PRELIMINARY PROGRESS REPORT
ARCTIC COAST GEOLOGICAL INVESTIGATIONS 1959*

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Introduction

During the period June 5 to September 7, 1959, reconnaissance geologic mapping of the surficial deposits and geomorphology of the Arctic Coastal Plain and adjacent foothills of northeastern Alaska was carried out by the author. The work done during this period was a continuation of a project begun in 1958 that had as its goals basic geologic mapping of the surficial deposits and establishment of Pleistocene and Recent chronology of the area, an evaluation of the terrain in terms of its suitability for construction, and the location of possible sites that would require little or no preparation for use as runways. During the summer of 1959, investigations in the foothills and coastal plain were carried out by two geologists traveling by fold-boat down the lower courses of three major rivers of the area, the Sadlerochit, Canning, and Kongakut. Ground traverses were made from 15 successive camps set up along these rivers; the area around an unnamed lake in the foothills north of the Sadlerochit Mountains was also examined briefly. Logistic support, including food, the transportation of geologists from river to river, and a field assistant during September, was furnished by the Arctic Research Laboratory of Point Barrow.

Surficial Geology

Much of the terrain mapped in 1959 consisted of till-covered foothills in which there is evidence of three separate glacial advances. During these advances ice moved northward through major valleys of the Brooks Range and spread out into the foothills. These glaciations have been tentatively correlated with previously mapped glaciations in the Mt. Chamberlin district to the south. As has been noted for other areas of the North Slope, the main criteria for distinguishing various glaciations are relative geographic occurrence and gross morphologic characteristics of the glacial deposits. Other characteristics, such as degree of weathering and preservation of original morainal topography, are less reliable indicators of age in the older glacial deposits. In the deposits of the older glaciations (recognized as older because they lie beyond recognizable termini of younger advances) the composition of the till itself appears to be as important a factor in determining the smoothness or roughness of the morainal topography as the age of the materials. Coarse till seems to retain hummocky forms, whereas clayey till appears to be relatively smooth.

*This report is based on research sponsored by the Geophysics Research Directorate of the Air Force Cambridge Research Center, Air Research and Development Command, under Contract CSO & A No. 59-531 with the U. S. Geological Survey.

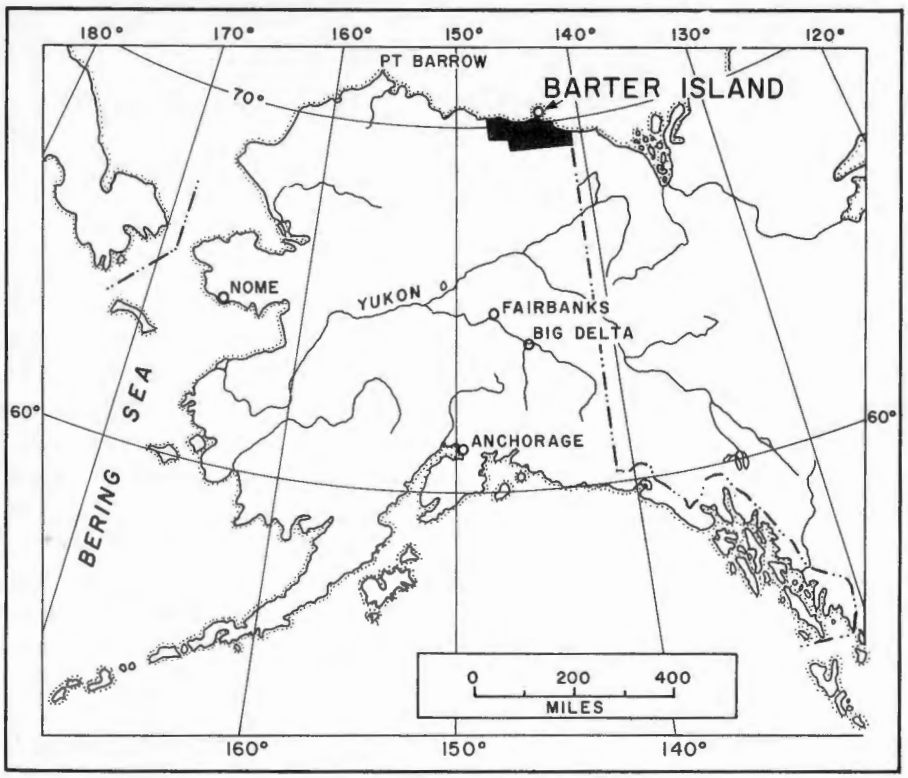

Fig. 1. Location of arctic coast region, northeast Alaska.

In the foothills of the Sadlerochit, Hulahula, and Canning River areas, three glaciations have been tentatively recognized. North of the Mt. Chamberlin quadrangle (mapped by G. W. Holmes in 1958) an extensive, well preserved outwash apron near the Sadlerochit River marks the northernmost extent of Chamberlin glaciation. However, discontinous sandy and gravelly morainal remnants, isolated erratics, and strongly colluviated till north and northeast of the Chamberlin outwash indicate an earlier, more extensive glaciation for which the name "Weller" has been suggested. During this glaciation, ice from valleys in the Franklin Mountains coalesced into extensive piedmont glaciers that moved northward to the southern slopes of the Sadlerochit Mountains and may have covered all of the foothills south of these mountains. The ice was then deflected to the northeast down the valley of the Sadlerochit. Younger till from piedmont glaciers fed from the Hulahula Valley to the east, and extensive outwash terraces along the Sadlerochit River have obscured evidence of the northerly termination of this oldest glaciation. It seems probable that ice of this glaciation spread out around the eastern nose of the Sadlerochit Mountains; a wide bench that contours the base of these mountains may be related to this glaciation. Other evidence of glaciation north of the Sadlerochit Mountains has been destroyed by the development of younger alluvial fans.

Older glacial deposits in both the Hulahula and Canning River areas have been tentatively correlated with the Chamberlin deposits of the Mt. Chamberlin quadrangle but probably also include deposits of the older Weller glaciation. These tundra-covered deposits are characterized by smooth broad divides with low subdued

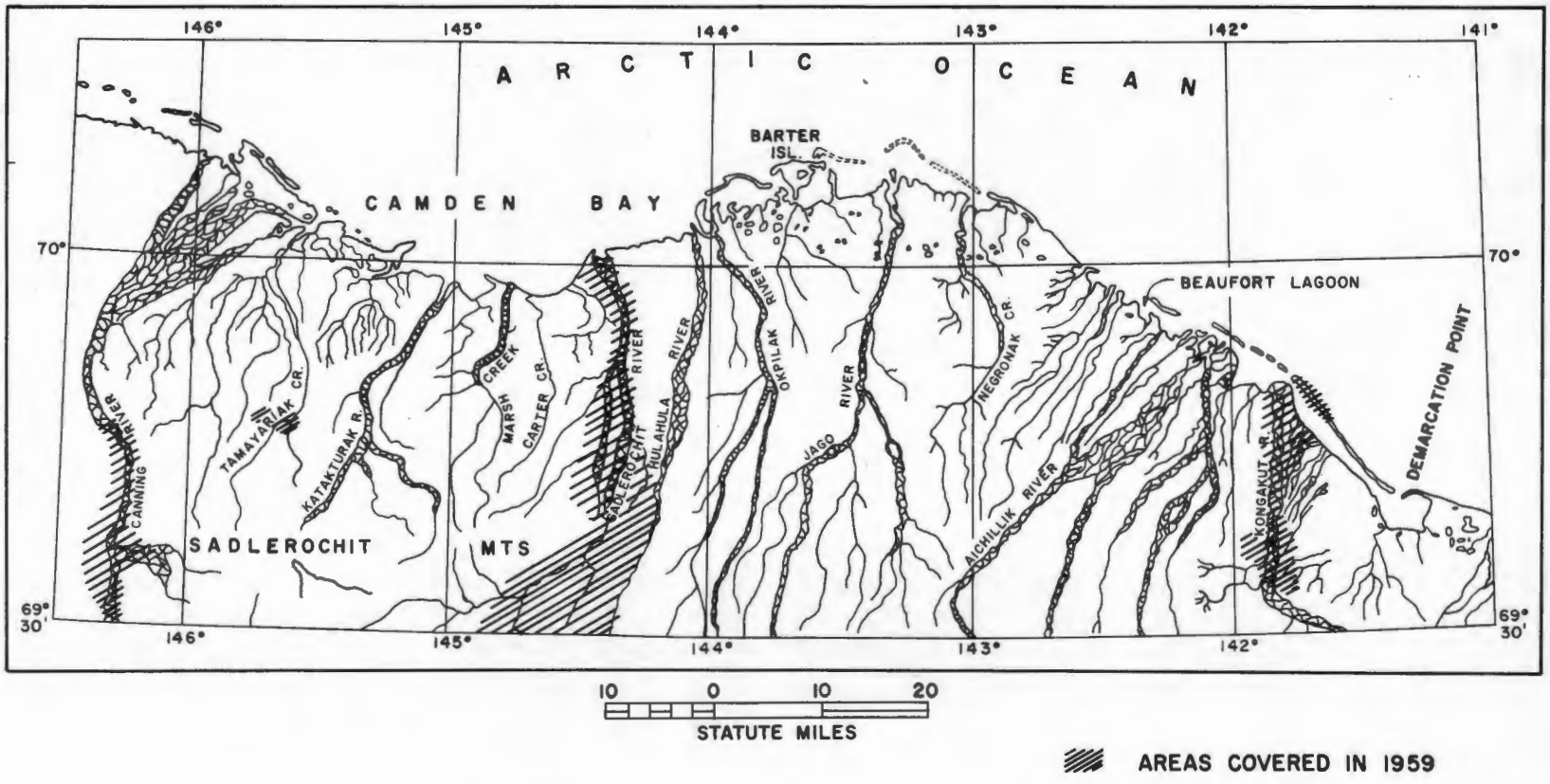

Fig. 2. Location of arctic coastal areas covered in 1959.

morainal remnants and a scattering of large erratics at the surface. During these older advances, valley glaciers moving down the Hulahula Valley spread out in the foothills to form piedmont lobes. These reached north of the latitude of the Sadlerochit Mountains down to elevations of 650 feet and to within 20 miles of the present coastline. The deposits end in an attenuated drift border that merges with a broad, gently sloping, tundra-covered outwash plain which extends northward to the coast. In the Canning River area, similar deposits indicate that during the older advances ice moved down the valley of the Canning from the Franklin Mountains, overflowed the valley walls in the foothills, and spread out north of the Sadlerochit Mountains in a broad piedmont lobe that reached as far east as the east fork of Tamayariak Creek and northward to within about 10 miles of the present coastline. This till deposited by the older advances has a very smooth tundra surface, is high in clay, and lacks the large surface erratics found in the Sadlerochit-Hulahula River area. These deposits mark the most northerly extent of glaciation in Alaska.

The youngest glacial deposits in the foothills have been tentatively correlated with Schrader glaciation of the Mt. Chamberlin quadrangle. They are characterized by well defined, tundra-free remnants of lateral and recessional moraines and knob and kettle topography that is lacking in the older deposits. During Schrader glaciation, ice was largely confined to the major valleys in the foothills. During this advance, ice moved down the Hulahula Valley to elevations of 900 feet and about 25 miles from the present coastline; a narrow outwash terrace borders the terminus of the Schrader moraines in this valley. Schrader glaciers also filled the valley of the Canning, pushed up into Ignek Valley, and advanced to within 20 miles of the coastline; much of the Schrader till and moraines in the floor of this valley have been modified and obscured by outwash of Schrader glaciers and by terraces probably related to a younger, less extensive glaciation.

A brief aerial reconnaissance of the Jago, Okpilak, and Aichillik Valleys indicate evidence for a glacial sequence similar to that in the Hulahula, Sadlerochit, and Canning River areas. No evidence of glaciation north of the Brooks Range was discovered in the foothills near the Kongakut River. From the mountain front to the ocean this river is flanked by a broad, gently sloping, delta-shaped alluvial plain; adjacent foothills are mantled with loess which is 25 feet thick in places.