REPORTS

Surficial Geology of the Margaretsville-Port George-Wilmot Area, Annapolis County, Nova Scotia*

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Introduction

A groundwater resource evaluation of the Annapolis-Cornwallis Valley has been under way since 1964. The project is being jointly sponsored by the CANADA DEPARTMENT OF FORESTRY (Agricultural Rehabilitation and Development Act) and the PROVINCE OF NOVA SCOTIA under the direction of the Groundwater Section, Geological Division, NOVA SCOTIA DEPARTMENT OF MINES. Detailed mapping of the surficial deposits in the Margaretsville-Port George-Wilmot Area, part of the field work conducted by the writer during the summer of 1965, suggests that all stratified glacial deposits in this area resulted from ablation of the last Pleistocene ice sheet.

Brief Description of Surficial Deposits in the Area

Ice-contact stratified drift includes all stratified silt, sand and gravel deposited in immediate contact with ablating ice. There are a number of kames, kame fields and kame complexes to be found in the map area (Figure 1). An esker, easily recognized by its distinctive sinuous form, may be seen on the edge of a wave-cut cliff at Port George, and another near the crest of North Mountain 2 miles south-southeast of Port George. A kame terrace, sand and gravel deposited between a melting ice mass and the valley side, extends 4 miles southwestward from Port George, and some of the ice-contact stratified drift to the northeast may have had a similar origin. In the vicinity of Melvern Square there is an area of bedded silt and very fine sand, probably the result of the brief existence of an ice-dammed lake.

In the Annapolis Valley, meltwater streams deposited stratified sand and gravel as an outwash plain, of which the northern fringe is shown in Figure 1. It should be noted that the plain does not extend towards the re-entrant in the North Mountain escarpment near Spa Springs. A small area of outwash occupies a valley at McNeily.

Till, predominantly unsorted bouldery detritus with some occasional lenses of stratified material, is present over much of the remainder of the map area.

Recent stream alluvium forms the flood plains of the Annapolis River and several of its larger tributary streams.

Discussion of Late Pleistocene Events

HICKOX (1962 and 1966) has suggested that there was important glacial meltwater discharge through the Wiswal and Spa Springs wind gaps in North Mountain during the last two glacial sub-stages.

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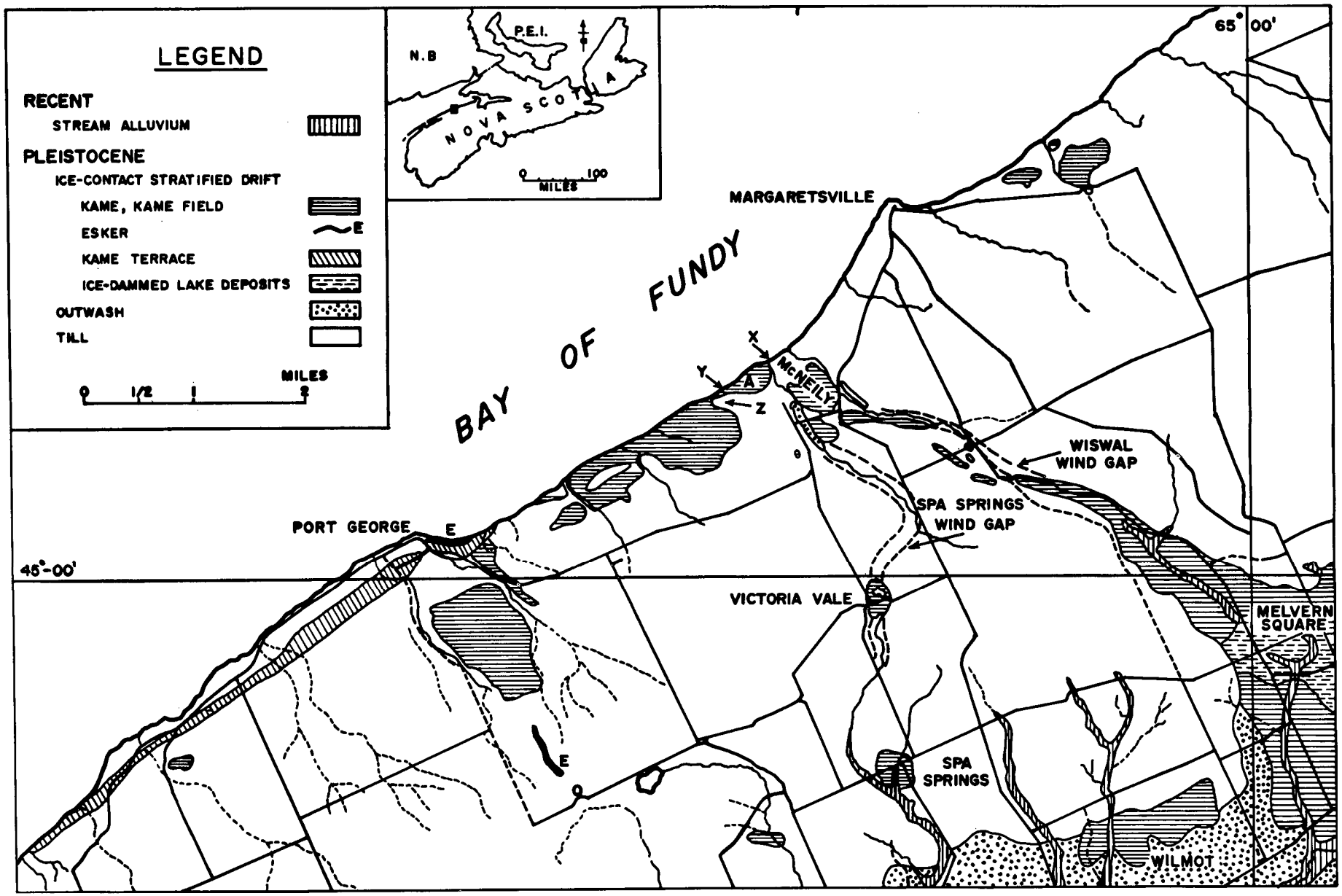

Figure 1. Surficial deposits in the Margaretsville-Port George-Wilmot area, Nova Scotia

He states that, prior to the final ice advance, an ablating mass of ice discharged water northward through the wind gaps, forming a delta in the Bay of Fundy. The surface of the delta is now at an elevation of about 110 feet above mean sea level and extends for two miles west of McNeily. Following the last glacial advance, which left ice-contact stratified drift on the over-ridden delta, "over-crest" drainage was re-established during dissolution of the ice mass "long enough to clear the channel of glacial debris, but not long enough to destroy the kames superposed on the delta top." (HICKOX, 1966, p. 78).

Evidence presented in the following discussion suggests that this was not the sequence of Late Pleistocene events:

1. The only stratified sand and gravel deposits in the vicinity of McNeily are kames, superposed for the most part on basalt. For example, the kame at A (Figure 1) is an irregular hill of lenticular, cross-bedded sand and gravel. It was deposited along and extends above a small re-entrant in the basalt cliff. If this kame were superposed on a delta, the well-drained beds of stratified sand and gravel should extend up-gradient from the kame to the mouths of the two "channels". Instead, a basalt flow is exposed at X and is probably near the surface at Y at the top of the wave-cut cliff. This lava flow rises gradually to the south underneath a thin cover of till. A hay field (behind the kame at A) on top of the till is so poorly drained that the farmer has several drainage ditches in it. A second basalt flow outcrops a Z and forms a small cliff to the south of the hay field. Thus, there is no evidence of permeable sand and gravel where the delta should be. Conversely, without a delta, there is no evidence for important overcrest drainage prior to the final glacial advance.

2. If the final overcrest drainage cleared glacial debris from the Wiswal and Spa Springs "channels", why are kames present in the Wiswal depression and at Victoria Vale? In addition, the final overcrest drainage should have left abundant evidence in the form of stream and terrace deposits. The lack of such deposits, aside from the outwash at McNeily, cannot be attributed to recent erosion because the existing kames would also have been destroyed.

Revised Late Pleistocene and Recent Events

The entire mass of surficial stratified sand and gravel in Figure 1 was deposited during final ablation of the last Pleistocene ice sheet. A mass of ice occupied the south side of the Fundy Basin for 9 miles, centred about Port George. Northeast of Port George are individual kames as well as kame fields. Some of the well washed sand and gravel along the sea cliff, however, may be more similar in origin to the kame terrace deposits to the southwest of Port George. Other masses of melting ice occupied an area to the southeast of Port George as well as the Spa Springs and Wiswal wind gaps. There was, however, no major meltwater discharge through these depressions.

At one stage in the ablation of the ice, bedded silt and very find sand were deposited in an ice-dammed lake near Melvern Square. During the final dissolution of the ice, meltwater streams left a small area of outwash near McNeily while an extensive outwash plain was being formed in the Annapolis Valley.

Recent erosion has dissected some of these deposits to a minor extent, particularly the glacial lake deposits at Melvern Square.

A groundwater resource evaluation of the Annapolis-Cornwallis Valley is due for publication by the Nova Scotia Department of Mines some time in 1967.

References cited

HICKOX, C.F., 1962, Pleistocene geology of the Central Annapolis Valley, Nova Scotia: Province of Nova Scotia, Department of Mines, Memoir No. 5.

_____, 1966, Glacial drainage channels crossing North Mountain, Annapolis County, Nova Scotia: Maritime Sediments, v. 2, no. 2, p. 76-79.