

SHEETS 58 NW, and 68 NE. (Parts of)

GEOLOGICAL SERIES

DESCRIPTIVE NOTES

Corwallis and Little Corwallis Islands comprise areas of about 2,850 and 190 square miles respectively, and are situated in the approximate geographic centre of the Canadian Arctic Archipelago, some 4 degrees north of the Arctic Circle. The R.C.A.F. station Resolute, which is accessible by aircraft throughout the year, is situated on the south-central coast of Corwallis Island. Corwallis Island is also accessible to ships for 2 to 3 months of the summer and fall. Resolute is approximately 1,130 airline miles directly north of Churchill, Manitoba.

This work presents the first systematic geological investigation of these remote islands. The only information previously available concerning the geology of this region was obtained from small collections of fossils made along the southern and eastern coasts of Corwallis Island by early explorers. These indicated the presence of Silurian strata.

Although the Corwallis Islands have been subjected to orogenic deformation, no part of this region possesses mountainous terrain. Instead these islands comprise plains topography marked by subdued hills and ridges, and generally broad valleys that have developed on a former surface of erosion, a remnant of which forms a plateau reaching an elevation of 1,250 feet. This plateau represents the highest part of the island. The maximum elevation of Little Corwallis Island is 525 feet.

Numerous erosional and depositional features of glaciation are present on the Corwallis Islands. Available evidence indicates that these islands were covered by local ice-caps and on Corwallis Island, at least, the glacier is believed to have moved outward from a central location on the southeastern plateau.

Emerging strand lines and intervening swales are conspicuous topographic features on the Corwallis Islands and are best developed where the land slopes gently to the sea. These may be observed sweeping up the sides of the valleys of major streams, bays and fjords, which indicates that their development and the emergence of the Corwallis Islands post-dates the period of glaciation. The emergence of the larger (first-cycle) streams pre-dates the period of glaciation. Smaller, second-cycle streams have cut channels across the raised beach deposits.

A thick, folded and conformable sequence of marine formations of mesozoic origin and ranging in age from Middle Ordovician to Late Silurian or Early Devonian comprises by far the greatest thickness of the formations in these islands. The approximate thicknesses of the formations in this sequence is given as follows: Eleanor River (1,500+ feet); Corwallis (5, 5000 feet); Allen Bay (3, 5,500 feet); Cape Phillips (5, 8,500 feet); Read Bay (4, 8,500 feet). The latter two formations are present in the lower part of the Corwallis formation. Sandstone and siltstone are present in the upper part of the Read Bay formation. The Cape Phillips formation is a calcareous and laterally facies equivalent of the Allen Bay and Read Bay formations which are characterized by shaly burlas. The line of facies change trends roughly east-west across the middle of Corwallis Island and separates the Cape Phillips formation in the northern half of Corwallis Island, as well as on Little Corwallis Island, from the Allen Bay and Read Bay formations in the southern half of Corwallis Island. The Snowblind Bay formation is the youngest of the conformable sequence of Lower Paleozoic formations and comprises mainly limestone breccias, limestone conglomerates, sandstone and siltstone. A vertebrate fauna from this formation seems best correlated with Early Devonian forms of Europe. However, in the light of the suggested age of the Disappointment Bay formation (7) (discussed below) the age limit of the Snowblind Bay has been extended. The Snowblind Bay formation is probably, in part at least, non-marine and seemingly it heralds the deformation of the geosyncline.

The conformable sequence of Lower Paleozoic formations has been gently to moderately folded to produce structures that strike northwesterly. On Corwallis Island these rocks are overlain unconformably by isolated remnants of later Paleozoic formations. The latter have been presented along the down-thrown side of normal faults which structures post-date all bedrock formations in this region.

The Disappointment Bay formation is the oldest of the post-orogenic formations. It is represented by two small outcrop localities on the north coast of Corwallis Island and possesses a maximum thickness of 200 feet. This formation rests with structural unconformity on the Cape Phillips formation. On the basis of a marine invertebrate fauna the Disappointment Bay formation is correlated with Upper Silurian rocks of the Appalachian region and yet this formation is clearly younger than the Snowblind Bay formation. Tentatively both the Snowblind Bay and Disappointment Bay formations are dated as Late Silurian or Early Devonian. Such dates narrowly limit the time of folding of the conformable sequence of Lower Paleozoic formations to the Caledonian period of deformation and probably to the Erian phase of that orogeny.

Middle and probably Late Devonian sediments may be present on Marshall Peninsula, Corwallis Island where numerous Devonian fossils are found loose on the surface or in large boulders. Some of the latter may represent bedrock.

The Intrepid Bay formation (8) is the youngest formation in this region and consists of non-marine, Pennsylvanian sand, sandstone, clay and coal deposits. It is represented by two relatively small outcrop localities in the western part of Corwallis. The maximum preserved thickness of this formation is 2,000 feet.

Scrutiny of air photographs reveals that the regional strike that characterizes the Corwallis Islands is also present in structures on small islands in Queens Channel to the north of the Corwallis Islands as well as in western Grinnell Peninsula and eastern Bathurst Island. In the latter area the regional strike gradually assumes a northerly trend. On Grinnell Peninsula, north-south structures appear to breach the continuity of the west-by-southwest striking folds in the southernmost extension of the Caledonian Fold Belt and the similarly trending folds on Melville and Bathurst Islands. The folding of the Ellesmere-Greenland structures and those of Melville and Bathurst Islands now appear to be co-genetic and an early phase of the Variscan orogeny. Formerly the Corwallis Islands were included with Melville and Bathurst Islands in the Perry Islands Fold Belt. In view of the Caledonian age of orogeny in the Corwallis Islands and the almost diametrically opposed regional strike of structures there to the Variscan structures, it is proposed to separate the Corwallis Islands from the Perry Islands Fold Belt. The name Corwallis Fold Belt is here proposed for the region including the Corwallis Islands and areas as far north as Grinnell Peninsula that are characterized by generally north-south striking folds.

Numerous occurrences of petroliferous shales, reef facies and bituminous residues on the Corwallis Islands indicate that these and adjacent islands of the Arctic Archipelago are favourable for oil exploration. The Intrepid Bay formation contains seams of subbituminous coal up to 5 feet thick.

NOTE 1. Area on Marshall Peninsula where a fauna of Upper and possibly Middle Devonian age was collected in limestone boulders, some of which may represent actual outcroppings.

NOTE 2. Area of small to house-size boulders composed of limestone breccia and tentatively interpreted as remnants of a sink-hole deposit developed in the Corwallis formation.

Bedding (horizontal, inclined, vertical, overturned) ...
Lineament (obtained from air photographs) ...
Fault (defined, approximate, assumed) ...
Joint (inclined, vertical) ...
Asymmetrical (defined, approximate, assumed) ...
Syncline (defined, assumed) ...
Glacial striae ...
Complete without skeleton found ...
Locality and number where invertebrate fossil collection was made ...
Locality and number where fossil fish collection was made ...
Approximate height in feet above mean sea level, by aneroid ...

LEGEND

PENNSYLVANIAN	8	INTREPID BAY FORMATION: sand, sandstone, clay, coal	
	SILURIAN (7) OR DEVONIAN		
	6	SNOWBLIND BAY FORMATION: limestone breccia, limestone conglomerate, sandstone, siltstone	
	SILURIAN		
	4	READ BAY FORMATION: limestone, argillaceous limestone, calcareous shale, shale, dolomite, minor sandstone and siltstone	
	ORDOVICIAN AND SILURIAN		
	3	ALLEN BAY FORMATION: dolomite, minor limestone, dolomite limestone, very minor argillaceous limestone and calcareous shale	
	ORDOVICIAN		
	2	CORWALLIS FORMATION: limestone, argillaceous limestone, dolomite limestone, dolomite, siltstone, shale, gypsum, gypsiferous shale, limestone breccia	
	ORDOVICIAN (?)		
1	ELEANOR RIVER FORMATION: limestone		

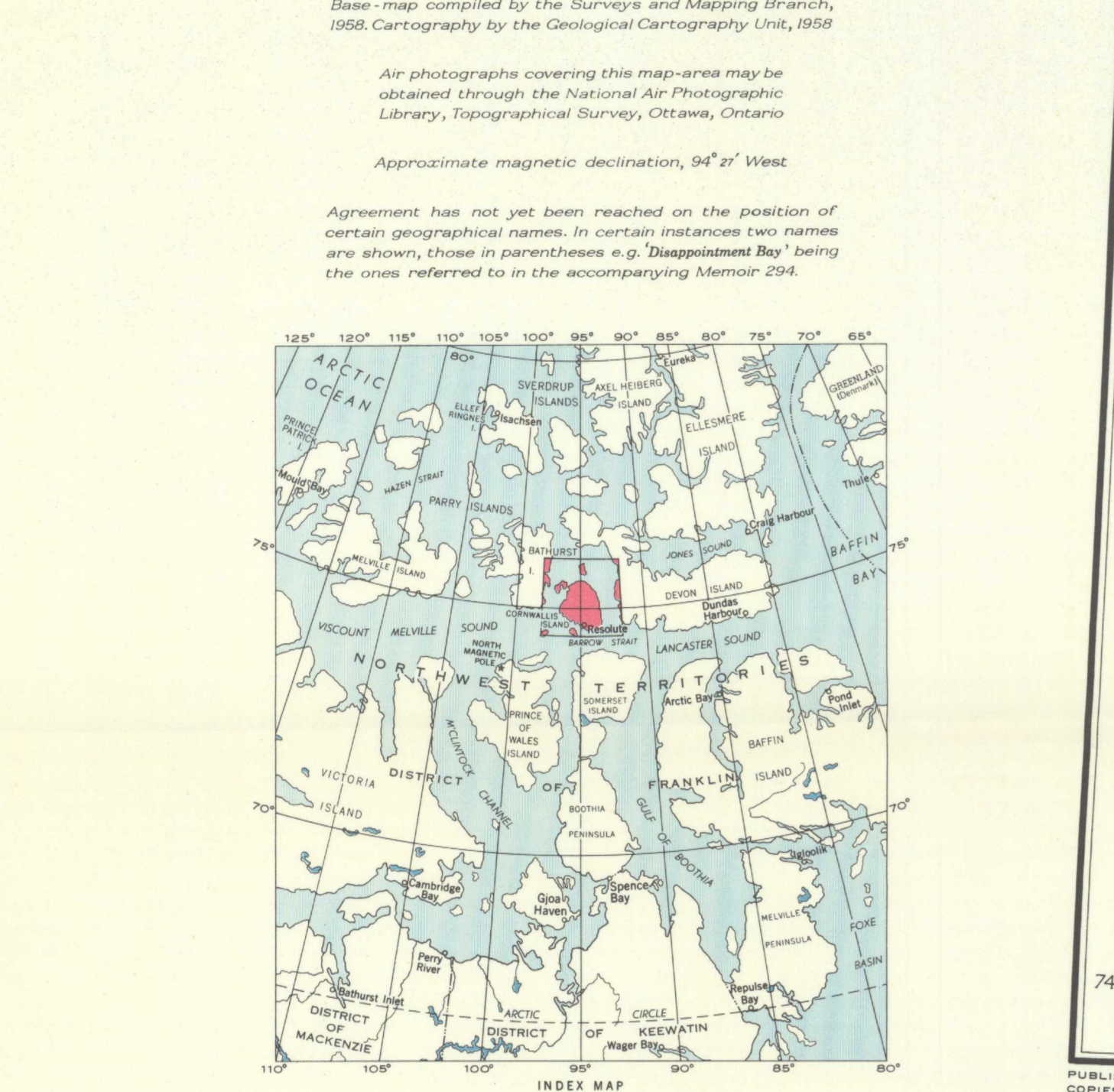
Geology by V.O. Foster and R. Thorsteinsson, 1950 and R. Thorsteinsson, 1951, 1952 and 1953

Base-map compiled by the Survey and Mapping Branch, 1956. Cartography by the Geological Cartography Unit, 1958

Air photographs covering this map area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa, Ontario

Approximate magnetic declination, 94° 2' West

Agreement has not yet been reached on the position of certain geographical names. In certain instances two names are shown, those in parentheses e.g. Disappointment Bay being the one referred to in the accompanying Memoir 204.



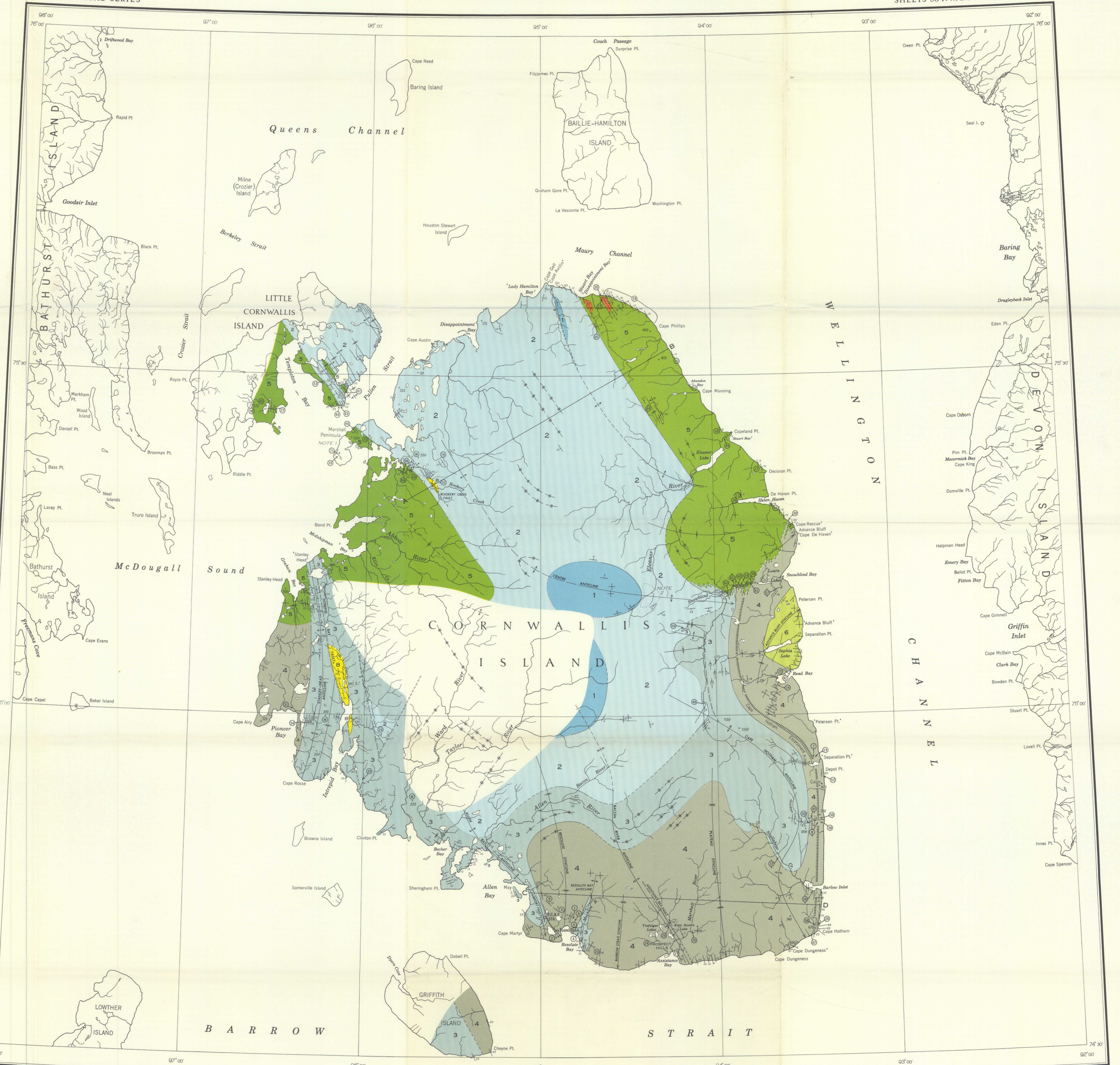
MAP 1054A

CORNWALLIS AND LITTLE CORNWALLIS ISLANDS
DISTRICT OF FRANKLIN
NORTHWEST TERRITORIES

Scale: One Inch to Four Miles = 1:253,440

1054A

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