CANADIAN HYDROGRAPHIC SERVICE
MARINE SCIENCES DIRECTORATE
DEPARTMENT OF THE ENVIRONMENT
BURLINGTON, ONTARIO

1972 JAMES BAY SURVEY
LOON ISLANDS TO FORT GEORGE

BY

D.J. KEAN
CENTRAL REGION

TABLE OF CONTENTS

COMPLETE STAFF RECORD - SHORE PARTY

Name	Function	Arrived	Departed	To
J. Kean	Sub Party Chief	16-6-72	18-10-72	Burlington
P. Pagé	Hydrographer	16-6-72	11-10-72	Burlington
R. Solvason	T.I.R.L.	16-6-72	01-09-72	Ottawa
B. Wright	H.I.C. James Bay Survey	28-6-72	07-07-72	Burlington
B. Bergen	U.S. Exchange	19-7-72	26-07-72	Burlington
D. Wills	Student Assistant	26-6-72	12-10-72	CCGS NARWHAL
B. Bodo	Student Assistant	26-6-72	02-10-72	Burlington
H. Blandford	Asst. Reg. Hydrographer	08-9-72	09-09-72	Burlington
A. Hughes	Engineering Supt.	08-9-72	09-09-72	Burlington
M. Moore	Electronics Technician	28-6-72	13-08-72	CCGS NARWHAL
M. Moore	Electronics Technician	11-10-72	16-10-72	Burlington
W. Smith	Electronics Technician	11-10-72	12-10-72	CCGS NARWHAL
N. Freeman	Tidal Officer	26-6-72	07-07-72	Burlington
N. Freeman	Tidal Officer	10-8-72	16-08-72	Burlington
J. Wilson	Hydrographer	25-8-72	25-08-72	CCGS NARWHAL
J. Wilson	Hydrographer	01-9-72	05-09-72	CCGS NARWHAL
J. Wilson	Hydrographer	11-9-72	20-09-72	Burlington
Dr. Hassan	A.O.L. Scientist	13-9-72	15-09-72	CCGS NARWHAL
M. Sastre	Helicopter Pilot	17-6-72	14-09-72	Ottawa
A. Kokanovich	Helicopter Engineer	17-6-72	14-07-72	Ottawa
W. Farquhar	Helicopter Engineer	13-7-72	20-09-72	Ottawa
J. Crawford	Helicopter Pilot	13-9-72	16-10-72	Ottawa
K. Mulrooney	Helicopter Engineer	19-9-72	16-10-72	Ottawa

..... 2

CHRONOLOGY OF EVENTS

June 15	Depart Burlington via Toronto, Timmins for Fort George.
June 16	Arrive Fort George.
June 17	Helicopter DOB arrives in Fort George.
June 22	DOB down with cracked drive shaft coupling. First shipment of gear arrives.
June 23	Two parcoll units arrive.
June 24	Tide gauge installation at Loon Point.
June 27	DOB repaired. Tide gauge installation on North Loon Island.
June 28	Base camp set up. Tide gauge installation on East Cub Island.
June 29	Proposed harbour reconnaissance survey commences.
July 6	Tide gauge installation on Loon Island.
July 8	Controlled hydrodist sounding commences.
July 13	Polar bear topples Slave I mini-fix antenna.
July 14	Ice removes complete tide gauge and sensor from East Cub Island.
July 31	Tide gauge lifted from North Loon Island.

.... 3

August 2	Tide gauge installation East Cub Island.
August 4	Storm removes tide gauge sensor at East Cub Island.
August 7	First CH25 radio contact with CCGS NARWHAL.
August 13	Tide gauge sensor installed on East Cub Island.
August 21	Canoe II sinks at mooring during high wind storm.
August 24	Sensor lost, tide gauge recovered and removed from East Cub Island.
August 25	SABLE FERRY traverse La Grande Rivière.
August 26	Tide gauge installation Spencer Island.
August 27	Tide gauge installation Bare Island.
August 30	Storm separates tide gauge cable on Spencer Island.
September 2	Tide gauge on Bare Island removed and installed in Roggan River area. Tide gauge removed from Spencer Island and installed in Brae Island area (Hook Island).
September 14	Tide gauge installation in La Grande Rivière. Tom Manning and assistant in search of transportation to North Twin Island for polar bear studies.
September 16	Two helicopter loads transport Tom Manning to North Twin Island.

.... 4

September 18	One helicopter load of T. Manning's gear to North Twin Island.
September 22	Wake of a bad storm burns the Fort George Post Office.
September 23	Dumb barge grounds at mouth of La Grande Rivière.
October 5	Tide gauges lifted from Hook Island and Roggan River.
October 8	Canoe II capsizes during the night and sinks at the mooring. Packing and laying up begins.
October 10	Tide gauge lifted from Loon Point.
October 13	Tide gauge lifted from La Grande Rivière.
October 14	Tide gauge lifted from Loon Island.
October 18	All personnel and equipment depart Fort George for the south.

.... 5

PLANNING AND PREPARATION

The purpose of this survey, from Loon Islands into La Grande Rivière, was to collect information to establish a safe shipping route, including anchorages and harbours, to the mouth of and into La Grande Rivière. As the present chart 5800, at a natural scale of 1:500,000, covers the whole of James Bay, the requirement for larger scale charts is self evident.

A shore based survey party worked out of Fort George, Quebec, from the period June 16, 1972 to October 18, 1972. Areas of operations and the sounding limits are shown on plates 4-6, with the main area of interest being covered by three field sheets which include Loon Islands, Seal Islands to Fort George and La Grande Rivière. Results of the survey were plotted on a Universal Transverse Mercator projection at a natural scale of 1:10,000.

Two of the three field sheets that were used were drawn up by the Research and Development section, Burlington, on the gerber plotter table. When these sheets were turned over to us, they contained both the U.T.M. and Geographic grids as well as the known existing control in the working area. The third of the three field sheets, which was a standard ten centimetre grid sheet, was completed with geographic grids upon returning to Burlington.

In order to facilitate a hydrodist positioning system survey, horizontal control had to be extended throughout the maze of islands which were included in the survey area. All observations for this work were done with the T-2 theodolite and the MRA-3 tellurometers.

One complete hydrodist chain, one half an MRB-2 system and the other half an MRB-201 system, were used at 50 metre spacings to adequately portray the very irregular bathymetry of

.... 6

that portion of James Bay. Two square sterned converted supply canoes, obtained locally in Fort George, were outfitted to adapt to hydrodist sounding using the portable Raytheon Model DE719 echo sounder for the continuous bottom profiles. The two parcoll units supplied to us were set up to house office, storage and effect minor repairs.

One M.S.D. Bell Jet Ranger helicopter was available to the survey on a full time basis and was essential in meeting both ship and shore-based party requirements.

.... 7

OPERATIONS - HYDRODIST SOUNDING

Two square sterned converted supply canoes, one a twenty-four foot Rupert House and the other a twenty foot Great Whale, both obtained locally in Fort George, were each outfitted in order to carry out hydrodist sounding. Each contained a small plywood cabin to keep instruments and men both dry and out of the wind, makeshift hydrodist masts made of one and one-half inch diameter plastic sewer pipe, covered over bows to ward off the spray, and built in Raytheon transducers to accommodate the Raytheon Model DE719 echo sounder. Both these sounding platforms were propelled by Evinrude 25 h.p. long shaft engines.

The hydrodist chain, consisting of one set of MRB-2 and one set of MRB-201, was used exclusively on the survey. Although the two systems were interchangeable in either canoe, the new MRB-201 was chiefly used in the larger Rupert House canoe because of its ease in use and because of its further range, thus aiding greatly in the rougher, deeper offshore areas of the survey. Save for initial loose cable connections in the master antenna assemblies, both systems performed exceptionally well all season in the area, considering the low lying nature of the terrain coupled with the fact that the antenna assembly was only seven feet high.

Initially sounding of a reconnaissance nature was carried out in the first large bay to the south of Governor Island, to determine the feasibility of a wharf site which was to be located within the area to be known as a proposed harbour. With the realization that sufficient water existed to allow ships of seaway draft to enter, horizontal control was extended into and around the proposed harbour such that controlled hydrodist sounding at fifty metre spacing could be undertaken. Sounding

then proceeded throughout the harbour to approximately two miles seaward (west) from the entrance to the harbour, thence northward to include the most northern island of the Loon Islands archipelago and eastward to include the entrance to La Grande Rivière.

With the arrivals of representatives from each of Transworld Shipping, Agence Maritime Shipping, James Bay Development Corporation, Department of Transport, Federal Commerce, St. Lawrence Construction, Foundation Engineering, and Campbell Marine Surveyors Ltd., throughout the season, a major interest was shown for soundings in La Grande Rivière. This was for the purpose of transporting thousands of tons of cargo upriver to both the settlement of Fort George and to a new Hydro-Québec wharf and staging depot which was another three miles upriver from Fort George.

As interests heightened, another survey of a reconnaissance nature was completed from the mouth of La Grande Rivière seven miles upriver to include the new wharf site. Horizontal control extended upriver past the new wharf and a tide gauge was installed at the upriver end to allow for controlled hydrodist sounding of the river.

Although many sand bars at the mouth of the river hamper deep draft traffic, vessels such as the 'SABLE FERRY', a converted L.S.T. managed to traverse the river with an eleven foot nine inch draft at high tide but not without soft grounding on several of these sand bars. A safe maximum draft of ten feet is the most suitable for travelling upriver although passage should only be attempted at high tide, during daylight hours and at relatively slow speed as sand bars exist throughout La Grande Rivière estuary.

CAMP

The survey camp consisted of two sixteen by sixteen foot parcoll units and one Okinawa tent, which supplied adequate space for office, for storage and for effecting minor repairs. The office parcoll, when set up, housed the MF/HF radio-telephone, the mini-fix monitor for monitoring ship-borne operations, two four by eight foot draughting tables, one small desk as well as sufficient room to store most of the survey gear and electronics parts. The other parcoll, a workshop, contained storage space for the rest of the gear plus a large work bench to facilitate minor engine repairs, while the Okinawa tent was primarily used for storage of helicopter gear.

HELICOPTER

The M.S.D. Bell Jet Ranger helicopter supplied to us was essential in order to meet both ship and shore-based party requirements. In its four month service with the party, the helicopter logged three hundred and fifty flying hours. Some of the duties of the helicopter involved the slinging of mini-fix gear to master and slave sites, including diesel units and diesel fuel. The phasing in of the mini-fix chain, periodic spot checks and preventative maintenance of the mini-fix sites was accomplished by helicopter. Selection of tide gauge sites, installation and operation checks involved helicopter use. Monumentation of all stations which included many from Phase I of the spring survey and as far as eighty miles away was carried out by helicopter. As well as this, establishing horizontal control, spotting of shoals and hazardous areas with a helicopter-mounted mini-fix receiver, and transporting to and removal from hydrodist remote sites of men on sounding days occupied some of the flying hours.

One rather unique job involved the transportation of Mr. Tom Manning, his assistant, a dog, a motorcycle, and gear, to North Twin Island, a trip of forty-five miles for the purpose of conducting one month of polar bear studies. This was done in a series of three trips of internal and sling loads by helicopter.

GAUGING

An extensive tide gauging program was undertaken this year covering a stretch of sixty miles along the eastern shore of James Bay. By the end of the survey season, tidal data had been collected from eight different locations to give a more detailed insight into the tidal phenomena of James Bay. Long term records (i.e. in excess of twenty-nine days) were obtained at both Loon Island and Loon Point (see plate 7), while the minimum twenty-nine day interval was collected at La Grande Rivière, Hook Island, North Loon Island and Roggan River. Unfortunately, the two remaining sites, Spencer Island and East Cub Island, yielded only a few days of records before severe storms wrecked all efforts.

Initially upon arrival in Fort George, gauges were installed and set operational at each of Loon Island, Loon Point, and North Loon Island. As Bench Marks had previously been established at Loon Point, water level transfers were used to carry a sounding datum to each of the other sites, and in particular, to Loon Island as this gauge was used for the majority of reductions throughout the sounding season. Reduction wise, the area was sounded in feet, reductions were in feet but the reduced sounding appeared as metres and decimetres on the field sheet.

A fourth tide gauge was set up on East Cub Island at this same time but the sensor was not lowered into the water because heavy winter ice lingered in the area. By the time installation could have been accomplished and upon return to the island, all that remained of tide gauge and sensor was one hundred feet of very badly mangled cable. Ice had taken the rest. After obtaining the required data from North Loon Island, this gauge was taken to East Cub Island for installation. Collecting two days records was hardly sufficient when a bad storm sheered

off another sensor. A third attempt included the sensor mounted in a one and one half inch welded steel pipe crib and anchored to pipe markers in the rock. With the loss of this sensor to another storm of winds gusting to fifty-five knots, all further attempts were aborted in favour of selecting another location.

The East Cub gauge was then transferred and installed on Spencer Island, After two and one half days of useful data, another storm wrapped kelp around the tubing and separated the sensor from the gauge.

Realizing that storms in James Bay are not conducive to tide gauge installations on any of the relatively low lying barren islands, and that high winds of unpredictable magnitude can breeze up in a matter of a few hours, all further attempts to collect tidal data in these areas were abandoned in favour of more protected areas on the mainland. This proved very satisfactory as in the case of Hook Island, Roggan River and La Grande Rivière, all protected areas which produced the minimum twenty-nine day records without incident.

One feature that greatly aided the installation of the tide gauge sensors was the helicopter. Sensors were mounted on steel I beam rails equipped with a slinging hook-up. By means of a two hundred foot long rope attached to the I beam, the helicopter could sling and gently lower the sensor assembly into the water, then return the rope to shore where it could be secured. This process was then used in reverse for recovering the sensors very effectively. The main advantage of this procedure of installation and recovery, was that a boat would not have several hours steaming each way, especially since fog and/or high winds were prevalent.

CONCLUSIONS AND RECOMMENDATIONS

1. The supply canoes proved very satisfactory for inshore areas, shoal areas and drying sand flat expanses while working in relatively good sea conditions. However, larger launches are required to work in offshore areas in the rougher weather.

2. As was the case this year, and if a major gauging program is to be repeated in future years, the assistance of one staff member from the Tides and Water Levels Section is essential for installation, levelling and maintenance of the gauges.

3. As all northern charts are in metric units, an effort should be made to convert present Ottboro gauges, echo sounders and tide staffs to metric units for ease in use.

4. The resident technicians' services were invaluable on this type of survey. With sufficient spares, regular checks and maintenance on all electronic equipment, peak performance was experienced at all times.

5. A helicopter is an absolutely essential vehicle in this survey as much of the work involved flights of up to eighty miles one way. In order to accomplish this, fuel caches should be set up in the winter months to ensure sufficient fuel for these long legs of operations.

6. Because actual good weather sounding days are very scarce, an experienced crew, at least in the particular type of positioning system, is a necessity as field training time is limited.

.... 14

7. Excellent VHF radio-telephone communication was maintained to two sounding platforms, two remote men, helicopter and C.C.G.S. NARWHAL through a base station at camp. The system worked effectively in all apsects of the survey including relaying weather reports.

8. Although Bell Canada operates a radio-telephone service out of Fort George, signals oftentimes were unreadable thus hampering calls through to Burlington. Priorities in the sounding area changed three times during the course of the season but were delayed for periods up to ten days as this was the normal time for mail to arrive in Fort George from Burlington. The quickest and safest method was to send such incoming mail by someone who was visiting the party, although this is a costly practice. Hopefully, Bell Canada will have a satellite system in operation in the near future.

9. One major setback encountered was the arrival of equipment. Although specific shipping details were included on the bills of lading, periods of up to three weeks in transit were experienced from Burlington to Fort George. The best solution would be to send out specific detailed instructions to those shipping outfits concerned.

10. After three months in isolated conditions combined with working long hours, many of the men started to show signs of fatigue for which a mid-season break may have cured.

11. Due to time limitations, a great majority of shoals on the field sheets remain unexamined. As well as this, there were no current observations taken which would be of benefit to ships traversing La Grande Rivière.

D. J. Kean
Jan. 23, 1972

.... 15

Establishment: JAMES BAY SURVEY (SHORE BASED)

O.I.C. D.J. Kean

	Project Number 6600-72-1	Project Number	Project Number	Project Number
Project Name JAMES BAY SURVEY				
Project Name				
Project Name				
Project Name				
Resources:				
Number of Hydrographers *	3/319½			
Number of Scientists *	1/15			
Number of Electronic Technicians *	1/51½			
No. of Student Assistants and Casuals *	2/194½			
No. of Support personnel (Ship's Crew etc.) Helicopter crew *	6/656			
Total Personnel *	13/1236½			
Number of Ships	N/A			
Number of ~~XXXXXXXXX~~ Canoes	2			
Number of Land Vehicles	1			
Number (and type) of Aircraft	Helicopter 206A			
Number of Minor Support Staff	N/A			
Other (specify) Rubber Dinghy	2			

* Should provide two figures separated by a slash. The first figure being the average number on strength and the second being the man days. e.g. number of Hydrographers: 5/100 (an average of 5 persons ... during the project).

Establishment JAMES BAY SURVEY	Project Number	Project Number	Project Number	Project Number
H.I.C. D.J. Kean	6600-72-1			
Time:				
Total operational days.	125			
Days actual field work.	76			
Days lost (weather)	35			
Days lost (Sat. Sun. Holidays)	6½			
Days lost (Equipment failure)	2			
Days lost in ~~XXXXXXX~~ Laying up, packing	5½			
Days lost in port for Supplies, Bunker, etc.				
Days lost, other causes				
Total Man days in period (staff)	319.5			
Total Man days worked (staff)	300			
Man days:- (staff)				
(a) Sounding	150			
(b) Shoal Examinations	9			
(c) Wharf surveys				
(d) Oceanography				
(e) Geophysics				
(f) Tides & water levels	27			
(g) Collecting bottom samples				
(h) Horizontal Control	18			
(i) Shorelining & Low Watering				
(j) Data processing & office admin.	78			
(k) Sailing directions	2			
(l) Place Names	1			
(m) Current observations				
(n) Photo-Ident.	15			
(o) Others (specify)				

1972 FROM JUNE 15 TO OCTOBER 18

Establishment JAMES BAY SURVEY H.T.C. D.J. Kean	Project Number 6600-72-1	Project Number	Project Number	Project Number
Sounding (Linear Nautical Miles/KM):				
Ship Sounding				
Launch Sounding	1860			
Other (specify)				
Total sounding				
Reconnaissance (Track) sounding	133			
Area sounded (XXXXX) (Km^2)	24			
Shoals Examined:				
Shoal Examinations (Ship)				
Shoal Examinations (Launch)	32			
Shoal Examinations (Sweep)				
Shoal Examinations (other) specify				
Shoal Examinations (Total)	32			
Navigational Aids:				
Shore Aids Positioned (including beacons ranges)	4			
Floating Aids Positioned				
Navigational Ranges Sounded				
Navigational Ranges Drifted				
Sector Ranges Positioned				
Navigational Aids Established				

FIELD REPORT STATISTICS: MONTHLY ... PROJECT ... FINAL FIELD

YEAR 1972 FROM JUNE 15 TO OCTOBER 18

Establishment: JAMES BAY SURVEY	Project Number 6600-72-1	Project Number	Project Number	Project Number
H.I.C. D.J. Kean				
Shore Control:				
Signals built	24			
Signals re-built	9			
Towers built				
Number of Stations occupied	27			
Number of Stations re-occupied	15			
Number of stations permanently marked	55			
Distance Traversed (XXXXX) (K.M.)	19.3			
Number of Elevations Measured	103			
Number of Heights Measured	4			
Number of Stations Photo Ident.	59			
Other (specify)				
Calibrations:				
No. of Calibration Stations:				
Lambda, Decca, Hi-Fix, Mini Fix,				
Loran, Decca Navigator,				
(hydrodist)				
No. of E/c's marked and referenced	16			

Department	JAMES BAY SURVEY	Project Number	Project Number	Project Number	Project Number	To
G.I.C.	D.J. Kean	6600-72 -1				
Tide and Current Data:						
Recording gauges established		8				
Recording gauges recovered		5				
Staff gauges established		4				
Bench Marks Recovered		3				
Bench Marks Established		18				
Bench Marks Levelled		21				
Distance Levelled (XXXX (KM)		1.4				
No. of Current Meters Set Out						
No. of Current Meters recovered						
No. of hours of Current Measurements						
(Other than with Moored Meters)						
Oceanography:						
No. of Oceanographic stations						
Gravity Profiles-survey (N.M.) (KM)						
Gravity Profiles-track, (N.M.) (KM)						
Magnetic Profile-survey (N.M.) (KM)						
Magnetic Profile-track, (N.M.) (KM)						
Seismic Profile-survey (N.M.) (KM)						
Seismic Profile-track (N.M.) (KM)						
Number of Water Samples						

1972 JUNE 15 OCTOBER 18

Establishment JAMES BAY SURVEY	Project Number	Project Number	Project Number	Project Number
H.I.C. D.J. Kean	6600-72-1			
Bottom Samples:				
Number of bottom samples (Grab)				
No. of bottom samples (underway)				
No. of bottom samples (Armed Lead)	103			
No. of Cores				
No. of Samples retained				
Miscellaneous: (Shoal areas fixed by helicopter using mini-fix)				
No. of Dangers to Navigation, rocks ruins, pilings, etc., fixed.	64			
Shoreline checked (N.M.) (KM)				
Wharves surveyed				
No. of Reference buoys streamed				
No. of Reference buoys recovered				
No. of Shore Stations Established:				
Lambda, Hi-Fix,				
Helicopter flying hours	350			

Year 1972 From JUNE 15 To OCT. 18

Establishment: JAMES BAY SURVEY

H.I.C. D.J. Kean

	Project Number 6600-72-1	Project Number	Project Number	Project Number
Data submitted from the field:				
(Include file numbers:)				
F.S. 3759 Loon Islands				
F.S. 3783 Seal Islands to F. George				
F.S. 3784 La Grande Rivière				
Observation Notes File No. 70346-A	1 book			
Computation Notes File No. 70347-A	1 book			
Miscellaneous Notes File No. 70348	1 book			
Sounding Notes File No. 70353	3 books			

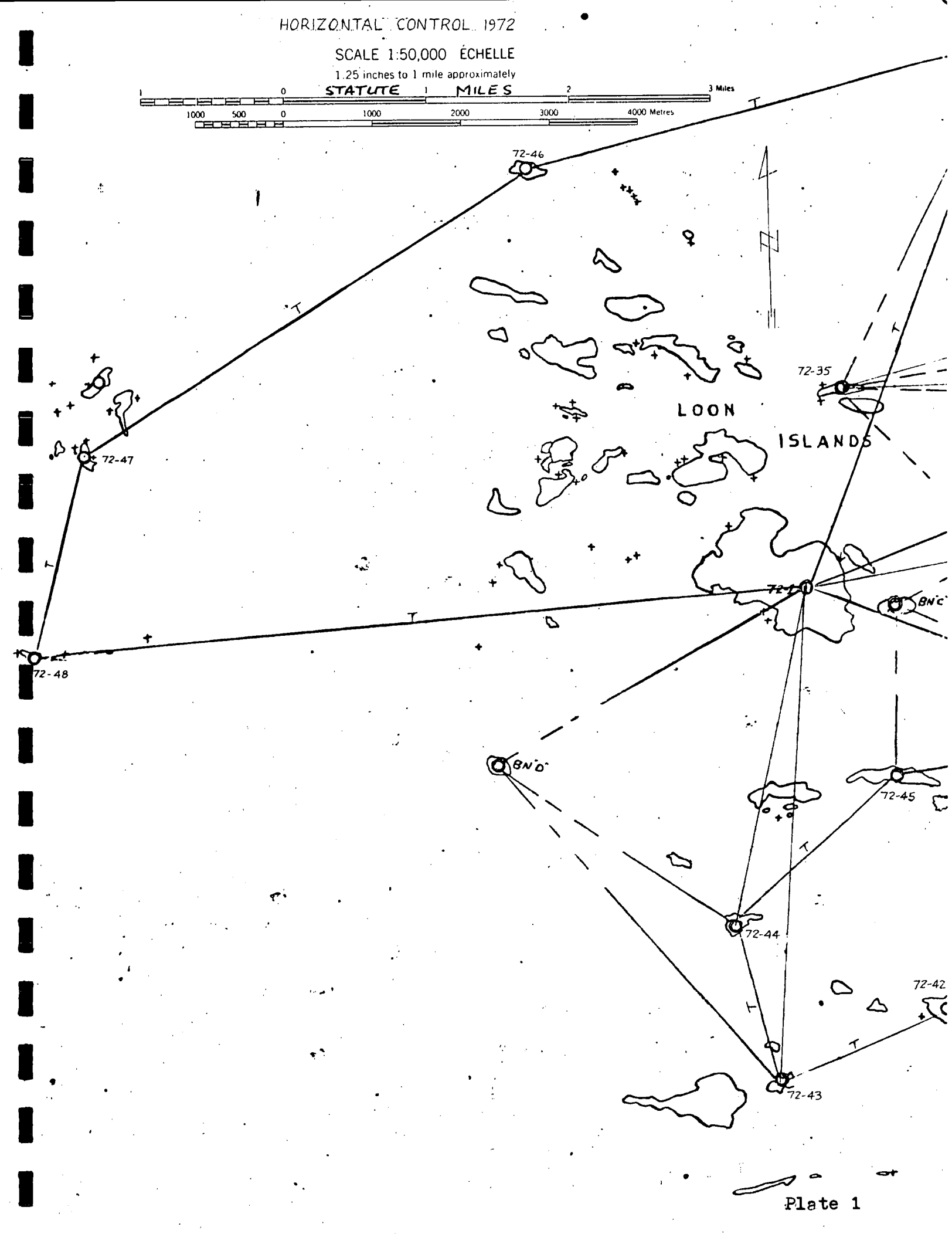

HORIZONTAL CONTROL 1972
SCALE 1:50,000 ÉCHELLE
1.25 inches to 1 mile approximately
STATUTE MILES
3 Miles
1000 500 0 1000 2000 3000 4000 Metres
72-46
72-47
72-48
72-35
LOON
ISLANDS
BN'C'
BN'D'
72-45
72-44
72-42
72-43

Plate 1

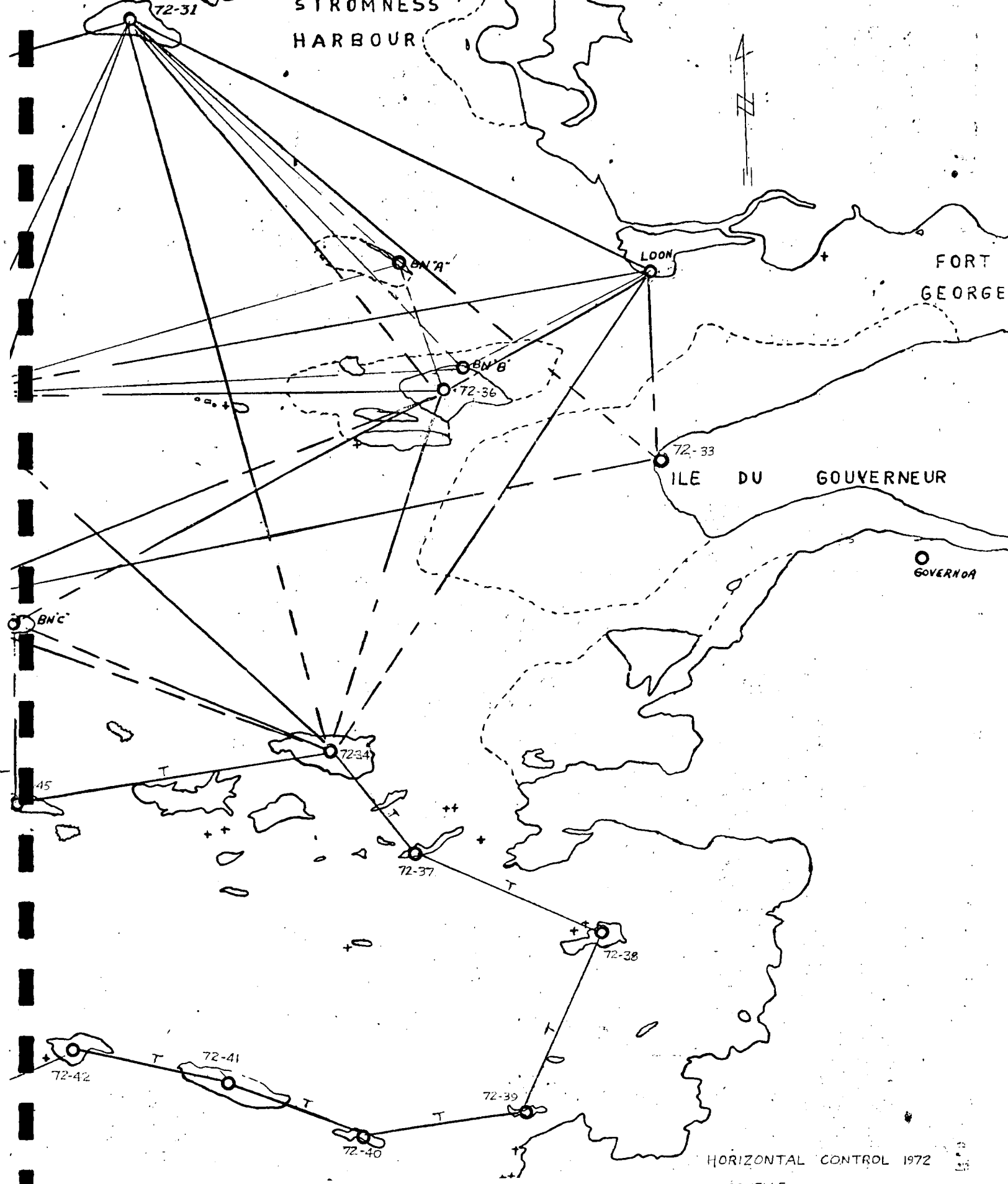
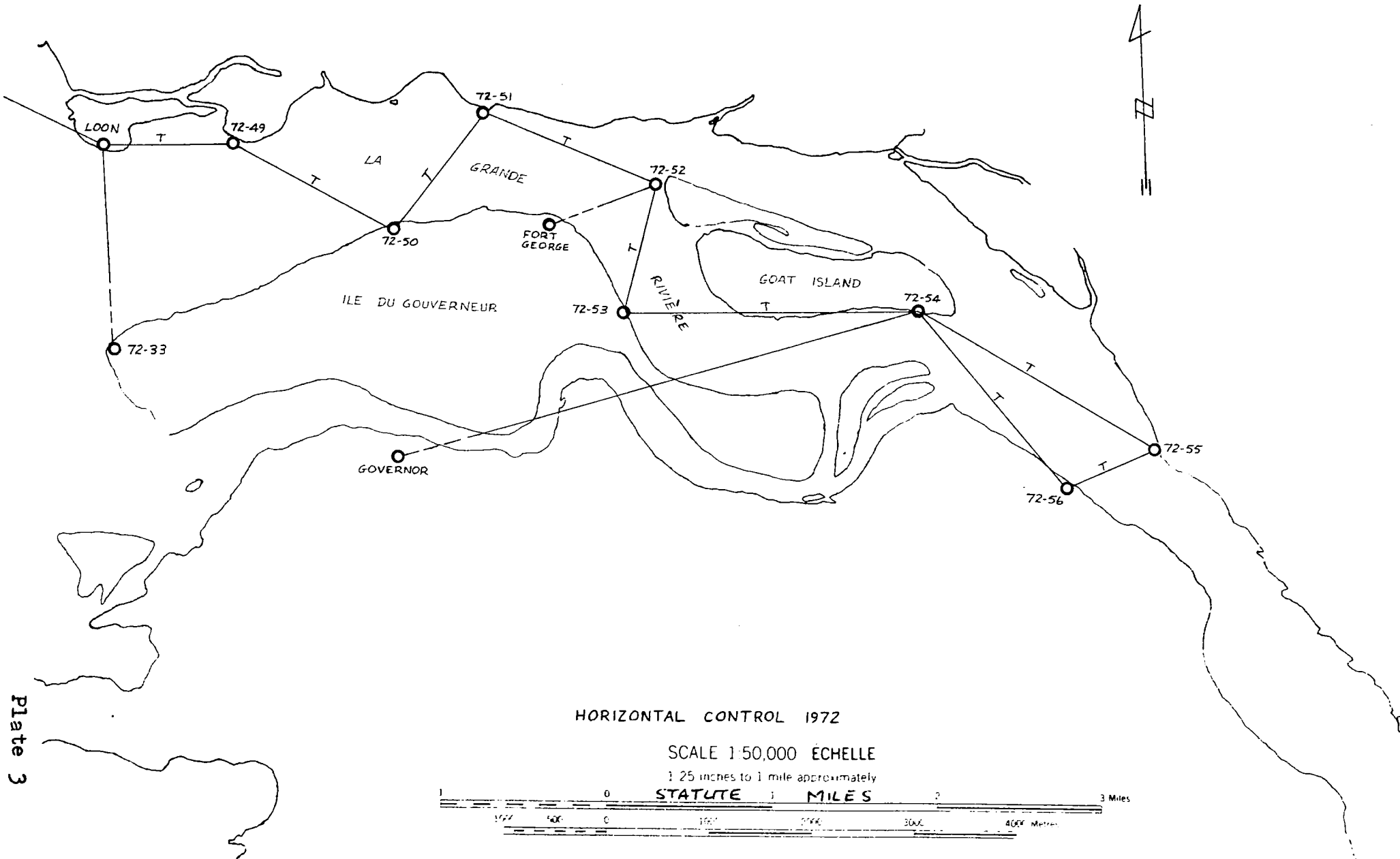

72-31
STROMNESS
HARBOUR
BN'A'
LOON
FORT
GEORGE
BN'B'
72-36
72-33
ILE DU GOUVERNEUR
GOVERNOA
BN'C'
7234
45
72-37
72-38
72-41
72-42
72-39
72-40
HORIZONTAL CONTROL 1972
SCALE 1:50,000 ÉCHELLE
1.25 inches to 1 mile approximately
STATUTE MILES
1000 500 0 1000 2000 3000 4000 Metres

Plate 2



HORIZONTAL CONTROL 1972

SCALE 1:50,000 ÉCHELLE

1.25 inches to 1 mile approximately

1 0 STATUTE 1 MILES 2 3 Miles

1000 500 0 1000 2000 3000 4000 Metres

Plate 3

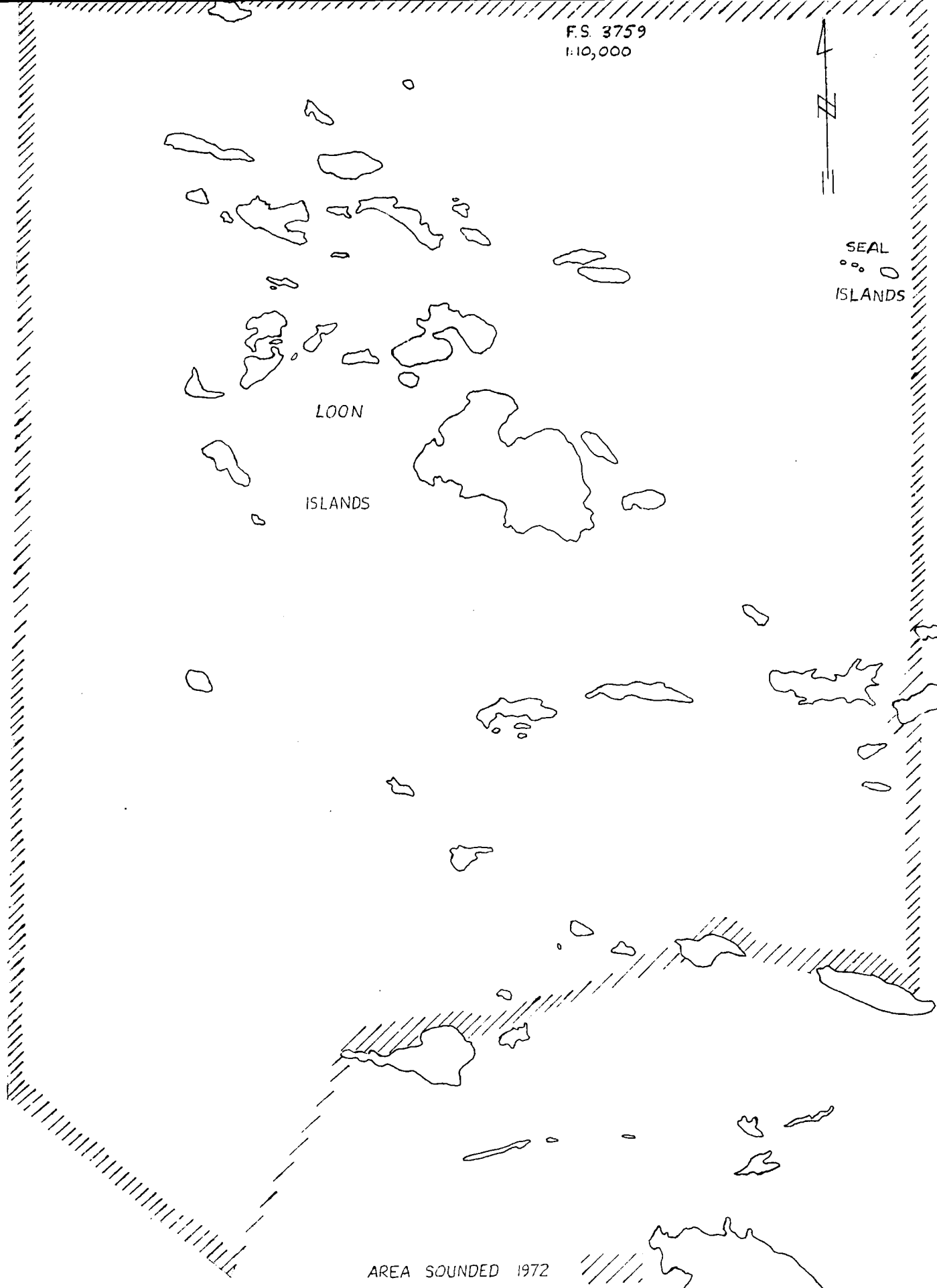

F.S. 3759
1:10,000
SEAL
ISLANDS
LOON
ISLANDS
AREA SOUNDED 1972
SCALE 1:50,000 ECHELLE
1.25 inches to 1 mile approximately
STATUTE MILES
3 Miles
1000 500 0 1000 2000 3000 4000 Metres

Plate 4

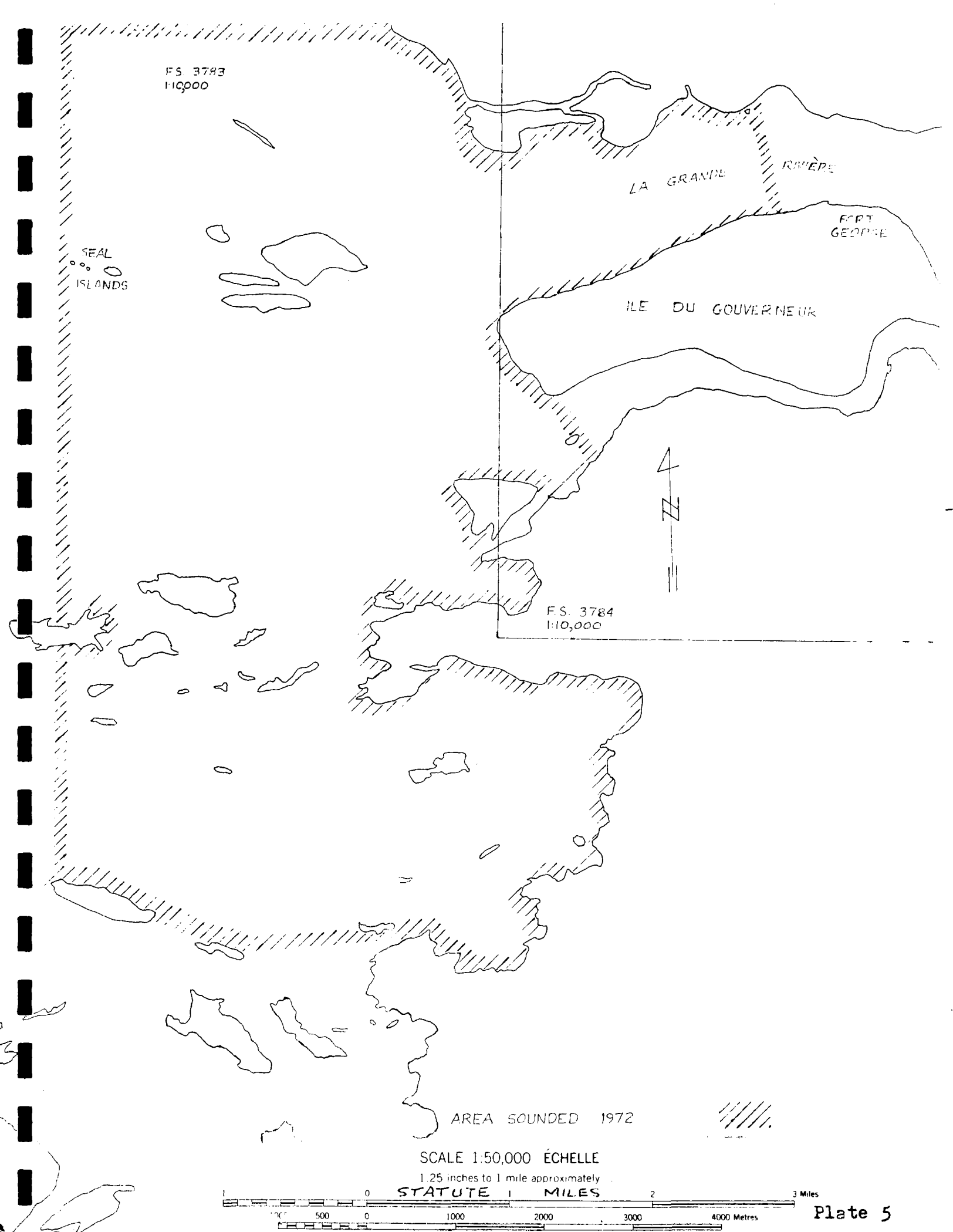

F.S. 3783
1:10,000
SEAL
ISLANDS
LA GRANDE RIVIÈRE
FORT GEORGE
ILE DU GOUVERNEUR
N
F.S. 3784
1:10,000
AREA SOUNDED 1972
SCALE 1:50,000 ÉCHELLE
1.25 inches to 1 mile approximately
STATUTE MILES
3 Miles
500
1000
2000
3000
4000 Metres

Plate 5

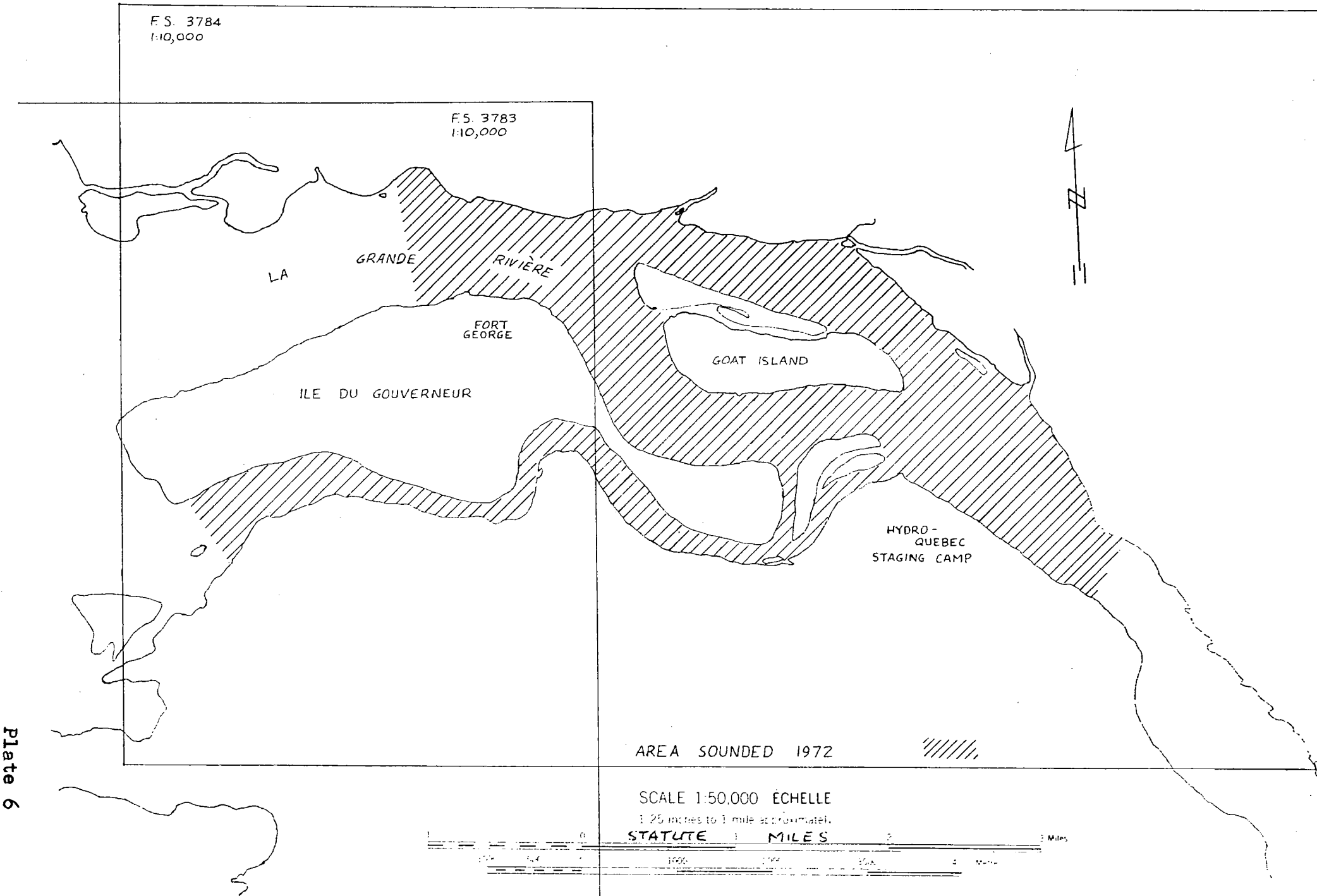

F.S. 3784
1:10,000
F.S. 3783
1:10,000
LA
GRANDE
RIVIÈRE
FORT
GEORGE
ILE DU GOUVERNEUR
GOAT ISLAND
HYDRO-
QUEBEC
STAGING CAMP
AREA SOUNDED 1972
SCALE 1:50,000 ÉCHELLE
1.25 inches to 1 mile approximately.
STATUTE MILES
0
1
2
3 Miles

Plate 6

WATER LEVEL GAUGING PROGRAM

JAMES BAY SURVEY

CENTRAL REGION

1972

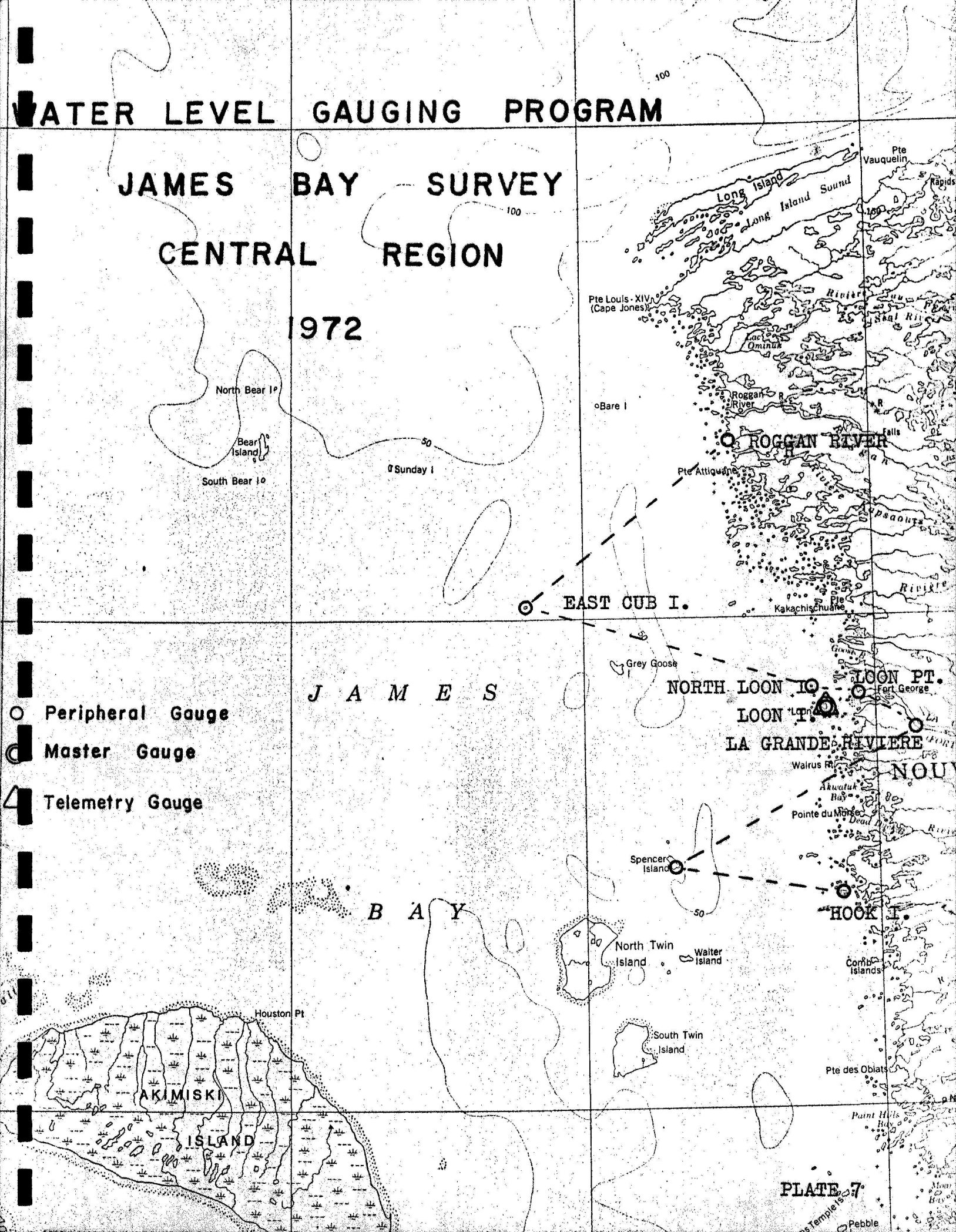


PLATE 7