'52"	76°53'48"	4	76°51 13	52						
1245	1645			44°07'24	76°51'13"	52			8	164		
1247	1647					110°			8	180		T. P.
1251	1651					110°			8	84		Range 1 (0-120)
1254	1654					110°-180°			8			Slowly around
1300	1700	44°05'54	76°48 54"			190°			8	90		
1315	1715	43°03'54	76°49' 30"			"			8	66		
1330	1730			44°00'54"	76°50'40"	190			"	111		
1337	1737					"			"			Range 2
1338	1738			43°59'45"	76°51'03"	"			0	106		STOP, ON STATION PC-3
1404	1804								0			Recorder off
1424	1824								0	108		PISTON CORE DROPPED
1456	1856											ANCHOR UP
1458	1858					099°			10.5	108		FULL SPEED, ON LINE
1500	1900					"			"	108		
1515	1915			43°59'42"	76°47'15"	"			"	86		
1530	1930			43°59'05"	76°43'15"	"			"	126		
1545	1945			43°58'30"	76°39'56"	"			"	120		

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed KNOTS	Depth in feet	STN. NO.	Remarks
1600	2000			43°58'00"	76°36'12"	099°			10.5	106'		ON RANGE 2.
1610	2010					099°			5	065'		CHANGE TO R-1
1615	2015			43°57'36"	76°32'10"	099°			10.5	096'		
1621	2021					099°			11	155'		CHANGE TO R-2
1630	2030			43°57'15"	76°28'56"	"			"	104'		
1632	2032					"			"	70'		CHANGE TO R-1
1645	2045			43°56'45"	76°25'18"	"			"	66'		
1700	2100			43°56'20"	76°21'57"	099°			"	054'		
1715	2115			43°55'58"	76°18'18"	"			"	058'		
1727	2122					156°			"	84'		T.P.
1730	2130			43°54'42"	76°15'12"	156°			"	83'		
1734	2134					273°			"	65'		T.P.
1745	2145			43°53'48"	76°17'24"	"			"	95'		
1747	2147					161°			"	75'		T.P.
1754	2154					"			"	130'		CHANGE TO R-2
1756	2156					272°			"	134'		T.P.
1800	2200			43°52'15"	76°18'15"	265°			"	114'		
1813	2213					250°			"	059'		T.P. R-1
1815	2215			43°51'48"	76°20'54"	147°			"	080'		
1821	2221					"			"	145'		R-2
1825	2225					"			"	60'		R-1
1830	2230			43°49'45"	76° 18'53"	272°			"	62'		T.P.
1842	2242					"			"	157'		R-2
1845	2245			43°49'48"	76° 22'18"	"			"	123'		R-2

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Local Time EDT.	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed KNOTS	Depth in feet	STN. NO.	Remarks
1900	2300			43°50.0	76°26.0	272°			10.5	120'		
1915	2315			43°49'56"	76°29'36"	"			10.5	140'		
1918	2318					000°			10.5	137'		T.P.
1929	2329			43°51'41"	76°30'12"	115°			"	088'		T.P.
1932	2332					115°			"	084'		CHANGE TO R-1
1945	2345			43°50'36"	76°27'06"	"			"	094'		
2000	0000			43°49'30"	76°23'54"	"			"	130'		R-2
2015	0015			43°48'24"	76°20'42"	"			"	102'		
2017	0017								"	104'		
2030	0030			43°47'15"	76°17'24"	"			"	80'		R-1
2036	0036					"			"	73'		CHNGE HEAD, T.P.
2037	0037			~~43°46'28"~~	~~76°15'00~~	185°			"	80'		
2039	0039					180°			"	88		
2041	0041								"	91'		T.P
2045	0045			43°46'06"	76°15'00	180°			"	110'		
2055	0055			43°44'18"	76°15'00	296°			"	120'		R-2
2100	0100			43°44'36"	76°16'06"	"			"	130'		
2105	0105					"			"	149'		
2115	0115			43°45'42"	76°19'06"	"			"	156'		
2130	0130			43°46'48"	76°22'06"	"			"	154'		
2145	0145			43°47'45"	76°25'09"	"			"	146'		
2200	0200			43°48'48"	76°28'18"	"			"	128'		
2215	0215			43°49'54"	76°31'18"	"			"	135		
2230	0230			43°51'04"	76°35'00	"			1	90'		DEAD SLOW,
2245	0245			43°52'12"	76°38'06"	"			10.5	75'		R-1
2300	0800			43°53'03"	76°40'42"	"			"	87		
2305	0305					"						
2315	0315			43°53'48"	76°43'15"	"						

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2330	0330			43°54'56"	76°46'18"	296°			10.5	56'		
2333	0333			43°55'06"	76°46'42"	242°			"	48'		T.P
2345	0345			43°54'29"	76°49'10"	"			"	66'		
2350	0350			43°53'56"	76°49'56"	115°			"	78'		T.P
2400	0400			43°53'26"	76°48'30"	"			"	88'		
6/10/69 0002	0402					"			"	112'		R-2
0015	0415			43°52'18"	76°45'12"	"			"	150'		
0030	0430			43°51'03"	76°41'45"	"			10.5	174'		
0045	0445			43°49'54"	76°38'36"	"			"	176		
0100	0500			43°48'48"	76°35'30"	"			10.5	178		
0115	0515			43°47'24"	76°31'08"	"			10.5	178		
0130	0530			43°46'18"	76°27'30"	"			"			
0145	0545			43°45'07"	76°24'00"	"			"	160		
0200 EDT	0600			43°44'06"	76°21'06"	"			"	144		all subsequent times ES
0115 EST	0615			43°42'54"	76°17'20"	"			10.5	120		
0127	0627			43°42'05"	76°15'00"	180			10.5	90		T.P
0139	0639			43°40'00"	76°15'00"	295			10.5	93		T.P
0145	0645			43°40'24"	76°16'10"	295			10.5	105		
0200	0700			43°41'18"	76°19'20"	"			10.5	152		
0215	0715			43°42'33"	76°22'33"	295			10.5	180		
0222	0722			1					"	196		Range 3
0230	0730			43°43'42	76°25'48"	295			"	206		
0245	0745			43°44'42"	76°28'45"	"			"	236		
0300	0800			43°45'36"	76°32'00"	295			10.5	208		
0315	0815			43°46'51"	76°35'12"	295			10.5	204		
0330	0830			43°47'48"	76°38'15"	"			"	"		

DATE

VESSEL MARTIN KARLSEN

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Local Time EST	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. NO.	Remarks
0345	0845			43° 48' 54"	76° 41' 18"	295°			10.5	199'		R-3
						"			"			
0400	0900			43° 49' 58"	76° 44' 33"	209°			"	180'		T.P.
0411	0911					115°			"	215'		T.P.
415	0915			43° 48' 02"	76° 45' 28"	115°			"	230'		
0430	0930			43° 46' 57"	76° 42' 18"	115°			"	232'		
0445	0945			43° 45' 52"	76° 38' 57"	"			"	253'		
0500	1000			43° 44' 36"	76° 35' 27"	"			"	275'		R-4
0515	1015			43° 43' 24"	76° 31' 53"	"			"	299'		
0530	1030			43° 42' 11"	76° 28' 06"	"			"	319'		
0545	1045			43° 41' 02"	76° 24' 36"	"			"	320'		
0600	1100			43° 39' 54"	76° 21' 18"	"			"	248'		R-3
0615	1115			43° 38' 48"	76° 17' 48"	"			"	156'		R-2
0630	1131			43° 37' 38"	76° 15' 30"	274°			"	100'		T.P.
0645	1145			43° 37' 52"	76° 18' 56"	274°			"	155'		
656	1156					"			"	196		R-3
0700	1200			43° 38' 12"	76° 22' 42"	"			"	233'		
0704	1204					"			"	286'		R-4
0711	1211					"			"	348'		R-5
0715	1215			43° 38' 19"	76° 25' 48"	"			"	386'		
0722	1222					"			"	432'		R-6
0730	1230			43° 38' 30"	76° 28' 54"	"			SLOW	433'		ON G-34
0740	1240			"	"	"			10.5	428'		OFF STN G-34 HEADED FOR G-32
0745	1245			43° 38' 33"	76° 30' 00"	"			"	429		
0800	1300			43° 38' 49"	76° 33' 30"	"				485		TIME CHANGE FOR SHIP, EDT to EST CHART 22

222
226

EST AS OF 2 AM

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VESSEL MARTIN KARLSEN

CRUISE NO. 69 - O - 16

26/101

Local Time E.S.T.	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed Knots	Depth in feet	STN. No.	Remarks
0815	1315			43°39.0	76°37'24"	274°			10.5	453		
0830	1330			43°39.12	76°41'08"	"			"	495		
0834	1334	→		43°39'13	76°41'54"	"			SLOW	480	ON G-32	ON G-32
0835	1335											BUCKET SAMPLE
0840	1340					"			STOP	482	"	
0845	1345					"			"	486	"	2nd Bucket Sample
0858	1358	→		43°39'06"	76°42'26"	"					OFF	
0859	1359					315°			10.5	488	G-32	
0915	1415					"			"	396		R-5
0933	1433					"			"	327		R-4
0947	1447					"			"	263		
0954	1454					"			"	238		R-3
1000	1500					"			"	230		
1005	1505					"			SLOW	223		
1010	1510					"			"	216		Timed Sounder @ 203 pulse/min
1015	1515					"			"	206		
1018	1518					243°			10.5	205		
1030	1530					"			"	210		
1040	1540					130°			"	217		
1044	1544			43°47'30"	76°58'48"	"			STOP	232	on I-30	WRONG POISITION.
1047	1547			"	"				"	236	"	FIRST BUCKET SAMPLE
1050	1550			"	"				"	234	"	2nd BUCKET SAMPLE
1058	1558			"	"	211°			10	230	OFF I-30	
1103	1603					300°			"	238		HEADING BACK TO RIGHT POISITION I-30
1105	1605					031°			"	235		
1112	1612					090°			"	220		
1130	1630					135°			SLOW	248		

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
1132	1632			43°47.3'	76°53'48"	-			0	246'	ON I-30	ON STN. I-30 RIGHT POSITION
1135	1635			"	"	-			0	247'	"	1st BUCKET SAMPLE
1142	1642			43°47'3"	"	224°			10.5	247	OFF I-30	2nd BUCKET SAMPLE
45	1645					"			"	252		
1200	1700					"			"	290		R-4
1216	1716								10.5	320		
1227	1727								10.5	346		R-5 (320-440)
1230	1730								10.5	356		
1245	1745								10.5	414		
1250	1750			43°39'00"	77°05'25"				10.5	420		ON G-28
1305	1805			43°39'00"	77°05'25"	093°			0			OFF G-28, en route G-30
1310	1810					093°			10.5	434		
1315	1815					093°			10.5	466		Range 6 400-520
1325	1825					093°			10.5	508		R-7 480-600
1331	1831					093°			10.5	510		
1345	1845					093°			10.5	540		
1349	1849			43°38'30"	76°54'00"	093			0	550		ON G-30
1350	1850								0	550		recorder off - on paper change
1354	1854								0	555		
1404	1904					180°			10.5	554		OFF G-30
1406	1906					180°			10.5	565		Range 8 560-680
1415	1915					180°			10.5	616		
1428	1928					180°			10.5	696		Range 9, inadequate
1429	1929					180°			10.5	114 FMS		FATHOM Range 2 80-200 FMS
1430	1930					180°			10.5	120 FMS		
1445	1945			43°30'12"	76°53'58"	180°			10.5	127 FMS		ON E-30

76° 54' 09" — 43 27' 30

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed Knots	Depth in feet	STN. No.	Remarks
1452	1952			43°30'12"	76°53'58"					768 ft.	E-30	Radar Reflector in Position
1504	2004					180°				123 FMS		OFF E-30, time in question is 1510
1515	2015					180°			10.5	123 FMS		
1530	2030					180°			10.5	109 FMS		
34	2034								10.5	110		maneuvering to go on line
1538	2038			43°27'24"	76°54'10"	319°			10.5	111		T.P., ON LINE "A"
1545	2045			43°28'10"	76°54'54"	315°			10.5	114 FMS		
1600	2100			43°29'40"	76°56'48"	315°			10.5	130 FMS		
1611	2111								08.	128		T.P. END OF "A" HEADED FOR LINE "B"
1615	2115			43°30'48"	76°57'20"	139°			08.	125		ON LINE "B"
1630	2130					139°			08.	124		"
1631	2131			43°29'18"	76°55'36"	139°			"	126 FMS		HALF WAY ON LINE "B"
1645	2145					139°			"	110		
1647	2147			43°27'45"	76°53'48"				"	109		T.P. END OF LINE "B"
1651	2151			43°28'06"	76°53'15"	319°			"	109		START OF LINE "C"
00	2200					"			"	120 FMS.		
1706	2206					"			"	125 FMS.		HALF WAY ON "C"
"	"					320°	TO CORRECT.		"			SLIGHTLY TO LEFT.
1715	2215					"			"	129 FMS.		
1721	2221			43°31'06"	76°56'48"	—			"	118 "		T.P. END OF LINE "C"
1726	2226			43°31'27"	76°56'18"	139°			"	120		ON LINE "D"
1730	2230					139°			"	131		
1741	2241					139°			"	125 FMS		HALF WAY ON LINE D
1757	2257			43°28'24"	76°52'48"	—			"	112		T.P. END OF LINE "D"
1802	2302			27'42"	52'15"	319°			"	113 FMS		ON END OF LINE "E"
1815	2315			→28'42"	JWB	"			"	128		JUST PASSING OUR RADAR REFLECT. HALF WAY ON "E"

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed KNOTS	Depth in feet	STN. No.	Remarks
1830	2330			43°31'48"	76°55'48"	319°			08.	126 FMS.		T.P.
1835	2335			32'06"	55'15"	139°			08.	126 "		ON LINE "F"
1857	2357					"			"	127 FMS.		HALF WAY ON LINE "F"
1900	0000					"			"	118 FMS		
1907	0007			29'06"	76°51'42"	—			"	111 FMS.		T.P. END OF LINE "F"
												MISSED POSITION FOR END OF "G"
1910	0010			43°29'24"	51'12"							
1926	0026					319°			"	126 FMS.		HALF WAY ON "G"
1930	0030					"			"	121 FMS.		
1941	0041			43°32'24"	76°54'42"	—			"	126 FMS.		T.P. END OF LINE "G"
1946	0045			32'42"	76°54'15"	139°			"	123 FMS.		ON LINE "H"
2003	0103					139°			"	126 FMS.		HALF WAY ON "H"
2016	0106					"			"	112 FA		
2018	0108			43°29'40"	76°50'42"	—			"	114 FM		START TURNING T.P.
2023	0123			43°30.0	76°50'0	319°			"	115 FM		ON LINE "I"
2037	0137					"			"	122 FM		
2038	0138			43°31'30"	76°51'54"	"			"	121 FM		HALF WAY ON "I"
2045	0145					"			"	120 FM		
2053	0153			43 33'06"	76°53'42"	—			"	118 "		END OF LINE "I" T.P.
2059	0159					—			"	118"		T.P.
2108	0208					228°			"	120"		ON LINE "J"
2115	0215					"			"	120"		"
2123	0223					"			"	125"		HALF WAY ON "J"
2130	0230					"			"	119"		
2138	0238					—			"	137		T.P.
2156	0256			43°29'12"	76°56'24"	048			"	119"		ON LINE "K"
2211	0311					"			"	129½		HALF WAY ON "K"

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
2225	0325			43°31'42"	76°52'10"	228°		126'	08	126 FMS		END OF LINE "K"
2242	0342					"			"	124'		
2252	0352			43°30'42"	76°53'45"	"			0	128' ON	E301	ON E301 BENTHOS CORE
2300	0400					"			08	128' OFF	E301	OFF E301
2307	0407			43°30'36"	76°54'00"	"			0	128' ON	E302	ON E302
2330	0430					"			0	128' ON	E302	ON E302 AGAIN AFTER DRIFTING
2340	0440					"			05	128' OFF	E302	OFF E302
0009	0509			43°30'30"	76°54'18"	"			0	128' ON	E303	ON E303 BENTHOS CORE
T 0020	0520					230			05	130'	OFF 303	COMING ABOUT TO 230° 1217 CORE UP
7 0030	0530					230°			05	131'		Enroute to E304
0039	0539			43°30'18	76°54'33"				0	1291	ON 304	ON E304
0050	0550								05	128	OFF 304	OFF E304
0100	0600					1800			03	128	ON	COMING ONTO E305 dead slow maneuvering
0104	0604			43°30'08"	76°54'48"				0	128	ON 305	ON E305
0112	0612								05	128	OFF 305	OFF E305
0115	0615					177°			10.5	128		ENROUTE C-30
0130	0630					"			10.5	110		
0140	0640					"			"	612		(660-680 Range) pipes adjusted
0144	0644					"			"	552		480-600 Range
0145	0645					"			"			
0147	0647					181			"	479		400-520 Range
0150	0650					"			10.5	410		320-440 Range
0156	0656					"			"	330		240-360 Range
0200	0700					181			"	259		
0205	0705					"			"	235		160-280 Range
0207	0707			43°21'42"	76°53'54"				0	214		ON C-30

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed KNOTS	Depth in feet	STN. No.	Remarks
0217	0717					285			03	198	C-30	OFF C-30
0230	0730					285			10.0	254		TO E-24
0232	0732					"			10.0	274		240 - 360 Range
0242	0732			NB 22 48		"			10.0	344		320 - 440 Range
0245	0745		>	43°14'45"	76°58'45"				9.0	364		
0253	0753								9.0	456		400-520 Range
0300	0800			43°23'24"	77°01'30"	285			9.0	482		
0301	0801					285			"			520 - 640
0313	0813					"			"	610		560 - 680
0315	0815					"			"	580		enroute to E24
0321	0821					285			"	106 FMS		TO FATHOMS
0330	0830			43°25'00"	77°07'15"				9.0	118		
0341	0841					295						COURSE DROPPED HEAVY SEA TO ANCHORAGE
0417	0917			43°23'18"	77°14'54"	246°			08.	102 FMS.		HEADED FOR ROCHESTER TO ANCHOR.
0430	0930								08.	098 FMS.		16 MILES OFF ROD.
0445	0945								08	083 FMS.		A
0448	0948									079 FMS		R-1
0500	1000					246°			08	065 FMS.		13 MILES OFF ROC
0516	1016					"			08	046 FMS		APPROX 11 MILES OFF
0518	1018					"			"			switch to feet mod
0530	1030					"			"	200	feet	
0545	1045			43 18.8	77 27.4	"			"			
0603	1103			43 18.1	77 29.9	"			"			
0638	1138								0	48		at anchor off ROCHESTER

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
												ANCHOR UP
0820	1320			43°18'.1	77°29'.9	060°			10.5	52 FEET		HEAD FOR E-30
0830	1330			43°17'.2	77°34'.5	"			"	88'		
0832	1332					"			"	128'		R-2
0841	1341					"			"	206'		R-3
0850	1350					"			"	284'		R-4
0857	1357			43°19'.2	77°29'.3	"			"	315'		TURN OFF SOUNDER
0900	1400					"			"	342'		TURN ON "
0907	1407					"			"	358		R-5
0916	1416					"			"	448		R-6
0918	1418			43°21'.3	77°21'.0	"			"	549		R-7
0930	1430					"			"	588		R-8
0944	1444					"			"	642		
0952	1452			43°23'.2	77°15'.2	"			"	625		
1000	1500					"			"	682		R-9
1005	1505					"			"	658		TURN OFF
1015	1515					"			"	700'		TURN ON
1020	1520					"			"	115 FMS		R - FATHOM
1028	1528			43°21'.1	77°09'.3	"			"	117 FMS		
1030	1530					"			"	113 FMS		
1032	1532					"			"	106 FMS		T.P. LOOKING FOR MARK BUOY
1044	1544					"			"	116 "		T.P. "
1100	1600					"			"	107 "		" "
1119	1619			43°26'.0	76°56'.6	000°			"			Looking for Buoy
1130	1630					180°			"			" " "
1135	1635					220°			"	86		Ranging in FATHOMS
1145	1645								"	70		looking for Buoy
1200	1700											
1215	1715					140						
1230	1730					180						
1233	1733					360			10.5			
1241	1741											

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16730 19737

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed KNOTS	Depth in feet	STN. No.	Remarks
1245	1745					360°			10.5	78 FMS		looking for Buoy
1250	1750					360°			10.5	98		" " "
1300	1800					360°			10.5	107		looking for Buoy
1315	1815					360°			10.5	120		
1322	1822											IN location of Buoy, unable to locate
1326	1826					303°			10.0	126		BROKE OFF SEARCH FOR BUOY
1330	1830					303			"	116		
1345	1845					"			10.0			
1400	1900					"			10.0			
1415	1915					"			10.0	104		
1427	1927					"			10.0	94		Range 1 - FATHOMS
1430	1930					303			"			
1445	1945					303			"			
1500	2000					303			"	65		
1515	2015					303			10.0	63		
1530	2030					303			10.0	54		
1545	2045					303			10.0	52		
1600	2100			43°43'00"	77°21'00	303°			10.0	40		
1615	2115					303°			10.0	30 FMS		
1630	2130			43° 44' 06	77° 24' 30"	303°			10.0	28 FMS.		
1645	2145					303°			10.0	28 FMS.		
1700	2200			43° 48' 02	77° 31' 17"	303°			10.0	24 FMS		HEADED FOR K-22
1715	2215					315°			10.0	68'	→	CHANGED TO FEET
1730	2230			43° 51' 54"	77° 37' 18"					156'		R-1
												CHANGE COURSE.

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
1800	2300					315°			10.5	110'		
1803	2303			43°56'12"	77°42'39"	—			0	106'		ON STN K-22
1809	2309					223°			START.	106'		OFF STN K-22
1817	2317					"			10.5	126'		HEADED FOR I-20
830	2330			44°53'45"	77°45'48"	223°			10.5	167'		ON RANGE-2
1832	2332					223°			"	154'		
1838	2338					"			"	191'		CHANGE TO RANGE-3
1845	2345					"			"	220'		" "
1900	0000			43°49'45"	77°51'12"	"			"	268'		CHANGE RANGE R-4
1915	0015					"			"	350'		CHANGE " R-5
1918	0018			43°47'24"	77°54'00"	—			0	354'		ON STN I-20
1928	0028			"	"	—			0	352'		END OF STN I-20
"	"				COURSE	115°			5			HEADED FOR I-22
1933	0033					"			10.5	332'		CHANGE TO R-4
1935	0035					"			10.5	370'		" " R-5
1945	0045			43°46'06"	77°50'24"	115°			10.5	380'		
2000	0100			43°45'00"	77°47'36"	"			"	404'		
2016	0116			43°44'12"	77°44'30"	"			"	415'		
2031	0131			43°43'23"	77°42'00	—			0	346'	ON I-22	
2053	0153			"	"	180°			10.5	352'	OFF I-22	HEAD FOR G-22
2100	0200					"			"	393		
2107	0207					"			"	442		R-6
2115	0215			43°33'18"	77°42'00	"			"	508		R-7
2119	0219					"			"	484		R-6
2120	0220					"			slow	520		R-7
2123	0223			43°39'—	77°42'00	"			0	526	ON G-22	

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VESSEL MARTIN KARLSEN

CRUISE NO. 69 - O - 16

27/10/69

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
2133	0233			43°39'0	77°42'0	180°		10.5		537	OFF C-22	
2154	0244					180°		"		570		PUT ON NEW PAPER
2200	0300			43°35'18"	77°42'0							
2203	0303					"		"		588		
2210	0310					"		"		594		R-8
2215	0315			43°33'18"	77°42'0							
2225	0325					"		"		556		R-7
2230	0330			43°31'12"	77°42'0	"		"		540		
2233	0333					360°		"		516		
2248	0348			43°30'18"	77°42'0	—		0		539	ON E-22	
2300	0400			"	"	180°		10.5		534'	OFF E-22	HEAD FOR C-22 TURN OFF
2315	0415			43°27'52"	77°42'0							
2318	0418					"		"		440		R-6 TURN ON
2330	0430			43°25'06"	77°42'0	"		"		390		R-5
2337	0437					"		"		260		R-4
2339	0439					"		"		233		R-3
2345	0445			43°22'24"	77°42'0	"				172		
2346	0446					"		"		150		R-2
2350	0450					"		SLOW		73		R-1
2353	0453			43°21'08"	77°42'0	"				56	ON C-22	
0015	0515					041			10.5	61	OFF C-22	
0020	0520					"			"	112		R-2 (80-200)
0025	0525			43°23'24"	77°38'06"	041			"	190		R-3
0030	0530			43°20'55"								
0035	0535									295		R-4 (240-360)
0038	0538					041			"	370		R-5
0043	0543					041			"	442		R-6 (400-520)
0045	0545			43°24'36"	77°35'54"					463		

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VESSEL MARTIN KARLSEN

CRUISE NO. 69 - 0 - 16

P. 2

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
0056	0556					041			10.5	512		R-7 to
0100	0600			43°26'50"	77°33'10"	041			10.5	520		E-24
0115	0615			43°29'04"	77°31'45"	"			"	512		
0125	0625			43°30'20"	77°30'20"				0	526		ONE-24 ↓
147	0647									508		OFF E-24 3 shipek samples
0200	0700			43°30'15"	77°26'45"	90°			10.5	546		
0213	0713					90°			10.5	591		Range 8
0215	0715			43°30'15"	77°23'00"	90°				612		
0230	0730			43°30'15	77°19'05"							Range 2 FATHOMS
0235	0735											Range 8 FEET
0245	0745			43°30'12"	77°15'30"							
0250	0750									670		Range 9
0300	0800			43°30'15"	77°11'54	90°			10.5	645		
0302	0802					90°			10.5	1150 FMS		Range 2 FATHOMS
0315	0815			43°30'08"	77°08'15"	90°			10.5	116		
0330	0830			43°30'06"	77°05'00"	"			"			
0345	0845			43°29'52"	77°01'25"	90°			"	118		
0400	0900			43°29'52"	76°57'45"	90°			"	114		
0420	0920					"				112 FMS		COMMING ON OUR MARKER BUOY.
0424	0924			43°30'24"	76°54'00"	—			0	110 FMS	E-30	AT BUOY - ON - E-30
0432	0932			"	"	—			0	109 FMS.	"	SHUT OFF BECKMER-
0815	1315			"	"	—			0	113 FMS	"	
0823	1323			"	"	—			0	112 FMS	"	
0838	1338			"	"	—			0	111 FMS	"	PISTON CORING START DOWN
0849	1349			"	"	—			0	111	"	" " START UP

20 — 26 . 7 m 5 .

DATE — OCT. — 1969

VESSEL MARTIN KARLSEN

CRUISE NO. 69 - O - 16

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28/10/69

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
												CORE
0859	1359			43°30'24"	76°54'00"	—			0	111 FMS	E30	FINISH UP
0957	1457			"	"	—			0	111 "	"	PISTON CORE DOWN
1004	1504			"	"	—			0	111 "	"	CORE HIT BOTTOM
1012	1512			"	"	—			0	111 "	"	CORE UP
1032	1532			"	"	—			0	111 "	"	BENTHOS CORE
1200	1700			"	"	—			0	111 "	"	
1258	1758									112		CORE IN POSITION TO GO DOWN
1300	1800			43°30'24"	76°54'00"					112	E-30	CORE DOWN
1300:30	—											TO FOOT SETTING, (89 690-720)
1303	1803											CORE HITS BOTTOM
1314	1814								0	115		TO FATHOM SETTING
1317	1817								0	116		CORE UP
1330	1830								0	118	E-30	
1418	1918			43°30'24"	76°54'00"				0	122	E-30	MANOEUVRING TO PICK UP MARKER BUOYS
1428	1928								0			BUOYS UP, ① RADAR BUOY ② SPHERICAL BUOY
1430	1930			43°30'24"	76°54'00"	270°			10.5	123	E-30	OFF E-30, STEAMING TO CE
1445	1945					270°			10.5	148		
1500	2000					270°			10.5			
1516	2016					270°			10.5	144		
1600	2100					270			10.5	136		
1615	2115			43°29'42"	77°14'18"	270°			"	133 FMS		
1627	2127					"			"	129 "		TURNED OFF RECORDER TO FIX — GIVING WRONG DEPTH — ON FMS RANGE 17 TURNS 20 TURNS IN 29 SEC.

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VESSEL MARTIN KARLSEN

CRUISE NO. 69 - 0 - 16

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Local Time	GMT	POSITION D.R. Lat. N.	POSITION D.R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed KNOTS	Depth in feet	STN. No.	Remarks
1633	2127					270°			10.5	126 FMS.		
1645	2145					"			"	118 FMS.		
1800	2300					"			"			
1814	2314				CHANGE COURSE TO	279°			"	485'		RANGE 400' - 530'
1830	2330			43°30'55"	77°50'48"	"			"	467'		
1840	2340					"			"	508'		RANGE 480' - 610'
1845	2345					"			"	527'		
1850	2350					284°			"	545'		CHANGE COURSE.
1900	0000			43°31'02"	77°58'01"	"			"	564'		
1916	0016					"			"	568'		
1930	0030			43°31'48"	78°04'48"	"			"	565'		
1933	0033					289°			"			CHANGE COURSE
1945	0045					"			"	580'		
1946	0046					"			"	579'		CHANGE RANGE +80
1959	0059			43°33'05"	78°10'18"	—			"	612'	ON CB	ON STN CB
2158	0258			"	"	—			"	613'	"	PICK UP BOUY
2203	0303			"	"	040°			10.5	613'	OFF CB	START SOUNDING
2215	0315			43°33'30"	78°09'18"	"			"	606'		
2230	0330		DR →	43°35'42"	78°07'08"	"			"	588		
2237	0337					"			"	547		R-7
2245	0345		DR →	43°37'58"	78°04'54"	"			"	537		
2300	0400		→	43°39'34"	78°02'32"							
2305	0405					"			"	477		R-6
2315	0415		DR →	43°41'48"	78°00'16"	"			"	451		
2320	0420		→	43°42'25"	77°59'16"							
2327	0427					"			"	402		R-5
2330	0430	43°43'56"	77°57'48"			"			"	386		
2345	0445					"			"	343		
2352	0452					"			"	328		R-4

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VESSEL MARTIN KARLSEN

CRUISE NO. 69 - O - 16

28 & 29/10/69

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No	Remarks
2355	0455	—	—			138°			10.5	339'	T. P.	CHANG DIRECTION SOUNDING
2400	0500	~~43°47'57"~~	~~77°53'00~~	43°46'57"	77°53'00"	"			"	339'		
0005	0505	~~43°47'57"~~	~~77°53'00~~			140°			10.5	360		R-5 (320-440)
0015	0515	43°44'45"	77°50'42"			146°			"	375		
0021	0521	43°44'06"	77°49'50"	~~43°44'06"~~	~~77°49'50"~~	219°			10.5	412		
0027	0527					"			"	430		R6 (400-520)
0030	0530	43°42'54"	77°51'08"	~~43°42'54"~~	~~77°51'08"~~	219°				450		
0045	0545	43°40'51"	77°53'30"	~~43°40'51"~~	~~77°53'30"~~	219°			"	510		R7
0100	0600	43°39'00"	77°55'50"			219°			"	556		
0112	0612					"			10.5	590		R8
0115	0615	43°37'00"	77°58'02"			"			10.5	590		
0130	0630	43°34'48"	78°00'45"		78° W	219			10.5	597		
0145	0645			43°31'48"	77°03'40"	219			10.5	578		
0155	0655					219						R7
0158	0658			43°30'12"	78°06'00"	219			0	553		ON E-18
0212	0712					000			0	552		OFF E-18
0215	0715					000			10.5	560		
0228	0728					000			10.5	598		R8
0230	0730			43°33'24"	78°06'00"	000			10.5	610		
0245	0745	43°36'09"	78°06'00"			000			"			
0250	0750					000			10.5	553		R7
0258	0758			43°38'15"	78°06'00"	000			0	533		ON G-18
0310	0810					000			0			OFF G-18
0315	0815	43°41'06"	78°06'00"			000			10.5	525		
0320	0820					000			"	482		R6
0330	0830	43°43'24"	78°06'00"			000			"	452		

13900
13310
19320
12320

G-16

DATE 27 OCT. — 1969
VESSEL MARTIN KARLSEN
CRUISE NO. 69 — 0 — 16

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed Knots	Depth in feet	STN. No.	Remarks
0343	0843					000			10.5	370		RS
0345	0845			43°45'46"	78°06'48"	000			10.5	374		radar plot
0352	0852					023				314		R4 (240 360) 780600 manuvering back to LANE
0400	0900			43°47'24"	78°06'00"	—			0	280'		ON I-18
0430	0930			"	"	—			0	278'		ON I-18
0456	0956			"	"	270°			5	282'		OFF STN # I-18
0515	1015			43°47'25"	78°08'55"	"			10.5	280'		HEADED FOR I-16.
0531	1031					"			"	278'		
0546	1046			43°47'24"	78°18'00"	—			0	"	X	ON STN I-16
0616	1116			"	"	—			0	268'		WAITING AT STN I-16
				"	"	—			0			"BEHIND IN LAG WORK
0630	1130			"	"	—			0	266'		
0643	1143			"	"	180°			5	268'		OFF I-16 — HEADED
0658	1158					"			10.5	338'		FOR G-16.
0704	1204					"			"	386'		CHANGE RANGE +80'
0714	1214			43°41'56"	78°18'00"	"			"	452'		CHANGE RANGE +80'
0730	1230					"			"	530'		+80'
0731	1231			43°39'00"	78°18'00"	—			—	538'		ON STN # G-16
0742	1242					—			—	595'		END OF STN # G-16
0754	1254					225°			10.5	592'		+80' TO RANGE.
0800	1300	43°36'43"	78°21'13"			225°			10.5	618'		
0815	1315	43°34'42"	78°23'52"			"			"	624'		
0827	1327					"			"	668'		R→ +640
0830	1330			43°32'54"	78°26'24"	"			"	672		
0833	1333					"			"	103 FMS		R→ FATHOM
0836	1336					"			"	645 FEET		R→ +640'

35 Sec
(20

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VESSEL MARTIN KARLSEN

CRUISE NO. 69 - O - 16

29/10/69

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
0838	1338					225°			10.5	344'		R — @ 560 FEET
0845	1345			43°31' ᵒᵒ	78°29' ᵒᵒ							
0847	1347					"			510W	640'		
0852	1352			43°30'.5"	78°30'.00	—			STOP	637'	ON E-14	
0901	1401					360°			10.5	630'	OFF E14	HEAD FOR G-14
0903	1403					"			"	620'		STOP SOUNDING
0915	1415			43°30' 38"	78°30'.00	"			"	—		
0926	1426					"			"	580'		FIXED SOUNDER
0930	1430			43°38' 36"	78°30' ᵒᵒ	"			"	572'		
0937	1437					"			"	554'		R → @ 480'
0945	1445			43°35'42"	78°30'.00	"			"	539'		
1000	1500			43°37'38"	78°30' ᵒᵒ	"			"	490'		R → @ 400'
1013	1513			43°39' ᵒᵒ	78°30'.00	—			O	470'	ON G-14	456' → BY WIRE SOUNDING
1018	1518					270°			8	470'	OFF G-14	HEAD FOR G-12
1030	1530			43°39' ᵒᵒ	78°31'52"	"			"	460'		
1045	1545			43°39' ᵒᵒ	78°34'32"	"			"	451'		
1100	1600			43°39' ᵒᵒ	78°37' ᵒᵒ	"			"	433'		
1115	1615			43°39' ᵒᵒ	78°39' 63"	"			"	430'		
1130	1630			43°39' 00"	78°42' 00"	—			O	420'	ON G-12	
1135	1635			"	"	—			O	418		
1138	1638			"	"	313°			8	416	OFF G-12	HEAD FOR I-10
1142	1642					"			"	408		R — @ 320
1145	1645			43°39'48"	78°43'12"	"			"	398		
1200	1700			43°41'45"	78°46'05"	"			"	370		
1206	1706					"			"	330		R — @ 240
1215	1715			43°43'30"	78°48'54"				10.5	307		
1230	1730			43°45'24"	78°51'06"				10.5			

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VESSEL MARTIN KARLEEN

CRUISE NO. 69 - O - 16

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Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
1231	1731					285			10.5	240		Range 3 (160-280)
1245	1745			43°47'24"	78°54'12"	285			0	162		ON I-10
1246	1746			43°47'24"	78°54'12"				0			Range 2 (80-240)
1254	1754								0			OFF I-10
1259	1759					180			10.5	192		to G10
1300	1800			43°46'42"	78°54'06"	180			10.5			
1311	1811					180			10.5	264		Range 4 (240-360)
1315	1815			43°44'03"	78°54'06"	180			10.5	294		
1325	1825					180°			10.5	350		Range 5
1330	1830			43°41'20"	78°54'06"	180°			10.5	—		
1349	1845			38.8	53.8				0			ON G-10
1355	1855								0			OF G-10
1415	1915			43°36'06"	78°53'54"	180°			10.5	410		
1407	1907					180°			10.5	428		Range 5 (400-520)
1430	1930			43°33'33"	78°53'54"	183°			10.5			
1444	1944					183°			0	465		ON E-10
1454	1954			43°30'12"	78°54'18"	255			0	465		OFF E-10
1500	2000									460		proceeding to C-10
1504	2004			4 SEP PAPER WAS PUT ON								PAPER CHANGES
1505	2005											X
1515	2015	43°29'12"	78°59'03"			256				448		X RECORDINGS
1530	2030	43°28'33"	79°02'36"			256				446		X ON ROLL
1545	2045					256				440		X MARKED WITH X
1557	2057					256°			10.5	435'		NEW ROLL

53.7 LIGHT BURNT OUT.

14310
19410
14410

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VESSEL MARTIN. KARLSEN

CRUISE NO. 69 - 0 - 16

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed KNOTS	Depth in feet	STN. No	Remarks
1615	2115			43°27'06"	79°14'30"	256°			10.5	427'		HEADED FOR W.B.
1630	2130					"			"	411'		
1645	2145			43°25'18"	79°21'48"	"			"	377'		
1700	2200					"			"	350'		
704	2204			43°24'32"	79°26'45"	—			0	346'		ON STN W.B
1707	2207					—			0			ANCHOR DOWN
1715	2215			"	"	—			0	344'		" " " "
1730	2230			"	"	—			0	344'		" " " "
1745	2245			"	"	—			0	344'		" " " "
1800	2300			"	"	—			0	344'		" " " "
1815	2315			"	"	—			0	344'		" " " "
1830	2330			"	"	—			0	344'		" " " "
1845	2345			"	"	—			0	344'		" " " "
1900	0000			"	"	—			0	344'		" ANCHOR UP.
1905	0005			"	"	—			5	344'		OFF STN W.B.
						055°			10.5			GOING TO SOUNDING
						055°			10.5			LINE. #7
1945	0045			43°27'42"	77°22'24"	270°			10.5	380'		ON LINE #8
2000	0100			43°27'36"	79°25'05"	270°			10.5	344'		" " "
2010	0110					"			"	325'		" " "
2015	0115			43°27'36"	79°28'03"	"			"	317'		
2030	0130			43°27'36"	79°30'30"	"			"	257'		R — ⊕ 160'
2045	0145			43°27'36"	79°33'36"	"			"	196'		
2053	0153					"			"	140'		R — ⊕ 80'
2100	0200			43°27'36"	79°36'42"	"			"	112'		START TURNING
2104	0204			43°28'00"	79°36'42"	90°			"	98'		T.P ON LINE #9

6.5°C

DATE — OCT. — 1969

VESSEL MARTIN KARLSEN

CRUISE NO. 69 – 0 – 16

* MUST CORRECT — 0 PAPER, WRONG LINE NUMBER

29/10/69
30/10/69

Local Time	GMT	POSITION D. R. Lat. N.	D. R. Long. W.	Actual Lat. N.	Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No	Remarks
2115	0215			43°27'56"	79°34'26"	90°			10.5	161'		ON LINE #9
2116	0216					"			"	180'		R — ⊕ 160'
2130	0230			43°28'03"	79°31'48"	"			"	234'		
2145	0245			43°28'06"	79°29'00"	"			"	266'		R → ⊕ 240'
2200	0300			43°28'06"	79°25'57"	"			"	330'		R → ⊕ 320'
2215	0315			43°28'06"	79°23'12"	"			"	364'		
2222	0322			43°28'06"	79°22'48"	START TURNING TO 270°			"	374'		
2228	0328			43°28'38"	79°22'24"							
2230	0330			43°28'36"	79°22'48"	270°			"	370'		T.P. ON LINE #10
2245	0345			43°28'45"	79°25'33"	"			"	335'		R → ⊕ 240'
2300	0400			43°28'42"	79°28'18"	"			"	264'		R → ⊕ 160'
2315	0415			43°28'42"	79°31'21"	"			"	222'		
2322	0422					"			"	162'		R → ⊕ 80'
2325	0425					"			"	145'		
2330	0430			43°28'24"	79°34'45"	"			"	110'		
2332	0432					START TURNING			"	88'		R → ⊕ 0
2334	0434			43°28'24"	79°35'42"							
2337	0437					90°			"	70'		T.P. ON LINE #11
2338	0438			43°29'08"	79°35'42"							
2340	0440					105°			"	100		
2342	0442					105°			"	126'		R → ⊕ 80
2345	0445			43°29'08"	79°33'54"	105°			"	148'		
2354	0454					90°			"	220'		R → ⊕ 160
2400	0500			43°29'08"	79°30'18"	"			"	247'		
30/10/69 0001	0501					"			"	254'		R → ⊕ 240'
0015	0515			43°29'06"	79°26'42"	90°			"	271		
0027	0527					90°				340		R → + 320'
0030	0530			43°29'06"	79°23'12"	90°				345		

2.6

DATE — OCT. — 1969

VESSEL MARTIN KARLSEN

CRUISE NO. 69 - 0 - 16

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. NO.	Remarks
0034	0534			43° 29'06"	79° 22'18"	000			10.0	356	356	T. P., Northcourse
0038	0538			43° 29'45"	79° 22'18"	270			"	350	350	T.P.
0045	0545			43° 29'45"	79° 23'42"	270			"	330	330a	R — (240 - 360)
0100	0600			43 29 45	79 27 15	270			10.0	268		
0106	0606								"	242		R — (160 - 260)
0115	0615			43° 29'45"	79° 31'08"	270			"			
0119	0619								"	163		R — (80 - 200)
0130	0630								10.0	60		R - (0 - 120)
0132	0632			43° 29'45"	79° 35'09"	190			"			T.P.
0140	0640					190			10.0	100		R + (80 - 200)
0145	0645			43° 27'30"	79° 35'54"	190			10.0	180		
0156	0656					190			10.0	184		R + (160 - 280)
0200	0700			43° 24'52"	79° 36'42"	190°			10.0	189		
0215	0715			43° 22'15"	79° 37'30"	190°			10.0	232		
0225	0725			43° 20'30"	79° 37'48"	90°				234		T.P.
0230	0730			43° 20'24"	79° 36'30"	90°						
0245	0745			43° 20'30"	79° 32'48"	90°			10.0	270		
0248	0748				( )	90°				260		R + (240 - 360)
0300	0800			43° 20'30"	79° 29'12"	90°			10.0	300		
0315	0815			43° 20'30"	79° 25'36"	90°			10.0	316		
0330	0830			43° 20'30"	79° 21'54"	90°			"	324		
0339	0839			43° 20'30"	79° 20'00"	180			"	326		T.P.
0345	0845			43° 19'18"	79° 20'00"	180			"	310		
0350	0850			43° 17'54"	79° 20'00"	270°			10.0			T. P.
0406	0900			43° 18'18"	79° 22'50"	270°			10.0	292		
0405	0915					270°			10.0	298'		

DATE — OCT. — 1969

VESSEL MARTIN KARLSEN

CRUISE NO. 69 - O - 16

(42)

30/10/69

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
0430	0930					270°			10	284'		
0432	0932			43°18'20"	79°30'00"	270°			10	277'		HALFWAY ON LINE 14
0437	0937											SHIP. GENERATOR
												CUT OUT.
0541	1041									220'		GN AGAIN
0545	1045			43°18'45"	79°35'54"	270°	"MAGNETIC"		10.5	210'		GYRO CAPUT.
0559	1059					"			"	158'		-80' CHANGE RANG
0603	1103					—			10.5	144'		T.P. END OF LINE 1
0614	1114					70°			"	139'		GYRO CAPUT
						70°			"			HEADED FOR CORING
						"			"			STN.
0625	1125			43°18'18"	79°40'00"	"			"	170'		
0630	1130					"			"	192'		+80' TO RANGE
0645	1145			43°18'42"	79°35'54"	"			"	275'		+80' TO RANGE.
0701	1201			43°20'31"	79°30'48"	"			"	322'		
0715	1215			43°20'35"	79°30'48"	"			"	345'		+80 TO RANGE.
0730	1230					"			SLOW	368'		
0733	1233					—			0	—		STOPPED NEAR STATION SOUNDER NOT WORKING
0825	1325					280°			SLOW	290'		
0828	1328					—			"	281'		
0853	1353			43°20'48"	79°30'54"	—			STOP	295'	ON PC-4	
0903 0924	1403 1424			43°20'48"	79°30'54"	—			"	294'	"	TRIGGERED PISTON CORING
0943	1443			"	"	—			"	294'	"	TURN OFF SOUNDING
1015	1515					260°			1	293'	OFF PC-4	HEAD FOR BURLINGTON
1028	1528					258°			10.5	286'		" "
1047	1547					"			"	240'		R → @ 160'

DATE — OCT. — 1969

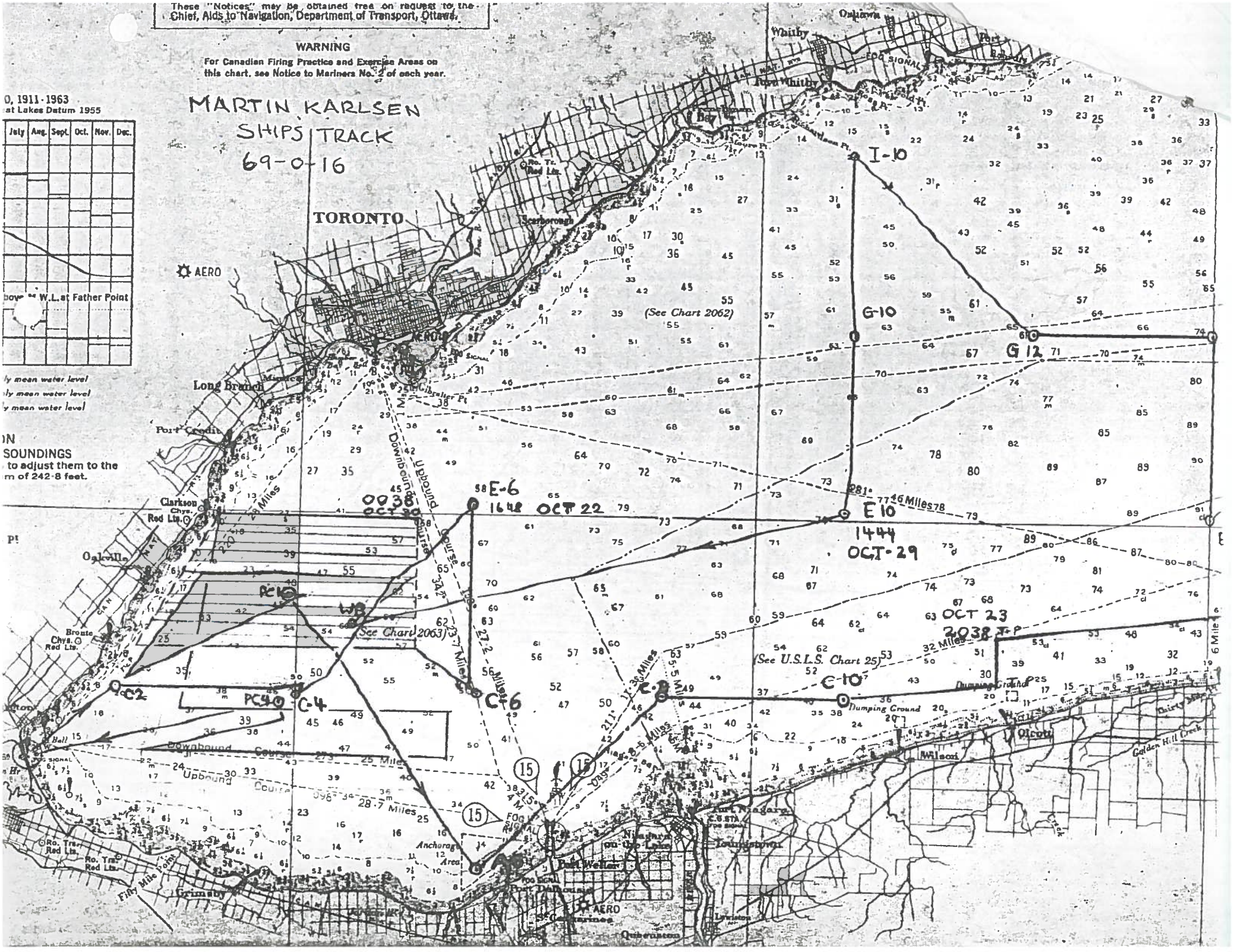
VESSEL MARTIN KARLSEN

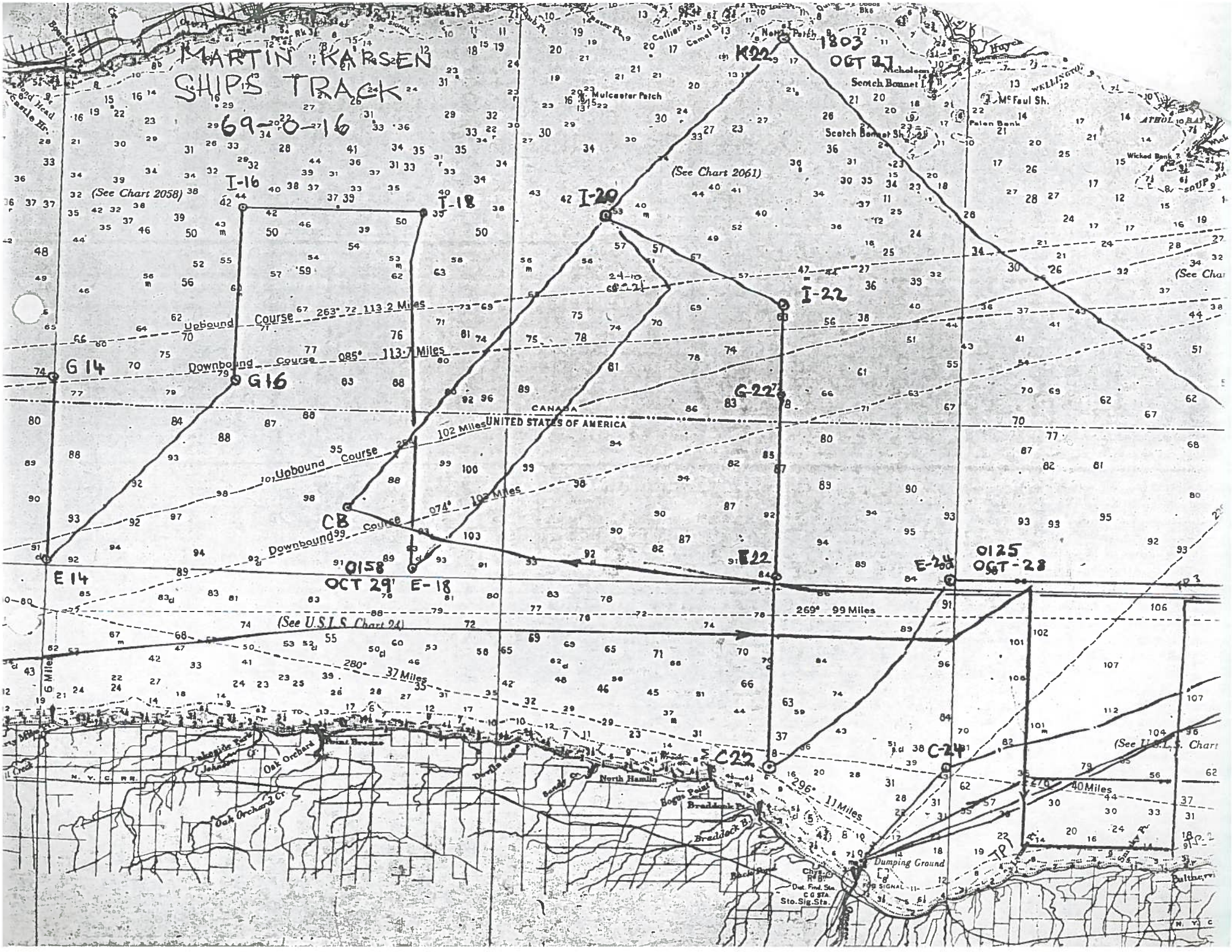
CRUISE NO. 69 — O — 16

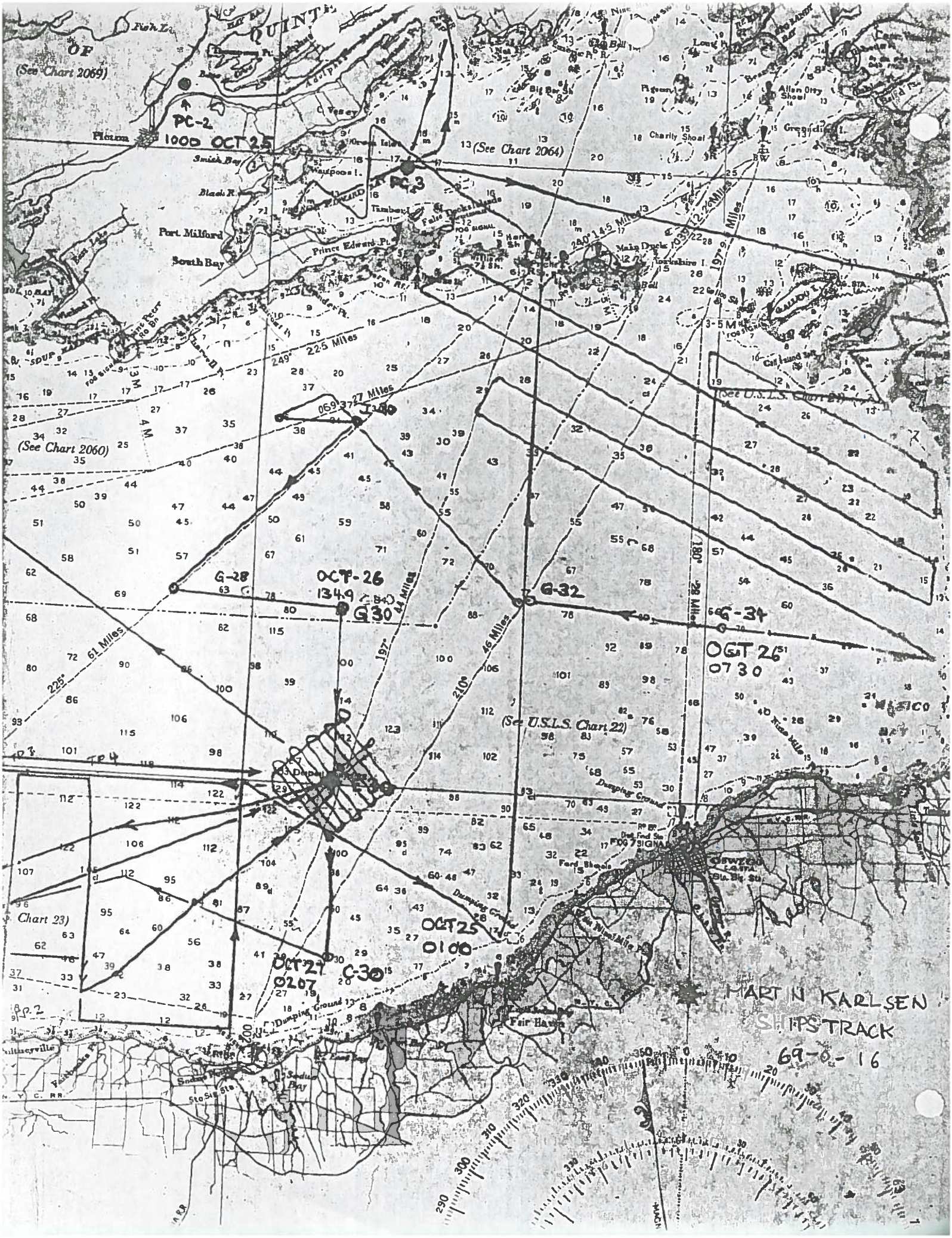
(43)

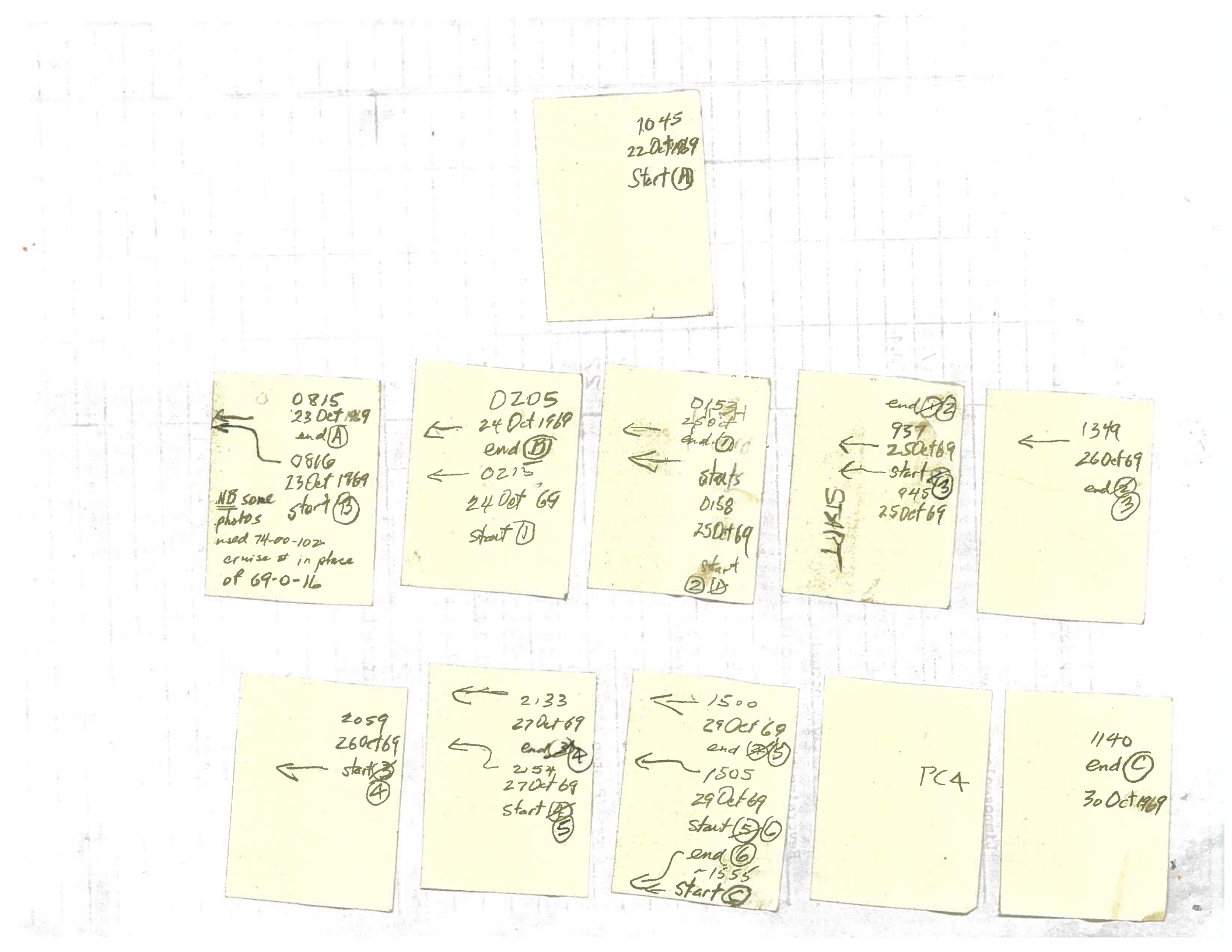
30/10/69

Local Time	GMT	POSITION D. R. Lat. N.	POSITION D. R. Long. W.	POSITION Actual Lat. N.	POSITION Actual Long. W.	COURSE Steered	COURSE Made Good	Miles Steamed	Ships Speed	Depth in feet	STN. No.	Remarks
405	1605					258°			10.5	162'		R → Ⓐ 80'
1123	1623					"			"	84'		R → Ⓐ 0'
1127	1627					"			SLOW	68'		PASSING FAREWAY BUOY
1140	1640								STOP	34'		UNDER BURLINGTON SKYWAY BRIDG
												TOTAL MILES
												1346


These "Notices" may be obtained free on request to the Chief, Aids to Navigation, Department of Transport, Ottawa.
WARNING
For Canadian Firing Practice and Exercise Areas on this chart, see Notice to Mariners No. 1 of each year.
MARTIN KARLSEN
SHIPS TRACK
69-0-16
TORONTO
I-10
G-10
G 12
E-6
0038
OCT 22
E 10
1444
OCT-29
OCT 23
2038
C-10
C-6
C-4
C2
PC10
PC4
W3
(See Chart 2062)
(See Chart 2063)
(See U.S.L.S. Chart 25)
Downbound Course
Upbound Course
Dumping Ground
Oshawa
Whitby
Scarborough
Long Branch
Port Credit
Clarkson
Oakville
Bronte
Grimsby
Fifty Mile Point
Port Weller
Port Dalhousie
St. Catharines
Niagara-on-the-Lake
Fort Niagara
Youngstown
Olcott
Wilson
Golden Hill Creek
Dairy Creek
Queenston
Lewiston
Ancherage Area
AERO
Gibraltar Pt.
Toronto Is.
Ro. Tr. Red Lts.
Ro. Trs. Red Lts.
Broute Chys. Red Lts.
Clarkson Chys. Red Lts.
Fog Signal
Bell
Whistle
Dangerous Ground
Mimico
Port Whitby
Port Darlington
Course 342°
Course 281°
Course 211°
Course 315°
Course 270°
Course 098°
22.2 Miles
28.7 Miles
25 Miles
32 Miles
46 Miles
6 Miles
5.5 Miles
11.35 Miles
8.6 Miles
0, 1911-1963
at Lakes Datum 1955
July
Aug.
Sept.
Oct.
Nov.
Dec.
W.L. at Father Point
y mean water level
y mean water level
y mean water level
ON
SOUNDINGS
to adjust them to the
m of 242·8 feet.


MARTIN KARSEN
SHIPS TRACK
69-20-16
1803
OCT 27
K22
I-16
T-18
I-20
I-22
G14
G16
G-22
CB
E14
0158
OCT 29
E-18
E22
E-24
0125
OCT-28
C22
C-24
(See Chart 2058)
(See Chart 2061)
(See U.S.L.S. Chart 24)
Upbound Course 263° 72 113.2 Miles
Downbound Course 085° 113.7 Miles
Upbound Course 284° 102 Miles
Downbound Course 074° 102 Miles
269° 99 Miles
280° 37 Miles
296° 11 Miles
40 Miles
6 Miles
CANADA
UNITED STATES OF AMERICA
Mulcaster Patch
Scotch Bonnet I.
Scotch Bonnet Sh.
McFaul Sh.
Wicked Bank
Point Breeze
Oak Orchard
Oak Orchard Cr.
North Hamlin
Bogus Point
Braddock Pt.
Braddock B.
Dumping Ground
Buffalo


PC-2
1000 OCT 25
PC-3
G-28
OCT-26
1349
G30
G-32
G-34
OCT 26
0730
OCT 25
0100
OCT 27
0207
G-30
MARTIN KARLSEN
SHIPS TRACK
69-6-16
(See Chart 2069)
(See Chart 2064)
(See Chart 2060)
(See U.S.L.S. Chart 22)
(See U.S.L.S. Chart 21)
Chart 23)
Port Milford
South Bay
Prince Edward Pt.
Timber I.
Main Ducks
Charity Shoal
Allen Dirty Shoal
Fair Haven
Oswego
MEXICO
Dumping Ground
61 Miles
46 Miles
225 Miles
27 Miles
44 Miles
36 Miles
180°
197°
210°
249°
240°
145 Miles
122 Miles
105°
197° 9 Miles
3-5 M


1045
22 Oct 1969
Start (A)
0815
23 Oct 1969
end (A)
0816
23 Oct 1969
start (B)
NB some photos need 74-00-10x cruise # in place of 69-0-16
0205
24 Oct 1969
end (B)
0215
24 Oct 69
start (1)
0153
25 Oct
end (1)
starts
0158
25 Oct 69
start
(2) (1)
end (2)
937
25 Oct 69
start (3)
945
25 Oct 69
SKIP
1349
26 Oct 69
end (3)
2059
26 Oct 69
start (3)
(4)
2133
27 Oct 69
end (4)
2154
27 Oct 69
start (4)
(5)
1500
29 Oct 69
end (5)
1505
29 Oct 69
start (5) (6)
end (6)
~1555
start (C)
PC4
1140
end (C)
30 Oct 1969

408 399 306

70-0-29

346

P. 1 (A)

DATE	Depth	LINE NO.	FIX	LAT	LONG
				43.3	79.8
9-6-70	358	A	1	43°18'08"	79°47'25
"	119	"	2	43.3° 43°19'06"	79.7° 79°42'50"
"	200	"	3	43.3° 43°19'50	79.6° 79°39'28
"	246	"	4	43.3° 43°20'24	79.6° 79°36'02
"	282	"	5	43.3° 43°21'17"	79.5° 79°32'48"
"	308	"	6	43.3° 43°22'02	79.5° 79°28'43
"	326	"	7	43.3° 43°22'30"	79.4° 79°26'03"
"	346	"	8	43.4° 43°23'06"	79.4° 79°21'56"
"	373	"	9	43°24'06"	79°18'30"
"	399	"	10	43°24'56"	79°14'54"
"	408	"	11	43 25 36	79 11 24
"	409	"	12	43 26 06	79 08 42
"	410	"	13	43 26 30	79 05 30
"	416	"	14	43 27 06	79 02 00
"	438	"	15	43 28 00	78 59 00
"	448	"	16	43 28 30	78 56 00
"	456	"	17	43 29 00	78 54 00
"	474	"	18	43 29 36	78 50 30
"	488	"	19	43 30 24	78 47 00
"	518	"	20	43 31 00	78 48 06
"	537	"	21	43 31 30	78 39 42
"	558	"	22	43 32 06	78 36 30
"	559	"	23	43 33 00	78 33 00
"	572	"	24	43 33 42	78 29 24
"	566	"	25	43 34 30	78 26 00
"	563	"	26	43 35 00	78 22 36
"	584	"	27	43 36 00	78 19 00

DATE 9-6-70	DEPTH	LINE No.	FIX #	LAT.	LONG.
9-6-70	560	" A	28	43 36 24	78-14 54
"	568	" "	29	43 37 00	78 11 30
"	558	"	30	43 38 00	78 08 00
10-6-70	550	" A	31	43 38 54	78 04 12
10-6-70	541	" A	32	43 39 30	78 01 12
10-6-70	502	" "	33	43 40 18	77 57 12
"	510	"	34	43 41 30	77 53 30
"	466	"	35	43 42 12 ×	77 49 00
"	432	"	36	43 42 36	77 45 24
"	392	"	37	43 43 18 ×	77 41 42
"	326	"	38	43 43 48	77 38 30
"	257	"	39	43 45 36 ×	77 35 00
"	241	"	40	43 45 21	77 32 06
"	222	"	41	43 46 09 ×	77 28 33
"	154	"	42	43 46 42	77 25 12
"	142	"	43	43 47 18 ×	77 21 30
"	125	"	44	43 47 54	77 18 18
"	105	"	45	43 48 30 ×	77 14 30
"	98	"	46	43 49 12	77 11 06
"	48	"	47 T.D.	43 49 48 ×	77 07 30
"	42	"	48 T.D.	43 50 12	77 05 39
"	32	LINE 1	49 T.D.	43 51 15	77 04 30
"	151	"	50	43 49 24	77 02 00
"	236	LINE 2	51 T.D.	43 47 00	76 59 00
"	179	"	52 T.D.	43 49 12	76 59 24
"	42	LINE 3	53	43 52 30	77 00 00
"	99	"	54	43 51 24	76 58 12
"	174	"	55	43 49 33	76 55 51

TIME	DATE	DEPTH	LINE NO	FIX #	LAT	LONG
	10-6-70	238	LINE 4	T.P. 56	43-47-30	76-53 42
	"	154	"	57 T.P.	43-50-24	76-54-48
	"	37	LINE #5	58	43-53-24	76-56-12
	"	113	"	59	43-52-12	76-54-08
	"	176	"	60	43-50-18	76-51-54
	"	213	LINE #6	T.P. 61	43-48-42	76-50-00
	"	128	"	62	43-51-54	76-50-06
	"	66	LINE #7	T.P. 63	43-54-30	76-50-18
	"	123	"	64	43-52-30	76-48-27
Buoy marker	10-6-70.	181.	"	65	43-50-54	76-46-18.
	End Line #7			66 corrected fix at 0822 hrs.		
	STOP TO Relign				0824 hrs	
0830 hrs	10-6-70	208	LINE #8	67	43 48 39	76 46 00
	"	182	"	68	43 50,00	76 46 12
	"	106	"	69	43 53 00	76 46 36
150 270	"	(154)	"	70	43 55 24	76 47 06
1433	"	112	LINE # K1	T.P. 71	43 54 42	76 42 18
	"	120	"	72	43 56 51	76 43 00
	"	100	"	73	43-59-24	76-44-00
	"	95	"	74	44-01-54	76-45-00
	"	85	T.P. K.1	75	44-03-45	76-45-42
	"	86	T.P. ALTER-COURSE K.1	76	44-05-45	76-41-48
	"	72	K1	77	44-08-00	76-39-00
	"	75	End K1	78	44-10-06	76-36-24
1220	"	66	Begin A_2 1220	79	44 10 18	76-36-09
1230	"	72	K-2	80	44 07 36	76-35-42
1245	"	105	"	81	44 05 52	76 34 42
1303	"	79	" T.P.	82	44 02 54	76 33 51

Time	DATE	Depth	Line No	Fix	Lat	Long
1315	10-6-20	109	K-2	83	44-01-24	76-35-18
1330	"	114	"	84	43-59-09	76-37-27
1345	"	117	"	85	43-57-08	76-39-45
1402	"	101 ✓	X. St. K-2 T.P.	86	43-54-42	76-42-18
1413	"	56 ✓	Restart X. 9 TP	87	43-54-18	76-39-21
1430	"	156 ✓	Start 10	88	43-51-30	76-40-30
1448	"	212 ✓	E.OF 10 S of 11	89	43-48-18	76-42-36
1500	"	180 ✓	Line # 11	90	43-50-00	76-40-54
1515	"	145 ✓	Line # 11	91	43-52-00	76-39-06
1526	"	72 ✓	End of 11 Start of 12	92	43-53-48	76-37-54
1545	"	160 ✓	12	93	43-50-40	76-38-03
1558	"	190 ✓	End of 12 Start of 13	94	43-48-00	76-38-00
1615	"	151 ✓	13	95	43-50-42	76-37-03
1630	"	123 ✓	13	96	43-53-00	76-36-12
1645	"	46 ✓	END OF 13 T.P. START OF 14.	97	43-54-30	76-35-30
1700	"	168 ✓	LINE-14	98	43-54-15	76-32-42
1715	"	95 ✓	END 14 T.P START 15	99	43-53-48	76-28-48
1730	"	94 ✓	15	100	43-51-54	76-31-03
1745	"	152 ✓	15	101	43-50-09	76-33-18
1756	"	170 ✓	END 15 START 16 T.P	102	43-48-42	76-34-48
1800	"	161 ✓	16	103	43-49-06	76-33-48
1815	"	130 ✓	16	104	43-50-18	76-30-24
1830	"	75 ✓	16	105	43-51-18	76-27-18
1842	"	46 ✓	END 16 T.P. START 17	106	43-52-24	76-25-00
1847	"	52 ✓	17	107	43-51-42	76-25-12
1900	"	126 ✓	17	108	43-49-42	76-26-54
1915	"	160 ✓	END 17 START 18 T.P	109	43-47-24	76-28-48
1930	"	138 ✓	18	110	43-48-42	76-26-06

TIME	DATE	DEPTH Ft	LINE NO	FIX	LAT	LONG
1945	10-6-70	66'	18	111	43-50-12	76-23-18
2000	"	108	18	112	43-51-54	76-20-30
2006	"	80	19	113	43-52-30	76-19-18
2013	"	138	20	114	43-51-48	76-18-12
2021	"	55	T.P. 20	115	43-50-36	76-18-54
2030	"	60	20	116	43-49-30	76-20-48
2045	"	140	20	117	43-48-00	76-23-30
2100	"	158	End 20 Start 21	118 T.P.	43-46-24	76-26-12
2115	"	140	21	119	43-47-06	76-23-00
2130	"	94	21	120	43-48-03	76-19-48
2143	"	47	TP END 21	121	43-49-00	76-61-36 19
2200	"	125	22	122	43-47-12	76-19-30
2215	"	136	22	123	43-45-48	76-22-12
2223	"	152	T.P. END 22	124	43-44-54	76-23-54
2230	"	140	23	125	43-45-00	76-22-36
2245	"	121'	23	126	43-45-48	76-19-18
2300	"	90'	23	127	43-46-18	76-15-54
2305	"	36'	TP END 23	128	43-46-48	76-14-12
2315	"	97'	24	129	43-45-33	76-16-48
2330	"	128'	24	130	43-44-24	76-20-24
2345	"	163'	END 24	131	43-43-12	76-24-30
2400	10-6-70	138	25	132	43-43-06	76-20-30
0015	11-6-70	106	25	133	43-43-27	76-17-15
0026	"	37	END 25	134	43-43-42	76-13-42
0045	"	117	26	135	43-42-45	76-18-10
0100	"	158	26	136	43-41-45	76-21-24
0110	"	240	END 26	137	43-41-18	76-23-50
0130	"	134	27	138	43-41-12	76-18-40
0149	"	70	END 27	139	43-41-15	76-13-48

Time	Date	Depth	Line	Fix	Lat	Long
0159	11-6-70	67	Start 28	140	43-39-42	76-13-45
0215	"	126	28	141	43-39-45	76-17-00
0230	"	208	28	142	43-39-45	76-21-12
0245	"	357	28	143	43-39.38	76-24-36
0256	"	380	28 T.P.	144	43-39-48	76-27-18
0306	"	436	END 28 START 29	145	43-38-12	76-27-24
0315	"	363	29	146	43-38.06	76-25-24
0330	"	217	29	147	43-38-15	76-21-24
0345	"	141	29	148	43-38.06	76-18-00
0405	"	41	29 T.P.	149	43-38-00	76-13-00
0414	"	35	END 29 START 30 T.P.	150	43-36-42	76-13-00
0430	"	121	30	151	43-36-50	76-16-54
0445	"	180	30	152	43-37-00	76-20-24
0500	"	270	T.P. 30	153	43-36-48	76-24-00
0508	"	248	END 30 T.P. START 31	154	43-35-36	76-24-15
0530	"	123	31	155	43-35-30	76-18-36
0545	"	80	31	156	43-35-24	76-14-54
0552	"	50	END 31 T.P. START 32	157	43-35-18	76-18-00
0600	"	46	32	158	43-34-00	76-14-00
0610	"	35	END 32 T.P. START 33	159	43-32-30	76-14-36
0615	"	41	33	160	43-33-06	76-15-30
0628	"	98	END 33 T.P. START 34	161	43-34-54	76-17-06
0635	"	92	34	162	43-33-57	76-19-54
0648	"	46	END 34 START 35 T.P.	163	43-31-54	76-19-00
0700	"	120	35	164	43-33-12	76-20-30
0713	"	193	END 35 T.P. START 36	165	43-35-06	76-22-30
0724	"	162	36	166	43-33-30	76-22-48
0734	"	72	END 36 START 37 T.P.	167	43-32-00	76-25-12
				168		

TIME	DATE	DEPTH	LNG	FIX	LAT	LONG
0745	11-6-70	188'	37	168	43-33-36	76-24-30
0755	"	268	END 37	169 T.P.	43-35-06	76-25-48
0800	"	256	38	170	43-34-18	76-26-00
0815	"	88	END 38 T.P.	171	43-31-48	76-25-54
0830	"	270	39	172	43-33-48	76-27-30
0839	"	363	END 39	173	43-35.2-03	76-28-48
0845	"	335	40	174	43-34-00	76-29-54
0900	"	166	40	175	43-31-48	76-28-30
0908	"	38	END 40	176	43-30-24	76-28-18
0916	"	155	41	177	43-31-24	76-29-18
0930	"	358	41	178	43-33-30	76-30-48
0945	"	522	END 41	179 T.P.	43-35-42	76-32-48
1000	"	423	42	180	43-33-24	76-32-30
1015	"	186	42	181	43-30-57	76-31-54
1026	"	46	END 42	182	43-29-00	76-31-24
1045	"	354	43	183	43-31-30	76-33-48
1100	" ✓	586	43	184	43-34-36	76-35-30
1110	" ✓	587	END 43 T.P.	185	43-35-18	76-36-48
1120	" ✓	610	44	186	43-33-30	76-36-48
1130	" ✓	472	44	187	43-31-54	76-36-24
1145	" ✓	240	44	188	43-29-24	76-35-48
1159	" ✓	53	END 44	189	43-26-54	76-35-30
1215	" ✓	110	45	190	43-26-20	76-38-36
1230	" ✓	179	45	191	43-25-18	76-42-00
1245	" ✓	234	"	192	43-24-42	76-45-24
1300	" ✓	224	"	193	43-24-00	76-48-45
1315	" ✓	249	"	194	43-23-12	76-52-06
1330	" ✓	260	"	195	43-22-27	76-55-30

Time	Date	Depth	Line	Fix	LAT	LONG
1345	11-6-70	248	45	196	43-21-33	76-58-54
1400	"	254	"	197	43-20-48	77-02-18
1415	"	223	"	198	43-20-00	77-05-45
1430	"	164	"	199	43-19-21	77-08-45
1445	"	123	"	200	43-18-40	77-11-57
1500	"	93	"	201	43-18-08	77-15-24
1520	"	57	END 45 T.P. START 46	202	43-17-18	77-19-42
1530	"	173	46	203	43-19-10	77-19-42
1545	"	455	"	204	43-21-42	77-19-45
1600	"	678	"	205	43-24-15	77-20-12
1620	"	680	"	206	43-27-42	77-20-00
1628	"	680	END 46 T.P. START 47	207	43-27-42	77-22-00
1645	"	664	47	208	43-24-48	77-22-30
1700	"	576	47	209	43-22-18	77-22-00
1715	"	209	47	210	43-19-36	77-21-54
1728	"	52.	T.P. 47	211.	43-17-10	77-22-00
1737	"	45	END 47 T.P. START 48	212.	43-17-10	77-24-12
1745	"	124	48	213	43-18-30	77-24-06
1800	"	432	48	214	43-21-00	77-24-15
1815	"	618	48	215	43-23-24	77-24-18
1830	"	677	48	216	43-26-00	77-24-12
1839	"	662	48 T.P.	217	43-27-48	77-24-12
1851	"	631	END 48 T.P. START 49	218	43-27-36	77-26-54
1900	"	642	49	219	43-26-06	77-27-24
1915	"	584	49	220	43-25-30	77-27-12
1930	"	448	49	221	43-21-03	77-27-06
1945	"	146	49	222	43-18-27	77-27-03
1952	"	67	T.P. 49	223	43-16-57	77-26-54

TIME	DATE	DEPTH	LINE	FIX	LAT	LONG
~~2000~~	~~11-6-70~~	~~67~~	~~49~~	~~224~~	~~43-15-18~~	~~77-29-18~~
2005	11-6-70	43'	49 ✓	224 T.P.	43-15-48	77-29-30
2015	11	118'	END 49 ✓	225	43-17-24	77-29-30
2030	11	307'	50 ✓	226	43-20-03	77-29-30
2045	11	490'	50 ✓	227	43-22-30	77-29-30
2100	11	590'	50 ✓	228	43-25-12	77-29-30
2114	11	566'	50 ✓	229	43-27-33	77-29-24
2125	11	563'	END 50 ✓	230	43-27-36	77-32-12
2145	11	520'	51 ✓	231	43-24-42	77-32-48
2200	11	265'	51 ✓	232	43-21-54	77-32-36
2215	11	150'	51 ✓	233	43-19-06	77-32-24
2230	11	79'	51 ✓	234	43-16-30	77-32-06
2240	11	48'	END 51 TP ✓	235	43-15-12	77-32-06
2254	11	108'	52 ✓	236 TP	43-17-48	77-32-00
2304	11	90'	52 ✓	237 TP	43-17-54	77-34-24
2315	11	152'	52 ✓	238	43-19-48	77-34-36
2330	11	293'	52 ✓	239	43-22-12	77-34-36
2345	11	486'	52 ✓	240	43-24-12	77-34-36
2400	11	526	52 ✓	241	43-25-36	77-34-36
0027	12-6-70	525	END 52 52 TP	242	43-27-39	77-34-42
0047	11	517	END 52 ✓ START 53 ✓	243	43-27-39	77-37-05
0100	11	511	53 ✓	244	43-25-54	77-37-18
0115	11	368	11 ✓	245	43-23-24	77-37-30
0130	11	142	11 ✓	246	43-20-42	77-37-24
0152	11	34	53 TP ✓	247	43-16-48	77-37-27
0207	11	18	END 53 ✓ START 54 ✓	248	43-18-39	77-40-00
0215	11	59	54 ✓	249	43-19-45	77-40-00
0230	11	232	11 ✓	250	43-22-27	77-39-48

Time	Date	Depth	Line	Fix	Lat	Long
0245	12-6-70	433	54	251	43-25-00	77-39-45
0258	"	495	54TP	252	43-27-33	77-40-00
0312	"	464	END 54 START 55	253	43-27-42	77-43-10
0330	"	340	55	254	43-24-06	77-43-12
0350	"	57	55TP	255	43-20-46	77-43-06
0404	"	37	END 55 START 56	256	43-21-12	77-46-00
0415	"	219	56	257	43-23-15	77-45-54
0430	"	414	56	258	43-25-54	77-45-54
0441	"	455	56 T.P.	259	43-27-42	77-45-54
0454	"	440	END 56 T.P. START 57	260	43-27-42	77-48-48
0515	"	242	57	261	43-24-00	77-48-54
0528	"	78	END 57 T.P. START 58	262	43-21-42	77-48-48
0548	"	174	58	263	43-23-15	77-52-40
0600	"	238	58	264	43-24-24	77-54-54
0615	"	392	"	265	43-26-18	77-57-36
0630	"	440	"	266	43-27-48	78-00-18
0645	"	526	"	267	43-29-18	78-03-30
0700	"	573	"	268	43-31-00	78-06-24
0715	"	595	"	269	43-32-24	78-09-00
0730	"	620	"	270	43-34-00	78-12-00
0745	"	577	"	271	43-35-54	78-14-12
0800	"	550	"	272	43-37-30	78-17-24
0815	"	500'	"	273	43-39-00	78-20-30
0830	"	448'	"	274	43-40-46	78-23-03
0845	"	325'	"	275	43-41-12	78-25-54
0900	"	354'	"	276	43-43-33	78-29-00
0915	"	294'	"	277	43-45-06	78-31-48

TIME	DATE	DEPTH	LINE	FIX	LAT.	LONG.
0930	12-6-70	246'	58	278	43-46-42	78-35-00
0945	"	232'	"	279	43-48-00	78-38-00
1000	"	143'	"	280	43-49-36	78-40-48
start	LAST	FIX	OSHAWA		Pick up	Fe boat
1150	"	72'	END 58 START 59	281	43-50-25	78-43-00
1200	"	74	59	282	43-50-24	78-45-24
1215	"	106	"	283	43-49-20	78-48-48
1230	"	148	"	284	43-48-03	78-52-00
1245	"	181	"	285	43-47-00	78-55-18
1300	"	188	"	286	43-45-48	78-58-42
1315	"	215	"	287	43-44-40	79-01-50
1330	"	226	"	288	43-43-30	79-05-12
1345	"	159	"	289	43-42-24	79-08-24
1400	"	101	"	290	43-41-20	79-11-39
1418	"	47	END 59 START 60	291	43-40-00	79-16-00
1430	"	57	60	292	43-38-18	79-17-32
1445	"	250	"	293	43-36-15	79-19-36
1500	"	269	"	294	43-34-10	79-21-48
1521	"	272	END 60 START 61	295	43-31-12	79-24-48
1530	"	212	61	296	43-32-12	79-26-48
1547	"	90	END 61 START 62	297	43-34-00	79-30-30
1600	"	145	62	298	43-31-45	79-30-42
1615	"	212	62	299	43-29-15	79-31-00
1632	"	289	END 62 T.P. START 63	300	43-26-06	79-31-12
1645	"	235	63	301	43-26-12	79-33-40
1705	"	73	END 63 T.P. START 64	302	43-26-15	79-38-42
1715	"	134'	64	303	43-24-24	79-39-00
1737	"	206	END 64 START 65	304	43-20-33	79-39-30

TIME	DATE	DEPTH	LINE	FIX	LAT.	LONG
1756	12-6-70	68	END 65 START 66	305	43-20-45	79-44-05

Dr. C. F. M. Lewis.

CANADA CENTRE FOR INLAND WATERS

Great Lakes Studies

CRUISE REPORT

Coring and Echo Sounding

CRUISE:	70 - 0 - 34
DATES:	September 21 - September 25
REGION:	Lake Ontario
VESSEL:	C. S. S. LIMNOS
MASTER:	Capt. R. Young
AGENCY:	Dept. of Energy, Mines & Resources (Limnogeology)
PROJECT LEADER:	Dr. P. G. Sly
OPERATIONS OFFICER:	Mr. D. J. Brooks

CONSECUTIVE CRUISE NUMBER 70-0-22

C. S. S. LIMNOS

Lake Ontario

70 - 0 - 34

Coring and Echo Sounding

September 21 Depart Burlington 1040 hrs.

September 25 Arrive Burlington 0640 hrs.

Operations Officer: Mr. D. J. Brooks

Personnel:

L. Benner H. K. Cho H. Don ———— Operations

Dr. J. Williams Dr. R. Thomas — Limnogeology

Dr. R. Lewis ———————————————— G. S. C.

Dr. J. P. Vernet ———————————————— Lakes Research, Switzerland

PURPOSE:

1. To collect Benthos gravity cores for phosphorous and sedimentological studies on the sediments of Lake Ontario.

2. To collect piston cores for sediment studies from Charity Shoal, Kingston Basin.

3. To complete an echo sounding survey of the Kingston Basin.

4. To obtain a bulk sample of Lake Ontario sediment for laboratory methodological studies.

ADDITIONAL TASKS:

1. To collect sediment samples (Shipek) in the Rochester area.

2. To carry out an echo sounding survey in the Toronto Burlington area.

CONTINUOUS OBSERVATIONS:

1. Near surface water temperature.

2. Air temperature.

3. Relative humidity.

4. Solar radiation.

5. Echograms during sounding survey.

6. Ship's position every 15 minutes during sounding surveys.

7. Every three hours a full meteorological observation.

CHRONOLOGY OF EVENTS:

September 21 1040 - Depart Burlington
1050 - Towed thermistor in water
1100 - Commence Sounding line
1202 - One core taken station C-3 on sounding line
1232 - End of sounding line
1353 - One core taken station E-6
1619 - Two cores taken station G-10
1745 - Two cores taken station E-11
1915 - One core taken station E-14
2103 - One core taken station F-17

September 22 0005 - Two cores taken station E-22
0600 - At Charity Shoal
0716 - Towed thermistor on board
0945 - Piston Core taken station 1
1312 - Piston Core taken station 2
1403 - Benthos Core taken station L-33
1740 - Piston Core taken station 3
- Proceed to Kingston
1840 - Alongside Kingston

September 23 0630 - Depart Kingston
0712 - Shipek taken station RT-1
0910 - Commence sounding lines Main Duck Is. area

September 24 0139 - Complete sounding lines
0355 - Benthos Core taken station G-34
0720 - Two Benthos Cores and two Shipek taken station E-30
0957 - Two Benthos Cores taken station H-27
1043 - One Benthos Core taken station G-26
1318 - Arrive Rochester area station RT-2
- Towed thermistor on board
1322 - Station RT-2 (Shipek) completed
- Proceed up Genesee River
1439 - Complete Shipek stations RT-3 to RT-6, Genesee River
1442 - Towed thermistor in water
- Proceed station H-17
1847 - Two Benthos Cores taken station H-17
2000 - One Benthos Core taken station H-15
- Proceed sounding line area off Toronto

September 25 - 0146 - Commence sounding lines
0545 - Complete sounding lines
- Proceed to Burlington
0615 - Towed thermistor on board
0640 - Alongside Burlington

NARRATIVE:

All assigned tasks were completed successfully during this cruise.

Cores taken from the Charity Shoal area were much shorter than anticipated (less than forty feet). The cores were returned to CCIW for further study by Dr. P. G. Sly and his staff and should shed more light on the special features which previously showed up on the Shoal such as the possibility of this being a "sink hole" and whether this area is a possible sediment trap.

Sounding Lines run in the Kingston Basin area were mainly to complete a sounding survey previously run by Dr. R. Thomas. The lines were completed and the echograms will be studied upon return to the Centre.

The sounding lines run in the Toronto Burlington area were in support of a study by Dr. M. Lewis to map a sub bottom ridge in the area.

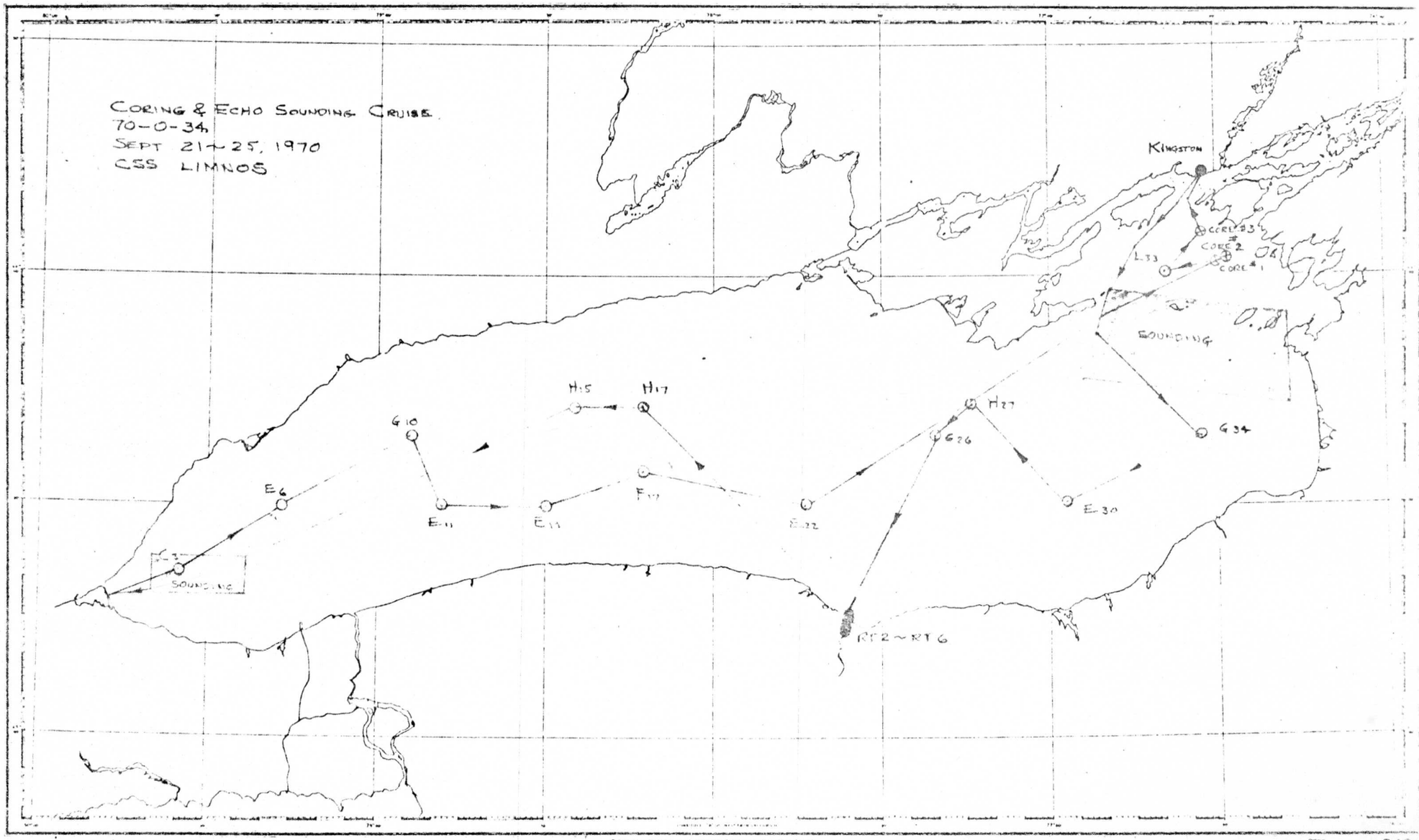
The Benthos gravity cores were taken to support a study by Dr. J. Williams to determine the various elements found in the sediments of Lake Ontario with emphasis on phosphorous.

The Shipek samples taken in the Rochester area were in support of a study by Dr. R. Thomas for heavy metals in Lake Ontario sediments.

A total of twenty Benthos cores, three Piston cores and eight Shipek samples were taken during this cruise.

SAMPLING STATIONS

Station	Latitude	Longitude	Samples
C-3	43° 21' 43"	79° 36' 23"	1 Benthos core
E-6	43° 30' 24"	79° 18' 09"	1 Benthos core
G-10	43° 38' 47"	78° 53' 49"	2 Benthos cores
E-11	43° 30' 20"	78° 48' 00"	2 Benthos cores
E-14	43° 30' 20"	78° 30' 00"	1 Benthos core
H-15	43° 43' 20"	78° 24' 00"	1 Benthos core
H-17	43° 43' 19"	78° 12' 03"	2 Benthos core
F-17	43° 34' 37"	78° 12' 00"	1 Benthos core
E-22	43° 30' 20"	77° 42' 00"	2 Benthos cores
G-26	43° 39' 00"	77° 16' 00"	1 Benthos core
H-27	43° 43' 20"	77° 12' 00"	2 Benthos cores
E-30	43° 30' 24"	76° 54' 00"	2 Benthos cores + 2 Shipek
G-34	43° 38' 30"	76° 28' 54"	1 Benthos core
L-33	44° 00' 56"	76° 36' 00"	1 Benthos core
1	44° 02' 21"	76° 29' 54"	1 Piston core
2	44° 02' 16"	76° 29' 21"	1 Piston core
3	44° 06' 18"	76° 31' 48"	1 Piston core
RT-1	44° 12' 48"	76° 37' 30"	1 Shipek
RT-2	43° 16' 28"	77° 34' 27"	1 Shipek
RT-3	43° 13' 54"	77° 37' 08"	1 Shipek
RT-4	43° 14' 27"	77° 36' 49"	1 Shipek
RT-5	43° 15' 08"	77° 36' 33"	1 Shipek
RT-6	43° 15' 27"	77° 36' 15"	1 Shipek



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DEPARTMENT OF ENERGY AND TECHNICAL SUPPLY, OTTAWA

LAKE ONTARIO

S-19

70-0-34

FIX	TIME	LAT.	LONG.	REMARKS
57	2100	43°51'48"	76°48'12"	REDUCED SPEED
58	2115	43°51'42"	76°46'24"	FULL SPEED RESUMED
59	2130	43°51'12"	76°42'27"	
60	2145	43°50'54"	76°39'06"	
61	2200	43°50'30"	76°35'36"	
62	2215	43°50'03"	76°31'36"	
63	2230	43°49'42"	76°28'18"	
64	2245	43°49'18"	76°24'54"	
65	2300	43°48'57"	76°21'12"	
66	2312	43°49'36"	76°18'30"	
67	2318	43°47'36"	76°18'36"	
68	2330	43°47'54"	76°21'30"	
69	2345	43°48'06"	76°25'06"	
70	0000	43°48'33"	76°28'30"	
71	0015	43°48'56"	76°31'48"	
72	0030	43°49'24"	76°35'42"	
73	0045	43°49'46"	76°39'05"	
74	0100	43°50'12"	76°42'30"	
75	0115	43°50'39"	76°46'24"	
76	0130	43°51'06"	76°49'54"	
77	0139	43°51'12"	76°50'50"	
78	0148	43°22'39"	79°40'00"	25-9-70 → soundings
79	0200	43°22'44"	79°35'24"	
80	0215	43°22'39"	79°32'00"	
81	0222	43°22'36"	79°30'00"	
82	0234	43°20'39"	79°28'48"	
83	0245	43°20'34"	79°31'33"	
84	0300	43°20'36"	79°35'06"	

70-D-34

FIX #	TIME	LAT.	LONG	REMARKS
				25-9-70
85	0315	43° 20' 34"	79° 38' 30"	
86	0320	43° 20' 39"	79° 40' 00"	
87	0327	43° 19' 21"	79° 40' 00"	
88	0345	43° 19' 13"	79° 35' 54"	
89	0400	43° 19' 15"	79° 32' 30"	
90	0415	43 19 08	79 28 36	
91	0424	43 19 18	79 26 33	
92	0436	43 18 21	79 23 21	
93	0500	43 18 15	79 29 36	
94	0515	43 18 21	79 33 09	
95	0530	43 19 18	79 36 54	
96	0545	43 18 21	79 40 00	END.

-)

R = RECENT MUD
X = NO RECENT

CRUISE : 70-0-34

STN #	CORE #	CORE LENGTH (cm)	NO CORE (TRACES)	DEPTH OF RECENT MUD (cm)	
CHARITY SHOAL POSN. 3		958 1/2		X	
CHARITY SHOAL POSITION 4		847		X	
WOLF ISLAND LONGPOINT POSN.		1079		40	

Limnos

STAR FORMAT CODING SHEET

entered by Shi

Cruise Ref. No. 70-0-34

BRIDGE LOG

date 22/9/70 pg.

INST.	cruise ref. no.	consc. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.		DATE yr.	DATE mo.	DATE dy.	TIME (GMT) 1st cast	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt slide no.	mon stn. no.	ARRIVAL & DEPARTURE GMT TIME	ARRIVAL & DEPARTURE LOCAL TIME	SHIPS COURSE	
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	25 26 27 28 29	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51	52 53 54 55 56	57 58 59 60 61	62 63 64 65 66	67 6
2 2			1 8	0	4 3 3	4 3 7		0 7 8	1 2 0	0		7 0	0 9	2 2	ON Stn	F-17				0023	2030	072°	1
2 2			1 8	0	—			0	—			7 0	0 9	2 2	OFF Stn	F-17				0103	2103	—	
2 2			1 8	0	4 3 3	0 2 0		0 7 7	4 2 0	0		7 0	0 9	2 2	ON Stn	E 22				0308	2308	101°	1
2 2			1 8	0	—			0	—			7 0	0 9	2 2	OFF Stn	E-22				0405	0006	—	
2 2			1 8	0	4 3 5	4 2 4		0 7 6	5 0 1	5		7 0	A	2 2						0823	0423	058°	
2 2			1 8	0	4 3 5	6 0 7		0 7 6	4 7 2	8		7 0	9	2 2						0843	0443	046°	1
2 2			1 8	0	4 4 0	1 3 0		0 7 6	2 9 2	4		7 0	9	2 2	Stopped at Charity Shoal					1000	0600	070°	1
2 2			1 8	0	4 4 0	2 2 1		0 7 6	2 9 2	4		7 0	0 9	2 2	Core #1					1200	0800	Vessel	
2 2			1 8	0	—			0	—			7 0	9	2 2						1345	0945	Off	
2 2			1 8	0	4 4 0	2 1 6		0 7 6	2 9 2	1		7 0	9	2 2						1412	1012	Anchored	
2 2			1 8	0	—			0	—			7 0	9	2 2						1712	1312	Off Stn	
2 2			1 8	0	4 4 0	5 5 6		0 7 6	3 6 0	0		7 0	9	2 2	ON Stn F-33					1745	1345	266°	
2 2			1 8	0	—			0	—			7 0	9	2 2	OFF Stn F-33					1803	1403	—	
2 2			1 8	0	4 4 0	5 1 0		0 7 6	3 2 0	0		7 0	9	2 2	Vessel steaming					1837	1437	039°	
2 2			1 8	0	4 4 0	6 1 8		0 7 6	3 1 4	6		7 0	9	2 2	Arrived on Stn #3.					2000	1600	000°	
2 2			1 8	0	—			0	—			7 0	9	2 2	OFF Stn					2140	1740	—	
2 2			1 8	0	4 4 0	3 1 5		0 7 6	3 6 1	7		7 0	9	2 2						2210	1810	320°	1
2 2			1 8	0	4 4 0	3 0 0		0 7 6	3 2 1	8		7 0	9	2 2	Vessel steaming							046°	

C.C.I.W. 1970

verified by

STAR FORMAT CODING SHEET

entered by Ships Officers

34

BRIDGE LOG

date 22/9/70 pg 2 of ___

LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.		DATE yr.	DATE mo.	DATE dy.	TIME (GMT) 1st cast	SND DEPTH metres 1/10	no. of (lev-els) obs'd	consc. bt slide no.	mon stn. no.	ARRIVAL & DEPARTURE GMT TIME	ARRIVAL & DEPARTURE LOCAL TIME	SHIPS COURSE	SHIPS SPEED	MILES steamed	DEPTH (FEET)
14 15 16 17		18 19 20	21 22 23 24		25 26 27 28 29	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51	52 53 54 55 56	57 58 59 60 61	62 63 64 65 66	67 68 69 70 71 72	73 74 75 76	77 78 79 80
34	37	078	12	00		70	09	22	ON Stn F-17					0023	2030	072°	10.8	13.5	615'
—		0	—			70	09	22	OFF Stn F-17					0103	2103	—	—	—	101°
30	20	077	42	00		70	09	22	ON Stn E22					0308	2308	101°	10.8	22.0	525'
—		0	—			70	09	22	OFF Stn E-22					0405	0005	—	—	—	058°
54	24	076	50	15		70	9	22						0823	0423	058°	10.8	44.8	045°
56	07	076	47	28		70	09	22						0843	0443	045°	10.8	3.4	070°
01	30	076	29	24		70	09	22	Stopped at Charity Shoal					1000	0600	070°	10.8	13.7	
02	21	076	29	24		70	09	22	Core #1					1200	0800	Vessel anchored on Coring			62'
—		0	—			70	09	22						1345	0945	Off Stn. #1.			
02	16	076	29	21		70	09	22						1412	1012	Anchored on Coring Stn #2.			56'
—		0	—			70	09	22						1712	1312	Off Stn			266°
05	56	076	36	00		70	09	22	ON Stn F-33					1745	1345	266°	10.8	5.3	107'
—		0	—			70	09	22	Off Stn. F-33					1803	1403	—	—	—	039°
05	10	076	32	00		70	09	22	Vessel stopped					1837	1437	039°	10.8	5.4	
06	18	076	31	45		70	09	22	Anchored on Stn #3.					2000	1600	000°	5.0	1.2	
—		0	—			70	09	22	Off Stn					2140	1740	—	—		320
10	15	076	36	17		70	09	22						2210	1810	320°	10.8	5.0	046°
13	00	076	32	18		70	09	22	Vessel at last Hydrostn.							046°		4.3	

verified by ___

Data Processing

CANADA CENTRE FOR INLAND WATERS

LAKES STUDIES

I.F.Y.G.L.

CRUISE PLAN

Bathymetric Survey, Lake Ontario

CRUISE NUMBER:	72 - 00 - 012
DATES:	June 12 - June 23
REGION:	Lake Ontario
VESSEL:	C.S.S. "LIMNOS"
MASTER:	Capt. D.R. Young
AGENCY:	Marine Sciences Directorate, D.O.E. Geological Survey of Canada, E.M.&R. Lakes Division, D.O.E.
PROJECT LEADER:	F.L. DeGrasse
PROJECT NOS.:	79F, IFYGL, 6600-72-4

DATE OF ISSUE: June 5, 19

C.S.S. "LIMNOS"
Lake Ontario
I.F.Y.G.L.

72 - 00 - 012

June 12	Depart Burlington	0900 hrs.
June 23	Arrive Burlington	1700 hrs.

Project Leader: Mr. F.L. DeGrasse

PERSONNEL

Marine Sciences Directorate

W. Silvey, Hydrographer
R. Rehbein, Hydrographer
B. Bodo, Student
D. Wells, Student
R. Bryant, P.Eng.
B. Waldock, Elec. Tech.

Inland Waters Directorate, Operations

F. DeVree
H. Don
D. Hore

Limnogeology

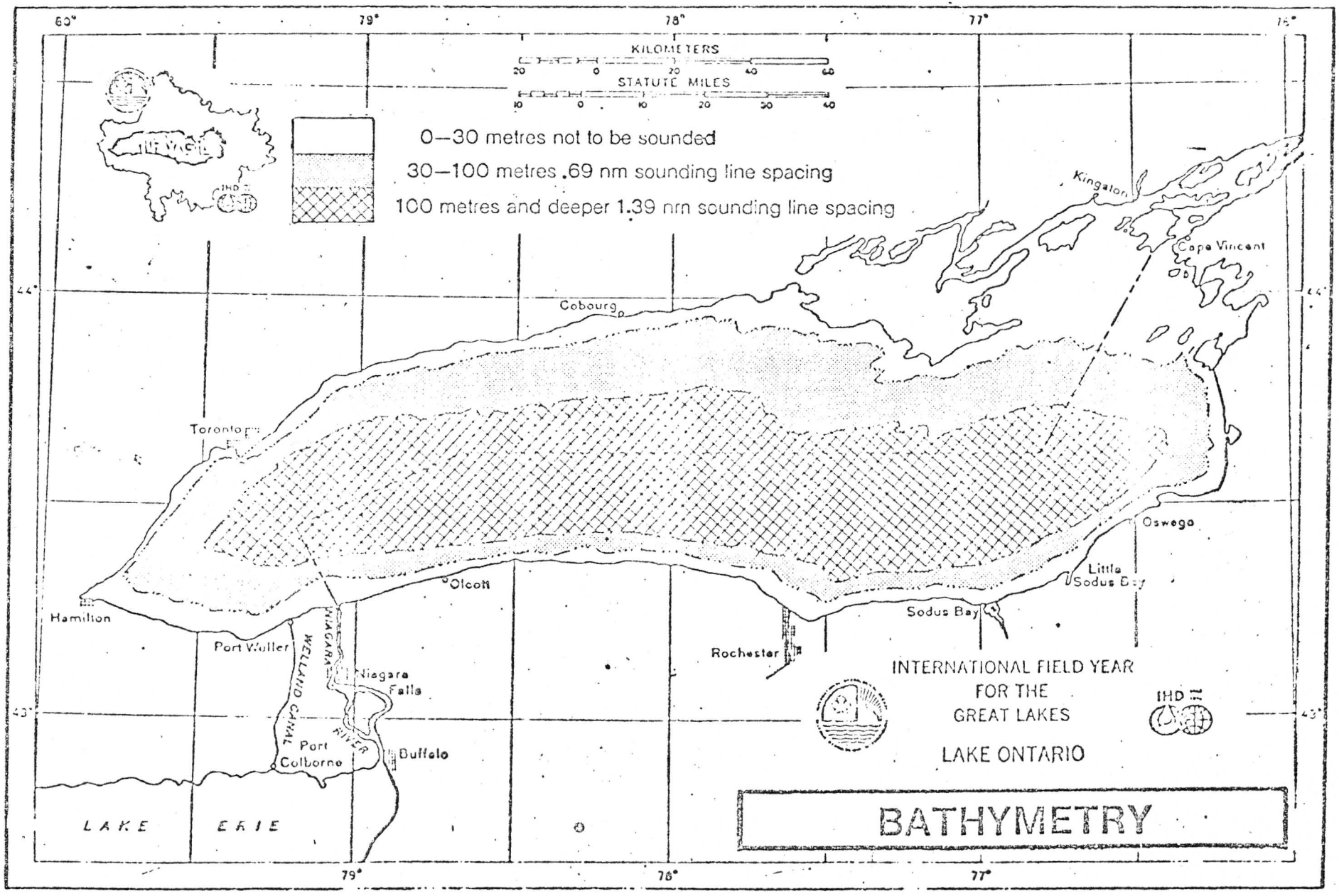
B. Henry,	June 12 - 16
J. Horsman,	June 19 - 23
S. Blasco,	June 12 - 23

CRUISE OUTLINE

To realize optimum results and make best possible use of resources and ship-time, an integrated survey will be run comprising the following activities.

A. Bathymetry
B. Seismic
C. Meteorology

For details see the attachments.


KILOMETERS
20 0 20 40 60
STATUTE MILES
10 0 10 20 30 40
0—30 metres not to be sounded
30—100 metres .69 nm sounding line spacing
100 metres and deeper 1.39 nm sounding line spacing
Kingston
Cape Vincent
Cobourg
Toronto
Oswego
Little Sodus Bay
Sodus Bay
Olcott
Hamilton
Port Weller
WELLAND CANAL
NIAGARA RIVER
Niagara Falls
Rochester
Port Colborne
Buffalo
LAKE ERIE
INTERNATIONAL FIELD YEAR
FOR THE
GREAT LAKES
IHD
LAKE ONTARIO
BATHYMETRY

A. Bathymetric Survey, Lake Ontario

The Canadian Hydrographic Service, M.S.D., will carry out a bathymetric survey of the offshore areas of Lake Ontario as an integral part of the I.F.Y.G.L. study.

The results of this survey will enable the publication of a new navigational chart and the data will be made available to the concerned and participating scientific agencies.

Mr. F.L. DeGrasse will act as Co-ordinator for the C.H.S. participation.

C.S.S. "LIMNOS" has been committed to the charting project for the periods as indicated:

A. June 12 - June 23
B. September 11 - September 22
C. October 23 - November 11

Estimated mileage to adequately delineate bottom contours and provide coverage of the offshore areas is 5500 n.m. To reach this objective in the time allotted will necessitate a 24-hour operation.

Specifically, the Lake will be surveyed at 1:200,000 with the data portrayed on a polyconic projection. Should it be necessary, areas of special interest can be surveyed at a scale of 1:80,000.

For charting purposes, the Lake will be divided into three zones, viz.:-

(a) Less than 30m in depth
(b) More than 30m but less than 100m in depth
(c) More than 100m in depth (see sketch)

Zone (a) will require a large scale survey, therefore it is not intended to sound the zone at this time.

Zone (b) will be surveyed using a sounding line spacing of $\frac{1}{4}$" or 0.69 n.m.; the total mileage for this zone will be approximately 2,300 n.m.

Zone (c) will be surveyed using a sounding line spacing of $\frac{1}{2}$" or 1.39 n.m. and the total mileage for this zone will be approximately 1,680 n.m.

In general, the sounding lines will be N - S oriented and check sounding lines will run E - W.

In the eastern U.S. section of the Lake the lines will run E - W with N - S check lines.

Additional lines will be run in areas of rapidly-changing depth to give optimum contour accuracy. Sounding lines over the deep trench at the eastern end of the Lake will be run normal to the axis of the trench. Approximate mileage - 500 n.m.

It should be noted that Universal Time (G.M.T.) will be recorded and all depths will be measured in metres and reduced to the International Great Lakes Datum (I.G.L.D.).

Acquisition and Data Processing of Bathymetry

The C.H.S. Development Group at C.C.I.W. will provide a service for the bathymetric survey in support of acquiring, recording and processing data pertaining to the chain pattern and bathymetry.

B. SEISMIC

Under the direction of Dr. M. Lewis for this phase of the project--June 12 - 23, a seismic air gun profiler will be towed and results recorded on an E.G. and G. recorder--basement data to the following specifications.

North - South collector lines at intervals of 16 km. (8.6 n.m.) to coincide with every 2nd line of 1968 sediment grid survey. See sketch.

Run 2 only East - West tie lines through the main lake basin.

If time permits, run one only East - West tie line through Kingston Basin.

On all other sounding lines other than those at the 16 km. spacing the Kelvin Hughes 26B echo sounder will be operated simultaneously with the Atlas DESO 10 sonar equipment.

Speed of vessel - 5 to 8 knots depending on the sea state.

Estimated mileage - 955 n.m. of seismic profiling.

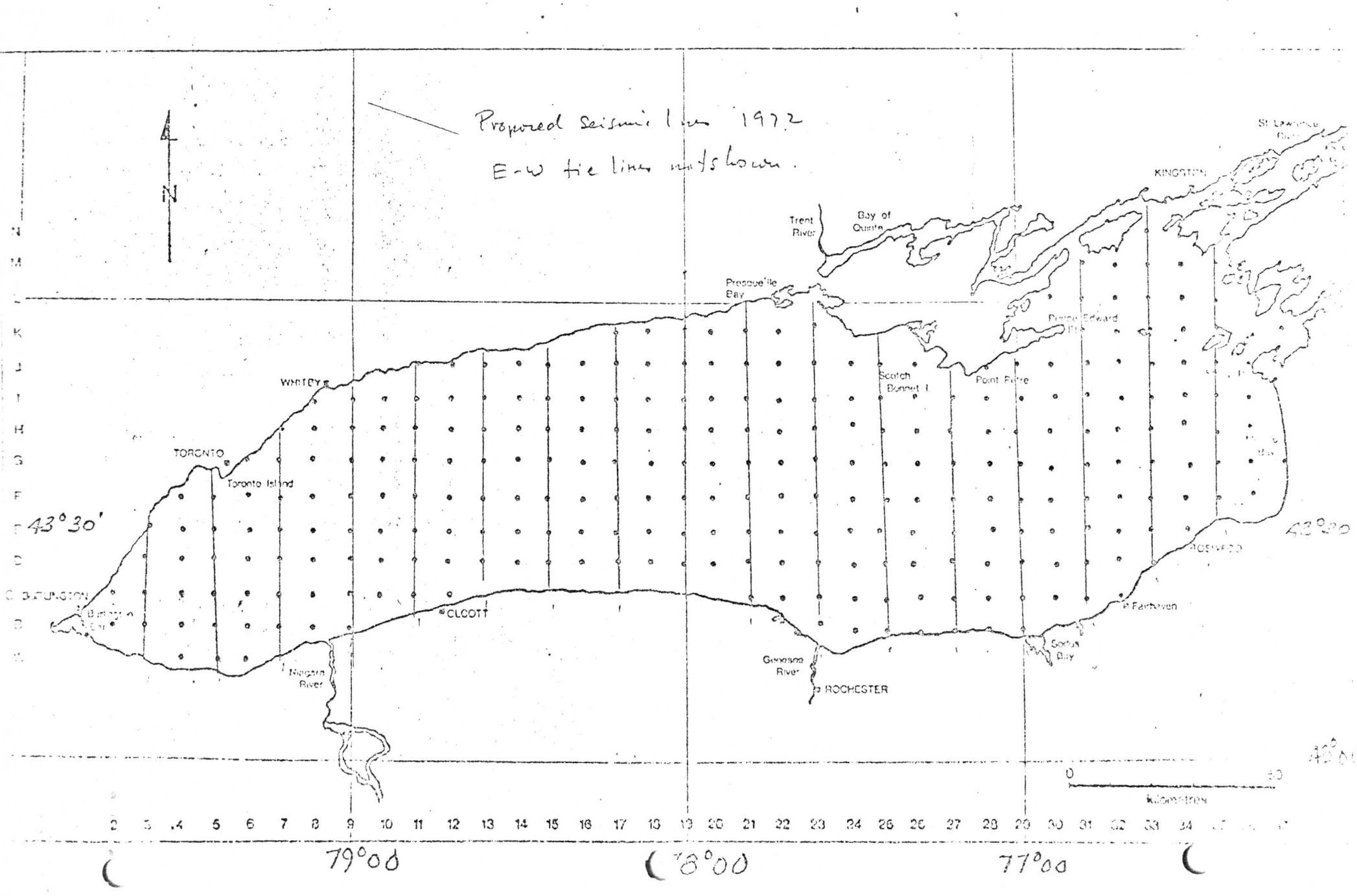
Estimated time - 7 days*.

* based on an "around the clock" operation

If the Side Scan Sonar equipment is available it is quite feasible the system will be used in more shallow water.

Every effort will be made to complete the seismic profiling during this phase as the equipment will not be available in September.

Note: This aspect of the survey is quite compatible with data collecting for bathymetry.


Proposed Seismic Lines 1972
E-W tie lines not shown.
N
Trent River
Bay of Quinte
KINGSTON
Prescott Bay
Prince Edward Pt.
Scotch Bonnet I.
Point Petre
WHITBY
TORONTO
Toronto Island
43°30'
42°30'
CLCOTT
Niagara River
Genesee River
ROCHESTER
Fairhaven
Sodus Bay
0
50
kilometers
79°00
78°00
77°00

C. OBSERVATION, METEOROLOGY

1) Continuous near surface water temperature

   a) towed sensor
   b) in hull sensor

2) Continuous air temperature

3) Continuous relative humidity

4) Continuous longwave (1R) radiation

5) Continuous solar radiation

6) Every hour - a deck level meteorological observation

7) Every three hours - a full surface meteorological observation

8) Continuous conductivity

• LAKE ONTARIO 1-80,000

LINES TO RUN 190 Metres and greater

GREEN approximatly 200 Statute Miles

28 lines

E 43

E 47

F 31

F 33

F 35

F 37

F 39

F 41

F 43

F 46

F 47

G 31

G 33

G 35

G 37

G 39

G 41

G 43

H 40

H 45

H 47

I 31

I 33

I 35

I 37

I 39

I 41

I 43

CANADA CENTRE FOR INLAND WATERS

LAKES STUDIES

IFYGL

CRUISE REPORT

BATHYMETRIC SURVEY - LAKE ONTARIO

CRUISE NUMBER:	72-00-012
DATES:	June 12 - June 22, 1972
REGION:	Lake Ontario
VESSEL:	C.S.S. LIMNOS
MASTER:	Capt. R. Young
AGENCY:	Department of the Environment
HYDROGRAPHER-IN-CHARGE:	Mr. F. L. DeGrasse

Date of Issue: June 30, 1972

Consecutive Cruise Number: 72-22-030

CRUISE OUTLINE

To realize optimum results and make best possible use of resources - ship-time, staff, etc., an integrated survey comprised of the following activities was carried out during the period June 12 - 22:

A. Bathymetry *

B. Seismic-Geomorphology

C. Meteorology

* Priority

C.S.S. "LIMNOS"
Lake Ontario
I.F.Y.G.L.

72 - 00 - 012

June 12	Depart Burlington	0915 hrs.
June 22	Arrive Burlington	2230 hrs.

Project Leader: Mr. F.L. DeGrasse

PERSONNEL

Marine Sciences Directorate

W. Silvey, Hydrographer

R. Rehbein, Hydrographer

B. Bodo, Student

D. Wells, Student

R. Bryant, P.Eng. - June 12-16

B. Waldock, Elec. Tech.

Inland Waters Directorate, Operations

F. DeVree

H. Don

D. Hore

Limnogeology

B. Henry, June 12 - 16

J. Horsman, June 19 - 23

S. Blasco, June 12 - 23

CRUISE OUTLINE

The Canadian Hydrographic Service, a participant in the IFYGL study of Lake Ontario, has taken on the sole responsibility of collecting bathymetry in the offshore areas.

The survey is to be carried out in three phases, viz. -

June 12 - 23

September 11 - 22

October 23 - November 10

Marine Sciences vessel C.S.S. "LIMNOS" is assigned to this project.

Phase I was completed on schedule despite adverse weather conditions and gale force winds, on June 23, which made it necessary to terminate operations and return to C.C.I.W. one-half day earlier than scheduled.

During Phase I, 1492 nautical miles of good quality bathymetry was collected. Tie lines (crossover checks) were run to substantiate our findings.

To make best possible use of resources, ship-time, and take advantage of the DECCA positioning system, seismic lines were run in compliance with specifications as written by Dr. M. Lewis of the Limnogeology group, C.C.I.W. See the attached report by assistant, S. Blasco.

The bathymetric program will be continued in September as scheduled and hopefully the seismic profiling furthered, should the equipment be available.

Three hundred and seventeen nautical miles of seismic data were recorded.

As in previous cruises, meteorological data collected by personnel from the Inland Waters Directorate were recorded. See attachment.

B. GEOMORPHOLOGY AND SEISMIC SURVEY

OF LAKE ONTARIO

CRUISE #72-00-012

June 12 - 22, 1972

As an integral part of the IFYGL Bathymetric survey of Lake Ontario, a Geomorphology and Seismic survey of the lake was conducted.

The purpose of the survey was threefold:- to determine the basement topography, to uncover historical drainage patterns, and to discover something of the character of the lake sediments. The objective is to obtain a better understanding of the Pleistocene geology of the lake basin.

The distinct advantage to undertaking the survey at this time was the Decca Navigational System, for optimum positioning techniques could be applied to survey lines.

Progress of the survey was hampered a great deal during the first week of operation by technical difficulties. The Air Compressor had not been serviced and suffered gross leakage problems from the start. The hydrophone cable was rotten and had to be replaced. The Boomer system could not be operated at full power, so that interference from ship noise blotted out the record. And, of course, the EG&G seismic recorder still suffered internal electronic problems. Consequently, the week's achievements were limited to only two seismic lines. However, the second week's results were much improved, with five lines being completed.

Two systems were used for data collection:

System #1 - EG&G-Huntec Seismic Recorder
Onas-Bauer Air Compressor
Bolt Air Gun

System #2 - EG&G-Huntec Seismic Recorder
EG&G-Huntec Boomer System

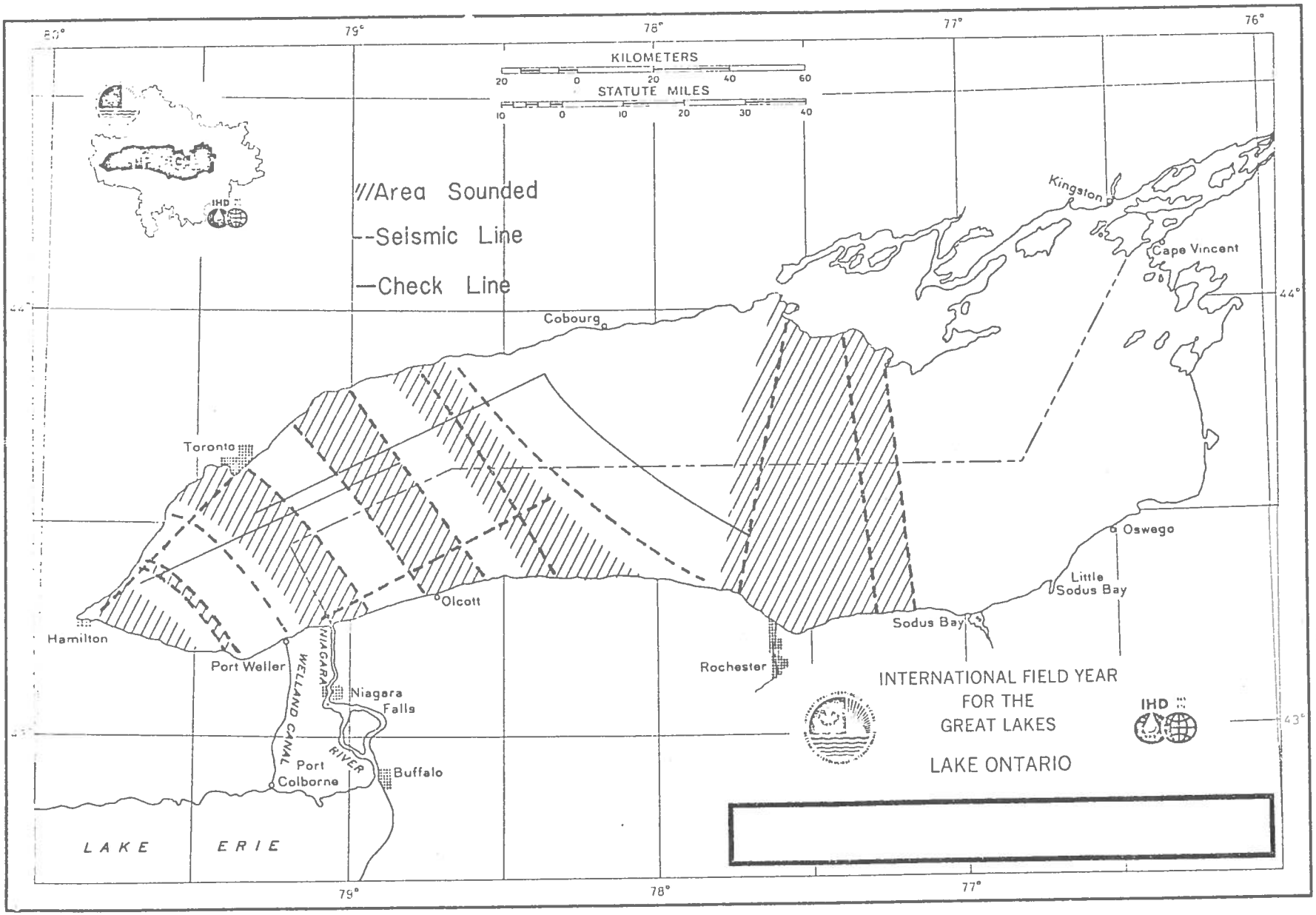
The seismic records that were obtained were of excellent quality and quite adequate for their intended purpose. Interpretation of the records will be done under the supervision of Dr. C.F.M. Lewis at the Canada Centre for Inland Waters.

Using the EG&G recorder and tow fish, a side scan sonar survey of shallow water areas was attempted. Results were negligible because of the large separation between tow fish and lake bottom. In the future it is recommended that a weighted fish and extra cable be used.

If advantage is to be taken of the opportunity in September and October-November to complete the survey, it is strongly recommended that the equipment be checked over and overhauled, so that optimum results can be obtained.

Personnel during the first phase of the program were:

Mr. Brian Henry of C.C.I.W., and Mr. John Horsman and Mr. Steve Blasco of the G.S.C.


KILOMETERS
20 0 20 40 60
STATUTE MILES
10 0 10 20 30 40
///Area Sounded
--Seismic Line
—Check Line
IHD
Kingston
Cape Vincent
Cobourg
Toronto
Oswego
Little Sodus Bay
Sodus Bay
Olcott
Hamilton
Port Weller
WELLAND CANAL
NIAGARA RIVER
Niagara Falls
Port Colborne
Buffalo
Rochester
LAKE ERIE
INTERNATIONAL FIELD YEAR
FOR THE
GREAT LAKES
IHD
LAKE ONTARIO
80°
79°
78°
77°
76°
44°
43°

C. OBSERVATION, METEOROLOGY

1) Continuous near surface water temperature

   a) towed sensor
   b) in hull sensor

2) Continuous air temperature

3) Continuous relative humidity

4) Continuous longwave (IR) radiation

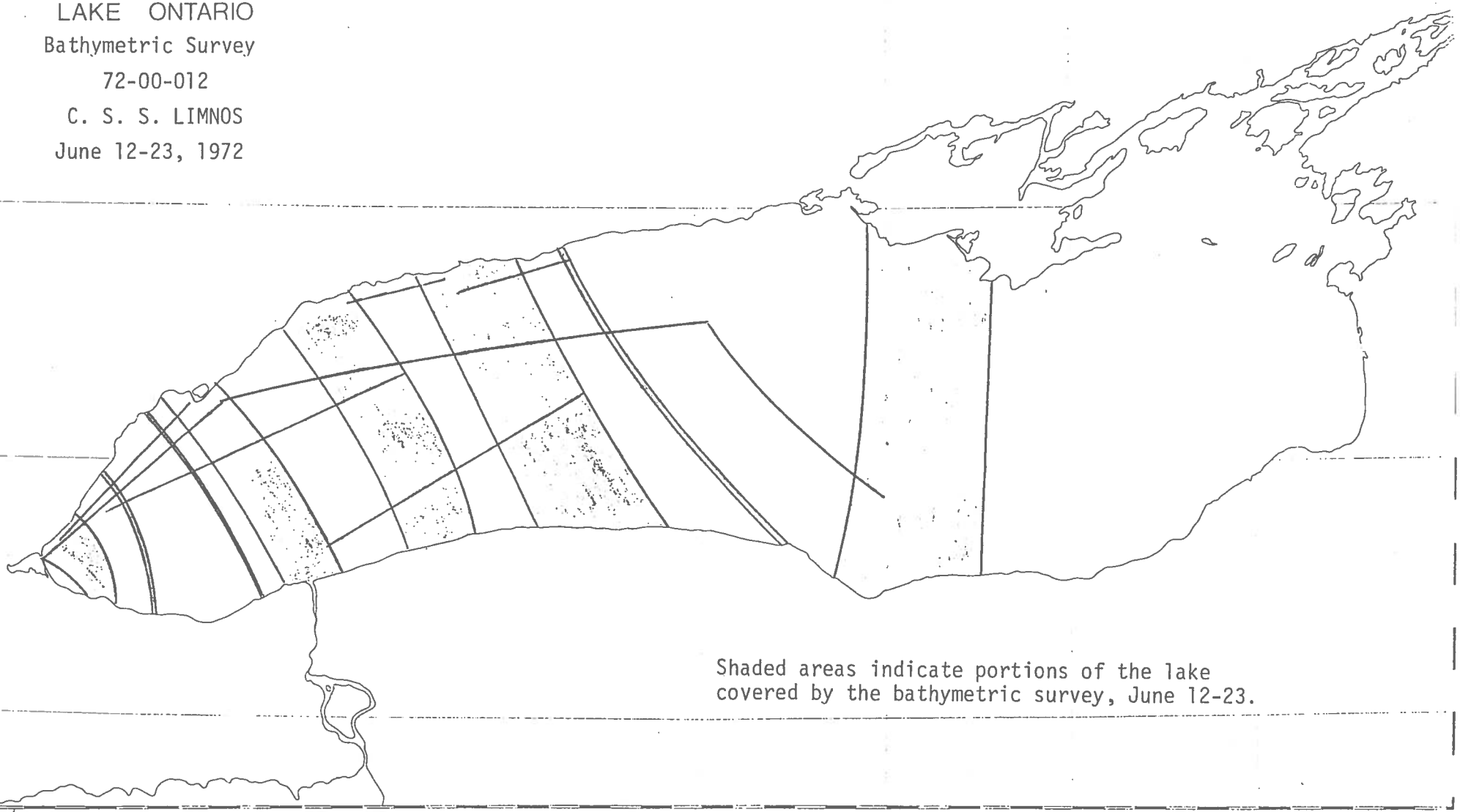
5) Continuous solar radiation

6) Every hour - a deck level meteorological observation

7) Every three hours - a full surface meteorological observation

80 79 78 77

LAKE ONTARIO
Bathymetric Survey
72-00-012
C. S. S. LIMNOS
June 12-23, 1972



Shaded areas indicate portions of the lake covered by the bathymetric survey, June 12-23.

79 79 77

Echogram Log

72-00-12

Limnos - Bathymetry cruise June 12 - 22/

Roll #		Decca Lane # & Colour			Fix #	
1	start	D 10	red		1	
		D 6	"			
		C 22	"		32	end
2	start	C 22	red		33	
		B 12	"			
		B 8	"			
		B 4	"			
		A 14	"			
		A 12	"			
		A 10	"	(seismic line)	106	end
3	start	A 10	red	(seismic line)	107	
		I 22	"	(seismic line)		
		I 16	"			
		I 12	"			
		I 8	"			
		I 4	"		36	end
4	start	I 4	red		37	
		I 0	"			
		F 22	"			
		G 4	"			
		G 8	"			
		G 12	"		24	end
5	start	G 12	red		25	
		G 16	"			
		H 10	"			
		H 16	"			
		F 16	"		7	end
6	start	F 16	red		8	
		F 12	"			
		F 8	"			
		A 47	green			

(cont'd

6 cont'd		A 16	red	
		B 0	"	
		off Burlington from Gibraltar Pt.		68 end.
7	start	A 36	green	1
		A 8	red	
		A 32	green	
		G 4	red	
		A 32½	green	
		E 10	red (seismic line)	
		D 36	green	
		D 38	"	32 end
8	start	D 38	green	33
		D 42	"	
		E 30	"	
		D 45	" (seismic line)	
		E 34	"	
		E 38	"	13 end
9	start	E 38	green	14
		E 42	"	
		E 45	" (seismic line)	
		F 30	"	
		F 34	"	56 end
10	start	F 45	green (seismic line)	4
		F 42	"	
		F 40	"	
		E 32	"	
		D 2	red	
		A 35	green	51 end.
11	start	A 35	green. (seismic line)	52 — 59 end

Ontario

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101x74-00-102

date Aug 5th pg 8 of ____

INST.	CCIW cruise ref. no. FIX	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									510.8	
212	1219		118	0	42 13 11 14			017	19 11	14 19	74				▲			TP					1134	005	8.6	
212	1210		118	0	42 13 12 17			017	19 11	13 18	74				▲								1145	"		
212	1211		118	0	42 13 15 14			017	19 11	13 16	74				▲								1200	"		
212	1212		118	0	42 13 17 18			017	19 11	13 16	74				▲								1215	"		
212	1213		118	0	42 14 01 19			017	19 11	13 16	74				▲								1230	"		
212	1214	01 12	118	0	42 14 05 20			017	19 11	13 15	74				012 ▲ 5			0.8 0 315	11 9	11 2	01 10	18 10	1245		11.6	
212	1215	01 12	118	0	42 14 05 20			017	19 11	13 15	74				▲			01 315					1309	008		
212	1		118	0							74				▲								435		9.6	
212			118	0							74				▲											
212			118	0							74				▲								0227		5.0	
212	1216	111	118	0							74				▲											
212	1217		118	0							74				▲											
212	1218		118	0							74				▲											
212	1219		118	0							74				▲											
212	1220		118	0							74				▲											
212	1221		118	0							74				▲											
212	1222		118	0	43 13 24 13			017	18 21	12 14	74				▲								0418			
212	1223		118	0	43 13 40 5			017	18 23	21	74				▲								0430			

verified by ____

total miles steamed 581.1

Ship [illegible]

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. [illegible]

date [illegible] pg 9 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (lev-els) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									5-81.1	
212	134		118	0	43	36	12	079	33	30	71	01	16										0448		7.4	END OF LINE
212	135		118	0	43	42	52	078	02	54	71	01	16										0652		19.6	START of LINE
212	136		118	0	43	47	42	078	03	06	71	02	16										0715			
212	137		118	0	43	42	25	078	02	54	71	02	16										0730			
212	138		118	0	43	38	54	078	02	57	71	01	16										0745			
212	139		118	0	43	37	24	078	02	58	71	01	16										0800		10.5	
212	1410		118	0	43	35	15	078	02	15	71	01	16										0815			
212	1411		118	0	43	32	54	078	02	15	71	01	16										0830			
212	1412		118	0	43	30	37	078	02	15	71	01	16										0845			
212	1413		118	0	[illegible]			[illegible]			71	01	16										0900			
212	1414		118	0	43	25	10	078	01	10	71	01	16										0915			
212	1415		118	0	43	22	57	078	01	02	71	01	16					T/P1					0927	090°		END OF LINE.
212	1416	0113	118	0	43	23	30	078	18	43	71	01	16					ON P21/1A					1056		13.8	BUOY ON "P21"
212	1417	0113	118	0	43	23	10	078	14	43	71	01	16					OFF P21/1A					1142			
212	1418	0114	118	0	43	23	10	078	14	43	71	01	16					ON P21/1B					1150			
212	1419	0114	118	0	43	23	10	078	14	43	71	01	16					OFF P21/1B					1203	090°		
212	1420		118	0	43	23	10	078	14	43	71	01	16					P21/1C					1217		4.0	
212	1421		118	0	43	23	10	078	14	43	71	01	16					[illegible]					1233	270°		

verified by ____

total miles steamed 633.4

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101 X 74-00-102.

date July 6 Th pg 10 of ____

INST.	CCIW F/X cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									633.4	
212	1512	01 16	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1738	1	1	ON P121D	1	1	1	1	1247Z		1.5	
212	1513	01 16	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1	1	1	OFF P121D	1	1	1	1	1257Z	270°		
212	1514	01 17	118	0	43 12 13 10			017 18 14 15	10		74 01 7 16				1774	1	1	ON P121E	1	1	1	1	1305Z		0.5	
212	1515	01 17	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1	1	1	OFF P121E	1	1	1	1	1315Z	345°		
212	1516	01 18	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1810	1	1	ON P121F	1	1	1	1	1325Z		0.7	
212	1517	01 19	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1	1	1	OFF P121F	1	1	1	1	1339	090°		
212	1518	01 19	118	0	43 12 13 10			017 18 14 15	10		74 01 7 16				1835	1	1	ON P121G	1	1	1	1	1344		0.5	
212	1519	01 19	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1	1	1	OFF P121G	1	1	1	1	1414	090°		
212	1520	01 20	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1823	1	1	ON P121H	1	1	1	1	1422		0.5	
212	1521	01 20	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1	1	1	OFF P121H	1	1	1	1	1429	180°		
212	1612	02 21	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1537	1	1	ON P121I	1	1	1	1	1441		1.0	
212	1613	02 21	118	0	43 12 13 10			017 18 14 15			74 01 7 16				1	1	1	OFF P121I	1	1	1	1	1446	270		
212	1614	02 22	118	0	43 12 13 10			017 18 14 15	10		74 01 7 16				1579	1	1	ON P121J	1	1	1	1	1456		0.5	
212	1615	02 22	118	0	43 12 13 10			017 18 14 15	10		74 01 7 16				1	1	1	OFF P121J	1	1	1	1	1504			
212	1616	02 23	118	0	43 12 13 15			017 18 14 15	10		74 01 7 16				1	1	1	ON P121K	1	1	1	1	1509		0.3	
212	1617	02 23	118	0	43 12 13 15			017 18 14 15	10		74 01 7 16				1	1	1	OFF P121K	1	1	1	1	1518			
212	1618	02 24	118	0	43 12 13 15			017 18 14 15			74 01 7 16				1	1	1	P121L	1	1	1	1	1523		0.1	
212	1619	02 24	118	0	43 12 13 15			017 18 14 15			74 01 7 16				1	1	1	P121L	1	1	1	1	1711			

verified by ____

total miles steamed 633.4

Ship Martin Karlsen

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. 74-01-101 74-00-102

BRIDGE LOG

date July 5th pg 11 of ____

INST.	CCIW cruise-ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			0330	
212	1810		118	0	43 12 13		10	017	10	57	74	07	05										1729	235		
212	1811		118	0	43 12 10		16	017	49	57	74	07	05										1744	000	5.4	TP
212	1812		118	0	43 12 13		10	017	50	12	74	07	05										1800	"		
212	1813		118	0	43 12 15		12	017	50	14	74	07	05										1815	"		
212	1814	0215	118	0	43 12 16		24	017	50	16	74	07	05					ON R1011					1826	"	5.4	
212	1815	0215	118	0	43 12 16		14	017	50	16	74	07	05					OFF R1011					1951			
212	1816		118	0	43 12 17		13	017	51	18	74	07	05										2000	000°		
212	1817		118	0	43 12 19		12	017	51	18	74	07	05										2015			
212	1818	01216	118	0	43 13 11		19	017	51	19	74	07	05					ON R1012					2020			
212	1819	01216	118	0	43 13 11		12	017	51	12	74	07	05					OFF R1012					2110			
212	1810		118	0	43 13 14		00	017	51	18	74	07	05										2130			
212	1811		118	0	43 13 16		14	017	51	17	74	07	05										2145			
212	1812		118	0	43 14 10		16	017	51	15	74	07	05										2200			
212	1813		118	0	43 14 12		11	017	51	17	74	07	05										2215			
212	1814		118	0	43 14 15		15	017	51	21	74	07	05										2230			
212	1815	01217	118	0	43 14 14		15	017	51	13	74	07	05					ON R1013					2239			
212	1816	01217	118	0	43 14 15		15	017	51	14	74	07	05					OFF R1013					2309			
212	1817		118	0	43 14 17		19	017	51	14	74	07	05										2330			

verified by ____

total miles steamed 650.9

Ship Gladstone Kelsey

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101-74-00-102

date July 6 pg 12 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			650.8	
212	1818	11	118	0	43 14 12			017 18 57			74	07	06		▲			PASS T/P					2332	- °	17.3	
212	1817	11	118	0	43 14 16			017 18 17			74	07	06		▲								2345	152°		
212	1911	11	118	0	43 14 31			017 18 41			74	07	06		▲								2400	"		
212	1911	11	118	0	43 14 21			017 18 14			74	07	07		▲								0016	"		
212	1912	0218	118	0	43 13 19			017 18 12			74	07	07		▲		ON	DROPPED A P-12 15	TAKES SUN				0032	"	9.9	
212	1913	0218	118	0	43 13 19			017 18 14			74	07	07		▲			OFF. A P-12 15	moved around for				0208	090°	6.0	
212	1914	0219	118	0	43 13 18			017 18 11			74	07	07		▲			ON B P-12 15					0214	"	0.5	
212	1915	0219	118	0	43 13 18			017 18 11			74	07	07		▲			OFF. B P-12 15					0227	090°		
212	1916	0220	118	0	43 13 18			017 18 11			74	07	07		▲			ON C P-12 15					0237		0.5	
212	1917	0220	118	0	43 13 17			017 18 10			74	07	07		▲			OFF. C P-12 15					0258	090°		
212	1918	0221	118	0	43 13 17			017 18 10			74	07	07		▲			ON D P-12 15					0325		2.3	
212	1919	0221	118	0	43 13 17			017 18 10			74	07	07		▲			OFF. D P-12 15					0320	241°		
212	2010	0222	118	0	43 13 18			017 18 12			74	07	07		▲			ON E P-12 15					0333		1.7	
212	2011	0222	118	0	43 13 15			017 18 14			74	07	07		▲			OFF E P-12 15					0354	140°		
212	2012	0223	118	0	43 13 8			017 18 4			74	07	07		▲			ON F P-12 15					0415		1.5	
212	2013	0223	118	0	43 13 9			017 18 4			74	07	07		▲			OFF P-12 15					1429	310		
212	2014	11	118	0	43 13 9			017 18 43			74	07	07		▲			A P-12 15					0506		1.7	DICK UP MARKER BUOY
212	2015	11	118	0	43 13 15			017 19 12			74	07	07		▲			T/P					0956		29.7	

verified by ____

total miles steamed 719.9

Ship - Martin Karlsen

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. 74-01-101 X 74-03-102

BRIDGE LOG

date July 7-11 pg 13 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. a	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									719.9	
212	016	013	118	0	43 13 17	15 0		017 19 12	12 13 7		74	01	07		▲			ON 701011					1002			
212	017	014	118	0	43 13 13	15 4		017 19 12	12 13 6		74	01	07		▲			OFF 701011					1027	"		
212	018	015	118	0	43 13 11	12 0		017 19 11	11 12		74	01	07		▲			ON 701012					1053			
212	019	015	118	0	43 13 11	12 6		017 19 12	13 15		74	01	07		▲			OFF 701012					1109	"		
212	020	016	118	0	43 13 16	13 2		017 19 11	18 14		74	01	07		▲			ON 701013					1151	"		
212	021	016	118	0	43 13 15	19 2		017 19 12	10 10		74	01	07		▲			OFF 701013					1212	"		
212	022	017	118	0	43 13 19	13 5		017 19 12	15 13		74	01	07		▲			ON 701014					1256	"	16.5	
212	023	017	118	0	43 13 19	13 5		017 19 12	15 13		74	01	07		▲			OFF 701014					1329	300°		
212		018	118	0	43 13 14	13 5		017 19 12	15 13		74	01	07		1012 ▲			ON WB 1	01 2 0	3 1 3	21 15	21 3 0	1424		27.	
212		018	118	0	43 13 14	10 5		017 19 12	15 13		74	01	07		▲			OFF WB.					1430	253°		
212		019	118	0	43 22 12	27		017 19 13	8 10	14	74	01	07		▲			ON PC 1014					1530		8.8	
212		019	118	0	43 22 12	27		017 19 13	8 10	14	74	01	07		▲			PC OFF 1014					1600			
212		020	118	0	43 21 12	1		017 19 13	7 5	7	74	01	07		▲			ON PC 1015					1805			
212		020	118	0	43 21 12	10		017 19 13	7 5	5	74	01	07		▲			OFF PC 1015					1825			
212			118	0							74	01	07		▲								2020		8.0	
212			118	0							74	01	07		▲											
212			118	0							74	01	07		▲											
212			118	0							74	01	07		▲											

verified by _____

total miles steamed 751.9

Ship _____

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. 74-01-101 x 74-02-102.

BRIDGE LOG

date _____ pg 1 of _____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
212			118	0							7															
212			118	0							7												3 - 0	067°		
212	21118		118	0	43 15 15 14			017	19	23 14 15	7												15.25			
212	21119		118	0	43 12 17 15			017	13	10 14	7												15.45	066°		
212	21210		118	0	43 12 18 13			017	11	17 18	7												16.00			
212	21211		118	0	43 12 18 28			017	11	13 48	7												16 15	066		
212	21212		118	0	43 13 03 30			017	10	57	7												1630	4		
212	21213		118	0	43 13 11 25			017	10	21 10	7												1645	4		
212	21214		118	0	43 13 25 58			017	09	04 10	7												1700	4		
212	21215		118	0	43 13 41 16			017	09	11 10	7												1715	4		
212	21216		118	0	43 13 50 00			017	08	47 40	7												1730	4		
212	21217		118	0	43 14 05 12			017	08	44 12	7												1745	4		
212	21218		118	0	43 13 69 00			017	07	50 45	7										1800		1730	4		
212	21219		118	0	43 13 61 48			017	08	47 00	7										1815		~~1745~~	4		
212	21220		118	0	43 13 75 53			017	06	45 36	7										1830		~~1750~~	4		
212	21221		118	0	43 14 09 00			017	08	42 30	7										1845		~~1775~~	4		
212	21222		118	0	43 14 13 27			017	08	38 12	7										1900		~~1800~~	4		
212	21223		118	0	43 14 14 45			017	08	34 30	7										1915		~~1815~~	4		

verified by _____ total miles steamed _____

Ship Wilfrid Laurier

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101 x 74-00-102

date July 9 pg 15 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no.	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									761.9	
212	234		118	0	43 42 45			078 32 10			74	07	09								1930		1850	066		
212	235		118	0	43 43 40			078 28 54			74	07	09								1945		1945	"		
212	236		118	0	43 44 56			078 26 54			74	07	09								2000		1950	"		
212	237		118	0	43 45 50			078 24 30			74	07	09										2015	"		
212	238		118	0	43 46 59			078 19 10			74	07	09										2030	"		
212	239		118	0	43 48 10			078 16 12			74	07	09										2045	"		
212	240		118	0	43 48 58			078 12 15			74	07	09										2100	"		
212	241		118	0	43 49 30			078 10 18			74	07	09										2115	"		
212	242		118	0	43 50 57			078 08 48			74	07	09										2130	"		
212	243	0141	118	0	43 51 51			078 10 14			74	07	09					ON T.P. 0181-11					2151		83.5	
212	244	0142	118	0	43 52 52			078 13 18			74	07	09					OFF 0181-11					2204	180°		
212	245	0142	118	0	43 53 45			078 14 10			74	07	09					ON 0181-12					2215	"		
212	246	0142	118	0	43 54 45			078 14 14			74	07	09					OFF 0181-12					2224	180°		
212	247	0143	118	0	43 46 10			078 13 18			74	07	09		1916			ON BC1-16	12.2	21.0	218.5	312.2	2304		6.5	
212	248	0143	118	0	43 46 58			078 11 15			74	07	09					OFF BC1-6					2354	165°		Line 43 45 58
212	249		118	0	43 38 10			078 10 14			74	07	10										0015			problem with fixing (DR?)
212	250		118	0	43 42 30			078 15 18			74	07	10										0030			
212	251		118	0	43 41 12			078 18 12			74	07	10										0045	160°		

verified by ____

total miles steamed 851.9

Ship [illegible] Cook

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-HLX-Pac-102

date July 5 74 pg 16 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									851.9	
212	216	214	118	0	43	18	42	017	18	10	74	07	12		1910▲	1	1	DN AC1-17	012	21	1010	117	0104		11.0	
212	218	215	118	0	43	18	42	017	15	50	74	07	12		▲	1	1	DFF. AC1-17					0304	046°		
212	219		118	0	43	17	18	017	15	16	74	07	12		▲	1							0330			
212	220		118	0	43	16	30	017	14	30	74	07	12		▲	1							0355	"		
212	221		118	0	43	15	01	017	13	55	74	07	12		▲	1							0500	"		JR
212	222		118	0	43	14	30	017	13	20	74	07	12		▲	1							0520	355		
212	223		118	0	43	13	48	017	12	37	74	07	12		▲	1							0608	270		
212	224	216	118	0	43	12	38	017	11	52	74	07	12		▲	1	1	DN QB-3					0747	255		
212	225	217	118	0	43	11	53	017	11	12	74	07	12		▲	1	1	DFF QB1-3					0816	[illegible]	15.5	
212	226		118	0	43	11	10	017	10	32	74	07	12		▲	1							0830			JR.
212	227		118	0	43	10	30	017	09	52	74	07	12		▲	1							0845			"
212	228		118	0	43	09	50	017	09	12	74	07	12		▲	1							0900			"
212	229		118	0	43	09	10	017	08	32	74	07	12		▲	1							0915	049°		JR.
212	230		118	0	43	08	30	017	07	52	74	07	12		▲	1							0945			"
212	231		118	0	43	08	18	017	07	15	74	07	12		▲	1							1000			DP.
212	232		118	0	43	07	57	017	06	31	74	07	12		▲	1		TP.					1011	120°		SIX
212	233	218	118	0	43	07	27	017	06	31	74	07	12		▲	1	1	CN PIC1-19					1054			
212	234	219	118	0	43	07	10	017	06	14	74	07	12		▲	1	1	DFF PIC1-19	moved around for coring/contour				1216	095°	16.6	

verified by ____

total miles steamed 905.0

Ship Hudson Knight

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101-X74-00-102

date 7th 10th pg 27 of ____

INST.	CCIW FIX cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									925.1	
DR 212	21710		118	0	43 15 17 12½			017 11 15 7½			74 01 17 11 10					1							12 36	095°		DR
212	21711		118	0	43 13 17 04			017 07 15 11½			74 01 17 11 10					1							12 57	"		
212	21712		118	0	43 13 17 01			017 12 11 15½			74 01 17 11 10					1							13 15	095°		
212	21713		118	0	43 13 16 58			017 16 11 18 10			74 01 17 11 10					1							13 20	"		
212	21714		118	0	43 13 16 54			017 21 11 20 10			74 01 17 11 10					1							13 45	"		
212	21715	21417	118	0	43 13 16 50			017 26 11 23 10			74 01 17 11 10				1412 5	1		ON. AC 112 OFF	012 10 cone	016 taken	1710	1310	13 57	"	15.0	
212	21716	21417	118	0	43 13 16 50			017 31 11 25 10			74 01 17 11 10					1		AC 113					15 25	095°		
212	21717		118	0	43 13 17 01			017 37 13 14 48			74 01 17 11 10					1							15 45	"		
212	21718		118	0	43 13 17 05			017 41 11 11 50			74 01 17 11 10					1							16 00	"		
212	21719		118	0	43 13 18 45			017 10 18 45			74 01 17 11 10					1							16 15	080		? WHAT IS THIS? 81° ?
212	21720		118	0	43 13 19 06			017 20 52 10			74 01 17 11 10					1							16 30	083		
212	21721		118	0	43 13 21 00			017 20 47 45			74 01 17 11 10					1							16 45	090		LATITUDE LOOKS INCORRECT 2015
212	21722	01417	118	0	43 14 01 01			017 16 57 30			74 01 17 11 10				1143 0	1		ON AC 111					17 05		13.2	
212	21723	01417	118	0	43 14 01 36			017 15 57 22			74 01 17 11 10					1		OFF AC 111					17 55	068		
212	21724		118	0	43 14 01 45			017 16 54 45			74 01 17 11 10					1							18 17	068		
212	21725		118	0	43 14 14 10			017 16 41 20			74 01 17 11 10					1							18 30	065		
212	21726		118	0	43 14 24 10			017 16 47 10			74 01 17 11 10					1							18 45	065		
212	21727		118	0	43 14 33 10			017 16 43 21			74 01 17 11 10					1							19 00	064		

verified by ____

total miles steamed 933.2

Ship Hakuho Maru

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. 74-01-101274-00-102

BRIDGE LOG

date Feb. 12th pg 10 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no.of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			933.2	
212	21818		118	0	43 43 15			017 16 41			74 01 12												1915			
212	21819		118	0	43 45 10			017 16 31	73	0	74 01 12												28	270		
212	21910	01719	118	0	43 45 10			017 16 38	30		74 01 12							ON PCV2					1940		14.8	
212	21911	01719	118	0	43 14 50	10		017 16 31	7	57	74 01 12							OFF PCV2					2225	052°		
212	21912		118	0	43 14 56	59		017 16 31	6	10	74 01 12												2244			
212	21913	01510	118	0	43 14 17	15		017 16 31	43	18	74 01 12							ON AC1/13					2306		3.5	
212	21914	01510	118	0	43 14 13	48		017 16 31	7	48	74 01 12							OFF AC1/13					0212	222°		
212	21915		118	0	43 14 1	10		017 16 1	1	48	74 01 12												0230	"		
212	21916		118	0	43 13 59	10		017 15 42	15	54	74 01 12												0246	"		
212	21917		118	0	43 13 47	30		017 15 42	15	12	74 01 12												0300	"		
212	21918		118	0	43 13 35	18		017 16 41	8	12	74 01 12												0315	"		
212	21919		118	0	43 13 23	36		017 16 50	30		74 01 12												0330	"		
212	21910		118	0	43 13 12	30		017 16 58	18		74 01 12												0345			
212	21911	01511	118	0	43 13 01	42		017 16 54	30		74 01 12							ON E 130					0357		18.5	
212	21912	01511	118	0	43 30 1	45		017 16 54	30		74 01 12							OFF E 130					0413	233		
212	21913		118	0	43 28 45			017 16 54	30		74 01 12												0430	235		
212	21914		118	0	43 27 16			017 01 10	7		74 01 12												0445	235		
212	21915		118	0	43 25 39			017 17 14	10	4	74 01 12												0500	235		

verified by ____

total miles steamed 970.0

Ship Hudson

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101 x 74-00-102

date June 11 pg 19 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no.	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
212	3016		118	0	43 12	43 3		017	01	12	74	01	11		▲								0515	235		
212	3017		118	0	43	3	58	017	02	54	74	01	11		▲								0530	232		
212	3018		118	0	43	2	17	017	13	016	74	01	11		▲								0545	230		
212	3019		118	0	43	1	57	017	15	54	74	01	11		▲								0600	222		
212	3020	TP	118	0	43	17	36	017	16	24	74	01	11		▲			TP					0619	065	22.0	
212	3021		118	0	43	18	11	017	16	45	74	01	11		▲								0630	065		
212	3022		118	0	43	19	13	017	17	48	74	01	11		▲								0645	065		
212	3023		118	0	43	19	12	017	19	51	74	01	11		▲								0700	063		
212	3024		118	0	43	21	13	017	20	37	74	01	11		▲								0715	063		
212	3025		118	0	43	22	15	017	21	15	74	01	11		▲								0730	064		
212	3026		118	0	43	23	38	017	22	010	74	01	11		▲								0745	065		
212	3027		118	0	43	24	15	017	16	59	74	01	11		▲								0800	065		
212	3028		118	0	43	25	17	017	16	56	74	01	11		▲								0815	066		
212	3029		118	0	43	26	13	017	16	53	74	01	11		▲								0830	066		
212	3030		118	0	43	27	13	017	16	50	74	01	11		▲								0845	063		
212	3031		118	0	43	28	15	017	16	47	74	01	11		▲								0900	"		
212	3032		118	0	43	29	15	017	16	44	74	01	11		▲								0915	062		
212	3033		118	0	43	30	15	017	16	41	74	01	11		▲								0930	"		

verified by ____

total miles steamed 9920

Ship Hudson

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-181-7460-102

date July 11 pg 20 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no.	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									992.0	
212	31214		118	0	43	12	10	017	16	18	71	07	11		▲								0945	061°		
212	31215		118	0	43	13	16	017	16	12	71	07	11		▲								1000	063°		
212	31216		118	0	43	14	14	017	16	13	71	07	11		▲								1015	064°		
212	31217		118	0	43	15	16	017	16	12	71	07	11		▲								1030	〃		
212	31218		118	0	43	16	15	017	16	10	71	07	11		▲								1045	065°		
212	31219		118	0	43	17	19	017	16	14	71	07	11		▲								1100	064°		
212	31310		118	0	43	18	13	017	16	15	71	07	11		▲								1115	〃		
212	31311		118	0	43	18	17	017	16	19	71	07	11		▲								1130	〃		
212	31312		118	0	43	19	12	017	16	16	71	07	11		▲			TP					1141	226°	49.9	
212	31313		118	0	43	17	18	017	16	19	71	07	11		▲								1200	〃		
212	31314		118	0	43	16	12	017	16	21	71	07	11		▲								1229	〃		
212	31315		118	0	43	15	14	017	16	21	71	07	11		▲								1245	〃		
212	31316		118	0	43	14	12	017	16	21	71	07	11		▲								1300	〃		
212	31317		118	0	43	13	18	017	16	21	71	07	11		▲								1315	〃		
212	31318	TV9	118	0	43	12	18	017	16	22	71	07	11		▲			PASS TV9					1320	255°	16.0	
212	31319	TV9	118	0	43	12	18	017	18	14	71	07	11		▲			PASS TV9					1330	227°	1.7	
212	31410		118	0	43	12	16	017	18	17	71	07	11		▲								1345	〃		
212	31411	TV9	118	0	43	12	17	017	16	13	71	07	11		▲			PASS TV9					1400	000°	4.8	

verified by ____

total miles steamed 1054.4

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101 X 74-00-102

date Aug. 11th pg 21 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (lev-els) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1004.4	
212	314		118	0	43 12 17 18			017 13 19 12			74 01 11				▲								14.15	000°		
212	314		118	0	43 12 19 30			017 13 19 12			74 01 11				▲								14.30	"		
212	314		118	0	43 13 17 15			017 13 19 12			74 01 11				▲								14.45	"		
212	314		118	0	43 13 14 12			017 13 19 11			74 01 11				▲								15.00	"		
212	314		118	0	43 12 16 30			017 13 19 11			74 01 11				▲								15.15	"		
212	314		118	0	43 13 18 15			017 13 19 11			74 01 11				▲								15.30	"		
212	314		118	0	43 14 12			017 13 19 11			74 01 11				▲								15.45	"		
212	314		118	0	43 13 12			017 13 19 11			74 01 11				▲								16.00	"		
212	315	TP.	118	0	43 14 16 15			017 13 19 12			74 01 11				▲			TP. SS.					16 18	326	20.2	
212	3151		118	0	43 14 23 7			017 14 10 45			74 01 11				▲								16 30	327		
212	3152		118	0	43 15 01 0			017 14 21 20			74 01 11				▲								16 45	326		
212	3153		118	0	43 15 21 3			017 14 22 5			74 01 11				▲								17 00	326		
212	3154		118	0	43 15 01 0			017 14 21 0			74 01 11				▲			TP					17 20	105	10.4	
212	3155		118	0	43 15 43 2			017 14 15 15			74 01 11				▲								17 30	105		
212	3156		118	0	43 15 49 0			017 14 21 03			74 01 11				▲								17 45	105		
212	3157		118	0	43 15 34 1			017 13 18 21 0			74 01 11				▲								18 00	105		
212	3158		118	0	43 15 27 57			017 13 15 14 8			74 01 11				▲								18 15	105		
212	3159		118	0	43 15 22 4			017 13 21 25			74 01 11				▲								18 30	109		

verified by _____ total miles steamed 1095.1

Ship Hudson Labrador

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101, 74-00-102

date July 11 pg 22 of

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42	43 44	45 46	47 48 49	50 51 52	53 54 55	56 57	58 59 60	61 62 63			1075.1	
212	3610		118	0	43	51	25	017	16	19	7	10	7					TP					1745	209	13.5	
212	3611		118	0	43	53	10	017	16	31	7	10	7										1900	310		
212	3612		118	0	43	54	30	017	16	32	7	10	7										1915	310		
212	3613		118	0	43	55	24	017	16	35	7	10	7					TP					1924	053	5.8	
212	3614		118	0	43	55	57	017	16	37	7	10	7										1930	053		
212	3615		118	0	43	57	31	017	16	51	7	10	7										1945	053		
212	3616		118	0	43	59	31	017	16	17	12	19	7					TP					2002	270	7.1	
212	3617		118	0	43	59	13	017	16	19	15	12	7										2015	"		
212	3618		118	0	43	57	19	013	10									TP					2029	090°		
212	3619	01512	118	0	43	57	9	12	18	017	16	13	10	15	10	7	14	10	17	1	1	ON P1C1114			2043		
212	3710	01512	118	0	43	51	9	15	13	017	16	31	01	01	0	7	14	10	17	1	1	OFF P1C1114			2203	161°	
212	3711		118	0	43	58	12	18		017	16	21	81	15	7	14	10	17	1	1		T.P.			2228	099°	1.5
212	3712		118	0	43	57	15	12		017	16	25	10	16	7	14	10	17	1	1					2245	096°	
212	3713		118	0	43	57	14	10		017	16	21	21	25	7	14	10	17	1	1					2258		
212	3714		118	0	43	57	12	13		017	16	11	18	10	7	14	10	17	1	1		T.P.			2313	125°	7.9
212	3715		118	0	43	58	14	12		017	16	11	17	12	7	14	10	17	1	1		TP			2323	278°	1.5
212	3716		118	0	43	58	15	15		017	16	11	18	18	7	14	10	17	1	1					2330	275°	
212	3717		118	0	43	59	11	12		017	16	21	10	11	7	14	10	17	1	1					2345	"	

2325 Anchored

verified by

total miles steamed 1102.4

1122.4

Ship Hudson

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. 74-01-181 X22000-152

BRIDGE LOG

date 2 Nov 74 pg 23 of ____

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									1132.4	
212	31718		118	0	43 15 17	15 17		017 16 12	13 13	10	74	10	27		▲								2400	278°		
212	31719		118	0	43 13	15 18		017 16 12	15 13	14	74	10	27		▲								0015			
212	31810		118	0	43 13	19 14		017 16 12	17 12	15	74	10	27		▲								0030			
212	31811	0513	118	0	43 12	17 12		017 16 12	19 12	18	74	10	27		▲			ON PG15					0103		8.5	
212	31812	0513	118	0	43 12	15 14		017 16 12	17 12	18	74	10	27		▲			OFF PG15					0207	000°		
212	31813	7A	118	0	43 13	18 10		017 16 12	19 12	18	74	10	27		▲			PASS. 17P1					0220	099°	1.8	
212	31814	0514	118	0	43 15	17 12		017 16 12	16 13	16	74	10	27		▲			ON 01B4					0237		2.3	
212	31815	0514	118	0	43 15	17 12		017 16 12	18 12	17	74	10	27		▲			OFF. 01B4					0248	"		
212	31816	0515	118	0	43 15	17 12		017 16 12	21 12	18	74	10	27		▲			ON 01B5					0313		2.8	
212	31817	0515	118	0	43 15	17 13		017 16 12	19 12	19	74	10	27		▲			OFF 01B5					0328			
212	31818	0515	118	0	43 15	17 10		017 16 12	20 12	14	74	10	27		▲			ON 01B5					0341	"	1.5	
212	31819	0515	118	0	43 15	17 10		017 16 12	21 12	18	74	10	27		▲			OFF 01B6					0348			
212	31910		118	0	43 15	17 08		017 16 12	18 13	10	74	10	27		▲			ON 01B7					0401	"	1.4	
212	31911		118	0	43 15	17 24		017 16 12	18 13	10	74	10	27		▲			OFF 01B7					0412	259		
212	31912		118	0	43 15	16 35		017 16 22	17 10		74	10	27		▲								0430	267		
212	31913		118	0	43 15	16 22		017 16 21	15 13	10	74	10	27		▲			TP					0446	242	4.8	
212	31914		118	0	43 15	15 12		017 16 28	19 10		74	10	27		▲								0500	246		
212	31915		118	0	43 15	32 24		017 16 31	14 18		74	10	27		▲								0515	246		

verified by ____

total miles steamed 1152.7

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101 ; 74-00-102

date July 12 pg 24 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. &	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1152.7	
212	396		118	0	48 53 06			126 32 45			74	07	12					TP					0521	N	6.3	½ speed
212	397		118	0	43 54 96			076 32 30			74	07	12		9564			PC ON 1/16					0535		1.0	BEUT-02
212	398	FP	118	0	43 54 20			076 32 06			74	07	12					PC 1/16					0620		0.6	PC
212	399	159	118	0	43 54 07			076 31 57			74	07	12					PC OFF 1/16					0644	002		
212	400		118	0	43 54 18			076 31 45			74	07	12										0700	002		
212	401		118	0	43 54 25			076 31 40			74	07	12										0718	002		
212	402		118	0	44 01 30			076 31 25			74	07	12										0732	002		
212	403		118	0	44 03 21			076 31 21			74	07	12					TP					0743	349	9.1	
212	404		118	0	44 07 12			076 30 12			74	07	12					TP					0810	270		
212	405	158	118	0	44 07 10			076 30 13			74	07	12					OFF PC 1/17					0818		0.5	
212	406	159	118	0	44 10 16	53		076 30 14	15		74	07	12					OFF PC 1/17					0906			
212	407		118	0	44 13 10	10		076 29 10	12		74	07	12					Kingston area					1017		11.2	buoy off Kingston. Kingston outer harbour
212	408		118	0	44 13 10	10		076 29 08	12		74	07	12													outer harbour entrance.
212	409		118	0	44 13 13	15		076 26 16	15		74	07	12										1101	063°		
212	410		118	0	44 13 13	10		076 25 14	12		74	07	12										1115	063°		
212	411	TP	118	0	44 14 16			076 23 56	14		74	07	12					TP					1132	077°		
212	412	TP	118	0	44 14 31			076 21 18			74	07	12					TP					1145	106°		
212	413		118	0	44 14 17			076 21 10			74	07	12					TP					1155	050°	6.8	

verified by _____

total miles steamed 1128.2

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101 & 74-00-102

date July 12 pg 25 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. a	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
212	4 1 4	TP 1	118	0	4 1 1	4 1 2					7 1	4 0	7 1 1 2					T.P.					1202			
212	4 1 5	TP 1	118	0	4 1 1	4 1 0		0 1 7	6 1 2	0 0 1 2	7 1	4 0	7 1 1 2					T.P					1207	118		
212	4 1 6	TP 1	118	0	4 1 1	4 1 2	1 7	0 1 7	6 1 9	1 1 5	7 1	4 0	7 1 1 2					T.P.					1212	050		
212	4 1 7	T.P 1	118	0	4 1 1	4 4 1	2	0 1 7	6 1 1	8 1 3 2	7 1	4 0	7 1 1 2					T.P.					1220	139		
212	4 1 8	TP 1	118	0	4 1 1	4 1 1	2	0 1 7	6 1 1	7 1 5	0 7 1	4 0	7 1 1 2					T.P.					1230	031		
212	4 1 9	T.P. 1	118	0	4 1 1	5 1 1	1	0 1 7	6 1 1	7 0 0	7 1	4 0	7 1 1 2					T.P.					1247	165	3.5	
212	4 2 0	TP 1	118	0	4 1 1	4 2 1	1	0 1 7	6 1 1	6 4 2	7 1	4 0	7 1 1 2					TP 1					1259	039°		
212	4 2 1	TP 1	118	0	4 1 1	5 4 1	0	0 1 7	6 1 1	5 1 1 2	7 1	4 0	7 1 1 2					TP					1324	158	2.5	
212	4 2 2	T.P. 1	118	0	4 1 1	4 1 2		0 1 7	6 1	1 4 5	7 1	4 0	7 1 1 2					TP					1337	275		
212	4 2 3	0 1 6 0	118	0	4 1 1	4 5 2		0 1 7	6 1	1 5 2 5	7 1	4 0	7 1 1 2					PC ON 18					1345		1.5	
212	4 2 4	0 1 6 0	118	0	4 1 1	5 0 1	2	0 1 7	6 1	5 1 2 0	7 1	4 0	7 1 1 2					OFF. PC 18					1445	var.		
212	4 2 5	0 1 6 1	118	0	4 1 1	4 1 3	0	0 1 7	6 1 2	1 1 8	7 1	4 0	7 1 1 2		0 1 3 6			ON 018 18					1519		5.0	
212	4 2 6	0 1 6 1	118	0	4 1 1	4 1 3	0	0 1 7	6 1 2	1 1 8	7 1	4 0	7 1 1 2					OFF 018 18					1525	var.		
212	4 2 7	0 1 6 2	118	0	4 1 1	4 1 2	0	0 1 7	6 1 3	1 1 2	7 1	4 0	7 1 1 2		0 1 3 1			ON 018 9					1533		0.7	
212	4 2 8	0 1 6 2	118	0	4 1 1	4 1 2	0	0 1 7	6 1 2	1 1 0	7 1	4 0	7 1 1 2					OFF. 018 9					1540	var.		
212	4 2 9		118	0	4 4 1	1 3	0 0	0 1 7	6 2	8 1 5 4	7 1	4 0	7 1 1 2										1610		4.2	KINGSTON
212	4 3 0		118	0	4 4 1	1 3	0 0	0 1 7	6 2	8 1 5 4	7 1	4 0	7 1 1 2										1643	246		TOWN. TIME
212	4 3 1		118	0	4 4 1	2 1	0 3	0 1 7	6 3	2 1 4 5	7 1	4 0	7 1 1 2										1704	246		

verified by _____

total miles steamed 1205.6

Ship _____

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101x74-CTD-102

date July 12 pg 25 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no.	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									1205.6	
212	432		118	0	44 11 33			076 35 15			74	07	12		▲			TP					1713	226	5.5	
212	433		118	0	44 10 10			076 35 20			74	07	12		▲			TP					1724	140	2.2	
212	434		118	0	44 09 36			076 34 20			74	07	12		▲								1739	142		
212	435		118	0	44 09 40			076 30 54			74	07	12		▲			TP					[illegible]	103	6.0	
212	436		118	0	44 09 50			076 26 33			74	07	12		▲			TP					1823	054	[illegible]	
212	437		118	0	44 09 60			076 21 90			74	07	12		▲								1835	054	2.1	
212	438		118	0	44 07 00			076 22 25			74	07	12		▲								1845	054	1.5	
212	439		118	0	44 07 56			076 20 40			74	07	12		▲								1852	054	1.5	
212	440	613	118	0	44 08 54			076 20 15			74	07	12		▲			OB10					1940			BENTHOS/[illegible]
212	441	614	118	0	44 09 42			076 19 50			74	07	12		▲			OB11					1950		4.5	— " —
212	442		118	0	44 07 57			076 20 54			74	07	12		▲								2014		1.0	
212	443		118	0	[illegible]			[illegible]			74				▲								[illegible]	200	2.2	
212	444		118	0	44 05 46			076 21 36			74				▲								2037	163°		
212	445		118	0	44 04 58			076 23 20			74				▲								2042	270°	1.6	
212	446		118	0	44 04 49			076 26 35			74				▲								[illegible]	260		
212	447		118	0	44 04 24			076 29 30			74				▲								2114		3.3	
212	448		118	0	44 04 25			076 29 30			74				▲								2139	090		
212	449	615	118	0	44 04 59			076 25 50			74	07	12		▲		ON	PC19					2202		2.6	

verified by _____

total miles steamed 1242.9

Ship Martin Karlsen

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. 74-00-102

BRIDGE LOG

date July 12 & 13 pg 27 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									1242.9	
212	450	0165	118	0	44	01	57	01	16	21	74	07	12			1		OFF PIC 1					2239	236°		
212	4571		118	0	44	01	41	01	16	21	74	07	12			1		T.P.					2251	354°	1.4	
212	4572		118	0	44	01	61	01	16	21	74	07	12			1		T.P.					2307	218°	1.8	
212	4573		118	0	44	01	33	01	16	13	74	07	12			1							2330	"		
212	4574		118	0	44	01	14	01	16	13	74	07	12			1							2345	"		
212	4575		118	0	44	01	01	01	16	13	74	07	12			1		T.P.					2351	015°	6.4	
212	4576		118	0	44	01	21	01	16	13	74	07	13			1							0002	014°		
212	4577		118	0	44	01	51	01	16	13	74	07	13			1							0080	008°		
212	4578		118	0	44	01	61	01	16	13	74	07	13			1							0045	var.		
212	4579	TP	118	0	44	01	71	01	16	13	74	07	13			1		PASS TP					0053	249°	7.5	
212	4610	TP	118	0	44	01	81	01	16	13	74	07	13			1		PASS TP					0116	205°	2.7	
212	4611		118	0	44	01	73	01	16	13	74	07	13			1							0130	"		
212	4612		118	0	44	01	81	01	16	13	74	07	13			1							0145	"		
212	4613	TP	118	0	44	01	91	01	16	13	74	07	13			1		PASS. TP					0201	162°	5.0	
212	4614		118	0	44	01	81	01	16	13	74	07	13			1							0215	"		
212	4615	TP	118	0	44	01	61	01	16	13	74	07	13			1		PASS TP					0232	282°	3.8	
212	4616		118	0	44	01	61	01	16	13	74	07	13			1							0245	"		
212	4617	TP	118	0	44	01	61	01	16	14	74	07	13			1		PASS. TP					0301	167°	3.1	

verified by _____

total miles steamed 1274.5

Ship H. T. Hachey

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101-74-00-102.

date 74 July 13 pg 28 of 41

INST.	CCIW FIX cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (lev-els) obs'd	consc. bt trace no.	mon. stn. no. a	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1274.3	
212	4718		118	0	44 01 57 10			017 14 13 6			74 01 7 13												03.15	165°		
212	4719	TP	118	0	44 01 31 12			017 04 10 15			74 01 7 13							PASS. TP					0331	223°	3.6	
212	4720		118	0	44 01 31 54			017 13 11 48			74 01 7 13												0345	"		
212	4721	TP	118	0	44 01 57 16			017 03 14 15			74 01 7 13							PASS. TP					04 01	225°	3.6	
212	4722	TP	118	0	44 01 33 35			076 45 09 0			74 01 7 13							TP					0416	332	1.8	
212	4723	TP	118	0	44 01 51 11			076 46 16 11			74 01 7 13							TP					0431	263	1.9	
212	4724	TP	118	0	44 01 44 8			076 50 13 0			74 01 7 13							TP					0456	088	3.0	
212	4725	TP	118	0	44 01 96 36			076 49 12 7			74 01 7 13							TP					0513	262	2.4	
212	4726	TP	118	0	44 01 96 30			076 49 15 4			74 01 7 13							TP					0523	151	1.1	
212	4727	TP	118	0	44 01 94 30			076 49 13 0			74 01 7 13							TP					0534	242	2.1	
212	4728	TP	118	0	44 01 34 42			076 52 11 6			74 01 7 13							TP					0556	090	3.0	J
212	4729		118	0	44 03 39			076 42 18			74 01 7 13												0617			
212	4730	TP	118	0	44 03 30			076 45 18			74 01 7 13							TP					0627	100	5.1	
212	4731	TP	118	0	44 03 18			076 43 49			74 01 7 13							TP					0634	047	1.1	
212	4732	TP	118	0	44 03 43			076 43 12			74 01 7 13							TP					0639	090	.7	
212	4733		118	0	44 03 39			076 38 57			74 01 7 13												0657			
212	4734	TP	118	0	44 03 42			076 33 48			74 01 7 13							TP					0718	208	6.6	I
212	4735	TP	118	0	44 02 18			076 35 [illegible] 0			74 01 7 13							TP					0729	270	1.7	G

verified by _____

total miles steamed 1312.3

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101-74 00 02.

date Feb 13th pg 9 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no.	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									312.3	
212	4216		118	0	44	19	12	136	32	54	74	02	13										0757	276		
212	4217		118	0	44	21	13	136	42	19	74	02	13										0801	270°	5.2	
212	4218		118	0	44	21	15	136	45	18	74	02	13										0816	269°		
212	4219		118	0	44	21	10	136	48	17	74	02	13										0830	270°		
212	4220		118	0	44	21	12	136	53	11	74	02	13					T.P.					0852	246°	8.3	
212	4221		118	0	43	19	14	136	51	16	74	02	13										0915	242°		
212	4222		118	0	43	18	13	136	41	45	74	02	13					T.P.					0924	39°	6.2	
212	4223		118	0	44	10	19	136	46	10	74	02	13										0945	40°		
212	4224		118	0	44	12	17	136	44	12	74	02	13										1000	41°		
212	4225		118	0	44	14	19	136	42	12	74	02	13										1015	"		
212	4226		118	0	[illegible]			[illegible]			74	02	13										1030			
212	4227		118	0	[illegible]			[illegible]			74	02	13					T.P.					[illegible]		13.5	
212	4228	616	118	0	44	19	18	136	39	16	74	02	13					P1 C1 2 1					[illegible]			
212	4229	66	118	0	[illegible]			[illegible]			74	02	13					P1 [illegible]					1132	190		
212	5010		118	0	[illegible]			[illegible]			74	02	13					TP					1152	232		
212	5011		118	0	44	15	16	[illegible]	44	15	74	02	13										1215	"		
212	5012		118	0	44	15	16	137	12	15	74	02	13										1230	"		
212	5013		118	0	44	14	12	137	14	18	74	02	13										1245	"		

verified by _____

total miles steamed 1345.5

Ship [illegible]

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. 74-01-101 x 74-03-102

BRIDGE LOG

date July 11 pg 30 of 41

INST.	CCIW FIX cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1345	
212	[illegible]	TP	118	0	[illegible]			[illegible]			74	07	13		▲			PASS. TP					12 54	345°	8.0	
212	5015	0617	118	0	[illegible]			[illegible]			74	07	13		▲			ON 01B1112					13 05		1.0	
212	[illegible]	0617	118	0	[illegible]			[illegible]			74	07	13		▲			OFF. 01B1112					13 20	155°		
212	[illegible]	TP	118	0	[illegible]			[illegible]			74	07	13		▲			PASS TP					13 38	110°	2.5	
212	[illegible]		118	0	[illegible]			[illegible]			74	07	13		▲								14.00	"		
212	[illegible]		118	0	[illegible]			[illegible]			74	07	13		▲								14.15	"		
212	[illegible]		118	0	[illegible]			[illegible]			74	07	13		▲								14.30	"		
212	[illegible]	0618	118	0	[illegible]			[illegible]			74	07	13		▲			ON PC1211					14.42		10.2	
212	[illegible]	0618	118	0	[illegible]			[illegible]			74	07	13		▲			OFF. PC1211					15.17	107°		
212	[illegible]		118	0	[illegible]			[illegible]			74	07	13		▲								15.30	"		
212	[illegible]		118	0	[illegible]			[illegible]			74	07	13		▲								15.45	"		
212	[illegible]		118	0	[illegible]			[illegible]			74	07	13		▲								16.00	"		
212	[illegible]		118	0	43	56	53	076	19	45	74	07	13		▲			TP					16.13	090	9.2	
212	[illegible]		118	0	43	56	45	076	14	10	74	07	13		▲			TP					1635	000	3.8	
212	[illegible]	TP	118	0	43	51	42	076	13	59	74	07	13		▲								1649	053		
212	[illegible]	TP	118	0	43	59	07	076	12	36	74	07	13		▲								1658	343°		
212	[illegible]	TP	118	0	43	59	52	076	12	54	74	07	13		▲								1707		3.6	
212	[illegible]	TP	118	0	44	00	02	076	11	55	74	07	13		▲								1716		1.1	

verified by _____

total miles steamed 1384.9

Ship - Hai Kao

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. [illegible]

date [illegible] pg 31 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no.	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1334.9	
212	FIY 5212		118	0	47 10 04	30		176	11	12	74	07	13		▲								1719	100		
212	5213		118	0	44 01	02	19	176	10	16	74	07	13		▲								1725	015		
212	5214		118	0	44 01	12	10	176	09	15	74	07	15		▲								1731	110		
212	5215		118	0	44 01	15	18	176	09	12	74	[illegible]	[illegible]		▲								1739	[illegible]		
212	5216	[illegible]	118	0	44 01	23	12	176	08	AD	74	[illegible]	[illegible]		▲		ON						1744		4.3	↙ ↓
212	[illegible]	[illegible]	118	0	[illegible]			[illegible]			74	[illegible]	[illegible]		▲		OFF	PC212					2103	[illegible]		↗ ↑
212	5217		118	0	44 01	01	01	[illegible]			74	[illegible]	[illegible]		▲								2122	211		
212	[illegible]		118	0	43 15	18	12	176	13	PD	74	07	13		▲								2131	180		
212	[illegible]	TP	118	0	43 15	18	02	176	13	10	74	[illegible]	[illegible]		▲								2137	142		
212	[illegible]	TP	118	0	43 15	16	47	176	10	34	74	[illegible]	[illegible]		▲								2155	017		
212	[illegible]	TP	118	0	43 15	07	18	176	09	36	74				▲								2206	117		
212	[illegible]	TP	118	0	43 15	06	53	176	08	15	74				▲								2215	018		
212	[illegible]	TP	118	0	43 15	18	03	176	07	34	74				▲								2225	096		
212	[illegible]	TP	118	0	43 15	07	58	176	06	24	74				▲								2238	000		
212	[illegible]	2710	118	0	43 15	08	19	176	06	15	74				▲		ON	PC23					2241		13.6	
212	[illegible]	2710	118	0	43 15	08	19	176	06	15	74				▲		OFF	PC23					2335			
212	[illegible]	TP	118	0	43 15	15	14	176	13	18	74	[illegible]	[illegible]		▲			P.255. TP					0014.	280	5.0.	
212	[illegible]		118	0	43 15	16	06	176	18	06	74	[illegible]	[illegible]		▲								0037.	[illegible]		

verified by _____

total miles steamed 1408.8

Ship Martin Karlsen

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. 74-011101A74.00102

BRIDGE LOG

date July 13 pg 32 of 41

INST.	CCIW cruise ref. no. FIX	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1205.8.	
212	011	TP1	118	0	43 16 54	017 12 16		7										PASS. TP1					0103.	236°	7.9.	
212	012	TP	118	0	43 16 13	017 12 8		7										PASS. TP1					0130.	236°	4.1.	
212	013		118	0	43 15 32	017 11 10		7															01.45			
212	014	0171	118	0	43 15 28	017 10 13		7										ON PIC 14					02.21		5.5	
212	015	0171	118	0	43 15 18	017 9 38		7										OFF PIC 14					02.40	var.		
212	016	0172	118	0	43 15 14	017 9 13		7										ON OBY 13					02.33		2.0	
212	017	0172	118	0	43 15 12	017 8 48		7										OFF OBY 13					02.43	180°		
212	018	0173	118	0	43 15 3	017 8 18		7										ON OBY 14					02.55	"	1.4	
212	019	0173	118	0	43 15 54	017 6 38	02	7										OFF OBY 14					0404	"		
212	020	0174	118	0	43 15 16	017 6 37	58	7										ON OBY 15					0418	"		
212	021	0174	118	0	43 15 13	017 6 37	48	7										OFF OBY 15					0446	180		
212	022	175	118	0	43 14 38	017 6 32	45	7										ON OBY 16					0522	170	5.4	
212	023	175	118	0	43 14 36	017 6 32	10	7										OFF OBY 16					0542	114		
212	024		118	0	43 14 30	017 6 34	45	7															0601	114		
212	025		118	0	43 14 54	017 6 31	09	7															0616	114		
212	026		118	0	43 14 45	017 6 28	45	7															0630	117		
212	027		118	0	43 14 32	017 6 25	10	7															0645	108		
212	028		118	0	43 14 25	017 6 21	54	7															0700	108		

verified by _____

total miles steamed 1435.1

Ship Lt. Tp. Kedlaya

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. [illegible]

BRIDGE LOG

date Feb. 14 pg 33 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. a	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1435.1	
212	5518		118	0	43 41 41			017 16 12		49	71	40	23		▲								0715	114		
212	5519		118	0	43 40 35			017 16 15		57	71	40	23		▲								0730	114	20.0	
212	5520		118	0	43 40 10			017 16 18		40	71	40	23		▲								0743	114		
212	5521		118	0	43 40 03			017 16 18		32	71	40	23		▲			ON 018/17					0755			
212	5522		118	0	43 40 02			017 16 18		23	71	40	23		▲			OFF 018/17					0804	270		
212	5523		118	0	43 40 16			017 16 15		12	71	40	23		▲			ON 018/18					0820			
212	5524		118	0	43 40 15			017 16 15		13	71	40	23		▲			OFF 018/18					0827	269°	1.58	
212	5525		118	0	43 40 19			017 16 18		58	71	40	23		▲			ON 018/19					0845	266°	2.40	
212	5526	T.P.	118	0	43 40 10			017 16 18		57	71	40	23		▲			OFF 018/19					0853	090°		T.P.
212	5527		118	0	43 39 53			017 16 16		17	71	40	23		▲			ON 018/210					0908			
212	5528	T.P.	118	0	43 39 52			017 16 16		16	71	40	23		▲			OFF 018/210					0917	193°	1.5	T.P.
212	5529		118	0	43 38 16			017 16 17		17	71	40	23		▲								0930	"		
212	5530		118	0	43 38 16			017 16 18		16	71	40	23		▲								0945			
212	5531		118	0	43 38 13			017 16 19		12	71	40	23		▲								1000			
212	5532	T.P.	118	0	43 38 11			017 16 19		12	71	40	23		▲								1011	294°	8.3	T.P.
212	5533		118	0	43 38 12			017 16 21		16	71	40	23		▲			ON 018/211					1018	"		
212	5534		118	0	43 38 12			017 16 21		13	71	40	23		▲			OFF 018/211					1036	295°		
212	5535		118	0	43 38 12			017 16 21		18	71	40	23		▲			ON 018/212					1045			

verified by _____

total miles steamed 1468.9

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101-74-08-102

date Jul 14 pg 34 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS.
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1468.9	
212	51716	1911	118	0	43 13 12 14 13			017 16 21	14 18		71	01	17		▲			OFF 01B212					1058	296°		
212	51717	TP	118	0	43 13 12 14 14			017 16 21	15 15		71	01	14		▲								1163	032°	2.0	TP.
212	51718	1912	118	0	43 13 13 11 19			017 16 21	17 17		71	01	14		▲			ON 01B213					1114			TP
212	51719	1913	118	0	43 13 13 12 10			017 16 21	16 16		71	01	14		▲			OFF 01B213					1122	315		TP
212	51810	1913	118	0	43 13 14 10 16			017 16 21	21 10		71	01	14		▲			ON 01B214					1132			
212	51811	1913	118	0	43 13 14 11 16			017 16 21	21 16		71	01	14		▲			OFF 01B214					1148	030°	1.7	TP.
212	51812		118	0	43 13 18 12 14			017 16 18	18 18		71	01	14		▲								1220	"		
212	51813	TP	118	0	43 14 01 01 0			017 15 17	17 18		71	01	14		▲			PASS. TP					1229	270°	6.8	
212	51514	1914	118	0	43 14 01 11 2			017 15 12	12 14		71	01	14		▲			ON 01B215					1247		3.0	
212	51815	1914	118	0	43 14 01 11 2			017 16 12	12 14		71	01	14		▲			OFF 01B215					1254	260°		
212	51816		118	0	43 13 19 15 14			017 15 12	15 13	10	71	01	14		▲								1320	"		
212	51817		118	0	43 13 [illegible]			[illegible]	21 14	18	71	01	14		▲								1331	"		
212	51818		118	0	43 13 18 13 15			017 15 13	13 11	12	71	01	14		▲								1350	"		
212	51819	0914	118	0	43 13 18 11 12			017 15 13	18 10	10	71	01	14		▲			ON PC1215					1412	—	15.1	
212	51910	1915	118	0	43 13 18 11 12			017 16 37	13 16		71	01	14		▲			OFF PC1215					1515	80		
212	51911		118	0	43 13 17 15			[illegible]	16 15	14	71	01	14		▲								1630	"		
212	51912		118	0	43 13 15 11 4			[illegible]	37 15		71	01	14		▲								1546	"		
212	51913		118	0	43 13 13 15			017 16 13	13 11	10	71	01	14		▲								1700	"		

verified by _____

total miles steamed 1497.5

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101 - 74-02-222

date July 14th pg 35 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. a	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									1497.5	
212	5914		118	0							71	01	14											180		
212	5915		118	0	43	30	43	017	63	810	71	01	14				ON						1744	180	8.0	
212	5916	0886	118	0	43	11	90	017	63	710	71	01	14				off	PC26					1817	4		
212	5917	0887	118	0	43	29	43	017	63	715	71	01	14				ON	OB26					1935	4	1.3	
212	5918	0887	118	0	43	29	42	017	63	714	71	01	14				off	OB26					1942	4		
212	5919	0888	118	0	43	29	30	017	63	719	71	01	14				ON	OB27					1947	4	.4	
212	6010	0888	118	0	43	29	30	017	63	711	71	01	14				OFF	OB27					2015			
212	6011	0889	118	0	43	29	10	017	63	710	71	01	14				ON	OB28					2029			
212	6012	0889	118	0	43	29	09	017	63	708	71	01	14				OFF	OB28					2038			
212	6013	0890	118	0	43	28	46	017	63	716	71	01	14				ON	OB29					2046			
212	6014	0890	118	0	43	28	45	017	63	715	71	01	14				OFF	OB29					2057			
212	6015	0891	118	0	43	28	24	017	63	716	71	01	14					ON OB30					2111		1.1	
212	6016	0891	118	0	43	28	14	017	63	716	71	01	14					OFF OB30					2127	235°		235 to intercept hdng 76°30"
212	6017		118	0	43	27	25	017	63	810	71	01	14				TP						2147	180°		TP
212	6018	0892	118	0	43	27	13	017	63	810	71	01	14				ON	OB31					2150	4		
212	6019	0892	118	0	43	27	13	017	63	810	71	01	14				OFF	OB31					2155	4		
212	6020	0893	118	0	43	26	15	017	63	810	71	01	14				ON	OB32					2211	-		
212	6021	0893	118	0	43	26	15	017	63	810	71	01	14				OFF	OB32					2216	-		

verified by _____

total miles steamed 1508.3

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101-74-00-102

date Feb 14 pg 36 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. a	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42	43 44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									1508.3	
212		01914	118	0	43 12 57 18			017 16 38 10			74 01 14						ON	01B313					2230			
212		01914	118	0	43 12 57 19			017 16 38 11			74 01 14						OFF	01B313					2238	270°	4.4	TP
212			118	0	43 12 57 17			017 16 38 14 17			74 01 14							TP					2245	242°		TP
212			118	0	43 12 57 15			017 16 41 14 10			74 01 14												2300			Fix
212			118	0	43 12 57 15			017 16 41 14 15			74 01 14							TP					2345	250°		TP
212		01915	118	0	43 12 58 18			017 16 45 15 14			74 01 14							ON 01B313					0014		13.6	TP
212		01916	118	0	43 12 58 18			017 16 45 15 14			74 01 14							OFF 01B313					0022	000°		
212		01917	118	0	43 12 59 14			017 16 45 14 18			74 01 14							ON 01B315					0045			
212		01918	118	0	43 12 59 14			017 16 45 14 18			74 01 14							OFF. 01B315					0050	"		
212		01919	118	0	43 13 01 13			017 16 45 14 15			74 01 14							ON 01B316					0115			
212		01920	118	0	43 13 01 13			017 16 45 14 12			74 01 14							OFF 01B316					0123	"		
212		01921	118	0	43 13 02 14			017 16 45 14 10			74 01 14							ON 01B317					0137			
212		01922	118	0	43 13 02 14			017 16 45 14 08			74 01 14							OFF. 01B317					0148	"		
212		01923	118	0	43 13 03 14			017 16 45 14 06			74 01 14							ON 01B318					0158			
212		01924	118	0	43 13 03 14			017 16 45 14 04			74 01 14							OFF 01B318					0205	"		
212		01925	118	0	43 13 04 13			017 16 45 14 02			74 01 14							ON 01B319					0227			
212		01926	118	0	43 13 04 13			017 16 45 14 00			74 01 14							OFF 01B319					0240	"		
212		01927	118	0	43 13 05 13			017 16 45 13 58			74 01 14							ON 01B320					0248		5.3	

verified by _____

total miles steamed 1531.6

Ship Mar. Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. [illegible]

date July 14 pg 37 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. a	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1532.0	
212	[illegible]	1011	118	0	[illegible]			[illegible]			74				▲			OFF 0181					0304	[illegible]		
212	[illegible]	1012	118	0	[illegible]			[illegible]			74				▲			ON 0181					0314		0.7	
212	[illegible]	1013	118	0	[illegible]			[illegible]			74				▲			OFF 0181					0330	249		
212	[illegible]		118	0	[illegible]			[illegible]			74				▲								0400	[illegible]		
212	[illegible]		118	0	43	20	24	07	01	16	74				▲								0430	252		
212	[illegible]		118	0	43	19	10	07	12	06	74				▲								0500	255		
212	[illegible]		118	0	43	17	50	07	13	53	74				▲								0530	N		
212	[illegible]	1103	118	0	43	13	18	07	19	50	74				▲		ON	0B42					0548	N	15.5	
212	[illegible]	1103	118	0	43	12	21	07	21	18	74				▲		OFF	0B43					0603	N		
212	[illegible]	1104	118	0	43	18	11	07	20	04	74				▲		ON	0B43					0615	N		
212	[illegible]	1104	118	0	43	12	13	07	19	54	74				▲		OFF	0B43					0621	N		
212	[illegible]	1105	118	0	43	18	05	07	19	45	74				▲		ON	0B44					0628	N		
212	[illegible]	1105	118	0	43	18	44	07	19	46	74				▲		OFF	0B44					0634	N		
212	[illegible]	1106	118	0	43	19	31	07	20	02	74				▲		ON	0B45					0644	N		
212	[illegible]	1106	118	0	43	19	31	07	20	19	74				▲		OFF	0B45					0647	N		
212	[illegible]	1107	118	0	43	20	06	07	20	19	74				▲		ON	0B46					0655	N		
212	[illegible]	1107	118	0	43	20	16	07	20	19	74				▲		OFF	0B46					0659	N		
212	[illegible]	1108	118	0	43	20	31	07	20	05	74				▲		ON	0B47					0707	N		

verified by _____

total miles steamed 1547.8

Ship Hudson

STAR FORMAT CODING SHEET

entered by SHIPS OFFICERS

Cruise no. 74-101 101 x 74-00-102.

BRIDGE LOG

date July 15th pg 38 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19	20 21	22 23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1542.8	
212	614	1018	118	0	43 30 31			017 32 10		04	74 01	7	15				OFF	0847					0713	N		
212	615	1019	118	0	43 30 57			017 32 10		04	74 01	7	15				ON	0847					0720	N	3.7	
212	6150	1019	118	0	43 30 57			017 32 10		03	74 01	7	15				OFF	0847					0732	253		
212	6151		118	0	43 31 12			017 32 30		45	74 01	7	15										0755	"		
212	61512		118	0	43 31 18		18	017 30 10		13	74 01	7	15										0828	257		
212	61513	1110	118	0	43 31 17		19	017 31 17		18	74 01	7	15				ON	0815					0916		13.7	
212	61514	1110	118	0	43 31 17		19	017 31 17		18	74 01	7	15				OFF	0815					0922	019		
212	61515	1111	118	0	43 31 19		19	017 31 16		10	74 01	7	15				ON	0815					0940			
212	61516	1111	118	0	43 31 19		19	017 31 16		10	74 01	7	15				OFF	0815					0944			
212	61517	1112	118	0	43 32 10		18	017 31 15		17	74 01	7	15				ON	0815					0956			
212	61518	1112	118	0	43 32 10		18	017 31 15		17	74 01	7	15				OFF	0815					1001			
212	61519	1113	118	0	43 32 13		1	017 31 15		19	74 01	7	15				ON	0815					1011			
212	61610	1113	118	0	43 32 13		1	017 31 15		18	74 01	7	15				OFF	0815					1018			
212	61611	1114	118	0	43 32 10		15	017 32 15		15	74 01	7	15				ON	0815					1025			
212	61612	1114	118	0	43 32 10		15	017 31 15		15	74 01	7	15				OFF	0815					1032			
212	61613	1115	118	0	43 32 12		14	017 31 15		18	74 01	7	15				ON	0815					1038			
212	61614	1115	118	0	43 32 12		14	017 31 15		18	74 01	7	15				OFF	0815					1044			
212	61615	1116	118	0	43 32 13		14	017 31 15		14	74 01	7	15				ON	0815					1052		5.4	

verified by _____

total miles steamed 1571.6

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101 x 74-00-102

date July 15 pg 39 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (lev-els) obs'd	consc. bt trace no.	mon. stn. no. α	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63				
																									1571.6	
2	12	616	116	118	0	43	12	30	14	01	71	01	15				OFF	0181515					1059	019°		
2	12	617	117	118	0	43	13	28	13	01	71	01	15				ON	0181516					1103			
2	12	618	117	118	0	43	13	28	13	01	71	01	15				OFF	0181516					1112			
2	12	619	118	118	0	43	13	15	14	01	71	01	15				ON	018517					1127			
2	12	6110	118	118	0	43	13	15	14	01	71	01	15				OFF	018517					1132			
2	12	6111	119	118	0	43	12	14	13	01	71	01	15				ON	018518					1139			
2	12	6112	119	118	0	43	12	14	13	01	71	01	15				OFF	018518					1147	312°	2.0	TP
2	12	615	TA	118	0	43	12	15	16	01	71	01	15				PASS	TA					1200	300°	1.5	
2	12	6114	1210	118	0	43	12	7	16	01	71	01	15				ON	AC1217					1311			
2	12	6115	1210	118	0	43	12	7	16	01	71	01	15				OFF	AC1217					1418	080°		
2	12	616		118	0	43	12	08	12	01	71	01	15										1455	"		
2	12	617	TR	118	0	43	12	21	08	01	71	01	15				PASS	TR					1530		9.5	
2	12	618	1211	118	0	43	31	15	54	01	71	01	15				ON	AC1218					1611			
2	12	619	1211	118	0	43	31	13	08	01	71	01	15				OFF	AC1218					1737	080		
2	12	6120		118	0	43	32	12	12	01	71	01	15										1800	"		
2	12	6121	TP	118	0	43	32	55	05	01	71	02	15					TP					1825	180	8.4	
2	12	6122	122	118	0	43	30	05	15	01	71	02	15				ON	PC219					1855	4	3.0	
2	12	6123	122	118	0	43	29	06	13	01	71	02	15				OFF	PC219					2044			

verified by _____

total miles steamed 1595.9

Ship Martin Karlsen

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-21-101-74-00-102

date July 5th pg 40 of 41

INST.	CCIW FIX cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no. a	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1500.5	
212	61815		118	0	43 13 00			077 21 03			74	01	15										2115	270		
212	61816		118	0	43 12 19	13	18	077 17 21	13	10	74	01	15										2134	"		
212	6816		118	0	43 13 01			077 17 13	13	10	74	01	15				ON						2217		15.8	
212	61817		118	0	43 13 10	10	10	077 17 13	13	02	74	01	15				OFF						2243	261°		*
212	61818		118	0	43 13 12	12	17	077 17 13	19	18	74	01	15										2314			*
212	61819	24	118	0	43 13 15	59		077 17 14	51	12	74	01	15					PC 30 ON					2359			*
212	6910	24	118	0	43 13 15	42		077 17 14	51	08	74	01	15					PC OFF 30					0043	261°	10.6	
212	6911		118	0	43 13 15	16		077 17 15	12	16	74	01	15										0115			
212	6912		118	0	43 13 14	15		077 17 15	14	18	74	01	15										0145			
212	6913		118	0	43 13 13	15		077 17 12	15	08	74	01	15										0215			
212	61914	1215	118	0	43 13 13	10		077 17 11	10	10	74	01	15		1017			ON CIB					0234		.87	
212	61915	1215	118	0	43 13 13	10		077 17 11	10	10	74	01	15					OFF CIB					0248	273°		
212	61916		118	0	43 13 14	10		077 17 12	10	16	74	01	15										0323	"		
212	61917		118	0	43 13 14	12		077 18 12	10	04	74	01	15										0350	"		
212	61918		118	0	43 13 15	90		077 18 13	40	16	74	01	15										0430	270		
212	61919		118	0	43 13 15	15		077 18 14	10	16	74	01	15										0500	"		
212	61920		118	0	43 13 16	10		077 18 14	10	10	74	01	15										0530	"		
212	7021		118	0	43 13 16	10		077 18 15	40	10	74	01	15										0600	"	32.0	

verified by _____

total miles steamed 1673.6

Ship Hudson Labrador

STAR FORMAT CODING SHEET

BRIDGE LOG

entered by SHIPS OFFICERS

Cruise no. 74-01-101 X 74-002-102

date July 15 pg 41 of 41

INST.	CCIW cruise ref. no.	consec. stn. no.	country	octant	LAT. deg.	LAT. min.	LAT. sec.	LONG. deg.	LONG. min.	LONG. sec.	DATE (GMT) yr	DATE (GMT) mo	DATE (GMT) dy	TIME OF EBT (GMT)	SND DEPTH metres 1/10	no. of (levels) obs'd	consc. bt trace no.	mon. stn. no.	air temp. °C	w.s. kt.	rel. wind dir. °	ships head °	ON & OFF STN. TIME (GMT)	SHIPS COURSE	MILES steamed	REMARKS
1 2	3 4 5	6 7 8	9 10	11	12 13	14 15	16 17	18 19 20	21 22	23 24	30 31	32 33	34 35	36 37 38 39	40 41 42 43	44 45	46 47 48	49 50 51 52	53 54 55	56 57	58 59 60	61 62 63			1043.6	
212	7012		118	0	43 13 51 48			017	19	18	7	1	16		▲								1030	270	5.6	
212	7013		118	0	43 35 51 51			017	18	18	7	1	16		▲								0700	"	4.7	
212	7014		118	0	43 [illegible]			017	01	20	7	1	16		▲								0715	"	1.9	
212	7015		118	0	43 36 01 0			017	13	54	7	1	16		▲								0730	255	2.1	
212	7016		118	0	43 [illegible]			017	15	06	7	1	16		▲								0743		1.0	
212	7017	1216	118	0	43 13 51 16			017	16	14	7	1	16		▲		ON	PIC131					0848			
212	7018	1216	118	0	[illegible]			[illegible]			7	1	16		▲		OFF	PIC131					[illegible]17	280		
212	7019		118	0	43 13 16 34			017	19	15	7	1	16		▲								0932	225		TP.
212	7110		118	0	[illegible]			[illegible]			7	1	16		▲								0945			RIG FULL IN YEA
212			118	0	glengarriff Buckingham						7				▲			CC.1W.					1238.		36.7	
212			118	0							7				▲											
212			118	0							7				▲											
212			118	0							7				▲											
212			118	0							7				▲											
212			118	0							7				▲											
212			118	0							7				▲											
212			118	0							7				▲											
212			118	0							7				▲											

verified by _____

total miles steamed 1725.6 Total mileage

Dr. C.F.M. Lewis

CANADA CENTRE FOR INLAND WATERS

Great Lakes Studies

CRUISE REPORT

Lake Erie - Geolimnology
Lake Ontario - Geolimnology

CRUISE NUMBER:	74 - 01 - 101 and 74 - 00 - 102
DATES:	July 2 - 7 and July 9 - 16, 1974
REGION:	Lake Erie, Lake Ontario
VESSEL:	M.V. MARTIN KARLSEN
MASTER:	Capt. K. Maro
AGENCY:	Dept. of the Environment
SCIENTIFIC OFFICERS:	Dr. C.F.M. Lewis
	Dr. T.W. Anderson
OPERATIONS OFFICER:	Mr. D.H. Hanington
CONSECUTIVE CRUISE NUMBER:	74 - 22 - 103 and 74 - 22-015

Date of Issue: July 29, 1974

M.V. MARTIN KARLSEN

Lake Erie - Geolimnology
Lake Ontario - Geolimnology

July 2	Depart Sarnia	1615 hours
July 7	Arrive Burlington	1540 hours
July 9	Depart Burlington	0915 hours
July 16	Arrive Burlington	0838 hours

Operations Officer: Mr. D.H. Hanington

Personnel:

Mr. P.M. Healey Mr. J. Compton-Smith Mr. E. Walker Mr. D. Moore (July 2 - 7) Mr. G. Bota) Mr. B. Logan) Students Mr. D. Scorgie)	Technical Operations
Mr. J.R. Bowlby	Queen's University, Kingston
Dr. T.W. Anderson Dr. C.F.M. Lewis (July 9 - 16) Mr. J.R. Horsman Miss M. Simpson) Student	Geological Survey of Canada
Prof. K. Fahnestock (July 9 - 12)	New York State University Fredonia, N.Y.
Mr. J. Chesser	Science Fair Student Winner

"Iron Duke" Sea Cadets:

Messrs. Terka, MacKenzie, Savoi, O'Brien, Currie, Reynolds Delisle, Yeates

PURPOSE

To conduct a stratigraphic coring and echo sounding survey of Lakes Ontario and Erie in support of ongoing projects by the Geological Survey of Canada on the Quaternary Geology of the Great Lakes. The cruise will also provide support data for an IJC map of the geology of Lake Ontario which is already under preparation.

1. The cruise is designed to resolve specific problems of sediment distribution as revealed in all previous regional survey cruises.

2. To collect long piston, Benthos and short gravity cores in order to identify sub-bottom reflections in echograms and other relevant geological data.

3. To study the bottom configuration and sediment distribution pattern on elevated ridges and sills and at specific sites critical to defining shorelines and near-shore areas of the extreme low-level phases of Lakes Ontario and Erie.

4. To collect 8 Benthos cores from Lake Erie and 3 from Lake Ontario for detailed chemical analyses by Dr. A.L.W. Kemp, Head, Geochemistry Section, CCIW.

OBSERVATIONS

LAKE ERIE

1. At selected stations, Benthos cores were obtained for Dr. A. Kemp.

2. At selected stations, 1200 lbs. piston cores were obtained.

3. Sounding lines were run in an area in the Central basin corresponding to an area already examined by the Consumers Gas Company.

4. At some stations, additional Benthos and Shipek samples were obtained to support other geological sampling.

5. Sounding lines were run off the southern shore to more carefully delineate low level stratigraphy.

6. Every three hours, a full surface meteorological observation.

7. Continuous solar radiation.

LAKE ONTARIO

8. At selected stations, Benthos cores were obtained for Dr. A. Kemp.

9. At selected sites, 1200 lb. piston cores were obtained.

10. Sounding lines were run on a generally N-S direction to more carefully define the sediment distribution corresponding to low level phases of the lake.

11. At selected stations, generally selected on the basis of the echo sounding lines (item 10), 1200 lb. gravity cores were obtained.

12. Sounding lines were run in the Kingston Basin in order to more carefully define low water phases, channels, and other geological features of the area. Piston cores of up to 60 ft. were obtained at selected areas based on the sounding records.

ADDITIONAL OBSERVATIONS

1. 20 - 25 lbs. of mud were obtained by Shipek samples for Dr. Aspila (WQD) for analyses at CCIW. Samples were obtained at stations M-30, N-32, 1A, O-35.

2. 50 litre samples were obtained and acidified for Dr. R. Durham (Radiochemistry Section, CCIW). Samples were collected in Lake St. Clair (Northern part & Southern part) and in Western Lake Erie at station U-42.

CHRONOLOGY OF EVENTS

July 2	1615	- slip jetty, Sarnia
		- downbound, to Lake Erie
July 3	0007	- Detroit River light abeam
	0150	- arrive station U-42 (Lake Erie)
	0855	- arrive station G-16
		- sounding lines
	1402	- arrive station PC-1
		- sounding lines
	1829	- arrive station PC-2
	2045	- arrive station PC-3
		- sounding lines
July 4	0410	- completed Consumer Gas coring area soundings
	0834	- commence soundings on southern shore
		- continuous sounding and Benthos stations
July 5		- continuous sounding and Benthos stations
	0909	- completed sounding lines and Benthos stations
	1035	- Port Colborne breakwater abeam
		- Welland Canal transit
	2227	- Port Weller breakwater abeam
	2244	- commence sounding lines (Lake Ontario)
		- continuous sounding lines

July 6		-	continuous sounding lines
	0656	-	arrive area of peat deposit P-21
		-	grid Benthos sampling and piston core (40 ft.)
	1311	-	depart area of P-21
		-	commence sounding lines
	1426	-	gravity core R1
	1620	-	gravity core R2
	1839	-	gravity core R3
	2232	-	arrive area of peat deposit P-25
		-	grid Benthos sampling
July 7	0106	-	depart area of P-25
	0602	-	gravity core T1
	0653	-	gravity core T2
	0751	-	gravity core T3
	0856	-	gravity core T4
	1024	-	station WB
	1130	-	station PC-4
	1425	-	completed PC-5
		-	proceeding to Burlington
	1540	-	alongside, CCIW
July 8		-	alongside, Burlington
July 9	0917	-	slip jetty, CCIW
		-	proceeding to piston coring sites
	1751	-	arrive on station OB-1
		-	continuous coring and sounding
July 10		-	continuous coring and sounding
	2200	-	break off coring due to weather
		-	continuous sounding lines
July 11		-	continuous sounding lines
	1645	-	arrive coring site P-14
		-	continuous coring and sounding
July 12		-	continuous coring and sounding
	0630	-	stopped off Kingston, disembarked Prof. K. Fahnestock and Dr. C.F.M. Lewis by whaler
		-	continuous sounding and coring
	1210	-	stopped off Kingston, Dr. C.F.M. Lewis boarded by whaler
		-	continuous coring and sounding
	1800	-	continuous sounding
July 13		-	continuous soundings
	0700	-	continuous soundings & coring
July 14		-	continuous sounding and coring
	1800	-	continuous sounding and Benthos coring

July 15		- continuous sounding and Benthos coring
	0800	- continuous piston coring
July 16	0517	- completed last piston core (PC-31)
		- proceeding to Burlington
	0838	- alongside, CCIW

NARRATIVE

This cruise encompassed both Lakes Erie and Ontario. In support of the program continuous echo sounding was carried out, as well as Shipek, Benthos, 1200 lb. gravity cores, and piston coring. Many observations and sites were chosen on a last minute basis based on the echo sounding record.

July 2 to 5 was spent in Lake Erie, the remainder in Lake Ontario except a one day layover in Burlington on July 8. The large majority of observations were obtained in eastern Lake Ontario, including the Kingston basin and several miles into the St. Lawrence River.

Around the clock piston coring was carried out in the Kingston basin as necessary, but where possible soundings and Benthos observations were obtained during the early morning hours (midnight to 0600 hours).

Eight Sea Cadets from RCSCC "Iron Duke" (Burlington) joined the ship for this cruise. They were assigned, on a rotational basis, to the galley, engine room, and on deck.

Mr. J. Chesser, Hamilton Science Fair Winner was on board for the cruise. During his stay he developed a program to recover methane gas from methane producing bacteria in both Lakes Erie and Ontario sediments.

Professor K. Fahnestock of New York State University (Fredonia) was on board, as an observer from July 9 to 12, disembarking at Kingston, Ontario.

On station PC-29, one Benthos corer, with new valve and four lead weights of 20 kilo. each was lost during use. A loss report has been submitted.

GEOLOGICAL SURVEY OF CANADA REPORT (Dr. T.W. Anderson)

The main purpose of the cruise was to resolve some specific problems of stratigraphy and sediment distribution in Lakes Erie and Ontario as revealed in previous regional survey cruises. A total of 30 good quality piston cores, 7 (20 ft.) gravity cores, 70 Benthos (1 metre) gravity cores and 58 Shipek bucket samples were obtained at selected areas in the lakes in order to:

1. Study the quaternary stratigraphy of the bottom sediments,

2. Identify sub-bottom reflections in echograms and seismic profiles,

3. Study the bottom configuration and sediment distribution pattern on elevated planes, ridges and sills critical to defining shorelines and nearshore areas of extreme low-water levels,

4. Map the areal extent of Holocene mud distribution in the offshore areas of Lake Ontario.

Carefully selected piston cores were obtained from the deep trough of the Kingston basin of Lake Ontario to investigate the possible extension of a marine environment (Champlain Sea) into the Ontario basin at approximately 11,000 - 12,000 years ago. A number of long piston cores were also collected at specific locations in eastern Lake Ontario and oriented for the purpose of obtaining paleomagnetic stratigraphies at a later date. Five traverses were run from the nearshore areas (at water depth 50 ft.) lakeward, and Benthos gravity cores were collected at every 50 feet of water change to investigate the offshore mud-nearshore boundary. Benthos gravity and short piston cores were selected at strategic points in Lake Ontario in order to sample buried peat beds believed deposited during the Admiralty low-water stage of Lake Ontario about 11,000 years ago.

The assistance of Mr. J.R. Bowlby, Queens University, is gratefully acknowledged. Mr. Bowlby provided additional ideas to the program due to his previous geological studies in Lake Ontario and helped maintain a pleasant atmosphere throughout the cruise.

Prof. K. Fahnestock, a visitor from State University of New York, Fredonia, N.Y. spent three days aboard ship. He was much impressed with the ship's facilities, its capabilities and the overall coring and echo sounding operations.

STATISTICS SUMMARY

74 - 01 - 101
Cruise No. 74 - 00 - 102 Consec. No. _____

Dates From July 2 to July 6

Cruise Type Geolimnology

Ship MARTIN KARLSEN

Lake ERIE & ONTARIO

Miles Steamed 1725.6

Description	Total
Secchi	
Stations Occupied	126
Bathythermograph Casts	
E.B.T. Casts	
Transmissometer Casts	
Reversing Thermometer Obs.	
Water Samples Collected (Chemistry)	
Water Samples Collected (Microbiology)	
Water Samples Collected (Biolimnology)	
Water Samples Collected (Radiochemistry)	3
Water Samples Collected ( )	
Water Samples Collected ( )	
Water Samples Collected ( )	
Water Samples Filtered (Chlorophyll)	
Water Samples Treated (Phytoplankton)	
Zooplankton Hauls	
Zooplankton Hauls (Mysis)	
Primary Productivity Moorings	
Bottom Samples (Fauna)	
Integrator (10m)	
Integrator (20m)	
Total Number of Depths Sampled	
Total Number of Water Samples Collected	3
ONBOARD ANALYSIS	
Geolimnology	
Manual Chemistry (Tech. Ops.)	
Nutrients (W.Q.D.)	
Microbiology	

Description	Total
Moorings Established (CM)	
Moorings Retrieved (CM)	
Moorings Established (Met.)	
Moorings Retrieved (Met.)	
Moorings Established ( )	
Moorings Retrieved ( )	
Moorings Serviced (CM)	
Moorings Serviced (Met.)	
Moorings Serviced ( )	
Cores Taken (Gravity).	107
Cores Taken (Piston)	30
Grab Samples Taken	61
Drogues Tracked	
Dye Releases	
Observations (Weather)	84
Observations ( )	
Continuous Observations (Days)	
Air Temperature	
Relative Humidity	
Water Temperature (In-Hull)	
Water Temperature (Towed)	
Integrated Printout	13
Solar Radiation	13
Long Wave (IR) Radiation	

REMARKS - 4 samples (20-25 lbs.) of sediment for Dr. Aspila
- 7 1200 lb. gravity cores

STATION LOCATIONS

Station Number	Latitude N.	Longitude W.	Benthos Core	Shipek	Piston Core	25 lbs. Aspila	1200 lb. Gravity Core
U-42	41° 45' 36"	82° 59' 12"	X				
G-16	42° 00' 30"	81° 36' 12"	X				
PC-1	42° 02' 06"	81° 36' 36"	X	X	X		
PC-2	41° 59' 45"	81° 35' 50"			X		
PC-3	42° 01' 42"	81° 37' 00"			X		
K-30	42° 21' 30"	79° 54' 36"	X				
M-30	42° 32' 20"	79° 54' 20"	X			X	
L-31	42° 27' 00"	79° 47' 00"	X				
M-32	42° 32' 12"	79° 39' 24"	X				
N-32	42° 37' 48"	79° 39' 30"	X			X	
1-A	42° 35' 47"	79° 27' 30"				X	
O-35	42° 42' 40"	79° 17' 36"	X			X	
P-21A	43° 23' 00"	78° 43' 59"	X	X			
P-21B	43° 23' 00"	78° 43' 13"	X				
P-21C	43° 23' 00"	78° 42' 36"	X				
P-21D	43° 23' 00"	78° 44' 45"	X				
P-21E	43° 23' 00"	78° 45' 20"	X				
P-21F	43° 23' 30"	78° 44' 45"	X				
P-21G	43° 23' 30"	78° 44' 00"	X				
P-21H	43° 23' 30"	78° 43' 15"	X				
P-21I	43° 22' 30"	78° 43' 15"	X				
P-21J	43° 22' 30"	78° 44' 00"	X				
P-21K	43° 22' 45"	78° 44' 00"	X				
P-21L	43° 22' 51"	78° 43' 58"	X		X		
R-1	43° 26' 24"	78° 50' 06"					X
R-2	43° 31' 29"	78° 50' 09"	X				X
R-3	43° 44' 45"	78° 51' 23"					X
P-25A	43° 39' 18"	78° 42' 42"	X	X			
P-25B	43° 38' 48"	78° 41' 27"	X				
P-25C	43° 38' 56"	78° 40' 33"	X	X			
P-25D	43° 39' 24"	78° 40' 37"	X				
P-25E	43° 38' 46"	78° 42' 42"	X				
P-25F	43° 38' 00"	78° 41' 00"	X				
T-1	43° 34' 50"	79° 22' 37"					X

STATION LOCATIONS

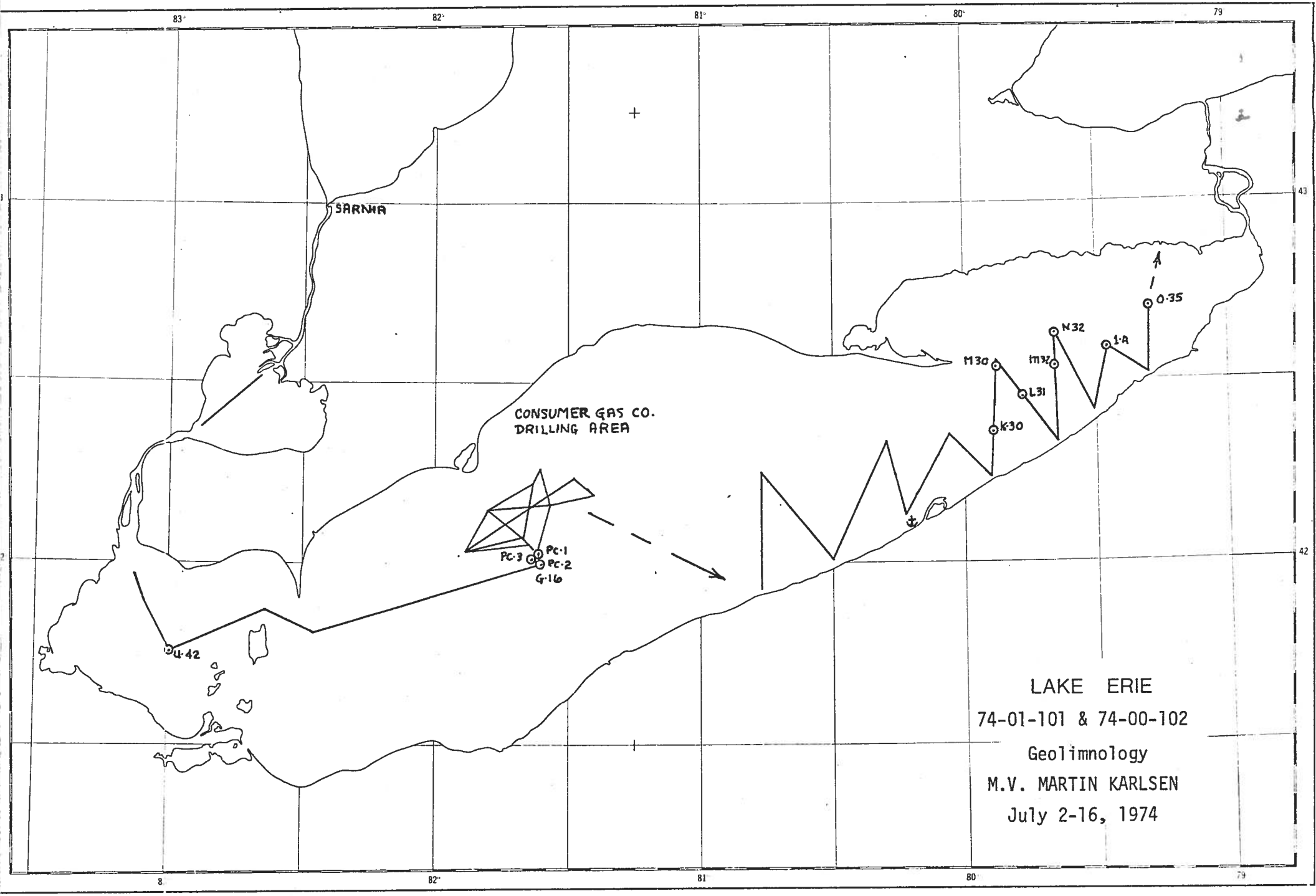
Station Number	Latitude N.	Longitude W.	Benthos Core	Shipek	Piston Core	25 lbs. Aspila	1200 lb. Gravity Core
T-2	43° 31' 20"	79° 21' 12"					X
T-3	43° 25' 32"	79° 18' 44"					X
T-4	43° 19' 36"	79° 16' 12"					X
WB	43° 24' 06"	79° 26' 30"	X				
PC-4	43° 21' 18"	79° 38' 04"	X	X	X		
PC-5	43° 21' 21"	79° 37' 57"			X		
OB-1	43° 51' 54"	78° 04' 20"	X				
OB-2	43° 50' 45"	78° 04' 00"	X				
PC-2	43° 46' 00"	78° 03' 28"	X	X			
PC-7	43° 38' 42"	78° 00' 00"	X	X	X		
OB-3	43° 48' 39"	77° 46' 57"	X	X			
PC-9	43° 37' 27"	77° 31' 10"	X	X	X		
PC-10	43° 36' 00"	77° 14' 18"	X	X	X		
PC-11	43° 40' 00"	76° 57' 20"	X	X	X		
PC-12	43° 45' 10"	76° 38' 30"	X	X	X		
PC-13	43° 47' 15"	76° 34' 38"	X	X	X		
E-30	43° 30' 42"	76° 54' 30"	X				
PC-14	43° 59' 28"	76° 30' 50"	X	X	X		
PC-15	43° 59' 42"	76° 29' 18"	X	X	X		
OB-4	43° 58' 12"	76° 26' 06"	X				
OB-5	43° 57' 42"	76° 22' 18"	X	X			
OB-6	43° 57' 50"	76° 20' 24"	X				
OB-7	43° 57' 24"	76° 18' 30"	X				
PC-16	43° 54' 06"	76° 32' 30"	X	X	X		
PC-17	44° 07' 10"	76° 33' 03"			X		
PC-18	44° 14' 52"	76° 15' 25"	X	X	X		
OB-8	44° 14' 30"	76° 22' 18"		X			
OB-9	44° 14' 20"	76° 23' 12"		X			
OB-10	44° 08' 54"	76° 20' 15"		X			
OB-11	44° 08' 42"	76° 19' 50"	X	X			
PC-19	44° 04' 59"	76° 25' 50"	X	X	X		
PC-20	44° 09' 18"	76° 39' 06"	X	X	X		
OB-12	44° 05' 12"	76° 46' 36"		X			

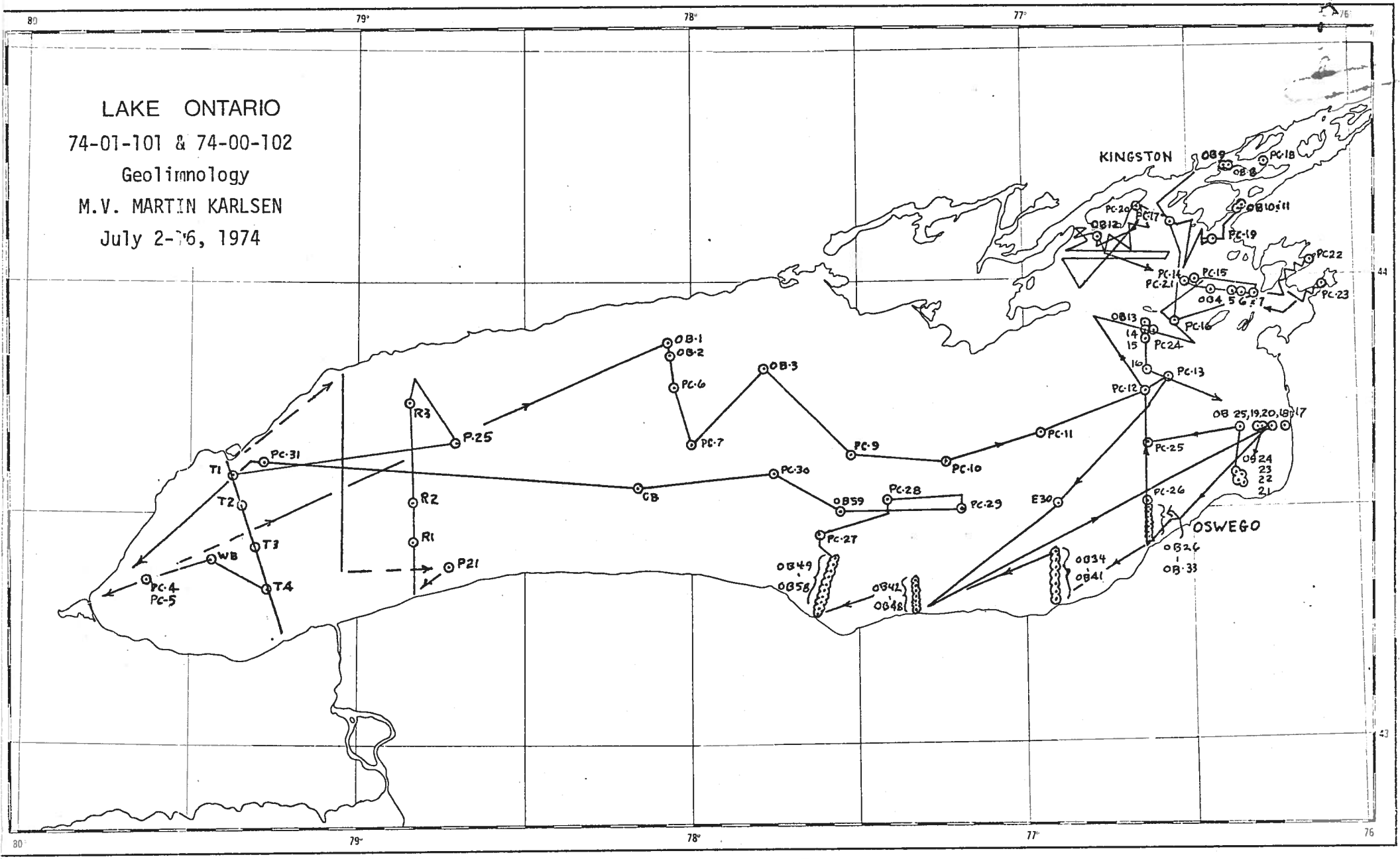
STATION LOCATIONS

Station Number	Latitude N.	Longitude W.	Benthos Core	Shipek	Piston Core	25 lbs. Aspila	1200 lb. Gravity Core
PC-21	43° 59' 24"	76° 31' 36"	X	X	X		
PC-22	44° 02' 32"	76° 08' 40"	X	X	X		
PC-23	43° 58' 29"	76° 06' 15"	X	X	X		
PC-24	43° 52' 48"	76° 36' 30"	X	X	X		
OB-13	43° 54' 18"	76° 38' 00"	X	X			
OB-14	43° 53' 00"	76° 38' 06"		X			
OB-15	43° 52' 16"	76° 37' 58"		X			
OB-16	43° 47' 38"	76° 38' 15"	X	X			
OB-17	43° 40' 03"	76° 13' 22"		X			
OB-18	43° 40' 06"	76° 15' 32"	X	X			
OB-19	43° 40' 09"	76° 18' 58"	X				
OB-20	43° 39' 53"	76° 16' 57"	X				
OB-21	43° 32' 11"	76° 20' 46"	X	X			
OB-22	43° 32' 48"	76° 21' 48"	X	X			
OB-23	43° 33' 19"	76° 21' 17"	X	X			
OB-24	43° 34' 06"	76° 22' 10"	X	X			
OB-25	43° 40' 12"	76° 21' 24"	X				
PC-25	43° 38' 12"	76° 38' 00"	X	X	X		
PC-26	43° 30' 43"	76° 38' 00"	X	X	X		
OB-26	43° 29' 43"	76° 37' 45"	X				
OB-27	43° 29' 30"	76° 37' 29"	X	X			
OB-28	43° 29' 10"	76° 37' 10"		X			
OB-29	43° 28' 46"	76° 37' 16"	X				
OB-30	43° 28' 24"	76° 37' 36"	X	X			
OB-31	43° 27' 13"	76° 38' 00"		X			
OB-32	43° 26' 15"	76° 38' 00"		X			
OB-33	43° 25' 18"	76° 38' 00"		X			
OB-34	43° 18' 18"	76° 54' 54"		X			
OB-35	43° 19' 24"	76° 54' 48"		X			
OB-36	43° 20' 30"	76° 54' 54"		X			
OB-37	43° 21' 18"	76° 55' 00"		X			
OB-38	43° 22' 00"	76° 55' 00"		X			

STATION LOCATIONS

Station Number	Latitude N.	Longitude W.	Benthos Core	Shipek	Piston Core	25 lbs. Aspila	1200 lb. Gravity Core
OB-39	43° 23' 12"	76° 55' 00"	X	X			
OB-40	43° 23' 36"	76° 55' 00"	X	X			
OB-41	43° 24' 24"	76° 55' 06"	X	X			
OB-42	43° 17' 18"	77° 19' 50"	X	X			
OB-43	43° 18' 11"	77° 20' 04"	X				
OB-44	43° 18' 45"	77° 19' 45"	X				
OB-45	43° 19' 31"	77° 20' 02"	X				
OB-46	43° 20' 06"	77° 20' 04"	X				
OB-47	43° 20' 31"	77° 20' 05"	X				
OB-48	43° 20' 58"	77° 20' 04"	X				
OB-49	43° 17' 09"	77° 37' 28"	X				
OB-50	43° 19' 09"	77° 36' 40"	X				
OB-51	43° 20' 28"	77° 35' 37"	X				
OB-52	43° 21' 31"	77° 35' 59"	X				
OB-53	43° 22' 05"	77° 35' 45"	X				
OB-54	43° 22' 24"	77° 35' 38"	X				
OB-55	43° 23' 04"	77° 35' 24"	X				
OB-56	43° 23' 28"	77° 35' 23"	X				
OB-57	43° 23' 54"	77° 34' 43"	X				
OB-58	43° 24' 16"	77° 34' 33"	X				
PC-27	43° 27' 36"	77° 37' 09"	X	X	X		
PC-28	43° 31' 54"	77° 24' 54"	X	X	X		
PC-29	43° 30' 05"	77° 11' 20"	X	X	X		
OB-59	43° 30' 00"	77° 33' 00"	X	X			
PC-30	43° 35' 59"	77° 45' 12"	X	X	X		
CB	43° 33' 00"	78° 10' 00"	X				
PC-31	43° 36' 16"	79° 16' 44"	X	X	X		


83°
82°
81°
80°
79
43
42
SARNIA
CONSUMER GAS CO.
DRILLING AREA
Pc-3
Pc-1
Pc-2
G-16
U-42
M30
m32
N32
L31
K30
1-A
0-35
LAKE ERIE
74-01-101 & 74-00-102
Geolimnology
M.V. MARTIN KARLSEN
July 2-16, 1974


LAKE ONTARIO
74-01-101 & 74-00-102
Geolimnology
M.V. MARTIN KARLSEN
July 2-16, 1974
KINGSTON
OSWEGO
80°
79°
78°
77°
76°
44
43
OB-1
OB-2
OB-3
PC-6
PC-7
PC-9
PC-10
PC-11
PC-12
PC-13
PC-25
R3
R2
R1
P-25
P21
T1
T2
T3
T4
WB
GB
PC-31
PC-4
PC-5
PC-30
PC-28
PC-29
PC-27
OB59
OB49
OB58
OB42
OB48
E30
OB34
OB41
OB26
OB-33
OB 25,19,20,18,17
OB24
23
22
21
OB9
PC-18
OB8
PC-20
PC-17
OB12
OB10,11
PC-19
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PC-21
PC-15
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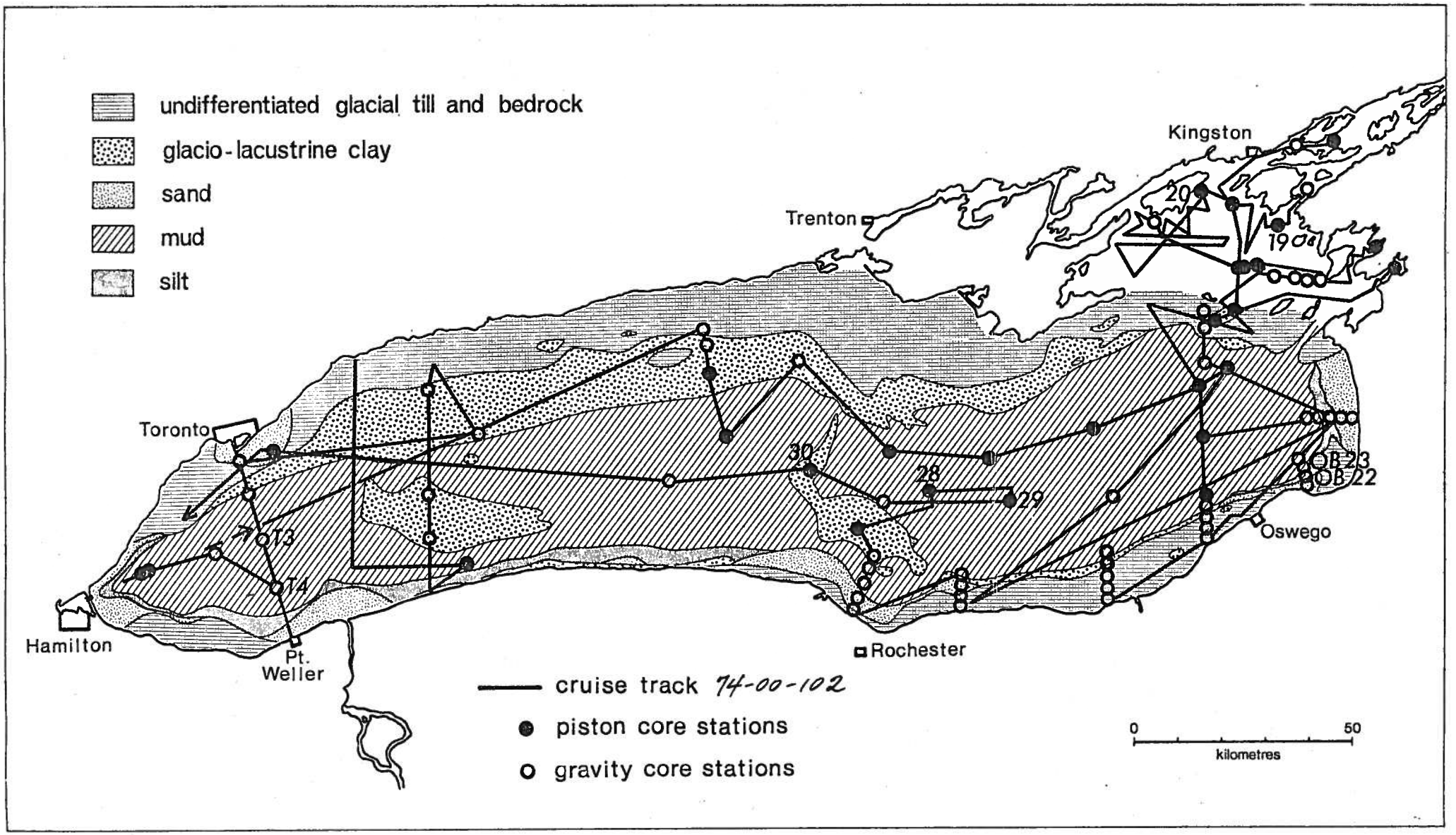
PC-23
OB13
14
15
PC24
16
PC-16
PC-26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glacio-lacustrine clay
sand
mud
silt
Kingston
Trenton
Toronto
Hamilton
Pt. Weller
Rochester
Oswego
T3
T4
28
29
30
OB 23
OB 22
cruise track 74-00-102
piston core stations
gravity core stations
0
50
kilometres