Nova Scotia

GEOLOGICAL MAP OF THE HANTSPORT AREA NOVA SCOTIA

MAP 83-1

COMPILATION & GEOLOGY BY
Stewart A. Ferguson

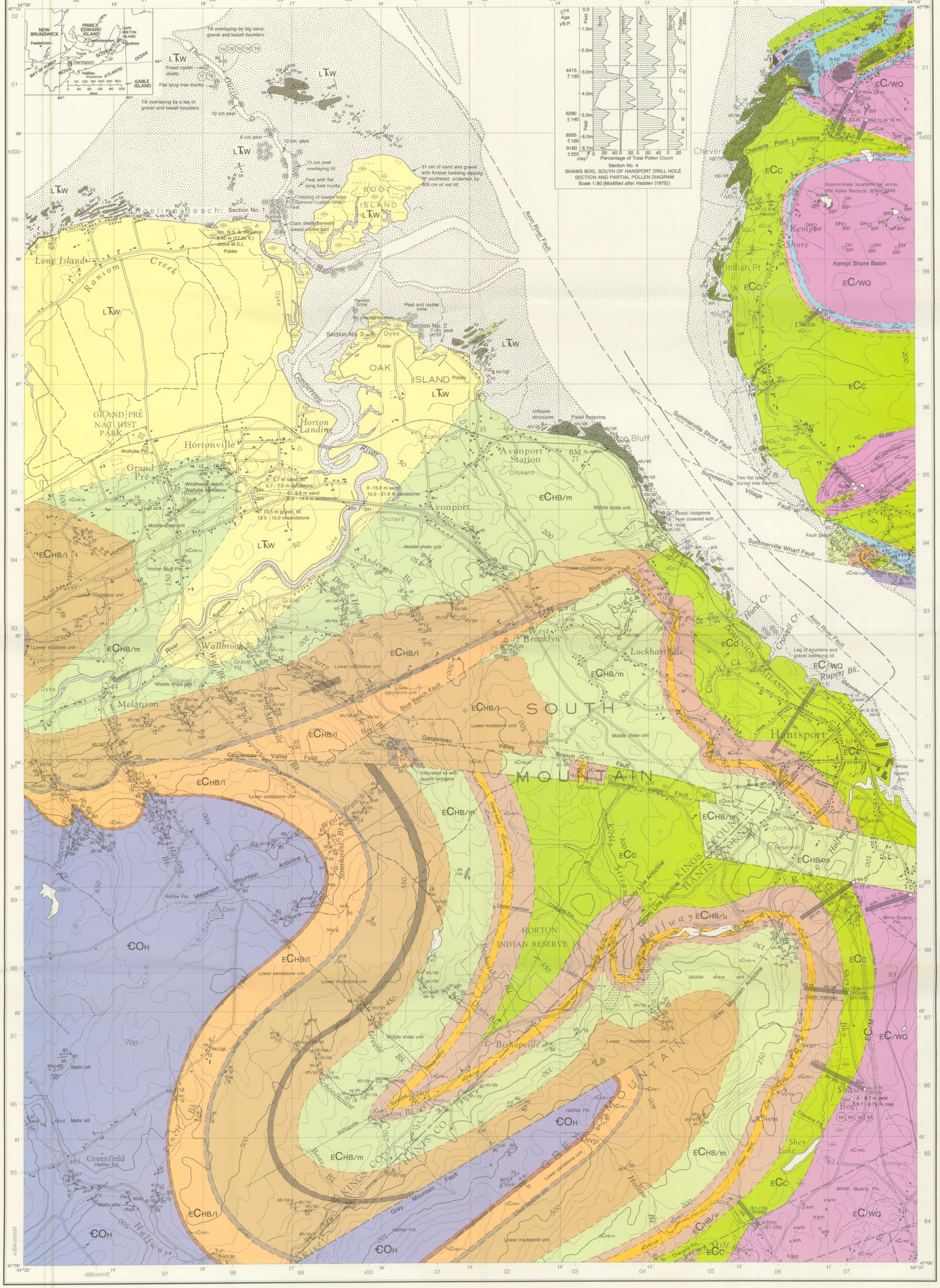
1983

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY

Hon. Ron Barkhouse, Minister
John J. Laffin, P. Eng., Deputy Minister

Scale 1:25,000

metres 500 0 500 1000 1500 2000 metres



LEGEND

CENOZOIC
QUATERNARY
RECENT: swamp, stream, tidal deposits and muds with associated rootlet beds, peat and parts of fossil trees.
PLEISTOCENE
TILL (ICE MOVING DOWNSLOPE) AND ABLATION TILL (ICE STAGNANT): Gravelly tills with a high stone content, locally distributed, and may rest on either of the earlier glacial units.
GLACIOFLUVIAL DEPOSITS: eskers, kames, kame terraces, deltas and outwash.
GROUND MORAINE DEPOSITS: sandy, silty, clayey till, unsorted and unstratified with a stone content in a great size range. In the underwater geology of the Bay of Fundy this unit is called Scotian Shelf drift. Not differentiated on the map but generally underlying the lighter coloured or uncoloured areas of the map.

MESOZOIC
JURASSIC
eJSb FUNDY GROUP
SCOTS BAY FORMATION (eJSb): sandy limestone (ls), calcareous sandstone (ss), and sandstone (ss).
TRIASSIC-JURASSIC
τJNM *NORTH MOUNTAIN FORMATION* (τJNM): basalt (b).
TRIASSIC
τΔB *BLOMIDON FORMATION* (τΔB): Shale, siltstone (slt), sandstone (ss).
τΔW *WOLFVILLE FORMATION* (τΔW): Sandstone (ss), siltstone (slt), shale (sh), red conglomerate (cgl.)

PALEOZOIC
LATE CARBONIFEROUS
LCSv PICTOU GROUP
SCOTCH VILLAGE FORMATION (LCSc): grey sandstone (ss), shale (sh).
EARLY CARBONIFEROUS
WINDSOR GROUP
εC/MR *MURPHY ROAD FORMATION* (εC/MR): siltstone (slt), minor gypsum (gyp), and the following sequence of limestones:
Kennetcook: K
Wallace Point: WP
Meander River: MR
Avon: A
Brooklyn Station: BS
Herbert River: HR
C-E Subzones
εC/PL *PESAQUID LAKE FORMATION* (εC/PL): siltstone (slt), and the following sequence of limestones:
Lebreau: L
Pesaquid: Psq
εC/WS *WENTWORTH STATION FORMATION* (εC/WS): gypsum, minor siltstone (slt), and the following sequence of carbonate rocks:
St. Croix Limestone: StC
Phillips Limestone: P
Dimock Limestone: D
North 60 dolostone: N60
B Subzone
εC/MC *MILLER CREEK FORMATION* (εC/MC): gypsum (gyp), minor siltstone (slt), and the following sequence of carbonate members, and a marker bed:
Sandford Limestone: S
Big Red Siltstone: BR Slt
Chambers Limestone: C
Belmont Limestone: B
Mantua Limestone: Man
Fisher Limestone: F
McCulloch Dolostone: McC
εC/T *TENNYCAPE FORMATION* (εC/T): red sandy shale (sh), siltstone (slt), minor gypsum (gyp), and anhydrite (anh). (Occurs in the Walton-Cheverie Area mapped by Boyle (1972) GSC Bull 166).
A Subzone
εC/WQ *WHITE QUARRY FORMATION* (εC/WQ): anhydrite (anh), salt, minor limestone (ls).
εC/P *PEMBROKE FORMATION* (εC/P): limestone conglomer (ls-cgl)
εC/M *MACUMBER FORMATION* (εC/M): thin bedded arenaceous limestone (ls).

HORTON GROUP
CHEVERIE FORMATION (εCc):
εCc/u Upper Member (εCc/u): Siltstone (slt), sandstone (ss), shale (sh).
εCc/l Lower Member (εCc/l): arkose (ark), sandstone (ss), siltstone (slt), conglomerate (cgl).
HORTON BLUFF FORMATION (εCHB):
εCHB/u Upper Member (εCHB/u): shale (sh), siltstone (slt), sandstone (ss).
εCHB/ugs Glass Sand marker bed (εCHB/ugs)
εCHB/m Middle Member (εCHB/m): shale (sh), minor dolostone (ds) and limestone (ls), and the following named unit: Middle shale unit.
εCHB/l Lower Member (εCHB/l): sandstone (ss), conglomerate (cgl), siltstone (slt), shale (sh), and the following sequence of units:
Lower mudstone unit with siltstone bed in places
Lower siltstone unit
Lower sandstone unit
Lower conglomerate unit
Ca Alaskite porphyry (Ca).
DCmg Muscovite, biotite monzo-granite (Dcmg).
DEVONIAN
Dgd Porphyritic, biotite granodiorite (Dgd).
SILURIAN
LSh *NEW CANAAN FORMATION* (LSh): mafic tuff, (mtf), felsic tuff (ftf), slate (sl), impure marble (mar).
LSk *KENTVILLE FORMATION* (LSk): slate (sl), minor siltstone (slt).
ORDOVICIAN-SILURIAN
WHITE ROCK FORMATION (OSw)
OSw/u Upper Member (OSw/u)
Slate (sl), paraconglomerate (cgl), (These units occur between quartzite beds).
OSw/qte Quartzite (qte), (repeated in the stratigraphic succession from two to five times).
OSw/l Lower Member (OSw/l): rhyolitic tuff, basalt, quartzite, siltstone etc. (Not mapped east of Gaspereau Lake, West Half, GSC Map 1346A, Mem 375).
CAMBRIAN-ORDOVICIAN
MEGUMA GROUP
€OH *HALIFAX FORMATION* (€OH): slate (sl), minor siltstone (slt), and metamorphosed Halifax Formation (€OHm).
€OG *GOLDENVILLE FORMATION* (€OG): greywacke (gwk), slate (sl), metaargillite (arg), conglomerate (cgl), mica schist (sch), hornfels (hnfl), and Goldenville Formation pervasively injected by granite (€OGg).
Mafic sills and dykes associated with periods of intrusive and extrusive activity throughout the geological column: basalt (Mb), spilitic sills (Mspl), chlorite schist (Msch), diorite (Md).

SYMBOLS

- Outcrop boundary (darker shade of colour), small outcrop
- Geological boundary (defined, assumed)
- Lateral facies change (assumed)
- Bedding (inclined, vertical, overturned)
- Cleavage, schistosity, gneissosity (inclined, vertical)
- Lineations (fold axis, bedding-cleavage intersection derived lineation)
- Facing of beds (dips of bedding and cleavage, graded bedding, cross bedding, channel filling)
- Joint (inclined, vertical)
- Fault (defined, assumed)
- Anticline, syncline
- Glacial striae (direction of movement known, unknown)
- Glacial striae, numbers indicate relative age, 1 being older
- Fossil locality in bedrock (F)
- Spore locality in bedrock (S)
- Fossil tree root (may include stump) in Recent sediments (R)
- Fossil oyster bed in Recent sediments (O)
- Fossil clam bed in Recent sediments (C)
- Depression generally a sink hole (d)
- Karst topography (k)
- Drill Hole, vertical (DH)
- Drill Hole, vertical with geology projected up the dip to surface
- Overburden with vertical depth in metres (ov 21 m)
- Drilling Record of Nova Scotia Department of Mines and Energy, Government Core Drills (R2352)
- Drill Hole number of Saarberg Interplan (Canada) Limited (S1-102)
- Drill Hole number of New Jersey Zinc (Canada) Limited (NJZ2)

ELEMENT AND MINERAL SYMBOLS

- Barium (Ba)
- Mn (Mn)

Fossil shell bed locations and unpublished age dates provided by J.S. Bleakney 1982.
Geology of the Winsor Group rocks in the Windsor Basin and stratigraphic guidance for rocks in the Summerville tidal zone by R.G. Moore 1962-1982.
Compilation and geology by Stewart A. Ferguson 1980-1982.
Cartography by Maritime Resource Management Service, Amherst, Nova Scotia, 1983.
Cartography & printing funded by Nova Scotia Department of Mines & Energy.

RADIOCARBON DATES

Material	Relation to HHW m	Original C^{14} age y B.P.	Corrected C^{14} age y B.P.	References and Map Locations
Oyster shell	-13.5		3750 ± 60	1a
Oyster shell	-13.5		3700 ± 60	1b
Oyster shell	-13.5	3615 ± 100		1c
Ribbed Mussels	-13.5		3800 ± 80	1d
Ribbed Mussels	-13.5	3310 ± 125		1e
Wood	-13.0		4470 ± 60	1f
Wood	-13.0	4115 ± 235		1g
Wood	- 6.1	4200 ± 200		2 3a, 3b
Wood	- 8.2	3440 ± 140	3480 ± 140	4
Wood	- 8.8	3800 ± 130	3820 ± 130	4
Peat	+ 14.8 ± 0.5	4415 ± 130		5a
Peat	+ 12.8 ± 0.5	6290 ± 140		5b
Peat	+ 11.8 ± 0.5	8505 ± 160		5c
Peat	+ 11.1 ± 0.5	9180 ± 255		5d
Wood	- 7.9	3515 ± 150		6 4
Wood	- 8.8	3100 ± 90		6 4
Wood	-11.6	3820 ± 100		6 4
Wood	-12.0	4455 ± 130		6 4

References:
1. Bleakney, J.S., Department of Biology, Acadia University, Wolfville, N.S. Personal communication August 11, 1982.
1a. Geological Survey of Canada, Radiocarbon Lab No. 2598, unpublished report.
1b. Geological Survey of Canada, Radiocarbon Lab No. 3043, unpublished report.
1c. Dalhousie University, Radiation Lab No. Dal-362, unpublished report.
1d. Geological Survey of Canada, Radiocarbon Lab No. 3040, unpublished report.
1e Dalhousie University, Radiation Lab No. Dal-362, unpublished report.
1f. Geological Survey of Canada, Radiocarbon Lab No. 3105, unpublished report.
1g. Dalhousie University, Radiation Lab No. Dal-361, unpublished report.
2. Cameron, H.L. (1958) Nova Scotia historic sites: Trans. Roy. Soc. Canada, Ser 3, vol 50, sec 2, p. 17.
3a. Carter, A.L. (1954) An age determination by carbon 14 analysis of wood from Avonport, Nova Scotia: M. Sc. Thesis, Dalhousie University.
3b. Carter, A.L. (1954) Age determination of a submerged tree stump by Carbon-14 analysis: Nova Scotian Inst. Sci. Proc. v 23 p. 423 (abstract)
4. Grant, D.R. (1970) Recent coastal submergence of the Maritime Provinces, Canada: Ph. D. Thesis, Cornell University p. 86.
5. Hadden, K.A. (1975) A pollen diagram from a postglacial peat bog in Hants County, Nova Scotia: Canadian Jour. Botany, v 53 p. 39-47.
5a. Isotopes Inc. New Jersey, reference No. I-7077.
5b. Isotopes Inc. New Jersey, reference No. I-7078.
5c. Isotopes Inc. New Jersey, reference No. I-7079.
5d. Isotopes Inc. New Jersey, reference No. I-7080.
6. Harrison, W. and Lyon, C.J. (1963) Sea-level and crustal movements along the New England - Acadian shore 4,500 - 3,000 years B.P.: Jour. Geol. v. 71, p. 96-98. (Data used was taken from Grant (1970) p. 86.

DENDROCHRONOLOGY

7. Lyon, C.J. and Goldthwait, J.W. (1934) An attempt to cross-date trees in drowned forests: Geographical Review vol 24, p 605-614.

Samples were taken from 77 stumps and 38 fallen trees from which 20 useful sections were made, all from prostrate tree trunks. The sections were chiefly white pine and hemlock with one each of spruce and Norway pine. The average age of the trees was 140 years with very few under 100 years. It proved possible to match growth rings only for adjacent trees located at nearly the same elevation, which was taken to indicate that sea level rise was very slow.

NOTES

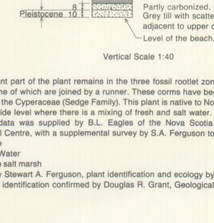
Base maps from Land Registration and Information Service, Resource Series, at a scale of 1:10,000 available from Nova Scotia Department of Lands and Forests, 1740 Granville Street, Halifax, N.S. B3J 1X5. Detail for the area below high tide taken from Chart 4140, Canadian Hydrographic Service, Department of Fisheries and Oceans, P.O. Box 8080, Ottawa, Ont. K1G 3H6, topographic map Wolfville, Nova Scotia at a scale of 1:50,000, and special low tide airphotos, 1963, both available from Canada Map Office, 615 Booth Street, Ottawa, Ont. K1A 0E9.

Approximate magnetic declination at Wolfville in 1976 was 21° 26.5' West, decreasing 5.3' annually.

Geology of Wolfville map-area by D.G. Crosby (1962) at a scale of 1:63,360 is GSC Map 1128A and accompanies GSC mem 325. A geological map of the Walton-Cheverie map-area accompanies GSC Bull 166 by R.W. Boyle (1972). G. deV. Klein (1957) described the Triassic geology of the Cornwallis Valley and adjacent areas in a M.A. thesis, University of Kansas, which is accompanied by a geological map at a scale of 1:50,000. The stratigraphy of the Horton Group has been described by W.A. Bell (1960) in GSC Mem 314, and parts of the section have been described in more detail in M.Sc. thesis at Acadia University by J.K. Worth (1969), G.W. Freeman (1972) and D.J. MacDonald (1973). The bedrock geological legend is modified from the legend on the Geological Map of the Province of Nova Scotia, compiled by J. Duncan Keppie (1979), and from Figure 1, Stratigraphic Column - Western Minas Sub-basin in Paper 76-5 Nova Scotia Department of Mines by R.G. Moore and R.J. Ryan (1976).

The Department of Geology, Acadia University has provided laboratory space for drafting and equipment for the examination of thin sections, and members of the geological staff have provided advice and assistance during the years that mapping has been in progress. Dr. J.S. Bleakney, Acadia University supplied a low tide airphoto, the locations of fossil shell beds and unpublished radiometric age dates. Dr. D.R. Grant, Geological Survey of Canada gave the writer a part of his Ph.D. Thesis (1970) Cornell University entitled Recent Coastal Submergence of the Maritime Provinces, Canada, which contained a table of radiometric age dates and the locations of the materials used. R.P. Shaffelburg, Nova Scotia Department of Transportation supplied copies of drill logs for holes drilled at bridge sites on Highway 101 at and adjacent to the Gaspereau River. Dr. Holger Quarch, Saarberg Interplan Canada supplied drill logs for holes drilled by his Company in the area. R. C. Boehner of the Nova Scotia Department of Mines and Energy provided a copy of a gravimetric plan for the Summerville vicinity with geophysics by The Nova Scotia Research Foundation Corporation. Spore assemblages in samples from the Cheverie Point shore are available in Nova Scotia Department of Mines & Energy. Open File Report 535 by Ulting, P.S. Giles & J.D. Keppie.

Section No. 1
SHORECLIFF SECTION NEAR THE EASTERN END OF LONG ISLAND



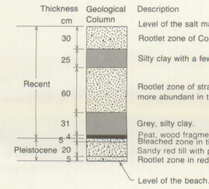
Vertical Scale 1:40

Notes:
An abundant part of the plant remains in the three fossil rootlet zones consists of partly carbonized small corms, some of which are joined by a runner. These corms have been identified as Scirpus maritimus L. a member of the Cyperaceae (Sedge Family). This plant is native to Nova Scotia and occurs in brackish water near high tide level where there is a mixing of fresh and salt water.
Elevation data was supplied by B.L. Eagles of the Nova Scotia Department of Agriculture, Kentville Agricultural Centre, with a supplemental survey by S.A. Ferguson to determine the level of the salt marsh.

Top of dyke	9.1 m (30.0 feet)
High High Water	8.2 m (27.0 feet approximately)
Level of the salt marsh	6.4 m (21.0 feet)

Geology by Stewart A. Ferguson, plant identification and ecology by S.P. Vander Kloet, Acadia University, fossil plant identification confirmed by Douglas R. Grant, Geological Survey of Canada.

Section No. 2
SHORECLIFF SECTION OF NORTH SHORE OF OAK ISLAND



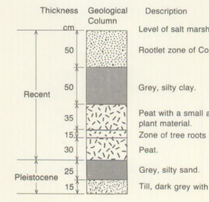
Vertical Scale 1:40

Elevations above Mean Sea Level from a map of the dyke by the Nova Scotia Department of Agriculture:

Top of dyke	9.1 m (30.0 feet)
High High Water	8.2 m (27.0 feet approximately)
Level of salt marsh	6.1 m (20.0 feet)

Geology by Stewart A. Ferguson 1982, plant identification by S.P. Vander Kloet.

Section No. 3
SECTION IN TIDAL DRAINAGE CHANNEL NEAR THE NORTH SHORE OF OAK ISLAND



Vertical Scale 1:40

Elevations above Mean Sea Level from a map of the dyke by the Nova Scotia Department of Agriculture:

Top of dyke	9.1 m (30.0 feet)
High High Water	8.2 m (27.0 feet approximately)
Level of salt marsh	6.1 m (20.0 feet)

Geology by Stewart A. Ferguson 1982, plant identification by S.P. Vander Kloet.