GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

SHEETS 21 H/11 E. Parts of 21 H/10 W. and 21 H/6 E.

LEGEND

MESOZOIC

TRIASSIC

9 — *QUACO FORMATION:* sandstone, conglomerate, shale

PALÆOZOIC

CARBONIFEROUS

PENNSYLVANIAN

PETITCODIAC GROUP

8 — *BOSS POINT FORMATION:* grey and red sandstone, conglomerate, shale, thin coal seams; 8a, sandstone, shale, conglomerate

MISSISSIPPIAN AND(?) PENNSYLVANIAN

HOPEWELL GROUP

7 — Conglomerate, sandstone, shale

MISSISSIPPIAN

WINDSOR GROUP

6 — Gypsum, sandstone, shale

PRECAMBRIAN AND/OR PALÆOZOIC

5 — Granite, granodiorite; 5a, quartz diorite; 5b, diorite; 5c, alaskite; 5d, quartz porphyry; 5e, feldspar porphyry

4 — Gabbro; 4a, olivine gabbro

PRECAMBRIAN(?)

1 2 3 — **COLDBROOK GROUP(?) (1-3)**

1. Mainly rhyolite and dacite; minor tuff and sericite schist
2. Mainly red feldspathic quartzite, red slate and red conglomerate; minor grey slate and sericite schist; 2a, mainly white weathered feldspathic quartzite, conglomerate, tuff and siltstone; minor sericite schist
3. Mainly andesite; minor dacite, basalt and chlorite schist

Observed rock outcrop, area of outcrops
Geological boundary (defined, assumed)
Bedding (horizontal, inclined, vertical, overturned)
Schistosity (inclined, vertical)
Fault (defined, assumed)
Anticline (defined, approximate)
Glacial striæ
Mineral occurrence ×Cu

MINERAL SYMBOLS

Copper	Cu	Lead	Pb
Diatomite	dia	Silver	Ag
Gypsum	gyp	Zinc	Zn

Geology by E. D. Kindle, 1957, 1958

Main highway
Other roads
Cart track
Trail
Building
Church
School
Post office
County boundary
Parish boundary
Park boundary
Intermittent stream
Falls (drop in feet)
Marsh
Contours (interval 100 feet)
Bluff, cliff or escarpment

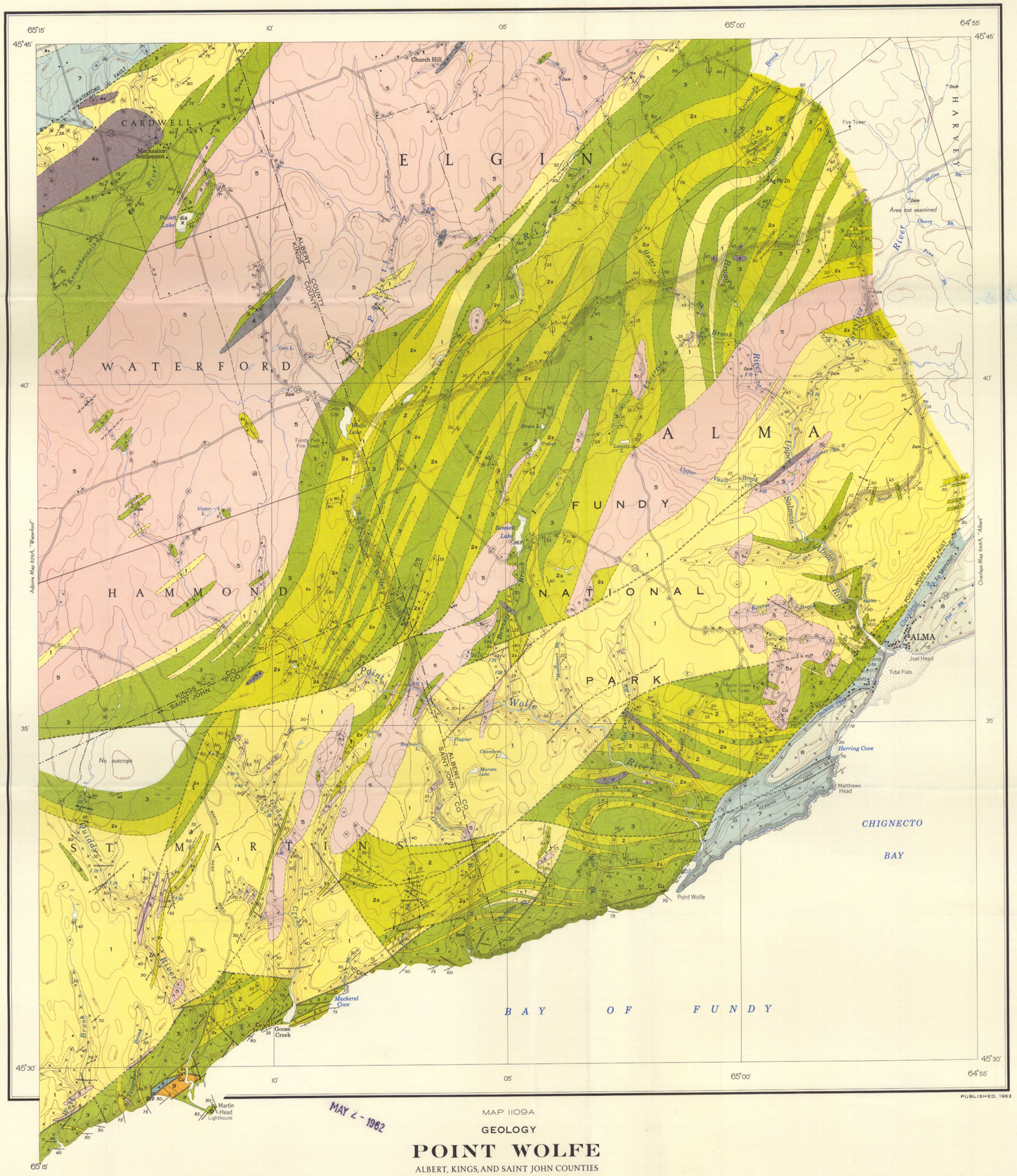
Base-map compiled from published maps of the Surveys and Mapping Branch

Cartography by the Geological Survey of Canada, 1961

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

Approximate magnetic declination, 22° 40′ West

INDEX MAP



MAP 1109A

GEOLOGY

POINT WOLFE

ALBERT, KINGS, AND SAINT JOHN COUNTIES
NEW BRUNSWICK

Scale: One Inch to One Mile = 1/63,360

Miles: 1, ½, 0, 1, 2, 3

COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

PUBLISHED, 1962

DESCRIPTIVE NOTES

PHYSIOGRAPHY

The map-area embraces the central part of the southern highlands of New Brunswick and is mostly rolling upland with prominent valleys and scattered hilltops. These hilltops reach 1,250 feet above sea-level (up to 300 feet above the valley bottoms) in the north half of the area and, only a mile or two from the Bay of Fundy, are over 1,000 feet above sea-level. The highest ground lies east of the head of Point Wolfe River and is nearly 1,450 feet above sea-level. Coastal slopes are nearly everywhere steep with precipitous bluffs, 500 to 800 feet high. All streams entering the Bay of Fundy are deeply incised. Walking along the sea coast is in most places impossible because high rock bluffs project at intervals into the sea.

Pollett and Kennebecasis Rivers in the north part of the area flow northward and then southwestward to Saint John River whereas all other streams drain southward to the Bay of Fundy. Waterfalls occur in all south-flowing streams; one of them, on Bennett Brook 1½ miles south of Bennett Lake, is 80 feet high and another on Upper Vault Brook is 70 feet high with a 50-foot fall 800 feet farther downstream.

The steep coastal topography and high inland hills are a consequence of the resistance to erosion of the bulk of the Precambrian rocks that underlie most of the map-area. A comparatively subdued relief is developed east of the mouth of Point Wolfe River where softer Carboniferous rocks abound.

The region was peneplaned in post-Carboniferous time and underwent Pleistocene glaciation. Southerly striking glacial striæ and glacial grooves are preserved in a few places. A persistent layer of boulder clay covers much of the upland terrain and deposits of stratified sands and gravels are also present. Some are kame deposits, others are fluvial deposits. There has been some uplift along the coast since the glacial period; remnants of rock terraces that were cut prior to the last uplift occur along the coast on both sides of the mouth of Quiddy River. Some red clay is present on the westerly terrace.

GEOLOGY

The volcanic and sedimentary succession (1, 2, 2a, 3) that underlies the greater part of the map-area is on the line of strike of lithologically similar Coldbrook group volcanic and sedimentary rocks of the Saint John region. Alcock (1938) recognized the Coldbrook group rocks to be of Precambrian age; they are overlain by Lower Cambrian beds at Saint John city, McCoys Corners, Hanford Brook, and Ratcliffe Brook. Norman (1941) and Flaherty and Norman (1941) traced the northeasterly extension of this belt from Upper Salmon River to within a few miles of Albert Mines and mapped these rocks as probably Precambrian. In the Waterford map-area (829A) west half, Alcock (1945) found the southwesterly extension of the volcanic belt west of Pollett Lake to underlie Carboniferous formations unconformably, and he classified them as Precambrian and similar to Coldbrook group rocks. For these reasons divisions 1, 2, 2a, and 3 are tentatively classified as Coldbrook group and of Precambrian age.

The volcanic rocks of units 1 and 3 are present in great variety and vary from light creamy yellow, pink, and pale purple hued rhyolites, through pale grey to green dacites, green andesites, and dark basalts. They are largely fine- to medium-grained porphyritic flows with feldspar phenocrysts mostly less than ¾ inch long. Some of the rhyolites are composed in part of small glassy quartz and albite phenocrysts in a felsitic groundmass and are akin to the quartz keratophyre flows described by Flaherty (1934) from east of Upper Salmon River. Amygdaloidal andesite flows are common; one that forms the fire-tower ridge-top west of Wolfe Lake holds quartz amygdules up to an inch long. Various amounts of epidote are present with the quartz. In the vicinity of major faults along the coast, the andesites are highly altered and display the bright green hues of epidote in irregular patterns, particularly along and near joints. Flaherty (1934) records the presence of albite-rich greenstones (spilites) in adjoining Albert map-area. Volcanic breccia and easily identified tuff beds apparently form a relatively small proportion of 1 and 3. Exposures of typical tuff containing angular fragments to ½ inch long are exposed along Fortyfive road below the Y, a mile north of the Moncton highway. These tuff beds are interbedded with quartzite and greywacke. Most of the flows are massive but many of them and most of the tuffaceous beds are partly schistose. Acidic lavas and tuffs are altered in some localities to sericitic schists, and some basic varieties are converted to chloritic schists.

The sedimentary units 2 and 2a and the volcanic units 1 and 3 apparently form a conformable series of alternating rock types. Both are formed of lenticular units that in places thin or thicken abruptly along strike. Exact boundaries are determinable only along streams near the coast where outcrops are numerous. Unit 2 is distinguished by the purple-to-red colour of its feldspathic quartzite and conglomerate members, the colour being due to the presence of hematite. The red beds are separated by various thicknesses of grey slate and phyllite. The latter is in layers several hundred feet thick along the streams flowing south into Point Wolfe River, and the contact of the grey rocks with the overlying red quartzite is marked there by 2 to 3 feet of white quartzite.

White-weathered feldspathic quartzite, the most abundant member of unit 2a, grades into grit- and pebble-conglomerate through a gradually increasing admixture of grit and pebbles. Some of the bedded siltstones of this unit are in part fine, water-sorted tuffs.

Most of the sedimentary rocks of units 2 and 2a show some degree of schistosity; in many places they are completely altered to quartz sericite and talc schists and the conglomerate pebbles are squeezed and elongated in the direction of schistosity.

Coarse, well-rounded, red granite pebbles are plentiful in a conglomerate band at the mouth of Brandy Brook, and also in a wedge of boulder conglomerate ½ mile east of the mouth of Goose Creek. Granite cobbles occur in boulder conglomerate ½ mile up Goose River; white quartzite carries scattered pebbles of red granite in addition to red and grey slate pebbles on Point Wolfe River at the first easterly bend above its mouth. Granite pebbles and cobbles also occur at the next outcrop of unit 2a up Point Wolfe River. North of the main belt of unit 1 the conglomerates are formed mostly of quartz, quartzite, rhyolite, andesite, and dacite pebbles. The granite pebbles show that a pre-Coldbrook granite landmass existed and supplied detrital material during the Coldbrook period of volcanism and sedimentation.

Because of granitic intrusions and excessive faulting no complete section of Coldbrook rocks exists. A partial section along a line running northwest from the edge of the granite stock east of Bennett Lake to the granite contact west of Wolfe Lake shows an apparent thickness of 15,000 feet of units 2, 2a, and 3 and to this must be added several thousand feet of the main body of acidic lavas (1).

The gabbro (4) that outcrops along the highway, 2 miles northwest of Wolfe Lake, has been greatly altered. Its plagioclase is completely changed to zoisite and epidote (saussurite) and the pyroxene is transformed to chlorite and epidote. The altered gabbro is slightly schistose and its presence in the centre of a granitic batholith, the rocks of which are much less altered, suggests that the gabbro is the older.

Pink-weathering, quartz-rich granite that contains up to 20% hornblende and biotite is the most prevalent of the granitic rocks (5). In places the granite grades through granodiorite and quartz diorite to diorite. The granitic rocks, and Coldbrook group rocks which they intrude, are cut by scattered dykes of quartz diorite, quartz porphyry, and feldspar porphyry.

The Windsor beds (6) are the oldest Carboniferous rocks in the map-area. They outcrop for 275 feet along the Bay of Fundy a mile northwest of Martin Head where they are faulted between andesite (3) and Triassic sediments (9). The exposures from the south fault northwest show: 10 feet of crumpled red shale, 10 feet of gypsum, 90 feet of hard grey sandstone with some thin purple shales, 150 feet of gypsum, 15 feet of red shale, a strong fault, and then andesite (3). The main gypsum band is contorted and brecciated and in places purple stained. The beds dip from vertical to 45°SE.

A small deep pond that lies a few hundred feet north of the coastline at the mouth of Dickson Brook (at Fundy Park amphitheatre), may be a sink-hole that originated through the solution by groundwater of a concealed gypsum deposit.

The Hopewell group (7) conformably succeeds the Windsor group. The predominant member is dull red conglomerate that consists largely of pebbles of quartz, quartzite, red slate, rhyolite, dacite, and pink to grey granite. The northeasterly striking fault that separates this group from the Coldbrook group (1-3) is exposed in a small steep creek bed on the north side of the Point Wolfe road, ½ mile northeast of the branch road to Herring Cove. On the north side of Herring Cove the group is represented by flaggy red sandstone and red shale. Small hematite nodules occur there at the contact of a 20-foot sandstone bed with an underlying 10-foot band of red shale. A few hundred feet farther northeast a change from red shales to conformably overlying grey and yellow weathering massive flagstones marks the change from the Hopewell group (7) beds to Boss Point (8) strata. About 30 feet above the contact a 10-foot bed of fine conglomerate is composed mostly of quartz pebbles with minor red, brown, and dark volcanic rocks and some coal fragments. Numerous thin coal seams occur in the Boss Point series along the coast east of Alma but they are only 1 inch to 3 inches thick.

The Triassic rocks (9) are dominantly reddish brown to pale yellow sandstones, with intercalated beds of red shale and some thin conglomerate layers. The latter hold pebbles of red chert, andesite, rhyolite, quartz, gypsum, shale, sandstone, and woody fragments. The fresh, friable and only partly cemented nature of these rocks is their outstanding characteristic. They are continuously exposed for 1,800 feet along the beach west of Martin Head and are faulted against the older rocks.

Isolated patches of Triassic sediments that occur along the New Brunswick shore of the Bay of Fundy are referred to by Alcock (1938) as the Quaco formation. The principal locality is at Quaco Bay 14 miles west of Martin Head; they also occur at Salisbury Bay 5 miles east of Alma.

STRUCTURE

As all the sedimentary and volcanic rocks in the are been folded and faulted and as the pre-Carbonifero are metamorphosed, partly schistose, and invaded b stocks, the resulting rock structures are in many c and subject to abrupt change. The dominant trend u and in the northerly half of the area dips are northw mostly between 20° and 50°. For a few miles north and wes Point Wolfe the Coldbrook rocks strike easterly to northwesterly and dip 20° to 75°S. These southerly dipping rocks may represent a part of the downfaulted south limb of a major anticlinal fold that once extended from the vicinity of Rose Brook northeasterly to Fortyfive road and beyond. The axis of this fold is still well developed where it crosses Fortyfive road 2 miles north of Moncton highway and also where it is intersected by Rose Brook and Goose River.

A great unconformity separates the Carboniferous sediments from the Coldbrook group and associated igneous rocks. The Carboniferous beds are fresh and hold abundant boulders and pebbles of granite. They are mostly gently folded but, near the major northeasterly striking faults, dips as high as 70° are common. The Triassic rocks near Martin Head are fresh and much softer than the Pennsylvanian strata. They are nearly flat-lying at their northerly fault contact but near the fault that marks their south boundary are turned up and dip 50°N.

Along the main Point Wolfe-Alma fault the block on the south side is downfaulted in relation to the rocks on the north. Vertical displacement may be more than 1,000 feet. This great fault probably continues northeasterly to well beyond Albert and may be more than 25 miles long. A parallel fault lies 1 mile to 2 miles to the southeast and has been traced by Flaherty and Norman (1941) and Norman (1941) for more than 22 miles, from Owl Head 2 miles east of Alma northeast to the north side of Shepody Mountain and to Shepody Bay north of The Rocks.

The northeast-trending fault (Waterford fault) in the northwest corner of the map-area has been traced by Alcock and Hayes (see GSC maps 845A, 478A, and 829A) for 36 miles southwesterly to the bend in Hammond River north of Marks Lake. It probably also extends 10 miles to the northeast towards Elgin or Pleasant Vale. At Waterford and farther southwest, strata on the northwest side of the fault are upthrown in relation to the rock on the south side, whereas in this map-area and farther northeast the rocks on the southeast side of the fault have moved up. The pivot point of this hinge fault is several miles west of the map-area.

Northwesterly striking faults are fewer than those striking northeast and are much shorter and with less displacement.

MINERAL DEPOSITS

Copper occurs in a number of places along northeast-trending faults and sheared zones. Years ago a shaft was sunk to test one of these zones at the Teahan prospect on the south side of Barrett Brook, 800 feet east of Broad River. In the mine dump are many pieces of quartzite and talc schist impregnated with pyrite and chalcopyrite. About 900 feet southwest of the shaft, on the west side of Broad River, a silicified and carbonated sheared zone 20 feet wide is exposed in a trench 40 feet long. It strikes N40°E and dips vertically, and carries pyrite, sphalerite, chalcopyrite, and some tennantite. A rusty zone covered by 10 feet of water occurs in a large pit 200 feet east of the shaft.

A 30-foot shaft that was sunk a long time ago on the west side of the mouth of Quiddy River disclosed copper mineralization in brecciated andesite along a northeasterly trending fault. Samples collected from the dump are stained with malachite and contain some chalcocite.

Some copper minerals occur along the coast in a northeast fault zone east of the mouth of Jim's Brook and in subsidiary parallel breaks in the steep rhyolite bluffs north of the main fault. These occurrences were investigated about 100 years ago and are referred to by Hind (1865) as the Vernon mine. The old adit driven north from 20 feet above high tide is now blocked by slide rock. The veins are for the most part only a few inches wide and carry small amounts of malachite and chalcopyrite.

A mineralized sheared zone strikes northeast along a granodiorite and quartz diorite contact on the east side of the Maple Grove fire tower road a mile northwest of Herring Cove. The granodiorite on the north side of a partly drift-filled pit is stained with malachite and holds a little chalcocite and chalcopyrite. Some massive quartz diorite 200 to 300 feet wide west of the road contains scattered grains of chalcocite.

Approximately 1½ miles up Rose Brook, a block of vein quartz in the stream bed marks the presence of an easterly striking vein concealed by moss. The quartz contains about 5% grey, finely crystalline, specular hematite.

Some of the northerly trending faults are also marked by vein fillings. A fault that strikes north along the contact between andesite and quartz diorite, 2,000 feet east of the Fundy Park fire tower, contains an apparently barren quartz vein up to 15 or more feet thick. The vein outcrops for 100 feet about 200 feet south of the road and is traceable by float for 300 feet north of the fire-tower road. About 2 miles up Quiddy River a small, northerly striking vein contains some sphalerite, pyrite, and chalcopyrite. The vein is only a few inches wide and is exposed for less than 50 feet. It occurs in an argillaceous band that is intercalated with rhyolite flows. Some chalcopyrite occurs in a 10-inch-wide quartz vein 2 miles southeast of Pollett Lake, which is exposed for 6 feet in the ditch on the west side of the main highway on the northerly contact of the schistose gabbro stock.

The outcrop schistose gabbro on the winding timber trail ½ miles west of Point Wolfe River and nearly 2 miles east of the Martin Head road, contains an unusual amount of ilmenite.

The gypsum deposite west of the mouth of Quiddy River is a downfaulted block confined between older rocks on the north and younger rocks on the south. The deposit has not been developed for commercial use. Diatomite from 1 foot to 6 feet thick covers the bottom of Pollett Lake, some 10 carloads of which were excavated and marketed about 50 years ago. According to Eardley-Wilmot (1928) the deposit is one of the largest in New Brunswick and contains high-grade diatomite.

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