The Canadian Hydrographic Service

Central Region

Final Field Report

FINAL FIELD REPORT
P.C.S.P. SURVEY
VISCOUNT MELVILLE SOUND
PROJECT NUMBER 5452-7230

E. F. THOMPSON

Ocean and Aquatic Sciences
Fisheries and Marine Service
Department of the Environment
Burlington, Ontario

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SUMMARY

The 1978 Arctic Survey Project instructions required the field component:

1. To gather bathymetric data at regular intervals for the construction and general improvement of navigational charts of eastern Viscount Melville Sound.

2. To gather depth information at regular and closely spaced intervals over areas designated as shipping routes through eastern Viscount Melville Sound.

3. To gather depth information which will augment the data on the 1:50,000 field sheets of Bridport Harbour and approaches, and Skene Bay.

4. To gather depth information on the channel between Byam Martin Island and Melville Island for a 1:50,000 field sheet.

5. To gather tidal information in Viscount Melville Sound.

6. To assist and support the Gravity and Geodynamics Division of the Department of EM&R in obtaining gravity readings over the survey area.

The above projects were completed with a total of 9067 spot soundings taken and 1294 gravity stations occupied.

Four 206B Jet Ranger helicopters were utilized with a total of 1199 hours used along with two tracked vehicles (Bombi and CF-237).

The season was a complete success, extending from February 20 to April 29.

PERSONNEL

NAME	TITLE	DURATION
E. F. Thompson	Hydrographer-in-Charge	Feb. 20 - April 29
A. Welmers	Hydrographer, Senior Assistant	Feb. 20 - April 21
R. Treciokas	Hydrographer	Feb. 24 - April 26
M. Powell	Hydrographer	Feb. 27 - April 24
D. Melrose	Hydrographic Term Student	Feb. 20 - April 24
H. Pulkinnen	Hydrographer (Contract)	March 3 - April 29
P. Millette	Electronic Technician	Feb. 27 - April 29
A. Raatikainen	Gas Engineer	Feb. 20 - April 29
B. Briggs	Tracked-Vehicle Driver	Feb. 20 - April 26
F. Voegeli	Tracked-Vehicle Driver	Feb. 20 - April 29
F. Spidalievi	Chief Cook	Feb. 27 - April 26
D. Chamberlin	Assistant Cook	Feb. 24 - March 3
J. Gagner	Assistant Cook	Mar. 17 - April 29

EARTH PHYSICS BRANCH (EM & R) OTTAWA

D. Halliday	OIC - Gravity	March 3 - April 10
S. Williams	Gravity Observer	March 3 - April 10
P. Pehme	Gravity Observer	March 3 - April 24
A. Camfield	Geomagnetic Division	Mar. 31 - April 13
M. Drury	Geomagnetic Division	Mar. 31 - April 13

VISITORS

F. Hunt	P.C.S.P. Field Operations Manager	March 1 - March 11
I. Styles	Rep. from Inland tracked Equipment	March 5 - March 18
M. Barnes	Phoenix Ventures (Arctec Engineer)	Mar. 31 - March 29
M. Dunne	Phoenix Ventures (Arctec Engineer)	Mar. 21 - March 29
G. Comfort	Phoenix Ventures (Arctec Engineer)	Mar. 27 - March 29
D. Grant	Petro-Canada	Mar. 37 - March 29

NAME	TITLE	DURATION
R. Clark	Phoenix Ventures	Mar. 26 - March 29
G. Chauffers	Phoenix Ventures	Mar. 26 - March 29
J. Ponslet	Phoenix Ventures	Mar. 26 - March 29
P. Asher	Phoenix Ventures	Mar. 26 - March 29
J. Beke	Phoenix Ventures	Mar. 26 - March 29
OKANOGAN PERSONNEL		
E. Laurie	Pilot	March 5 - March 25 Apr. 12 - April 23
B. Thurston	Pilot	March 8 - April 22
S. Kobayashi	Pilot	March 5 - March 21
J. Franklin	Pilot	March 8 - April 1
B. Holt	Pilot	April 1 - April 22
R. Brading	Pilot	Mar. 23 - April 22
B. Batchelor	Pilot	Mar. 25 - April 12
D. Mctighie	Engineer	
M. McConechy	Engineer	March 8 - April 1
G. Webber	Engineer	March 8 - March 21
"Dirty" Harry	Engineer	March 8 - March 28
P. Ryan	Engineer	Mar. 29 - April 22
G. McDougall	Engineer	April 22
J. Lesage	Pilot	Mar. 21 - March 21
E. Egav	Okanagan Field Operation, Supervisor	March 8 - March 11
MARINAV		
F. McClean	Marinav Coordination	March 1 - April 20
J. Ross	Marinav Technician	March 1 - April 20

CHRONOLOGY OF EVENTS

February 20	Advance party departed Burlington
February 21	Arrived in Resolute
February 22	Flew reconnaissance flight to locate campsite and determine ice conditions for DC-3 (Supplied fuel caches for helicopters)
February 23	4 DC-3 loads of gear sent to campsite
February 24	Established camp 6 miles west of Cape Gillman on the southern tip of Byam Martin Island.
February 27	All staff at Resolute Polar bear sighted on campsite airstrip.
March 1	Decca chain on the air
March 4	Dave Halliday arrived at Byam Martin camp. Three Okanogan helicopters(CYKZ, OKU and BQZ) arrive at our camp.
March 6	Helicopter BQZ departed. Camp to Beverley Inlet to assist other machines there. Radio beacon erected.
March 7	Installed one Aanderaa tide gauge and one T.A.T.S. sensor at Byam Martin camp.
March 8	Recovered 3 control points on Byam Martin Island. Established bar check ± 4 miles south of camp. Helicopters CJC, POM and BQZ arrived in camp.
March 11	Helicopter YKZ departs to Resolute. First helicopters (POM and CJC) sounding.
March 12	Zeroed Decca Chain with helicopter CJC and also Green Slave maximum reading flown. Anderaa tide gauge installed at Steffanson Island.
March 14	Checked Decca readings at several existing control points on north shore. Mr. K. Stylles, B. Briggs and P. Millette travel to Rae Point to outfit tracked-vehicle, Nodwell CF-23.

March 15	Nodwell CF-23 arrives at Byam Martin Camp
March 20	Two gravity meters unserviceable
March 21	Helicopter CJC made first contact with Phoenix Ventures tractor-train ± 12 miles north Byam Martin Island.
March 25	M. Barnes and M. Dunne (Arctec Engineers) arrive at Byam Martin camp.
March 26	Pulled engine out of CJC. BQZ has 100 hour inspection Phoenix Ventures tractor-train arrives at Byam Martin camp.
March 27	CJC ready for sounding at 14:30 hours
March 29	Phoenix Ventures departed our camp en route to Bridport Inlet.
March 31	OKU to Rae Point to change transmission and also 100 hour inspection. Adrian Camfield and Malcolm Drury, Division of Geomagnetism, arrived.
April 2	Nodwell CF-23 began sounding operations.
April 5	CJC started sounding at Bridport using Mini-Ranger III to obtain position.
April 7	Nodwell CF-23 at Rae Point.
April 10	D. Halliday, S. Williams, Earths Physics, departed.
April 12	Bombi out sounding.
April 13	Adrian Camfield and Malcolm Drury departed.
April 18	Tide gauges at Steffanson Island and Byam Martin camp retrieved.
April 22	CJC, BZQ, POM depart for Resolute. Start dismantling camp.
April 23	OKU depart for Resolute.
April 24	All gear at Resolute.
April 29	All personnel at Burlington

NARRATIVE

PLANNING AND PREPARATIONS

As in the past years, Ocean and Aquatic Sciences received aircraft support and logistical support from the Polar Continental Shelf Project (E M&R). The aircraft allotment consisted of 1200 helicopter hours on four 206B aircraft plus fuel, 85 hours on Twin Otter plus fuel and 275 hours on a DC-3 freighter aircraft plus fuel. The helicopters were used as survey vessels while the fixed wing aircraft was used for camp and fuel transportation. E M&R also supplied all fuel for the two ground vehicles and camp, one manned Decca 6f positioning system, miscellaneous camping equipment, wages for two cooks and a labourer, and logistical support from Polar Shelf in Resolute.

Existing 1:250,000 topographical maps were blown up to survey scale for shoreline by Headquarters in Ottawa.

Control data for Viscount Melville Sound was obtained from our Geodesy Section in Ottawa.

Field Sheet base plots and Decca lattices for the sounding area were drawn up on our Gerber plotter in Burlington.

All field equipment was transported to Montreal via truck during the first part of February for shipment to Resolute via commercial aircraft by February 20.

SURVEY OPERATIONS

GENERAL

An advance group of six Ocean and Aquatic Sciences personnel arrived in Resolute on February 21. All remaining staff arrived on February 27.

On February 22, a reconnaissance flight was made over the Viscount Melville Sound area, and a campsite was chosen on the Southwest side of Byam Martin Island. This position was picked due to the proximity of the area where the tracked vehicles worked (Byam Channel), mid-point of our overall work area and made an ideal location for the Decca Monitor site.

The camp was established in eleven days. The camp consisted of eight parcolls, one longhouse tent and three plywood sheds.

On March 4, Dave Halliday of Earth Physics Branch, Ottawa, and his two co-op students arrived at Byam Martin camp.

The four Okanogan helicopters were late arriving at our camp due to mechanical problems with one machine, and weather delays. All our electronic equipment was installed at Byam Martin instead of Resolute. The four helicopters were equipped with Decca 6f receivers. A Mini-Ranger receiver and NavBox was later added to one of the machines for doing the surveys of the approaches to Bridport Inlet, Skene Bay and Byam Channel.

On March 11, the 1978 sounding operation was commenced.

Two Aanderaa pressure gauges were deployed (Byam Martin Camp, Stephanson Island) along with one TATS (Byam Martin Camp).

The Decca 6f chain (owned by PCSP, and maintained by Marinav) was "on the air" March 1, and zeroed and calibrated by March 12.

The Phoenix Ventures track train chartered by Arctec, (who were carrying out a government unsolicited proposal to measure the thickness of the ice along a predetermined route between Bridport Inlet and Resolute in conjunction with carrying out tests on new equipment and techniques), made a scheduled stop at our camp during March 26 - 20. During this time frame, they utilized our runway to fuel and resupply the train from chartered aircraft.

During the period of March 31 to April 13, Mr. A. Camfield, Earth Physics Branch, Geomagnetic Division, used our establishment as a base camp to do some magneto-telluric experiments with new recording apparatus and techniques, in preparation for their 1979 trip to the North Pole.

The sounding operation was closed out on April 22.

All camp gear, survey equipment and personnel were removed to Resolute Bay from Byam Martin by 23:00 hrs April 23.

Storage of equipment and removal of stuff to Burlington was achieved before/on April 29.

Sounding Operation

All helicopters were at Byam Martin by/or on March 11. After zeroing the Decca chain, calibrating Mini-Ranger and Decca aircraft receivers and establishing the three tide gauges, sounding work commenced March 12 and continued to April 22.

Sounding program consisted of:

1. "SKENE BAY TO BYAM MARTIN ISLAND", Field Sheet No. 3984 (1:200,000) was surveyed on a 6 km grid. All shallow indications were surveyed on a 1 km grid. The proposed corridor from Bridport to Resolute lying in the boundaries of the field sheet was surveyed on a 2 km grid.

2. "MILNE POINT TO LOWTHER ISLAND", Field Sheet No. 3985 (1:200,000) was surveyed on a 6 km grid. All shallow indications were surveyed on a 1 km grid. The proposed corridor from Bridport to Resolute lying in the boundaries of the field sheet was surveyed on a 2 km grid.

3. "APPROACHES TO BRIDPORT", Field Sheet No. 3982 (1:50,000) was surveyed on a grid which produced a ½ km grid in a corridor up to the entrance when the 1977 and 1978 field is combined.

4. "SKENE BAY", Field Sheet No. 3944 (1977) (1:50,000) additional soundings we obtained in the entrance between SKENE BAY AND BEVERLEY to better define the lay of the bottom.

5. "NELSON GRIFFITHS POINT TO CONSETT HEAD", Field Sheet No. 3986 (1:50,000) was surveyed on a ½ km grid. Approximately 50% of the desired area was covered. This area was surveyed by helicopter, utilizing the NavBox, and the tracked vehicles.

All soundings were obtained using an Edo 9040 sounder, calibrated daily to a true depth of 30 metres.

Tides

Two Aanderaa tide gauges were installed in the sounding area:
- Byam Martin Island (Base Camp)
- Stefansson Island

Besides these gauges, the TATS system was deployed at our base camp. This system was to be used to provide the survey with real time tidal data. Due to the cold environment and malfunctions in the equipment, the system failed and provided us with zero data.

Positioning Systems

The four 206 B helicopters were fitted with Decca 6f receivers and antennas. One of the helicopters was also fitted with a Motorola Mini-Ranger III positioning system and NavBox.

The Decca 6f was used in hyperbolic mode, and the Mini-Ranger was used in Range-Range and Range-Bearing modes. Both systems worked well, with little down time.

The Bombi and CF-23 were both fitted with Motorola Mini-Ranger III positioning systems.

For a detailed report on Decca adjustments, see Appendix.

Electronic Equipment

As stated earlier, the Edo sounders and both positioning systems worked well with little down time credited to their malfunctions.

All the radios worked well - CH25, PYE, and PT 400's and 200's.

The main radios used for communication between the base and helicopters were the CH25s. The two reasons for this were:

1. In most cases the machines were too far away to work with the PYE or PTs.

2. The PYE and PTs interfered with the Decca more than the CH25s.

The PTs were used as a communication link between tracked vehicles and the base camp.

This season two fifty foot towers were erected. One tower was used for radio antennas and the other tower was used as the aircraft radio beacon. The use of the towers increased the range at the radios and radio becon substantially.

Tracked Vehicles

This was the third season for the two tracked vehicles CF-23 and Bombi. They were both used to obtain soundings in Byam Channel.

Both vehicles were outfitted with a Mini-Ranger III positioning system, Edo sounder, spiked transducer, and NavBox with print out.

I feel the work accomplished by the vehicles showed that tracked vehicle operations are feasible even though we encountered many mechanical and electronic problems.

The CF23 was used one week for sounding. During this time frame, four axles were broken so I retired the machine at Rea Point. Besides this fault, the machine worked well.

The Bombi was used for two weeks after the CF-23 was retired. The machine functioned well for the two weeks.

Both machines had problems with the spikes. The original spikes used for the last two years failed. After some experiments and alterations by our field technician, the spikes produced in 1978 worked.

The tracked vehicles obtained 761 soundings.

Both vehicles need a fair amount of work done to them before 1979 survey season.

Helicopter NavBox

This season a NavBox was installed in a helicopter and linked to the Mini-Ranger III positioning system.

This was an experiment to see if the NavBox would improve the ease and quantity of work.

From our tests this did not happen. The pilot found it harder to follow the lines and to land on desired coordinates. The main reason for this was that the NavBox did not update new values fast enough.

RECOMMENDATIONS FOR 1978

As a whole, the 1978 survey went well with all objectives completed.

I would like to make one recommendation for 1979:

1. In 1978, as 1977, we were plagued with a lot of wind. It was necessary to change our runway area on numerous occasions. We were lucky this year that alternative locations existed. I would like to recommend that an apparatus such as a harrow be purchased. This will allow the drifts which form on the runway during high winds to be dispersed before they become a hindrance to aircraft.

ACKNOWLEDGEMENTS

I feel that this year's Arctic survey was a complete success.

My thanks go to all the support services at C.C.I.W; Accounts, Stores, Tidal Section and Electronic support.

The hydrographers, electronic technician, cooks, vehicle drivers, Gravity personnel, Marinav personnel, and gas engineer put out 100% plus on this survey. I feel this was the main factor which caused the survey to be so successful.

As in the past, our survey was supported by Polar Shelf with aircraft, fuel and miscellaneous supplies. This amounts to quite a sum. I would like to thank Polar Shelf for their support and expecially Mr. F. Alt and staff at Resolute.

This year the helicopter contract was filled by a new company. After an initial break in period, the pilots and engineers did a good job. I would like to thank them for their cooperation.

APPENDIX 1

STATISTICS

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

YEAR 1978 FROM February 20 TO April 29

Establishment Arctic Survey

H.I.C. E. Thompson

	Project Number	Project Number	Project Number	Project Number	
Project Name					
Project Name					
Proèect Name					
Project Name					
Resources:					TOT.
Number of Hydrographers *	4/260				
Number of Scientists *					
Number of Electronic Technicians *	1/62				
No. of Student Assistants and Casuals *	1/64				
No. of Support Personnel (Ship's Crew, Etc.) *	6/360				
Total Personnel *	12/746				
Number of Ships					
Number of Launches					
Number of Land Vehicles	2				
Number (and type) of Aircraft 206B	4				
Number of Minor Support staff					
Other (spe€ify)					

* 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 Hydrographers spent 100 man days on the project).

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

YEAR 1978 FROM February 20 TO April 29

Establishment: Arctic Survey H.I.C.: E. Thompson	Project Number	Project Number	Project Number	Project Number
Time:				
Total operational days	69			
Days actual field work	37			
Days lost (weather	6			
Days lost (Sat., Sun., Holidays)				
Days lost (equipment failure)	2			
Days lost in transit	2			
Days lost in port for supplies, bunker, etc.				
Days lost - other causes Refurbishing Equipment setting up camp and dismantling camp.	22			
Total man days in period (staff)	260			
Total man days worked (staff)	260			
Man days: - (staff)	111			
(a) Sounding	2			
(b) Shoal Examinations				
(c) Wharf Surveys				
(d) Oceanography				
(e) Geophysics				
(f) Tides & Water Levels	2			
(g) Collecting bottom samples				
(h) Horizontal Control				
(i) Shorelining & Low Watering				
(j) Data Processing & Office Admin.	73			
(k) Sailing Directions				
(l) Place Names				
(m) Current Observations				
(n) Photo-Ident.				
(o) Others (specify)				
Setting up camp	66			
Calibrations	6			

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

YEAR 1978 FROM February 20 TO April 29

Establishment: Arctic Survey H.I.C.: E. Thompson	Project Number	Project Number	Project Number	Project Number
Sounding (Linear Nautical Miles/KM):				
Ship Sounding				
Launch Sounding				
Other (specify)				
Total Sounding				
Reconnaissance (track) sounding				
Area Sounded (N.M.^{2}) (Km^2)				
Spot soundings	9067			
Shoals Examined:				
Shoal Examinations (ship)				
Shoal Examinations (launch)				
Shoal Examinations (sweep)				
Shoal Examinations (other) specify				
Shoal Examinations (total)				
Shoal Examinations (spot sounding)	3			
Navigational Aids:				
Shore Aids Positioned (including ranges)				
Floating Aids Positioned				
Navigational Ranges Sounded				
Navigational Ranges Drifted				
Sector Ranges Positioned				
Navigational Aids Established				

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

YEAR 1978 FROM February 20 TO April 29

Establishment Arctic Survey H.I.C. E. Thompson	Project Number	Project Number	Project Number	Project Number
Shore Control:				
Signals Built				
Signals Re-built				
Towers Built				
Number of Stations Occupied				
Number of Stations Re-occupied				
Number of Stations Permanently Marked				
Distances Traversed (N.M.) (KM)				
Number of Elevations Measured				
Number of Heights Measured				
Number of Stations Photo. Ident.				
Other (specify)				
Calibrations:				
No. of Calibration Stations				
Lambda, Decca, Hi-Fix, Mini-Fix,	36			
Loran, Decca Navigator, ____________				
______________________				
No. of E/C's Marked and Referenced				
Mini-Ranger Calibration Stations	10			

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

YEAR 1978 FROM February 20 TO April 29

Establishment Arctic Survey H.I.C. E. Thompson	Project Number	Project Number	Project Number	Project Number
Tide and Current Data:				
Recording Gauges Established	3			
Recording Gauges Recovered				
Staff Gauges Established				
Bench Marks Recovered				
Bench Marks Established				
Bench Marks Levelled				
Distance Levelled (N.M.) (KM)				
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 Profiles - survey (N.M.) (KM)				
Seismic Profiles - track (N.M.) (KM)				
Number of Water Samples				
Gravity Stations Occupied	1294			

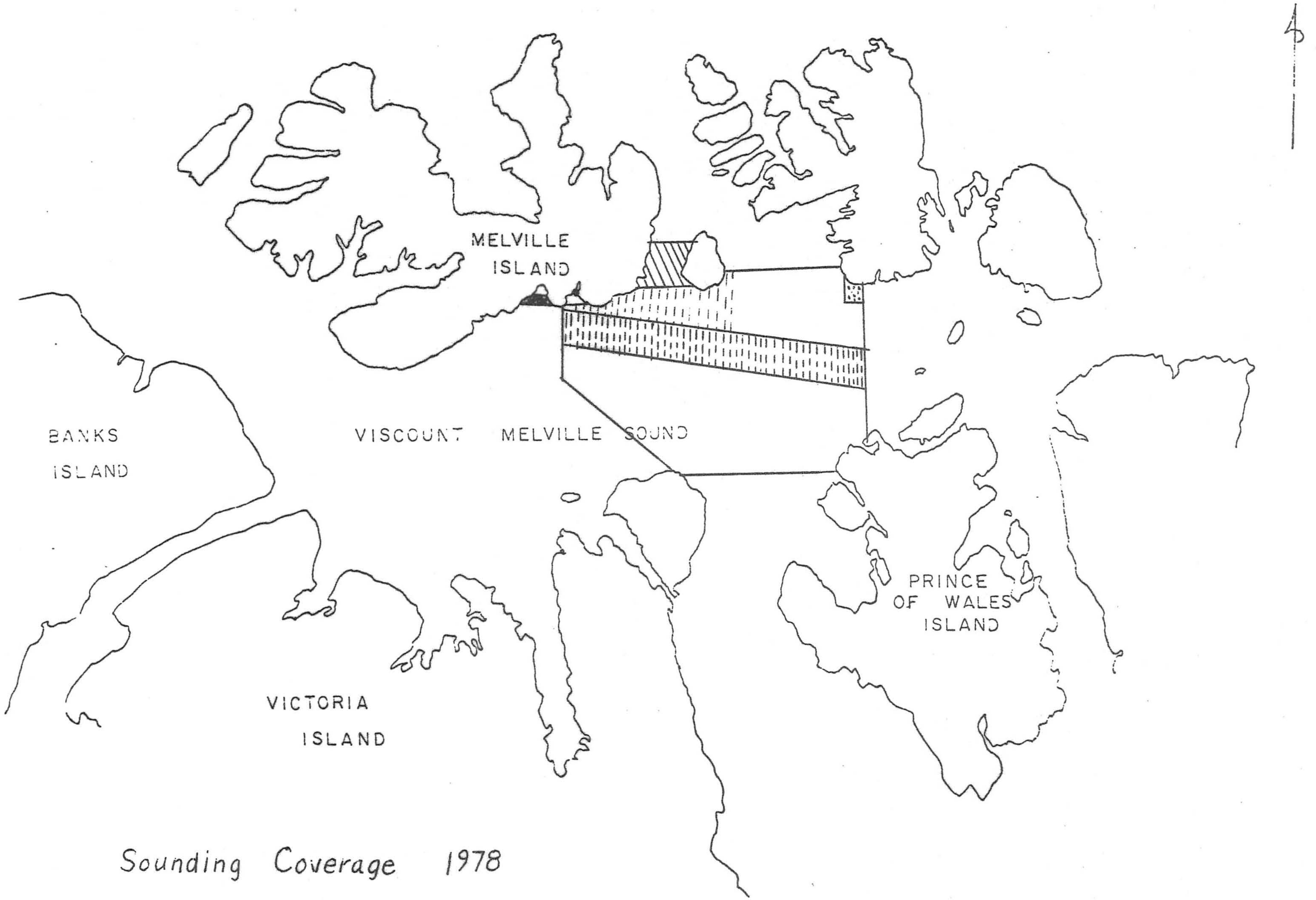
FIELD REPORT STATISTICS:- MONTHLY .... PROJECT .... FINAL FIELD ...X....

YEAR 1978 FROM February 20 TO April 29

Establishment Arctic Survey H.I.C. E. Thompson	Project Number	Project Number	Project Number	Project Number
Bottom Samples:				
Number of Bottom Samples (grab)				
No. of Bottom Samples (underway)				
No. of Bottom Samples (armed lead)				
No. of Cores				
No. of Samples Retained				
Miscellaneous:				
No. of Dangers to Navigation, rocks, ruins, pilings, etc., fixed				
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	1199			

APPENDIX 2

SKETCHES



Sounding Coverage 1978

6 KM. GRID
2 KM. GRID
1 KM. GRID
250 M. GRID
500 M GRID

Scale 1: 4,000,000

APPENDIX 3

DECCA 6F CHAIN PATTERN ADJUSTMENTS

In 1978 the P.C.S.P. Decca 6F chain was set up as follows:

GREEN - HEARNE POINT
MASTER - STEFANSSON ISLAND
RED - HAMILTON ISLAND

This report covers our mean results when calibrating the system on three different occasions.

The procedure followed was to obtain actual readings on control stations and comparing the readings with computed readings using a theoretical speed of propogation of 299600 km/s. From the results we computed new speeds of propagation as: GREEN - 299529 km/s.
RED - 299566 km/s.

APPENDIX 4

GEOLOGY

		MASTER	RED	GREEN
		STEFFANSSON IS.	HAMILTON IS.	HEARNE POINT
Geographic Co-Ords.	Lat Long	73 45 35.880 105 17 40.710	74 11 28.762 99 10 13.280	74 42 46.710 110 38 48.847
U.T.M. Co-Ords	N E	8,185,122.34 490,802.13	8,233,232.494 494,819.503	8,291.458.130 510,392.080
Zone		13	14	12
Baseline Length			194,747.23 m	193,984.30 m
Transmitted Freq. kHz		88.980	118.640	133.470
Comparison Freq. kHz			355.920	266.940
Speed of Propagation km/s			299.600	299.600
Lane Width			420.88 m	561.175 m
Total number of lanes			462.71	345.69
First Lane			A00	A30
Last Lane			J06.71	J33.68

RED PATTERN ADJUSTMENT

STATION	Ro	Rc	(Rc-Ro)	RcX + Y + (Rc-Ro) = 0
H-33	362.94	362.88	- .06	363X + Y - .06 = 0
H-27	414.53	414.47	- .06	414X + Y - .06 = 0
738	188.17	188.21	+ .04	188X + Y + .04 = 0
737	194.17	194.22	+ .05	194X + Y + .05 = 0
736	208.27	208.27	+ .00	208X + Y + .00 = 0
735	216.70	216.63	- .07	216X + Y - .07 = 0
734	223.27	223.20	- .07	223X + Y - .07 = 0
H-34	350.70	350.70	+ .00	351X + Y + .00 = 0
H-28	435.32	435.26	- .06	435X + Y - .06 = 0
H-29	454.28	454.28	+ .00	454X + Y + .00 = 0
GO	457.60	457.50	- .10	458X + Y - .10 = 0
BAR	458.88	458.79	- .09	459X + Y - .09 = 0
RED EXTENSION	462.77	462.68	- .09	463X + Y - .00 = 0
KRAB	447.54	447.42	- .12	447X + Y - .12 = 0
A-213	332.39	332.33	- .06	332X + Y - .06 = 0
740	207.63	207.46	- .17	207X + Y - .17 = 0
A-61	100.78	100.85	+ .07	101X + Y + .07 = 0
A-63	124.84	124.83	- .01	125X + Y - .01 = 0
A-59	66.04	65.94	- .10	66X + Y - .10 = 0
A60	84.17	84.07	- .10	84X + Y - .10 = 0

Rc^2 = 2059270.00

Rc = 5788.00

(Rc-Ro) = -1.00

Rc(Rc-Ro) = (363X - .06) + (414X - .06) + (188X + .04) + (194X + .05) +
(208X + .00) + (216X - .07) + (223X - .07) + (351X + .00) +
(435X - .06) + (454X + .00) + (458X - .00) + (459X - .09) +
(463X - .09) + (447X - .12) + (332X - .06) + (207X - .17)
(101X + .07) + (125X - .01) + (66X - .10) + (84X - .10) =
-332.94

Rc(Rc-Ro) = -332.94

o = 20

RED PATTERN ADJUSTMENT

I = 2059270x + 5788y - 332.94 = 0

II = 5788x + 20 y - 1.00 = 0

IIa = 1675047.2x + 5788y - 289.40 = 0

x = 0.00011320

y = +0.02

Speed of Propoagation = V

V = 299600 x .999886680

V = 299566

STATION	Rc	Rc (1+X)	Rc (1+X) + Y = Rc'	Ro	Rc-Ro	Rc' - Ro
H-33	362.88	362.92	362.94	362.94	- .06	- .00
H-27	414.47	414.52	414.54	414.53	- .06	+ .01
738	188.21	188.23	188.25	188.17	+ .04	+ .08
737	194.22	194.24	194.26	194.17	+ .05	+ .09
736	208.27	208.29	208.31	208.27	+ .00	+ .04
735	216.63	216.65	216.67	216.70	- .07	- .03
734	223.20	223.23	223.25	223.27	- .07	- .02
H-34	350.70	350.74	350.76	350.70	+ .00	+ .06
H-28	435.26	435.31	435.33	435.32	- .06	+ .01
H-29	454.28	454.33	454.35	454.28	+ .00	+ .07
GO	457.50	457.55	457.57	457.60	- .10	- .03
BAR	458.79	458.84	458.86	458.88	- .09	- .02
RED EXT.	462.68	462.73	462.75	462.77	- .09	- .02
KRAB	447.42	447.47	447.49	447.54	- .12	- .05
A-213	332.33	332.37	332.39	332.39	- .06	+ .00
740	207.46	207.48	207.50	207.63	- .17	- .13
A-61	100.85	100.86	100.88	100.78	+ .07	+ .10
A-63	124.83	124.84	124.86	124.84	- .01	+ .02
A-59	65.94	65.95	65.97	66.04	- .10	- .07
A-60	84.07	84.08	84.10	84.17	- .10	- .07

GREEN PATTERN ADJUSTMENT

STATION	Rc	Ro	(Rc-Ro)	RcX + Y + (Rc-Ro) = 0
H-33	85.11	85.08	+ .03	85X + Y + .03 = 0
H-27	76.45	76.34	+ .11	76X + Y + .11 = 0
738	140.31	140.27	+ .04	140X + Y + .04 = 0
737	132.03	132.05	- .02	132X + Y - .02 = 0
736	131.94	131.91	+ .03	132X + Y + .03 = 0
735	134.15	134.07	+ 08	134X + Y + .08 = 0
734	134.75	134.58	+ .17	135X + Y + .17 = 0
H-34	97.10	97.05	+ .05	97X + Y + .05 = 0
H-28	62.75	62.79	- .04	63X + Y - .04 = 0
H-29	54.41	54.42	- .01	54X + Y - .01 = 0
GO	49.42	49.43	- .01	49X + Y - .01 = 0
BAR	42.46	42.48	- .02	42X + Y - .02 = 0
KRAB	29.55	29.56	- .01	30X + Y - .01 = 0
A-213	18.32	18.32	- .00	18X + Y - .00 = 0
740	158.61	158.66	- .05	159X + Y - .05 = 0
A-64	191.99	191.96	+ .03	192X + Y + .03 = 0
A-61	216.05	216.09	- .04	216X + Y - .04 = 0
GREEN EXT.	345.72	345.81	- .09	346X + Y - .09 = 0
A-63	196.30	196.15	+ .15	196X + Y + .15 = 0
A-59	297.66	297.75	- .09	298X + Y - .09 = 0
A-60	251.37	251.44	- .07	251X + Y - .07 = 0

Rc^2 = 544051

Rc 2845

(Rc-Ro) +0.24

Rc(Rc-Ro) = (85X + .03) + (76X + .11) + (140X + .04) + (132X - .02) +
(132X + .03) + (134X + .08) + (135X + .17) + (97X + .05) +
(63X - .04) + (54X - .01) + (49X - .01) + (42X - .02) +
(30X - .01) + (18X - .00) + (159X - .05) + (192X + .03) +
(216X - .04) + (346X - .09) + (196X + .15) + (298X - .09) +
(251X - .07) = -5.30

n = 21

GREEN PATTERN ADJUSTMENT

$$I = 544051x + 2845y - 5.30 = 0$$

$$II = 2845x + 21y + 0.24 = 0$$

$$IIa = 385429.76x + 2845y + 32.51 = 0$$

$$x = 0.000238367$$

$$y = -0.04$$

Speed of Propagation = V

$$V = V'(1-x)$$

$$V = 299600 \times .999761633$$

$$V = 299528.86$$

STATION	Rc	Rc (1+x)	Rc (1+x) + y = Rc'	Ro	Rc - Ro	Rc' - Ro
H-33	85.11	85.13	85.09	85.08	+ .03	+ .01
H-27	76.45	76.47	76.43	76.34	+ .11	+ .09
738	140.31	140.34	140.30	140.27	+ .04	+ .03
737	132.06	132.06	132.02	132.05	- .02	- .03
736	131.94	131.97	131.93	131.91	+ .03	+ .02
735	134.15	134.18	134.14	134.07	+ .08	+ .07
734	134.75	134.78	134.74	134.58	+ .17	+ .16
H-34	97.10	97.12	97.08	97.05	+ .05	+ .03
H-28	62.75	62.76	62.72	62.79	- .04	- .07
H-29	54.41	54.42	54.38	54.42	- .01	- .04
GO	49.42	49.43	49.39	49.43	- .01	- .04
BAR	42.46	42.47	42.43	42.48	- .02	- .05
KRAB	29.55	29.56	29.52	29.56	- .01	- .04
A-213	18.32	18.32	18.28	18.32	- .00	- .04
740	158.61	158.65	158.61	158.66	- .05	- .05
A-64	191.99	192.04	192.00	191.96	+ .03	+ .04
A-61	216.05	216.10	216.06	216.09	- .04	- .03
GREEN						
EYT	345.72	345.80	345.76	345.81	- .09	- .05
A-63	196.30	196.35	196.31	196.15	+ .15	+ .16
A-59	297.66	297.73	287.69	297.75	- .09	- .06
A-60	251.37	251.43	251.39	251.44	- .07	- .05

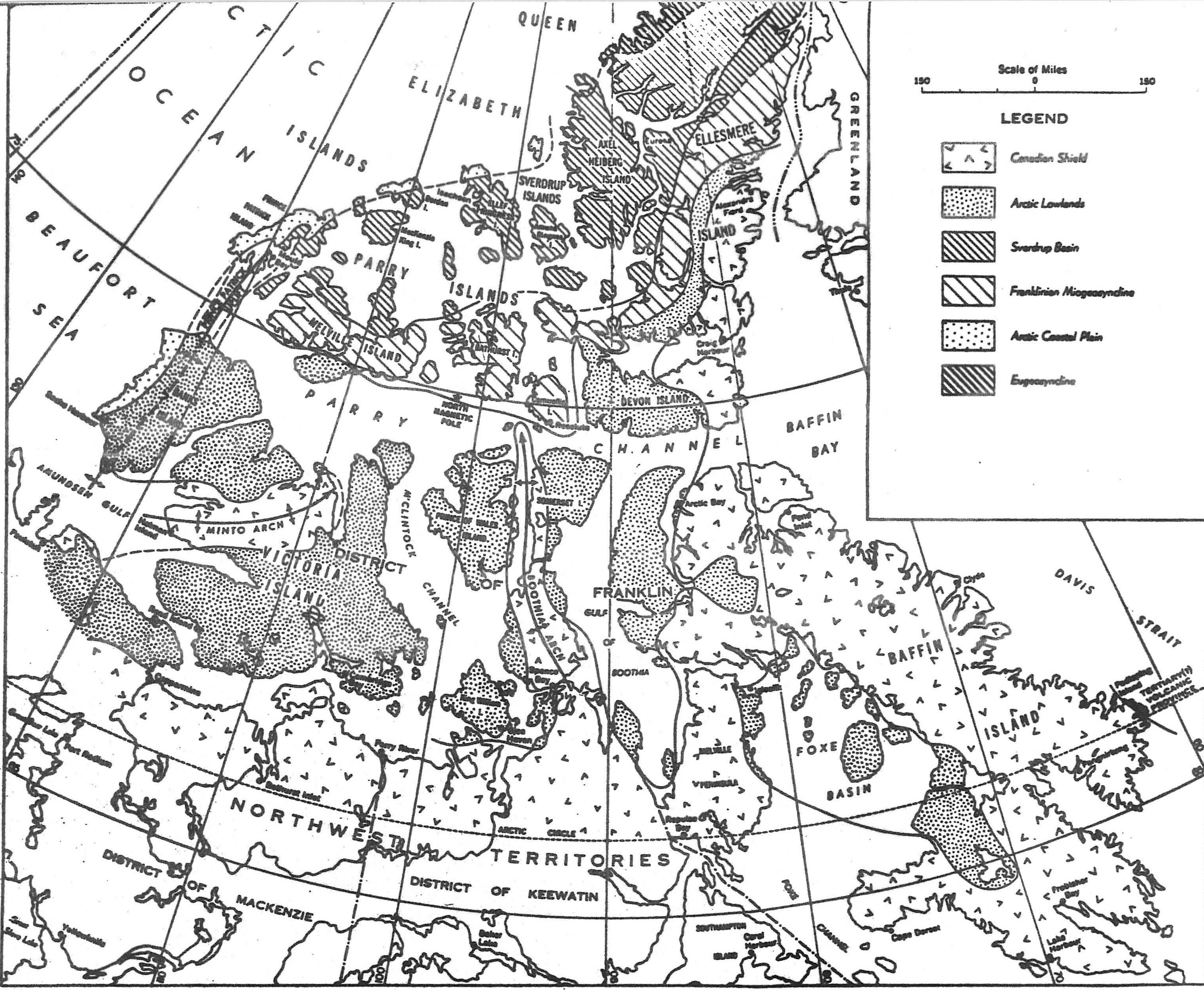
The Viscount Melville Sound area is located in the Canadian Arctic with boundaries 73 N to 76 N latitude and 96 W to II2 W longitude.

The islands in the Viscount Melville Sound area are Melville Island, Byam Martin Island and Bathurst Island which are all in the Franklinian Miogeosyncline region. Prince of Wales Island and Steffansson Island are in the Arctic Lowland region.

The Viscount Melville Sound area is covered mostly by alluvial deposits and there are sedimentary bedrock outcrops. Most of the outcrops are in folded zones or the Franklinian Miogeosyncline. In the Arctic Lowlands which are predominantly flat lying, there is evidence of glacial rebound.

With all this evidence, glaciers must have been the main cause of disturbance in this area. The two main glaciers in this area were the Laurentide and classical Wisconsin.

The predominant rock types of the Viscount Melville Sound area are limestone, sandstone, siltstone and some dolomite and shale.



Scale of Miles
150
0
150
LEGEND
Canadian Shield
Arctic Lowlands
Sverdrup Basin
Franklinian Miogeosyncline
Arctic Coastal Plain
Eugeosyncline
ARCTIC OCEAN
QUEEN ELIZABETH ISLANDS
BEAUFORT SEA
GREENLAND
ELLESMERE ISLAND
AXEL HEIBERG ISLAND
SVERDRUP ISLANDS
PARRY ISLANDS
MELVILLE ISLAND
DEVON ISLAND
PARRY CHANNEL
BAFFIN BAY
AMUNDSEN GULF
MINTO ARCH
VICTORIA ISLAND
DISTRICT OF FRANKLIN
M'CLINTOCK CHANNEL
BOOTHIA ARCH
GULF OF BOOTHIA
DAVIS STRAIT
BAFFIN ISLAND
FOXE BASIN
NORTH MAGNETIC POLE
TERTIARY(?) VOLCANIC PROVINCE
ARCTIC CIRCLE
NORTHWEST TERRITORIES
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
SOUTHAMPTON ISLAND

Franklinian Miogeosyncline

The Franklinian Miogeosyncline (see Fig. I) runs east and west for about nine hundred miles from the west coast of Melville Island through Byam Martin Island, Bathurst Island and Cornwallis Island which are just north of the Arctic Lowlands.

The southern and southeastern limits of Paleozoic folding and faulting are considered to mark the boundary betweem the miogeosyncline and the Arctic Lowlands.

Two periods of earth movements have been detected within the Franklinian miogeosyncline. The first period, here referred to as the early Paleozic movements, took place at about the time of the Siluro-Devonian boundary. The later period, called the mid-Paleozoic movements, was between the Upper Devonian and the Middle Pennsylvanian.

The early Paleozic movements affected a limited part of the Franklinian miogeosyncline and produced northernly structures. The synclines are broad and shallow and are separated by more closely folded anticlines. No thrust faults have been recognized. Normal faults are present on Cornwallis Island and some of these appear to be related to the folded structure in that they trend parallel th the axes of anticlines. On Melville Island and Bathurst Island the Silurian and Devonian rocks are structurally conformable. However, this boundary may mark a period of regression within the Archipelago because no certain Lower Devonian rocks are known.

In the mid-Paleozoic movements, the Cornwallis fold belt interrupts the continuity of the southern part of the Franklinian miogeosyncline. The most deformation occurs between the Upper Devonian and Middle Pennsylvanian. On Melville and Bathurst Island's there are regular folds, with long parallel axes. Overturning of beds is rare and known only in the Canrobert Hills of Melville Island. The intensity of folding increases to the north, and the southern limits of anticlines are usually steepest. It thus appears that the deformative forces acted from north to south.

Melville Island

Melville Island, except for the southern part of the Dundas Peninsula, is part of the Frankliniand Miogeosyncline. This miogeosyncline was the site of a more or less continuous, heavy sedimentation between late Pre-Cambrian and late Devonian times.

Rocks of the Frankinian Miogeosyncline that border the arctic Lowlands are miogeosynclinal in character of carbonates, quartzose, sandstones, and shales are the dominant facies.

The southern and eastern parts of Melville Islands are mainly layered sediments of alluvium, sandstone, shale, gravel, siltstone with small deposits of limestone, conglamerates ans dolomites. On the eastern side of the island there are large deposits of shale and sandstone near the surface. Some of the minerals found are lead, zinc, galena and coal.

Both the south and eastern sides of the island have areas of faulting and folding and the east side has some diapiric intrusions.

The Ordavician, Silurian and Devonian rocks form a concordant sequence on Melville Island. These rocks form more than 3000 feet of carbonate and graptolitic strata. The Devonian limestone which is 15,000 feet thick, is overlain by thick marine and non-marine terrigenous clastic rock. These clastic rocks are covered by 2000 feet of Permian marine sandstone and limestone.

Since emerged strand lines are highest and best developed on the south-eastern part of the island, this part experienced greater post-Wisconsin uplift than the other parts of the island. Most of the rocks on this part of the island are folded.

Since Melville Island has the greatest thickness of sedimentary rock, including possiblesource and reservoir types and the occurrence of large closed structures, this suggests that this area has the greatest potential for petroleum possibilities.

Pan Arctic's Beverly Inlet Oil Rig

Sherard
Bay
Cape Selwyn
Maori Point
Weatherall
Bay
Domett
Point
Boat Beach
Bradford Point
Towson
Bur
Richard
King Poin
Rea Poin
Consett He
Robertson
Point
Nelson
Griffiths Pt.
Little Point
Bridport
Inlet
Skene
Bay
Dealy I.
Palmer Point
Ross Point

Melville Island Legend

Cenozoic

Teriary

30 Beaufort Fm. non-marine sand and gravel, abundant fossil wood.

Mesozoic

Cretaceous

29 Eureka Sound Fm. non-marine sand

28 Gabbro dyke

27 black sandstone and light coloured sand

26 Marine shale, siltstone and fine grained sandstone

25 Kanguk Fm. grey marine shale

24 Hassel Fm. red and brown mon-marine sandstone and sand

23 Christopher Fm. marine shale, siltstone and fine grained sandstone

22 Isachsen Fm. white, yellow and brown non-marine sandstone, grit and conglomerate, coal, varibly lithified

Jurassis and Cretaceous

21 Mould Bay Fm. grey, greenish-grey and brown marine sandstone and sand, grey shale with calcareous concretions

Jurassis

20 Wilkie Point Fm. grey and green sand, dusky red sandstone, grey phosphatic nodules, marine and non-marine.

19 Borden Island Fm. green and red sand and sandstone, marine

Triassic

18 Heiberg Fm. marine and non-marine grey and brown sandstone

17 Schei Point Fm. marine grey calcareaus sandstone, limestone and sand

16 Bjorne Fm. red, brown and white non-marine sandstone and conglomerate

Paleozoic

Permian

I5 Assistance Fm. green, grey and dusky red sandstone, grey chert, grey limestones

I4 Sabine Bay Fm. green and grey calcareous sandstone, limestone, grey clay, marine, upper beds include non-marine sandstone and conglomerate

Pennsylvanian

I3 gypsum, limestone

I2 Canyon Fiord Fm. red, brown and orange sandstone and conglomerate, thin limestone beds near base, marine and non-marine

Devonian

II Griper Bay Fm. green, grey and white commonly carbonaceaus, non-marine sandstone, siltstone, shale and thin coal seams, marine brands of browm calcareaus sandstone

IO Helca Bay Fm. white, yellow and red non-marine sandstone

9 Weatherall Fm. mainly grey, marine and non-marine sandstone, siltstone and shale

8 Blue Fiord Fm. grey limestone

Silurian

7 grey dolomite

6 Kitson Fm. Black graptolitic shale, argillaceous limestone, calcareous siltstone

5 grey limestone and dolomite

Ordivician

4 Cape Phillips Fm. grey, and black graptolitic, shale, calcareous beds and concretions

3 Cornwallis Fm. grey dolomite and limestone

2 Ibbett Bay Fm. Black graptolitic shale, argillite and chert, minor dolomite

I Canrobert Fm. limestone, silty dolomite, edgewise conglomerate, calcaraus sandstone

Bathurst and Byam Martin Islands

The Bathurst Island group and Byam Martin Island have a total area of about 8,000 square miles. They are located near the geographic center of the Canadian Arctic Archipelago. The area is mostly covered by sedimentary rocks of Ordivician to late Devonian Age with a composite exposed thickness of 20,000 feet.

Ordivician evaporites and carbonates are the oldest rocks exposed. These are overlain by Upper Ordivician to Lower Devonian black graphtolitic shale which is followed by increasingly coarse-grained clastic rocks, including turbridites, of Early Devonian Age. Unconformities and marked facies changes indicate three pulses of Devonian uplift. Upper Cretaceous plant-bearing shale and sandstone with an interbedded basalt flow occur in a graben in S.E. Bathurst Island; nearby dykes and plugs are probably related to the flows.

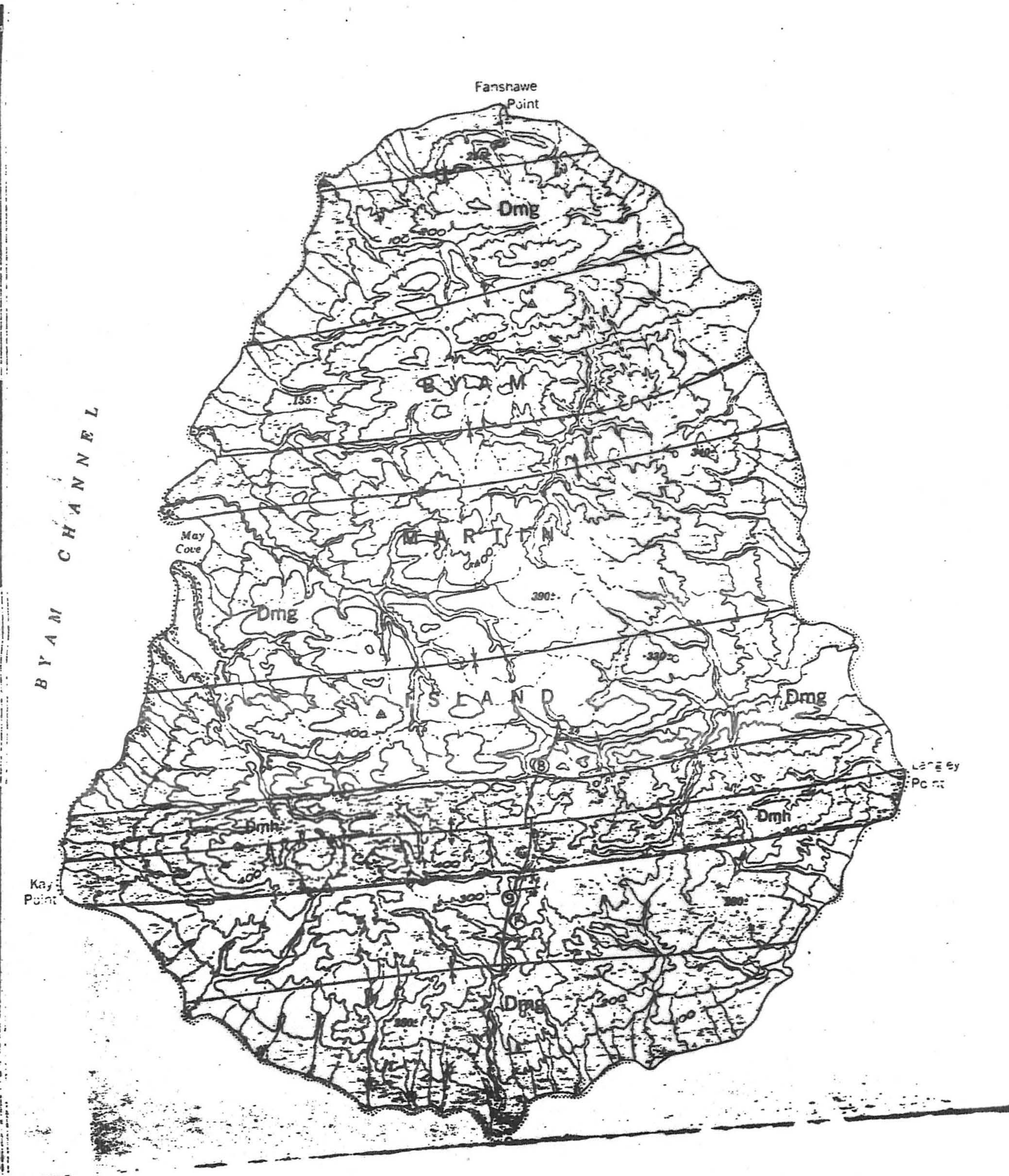
Bathurst Island lacks the prominent glacial landforms such as eskers and drumlins. It does not appear to have been covered by the continental North American (Laurentide) ice sheet during the last glaciation (classical Wisconsin). Bathurst Island nonetheless, has undoubted evidence of glaciation in the form of till erratics and meltwater channels. The rapid uplift that has taken in postglacial time is believed to result from glacial rebound. This is determined by radiocarbon dating of marine shells from the raised beaches.

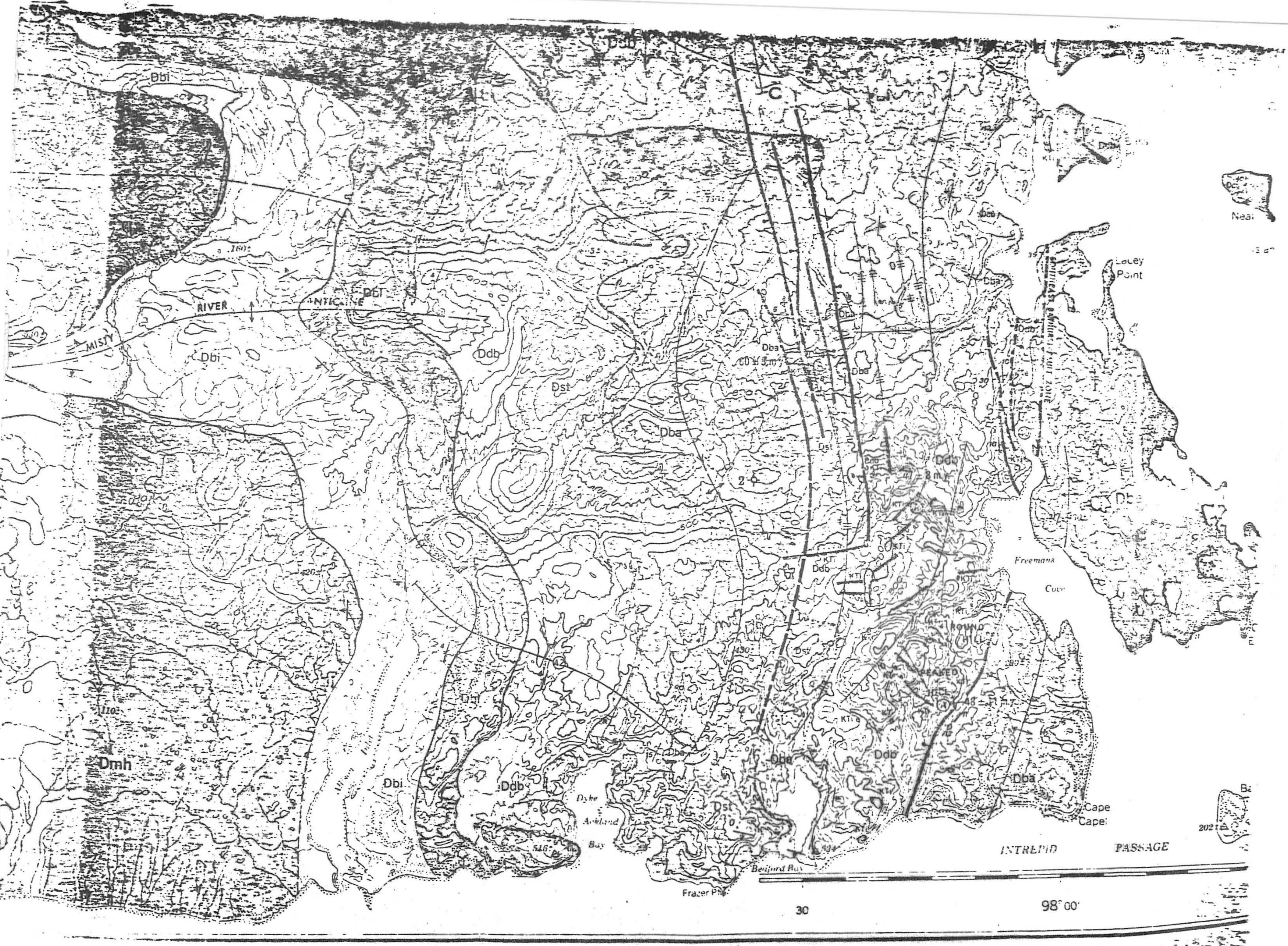
Bathurst Island has relatively the same surface feature of that of Melville Island. Beds of limestone, variably arillaceous and cherty, and chert, are common constituents on Bathurst Island.

The main rock types of Bathurst Island are sandstone, siltstone and shale with some deposits of limestone. Coal is also found on both of these islands.

There also is evidence of faulting and folding. The beach area is mainly covered with beach deposits.

UP
\ND


Fanshawe Point
BYAM CHANNEL
BYAM MARTIN ISLAND
May Cove
Kay Point
Langley Point
Dmg
Dmh
15'
12 Miles
18 Kilometres


Dbi
Ddb
Dbi
MISTY
RIVER
Dbi
Ddb
Dst
Dba
Dst
Ddb
Dba
Ddb
Dba
Dba
Lacey
Point
Neal
Freemans
Cove
ROUND
PEAKED
Dbi
Dmh
Dbi
Ddb
Dyke
Ackland
Bay
Dst
Ddb
Ddb
Dba
Cape
Capel
INTREPID
PASSAGE
Frazer Pt
30
98°00'

Legend for Bathurst and Byam Martin Islands

Cenozoic

Quartenery

Q Stream, deltaic, glacial and marine beach sediments

Mesozoic

Cretacous

Igneous rocks: andesite, dykes and plugs; includes one flow that is inbedded with Eureka Sound Fm. at the head of Freemans Cave.

Eureka Sound Fm. shale, sandstone, coal, interbedded lava flow

Jurassic

Jaeger Fm. sandstone, quartzose

Triassic

Heiberg Fm. quartz sandstone, minor ferrunginous sandstone and coal

Schei Point Fm. calcareous sandstone, licoclastic limestone

Bjorne Fm. quartz sandstone, crossbedded

Paleozoic

Permian

Trold Fiord Fm. sandstone, glauconitic, minor chert

Belcher Channel Fm. limestone, dolomitic, porous to vuggy, minor chert

Devonian (Middle and Upper)
Melville Island Group

Griper Bay Fm. quartz sandstone, siltstone, shale, commonly greenish weathering

Helca Bay Fm. limestone, quartzsandstone, resistant to recessive

Middle Devonian

Bird Fiord Fm. limestone, quartz sandstone, siltstone, commonly greenish

Lower and Middle Devonian

Blue Fiord Fm. limestone micritic in south and east; biostromal to the north and west

Eids Fm. limestone, siltstone, shale, fissile; recessive in north and west; resistant in east and south

Lower Devonian

Stuart Bay Fm. siltstone, shale, limy, mincer conglomerate and limestone interbeds; in south and east limestone is abundant

Disappointment Bay Fm. dolomite, porous to vuggy, resistant, light cream

Bathurst Island Fm. siltstone, fine grain sandstone, dolomite, minor limestone

Arctic Lowlands

The name Arctic Lowlands is given to the terrain where a thin cover of essintially undisturbed Paleozoic and younger rocks overlies the Precambrian basement. The Arctic Lowlands lie just south of the Franklinian miogeosyncline(see Fig.I) The relief on the Lowlands is not great, and the Paleozoic beds are generally horizontal or gently dipping. The closer the Paleozic beds are to the Franklinian miogeisyncline, the thicker they are.

On western Somerset Island and eastern Prince of Wales Island, adjacent to the northernly trending Boothia Arch, are red sandstones and conglomerates with astracoderms of Upper Silurian or Lower Devonian. The strata adjacent to the arch is synclinal. On eastern Prince of Wales Island, north-trending faults dislocate the Paleozoic succession.

The northern parts of the Lowlands, adjacent to the Franklinian miogeosyncline, in general exhibit homoclinal sections dipping towards the miogeosyncline. The monocline on Steffansson Island is probably part of an analogous structure. The youngest beds in these homoclines are Upper Devonian.

The smoother ancient erosion surface of the Lowlands are covered by a variety of glacial deposits, with extensive areas of drumlinoid redges which form the irregular hills. Both Stefansson and Prince of Wales Islands seem to be resistent to subsidence. This is proven by the fact Paleozoic rocks are the most frequently exposed rocks.

Northern Prince of Wales Island

The Northwestern part of Prince of Wales Island is a land of gentle sloping hills and wide shallow valleys. At the NE corner there are ridges trending roughly north-south formed from locally steeply dipping strata.

The beaches are covered with alluvium which means they were deposited by glaciers. The flat land could also suggest presence of the post-Wisconsin glaciation.

The main rock types of this island are limestone, dolomite and sandstone. There are also deposits of cong-lomerates, shale and siltstone. On the west side of the island the beds of the Peel Sound Fm. (cong. limestone,dol. ss., and sslt.) are relatively fine grained and intergrade and intertongued. There is also evidence of faulting and folding on the island.

The ice flow on Prince of Wales and Stefansson Islands is north to northwesterly.

Prince of Wales Legend

Cenozoic

Pleistocene and recent

I4 Glaciers and snowfields

I3 Marine beach deposits; alluvium

Paleozoic

Silurian

I2 undifferentiated 6(?), 7(?), 8-II

II sandstone, limestone, dolomite

IO Peel Sound Fm. conglomerate, sandstone, siltstone

9 Read Bay Fm. limestone, silty and argillaceous limestone; local gypsum

Ordivician and Silurian

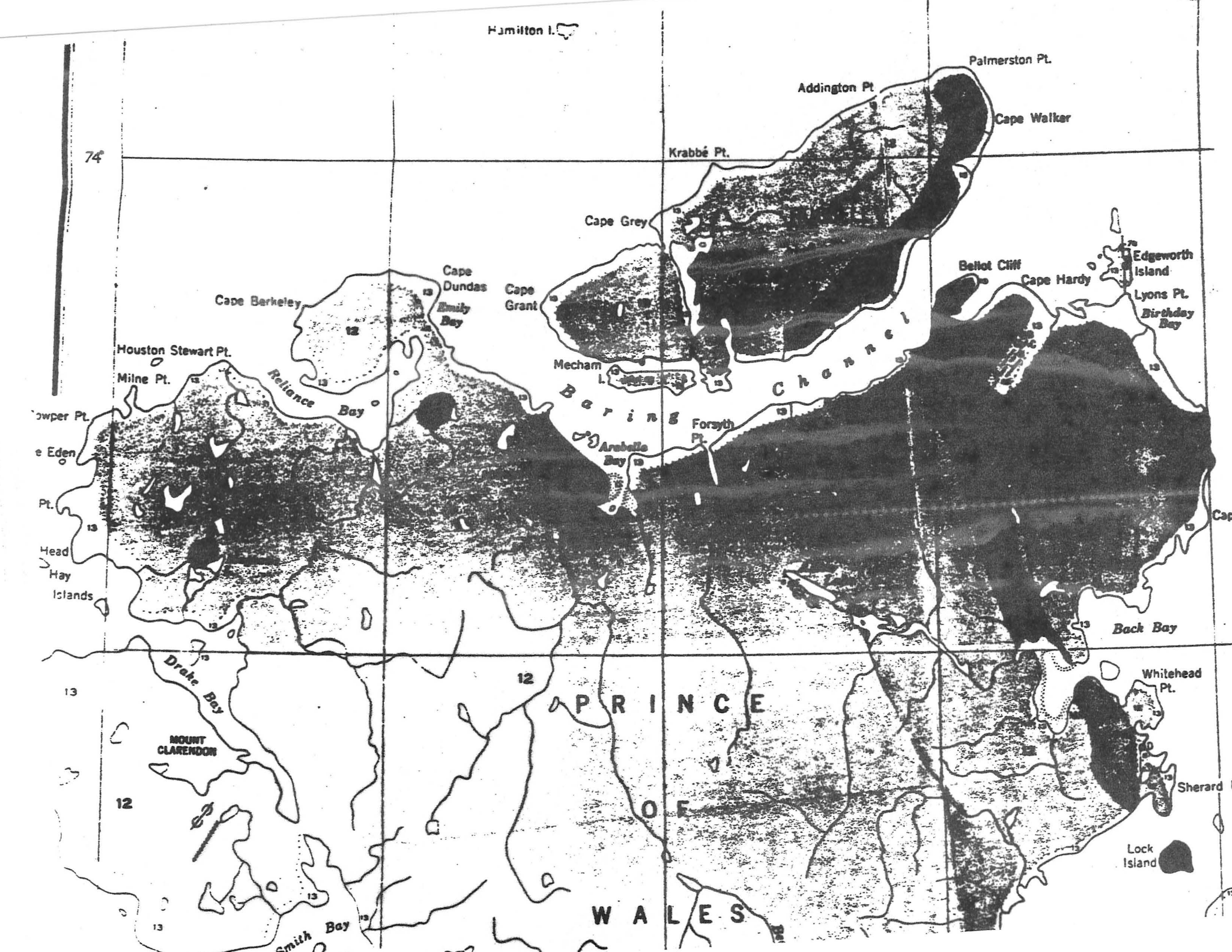
8 Allen Bay Fm. dolomite, dolomitic limestone

Ordivician

7 Ship Point Fm. dolomite silt

Ordivician and/or Cambrian

6 6a Gallery Fm. sandstone
6b Turner Cliffs Fm. sandstone, siltstone, mudstone, shale


Hamilton I.
74°
Palmerston Pt.
Addington Pt
Cape Walker
Krabbé Pt.
Cape Grey
Edgeworth Island
Bellot Cliff
Cape Hardy
Lyons Pt.
Birthday Bay
Cape Dundas
Cape Grant
Cape Berkeley
Emily Bay
12
Houston Stewart Pt.
Milne Pt.
Mecham I.
Reliance Bay
Baring Channel
Forsyth Pt.
Arabella Bay
Head
Hay Islands
Back Bay
Drake Bay
12
Whitehead Pt.
PRINCE
MOUNT CLARENDON
12
Sherard
OF
Lock Island
WALES
Smith Bay

Stefansson Island

Stefansson Island is a land made up of manotonous lowlands, hilly moraines, a low mountain range and dissected uplands terminating in some places as spectacular sea-cliffs.

There are five concordant rock successions which are separated by major unconformities. The main rock types consist of dolomite, sandstone, limestone, basalt, gypsum, anhydrite and shale which is the dominant rock type. Most of these are intruded by gabbro dykes and sills. There are also minor coal seams in the lower Cretaceaus rocks.

The interior of the island is largely covered by ground moraine, with NW aligned drumlins. Small outcrops of Paleozoic dolomite occur along the west coast and in the deeper stream valleys.

The Pre-Cambrian metasediments are characterized by steep dips and the younger Pre-Cambrian rocks are gently folded.

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