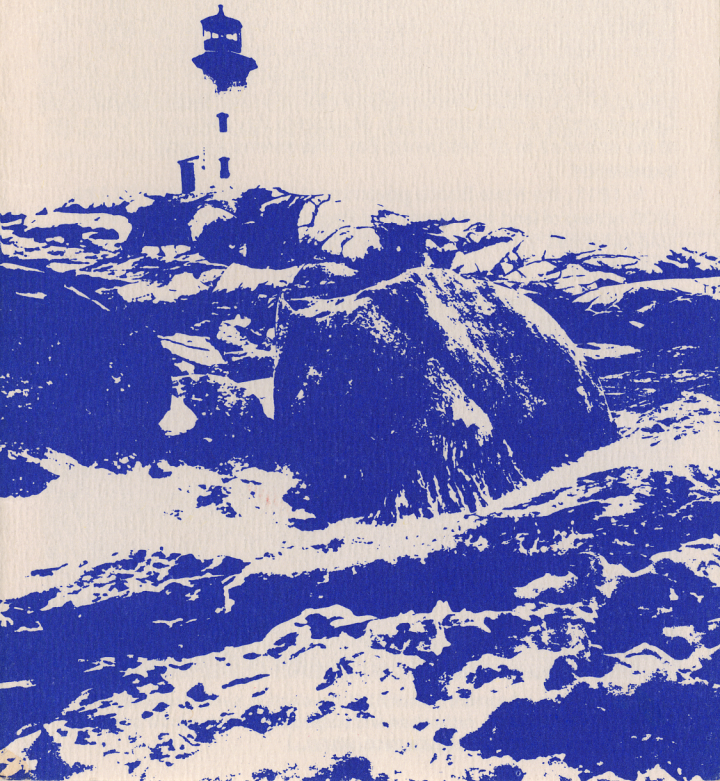
A Walking Tour of Rocks, Minerals And Landforms of Peggys Cove

Nova Scotia
Department of Mines and Energy

Information Circular 9



PEGGYS COVE — A Piece of Nova Scotia

For years, the picturesque combination of ocean and rugged granite coastline of Peggys Cove has provided artists and travellers with a setting of impressive natural beauty. Today, this small fishing village welcomes over 120,000 tourists annually.

The observable landforms and rocks provide valuable information about stages in the geological development of Peggys Cove and the surrounding areas. This tour is designed to introduce these rocks and landforms, and to show how they have influenced industry in this area. Walking through Peggys Cove will not only show how the present day landscape formed but also how geologists investigate the geological history of an area and evaluate its mineral resources.

The walking tour is made possible through support from the Public Information Program of the Canada-Nova Scotia Mineral Development Agreement (CNSMDA). This Agreement provides the means through which the federal and provincial governments can stimulate development of Nova Scotia's mineral industry.

Caution

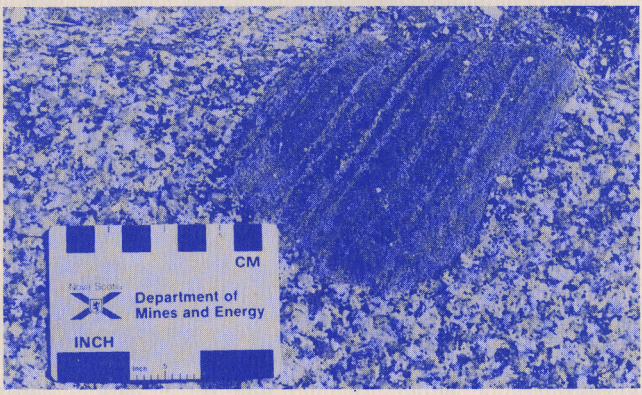
Although many visitors enjoy gazing at the panoramic view of breaking waves at Peggys Cove, we urge you to exercise extreme caution. Large waves often break further on shore than expected. Visitors can "play it safe" by avoiding shoreline edges and steep slopes. Please ask permission to cross private property.

Location and Settlement

Peggys Cove is located 53km (33 mi) southeast of Halifax along the southern shore of Nova Scotia. It lies on the eastern side of the mouth of St. Margarets Bay in Halifax County and has a population of approximately 65 residents.

There are two versions of the origin of the name "Peggys Cove". One account relates the story of Margaret, the only survivor of a schooner shipwreck which occurred on "Halibut Rock" off the Lighthouse Point. Margaret, later known as "Peggy of the Cove," swam ashore where she was rescued. She later married a Cove resident and settled in the village, which soon became known as Peggys Cove. The second version states that the name Peggys Cove is simply a short form of St. Margarets Bay. Since the Cove lies at the entrance to St. Margarets Bay, this seems a logical explanation.

In 1811, the Nova Scotia government issued a grant of 324 ha (800 acres) of land to 6 families of Peggys Cove. The designated land extended from Indian Harbour southeast about 5.6km (3.5 mi) to Pollock Cove.



Granite enclosing a fragment (xenolith) of pre-existing layered rock. Granite consists of quartz (grey), orthoclase and plagioclase feldspar (pale grey-tan), biotite mica (black) and muscovite mica (white).

Fishing, Farming, Tourism, Arts and Crafts

The first settlers of Peggys Cove chose this location because of its potential as a fishing port. The Cove's protection from storms and its closeness to fishing grounds were key factors in this decision. Fishing continues to be important today. Fishermen from Peggys Cove and the surrounding region catch lobster, cod, herring, tuna, pollock, mackerel, salmon and haddock. Peggys Cove is home port to inshore fishing vessels; fish processing plants are located in Sambro, Hubbards and Blandford.

Although fishing was initially the primary industry of Peggys Cove and surrounding areas, farming was also attempted. However, the terrain is not suitable as farmland. The bedrock is very hard and resistant to weathering and erosion, producing almost no soil. Only small, shallow areas of rocky soil remain since the last ice age when glaciers scraped away all the topsoil.

Because the Peggys Cove area has become such a popular tourist attraction, the principal industry has evolved from fishing to tourism. The variety of arts and crafts produced includes oil paintings, pottery, weaving, leather goods and candles. Often it is possible to observe artists at work.

The remarkable 'fisherman's monument' was carved by a talented marine artist, William E. deGarthe, on a wall of granite. Displaying over 30 figures, the monument is a tribute to fishermen and their families. The deGarthe Memorial Provincial Park surrounds the monument; it was established in August, 1986 to commemorate his dedication and contribution to Peggys Cove.

The granite rock of this area, although a deterrent to farming, contributed to the building stone industry. Coarse grained granite was once quarried on the west side of St. Margarets Bay; this granite was used to build the Halifax City Hall in 1888. The Brookfield Quarry, located on the east side of the Terence Bay River, operated from the late 1800s until 1904. Granite from this quarry was used in the construction of the Merrill Lynch Building in Halifax in the early 1900s. Presently, geologists from the Department of Mines and Energy are re-evaluating the granite in this area for use as building stone under a CNSMDA project.

The lighthouse at Peggys Cove is an important landmark; the first was erected in 1868 to facilitate safe navigation into St. Margarets Bay. Today, there is a replacement lighthouse which has stood since 1914 and is the only one in Canada to contain an operating post office. Widely promoted through tourism, photographs and paintings, the Peggys Cove lighthouse has become a symbol of Atlantic Canada.

Small vein of aplite cutting granite. Aplite is composed of sugary textured quartz and feldspar. The vein of aplite was intruded after the granite crystallized.

GEOLOGICAL HISTORY

The geological history of the Peggys Cove area began over 470 million years ago with the deposition of mud and sand in a deep ocean basin near ancient Africa. As the thickness of sediment increased, the mud and sand were compacted into rocks named shale and sandstone. Movement of the ocean basin toward ancient North America resulted in a major collision of crustal plates. This collision initiated a period of mountain building 400 million years ago. The shale and sandstone were crumpled and folded, and the added heat and pressure transformed them into metamorphic rocks known as slate and quartzite.

Heat generated from the collision melted rocks at the base of the earth's crust 370 million years ago. The molten material intruded upward until it cooled and solidified into granite. Uplift, weathering and erosion removed several kilometres of overlying rock, finally exposing the granite that is visible at Peggys Cove.

About 350 million years ago when the climate was tropical and the water warm, the sea invaded all of the valleys. Conditions were perfect for the building of reefs and the precipitation of limestone, salt, gypsum and potash. One of the low-lying valleys invaded by the sea is now St. Margarets Bay. Limestone deposits have been found on the floor of the Bay and on its east side, south of Tantallon. This limestone represents the deposits of a warm, inland sea.

Today, we know the slates and quartzites as the gold-bearing Meguma Group. The many gold mines in Nova Scotia during the period 1865-1950 were located in rocks of this Group. The granite is now referred to as the South Mountain Batholith which extends from Halifax to Yarmouth. It contains the only primary tin mine in North America near Yarmouth. Under the CNSMDA, geologists are studying the granites, gold-bearing rocks and limestones to learn about their mineral deposits.

Peggys Cove. The actual cove is the result of glaciers and water eroding the granite along a zone of weakness created by closely spaced fractures. The orientation of these fractures is west-northwest and is parallel to many other coastal harbours and coves.

Granite Forms the Bedrock

Peggys Cove and surrounding areas are underlain by coarse grained, greyish-white granite. Granite is a hard, igneous rock formed by the slow cooling of hot, molten material into coarse grained crystals of quartz, feldspar (orthoclase and plagioclase) and mica (muscovite and biotite).

An interesting geological feature in the granite is the presence of xenoliths. As the molten granite pushed its way upward, fragments of pre-existing bedrock sometimes fell into the granite melt. They became incorporated into the solidifying granite, recrystallized and cooled. Some xenoliths also formed from parts of earlier solidified granite. Xenoliths appear today generally as darker inclusions of different rock composition within the granite.

Cutting across the granite are veins of aplite and pegmatite. These two rock types were once molten and were intruded into the granite after it solidified. Pegmatite can be distinguished from aplite because it has much larger crystals (1 - 6cm), indicating that the molten rock cooled very slowly. Aplite is finer grained and has a sugary texture. The smaller crystal size (1 - 2mm) indicates a faster cooling process.

The granite sculpture carved by William E. deGarthe is located at the deGarthe Memorial Provincial Park.

Fractures and Faults

Commonly, the granite of this area is jointed and fractured with oriented cracks that formed during the cooling of the granite and during mountain building. Fractures along which movement has occurred are known as faults.

These features were later exaggerated by glaciation. It is interesting to note that the glacial movement occurred in the same direction as some of the previously formed fractures and faults. This consistency greatly enhanced these glacial features. A result of such preferential erosion is Dover Harbour, located just east of Peggys Cove and oriented NW-SE. During glaciation, ice exploited the weakness of the fractures and faults in this area by simultaneously widening them and removing rock material. Peggys Cove harbour was formed in a similar way. Like Dover Harbour, it owes its existence to fractures and faults which were preferentially eroded by the glaciers. When the ice melted, sea level rose and filled these coastal areas. Today, the mechanical action of breaking waves and repetitive freezing and thawing continues the process of erosion by removing chunks of granite from the edges of coastline.

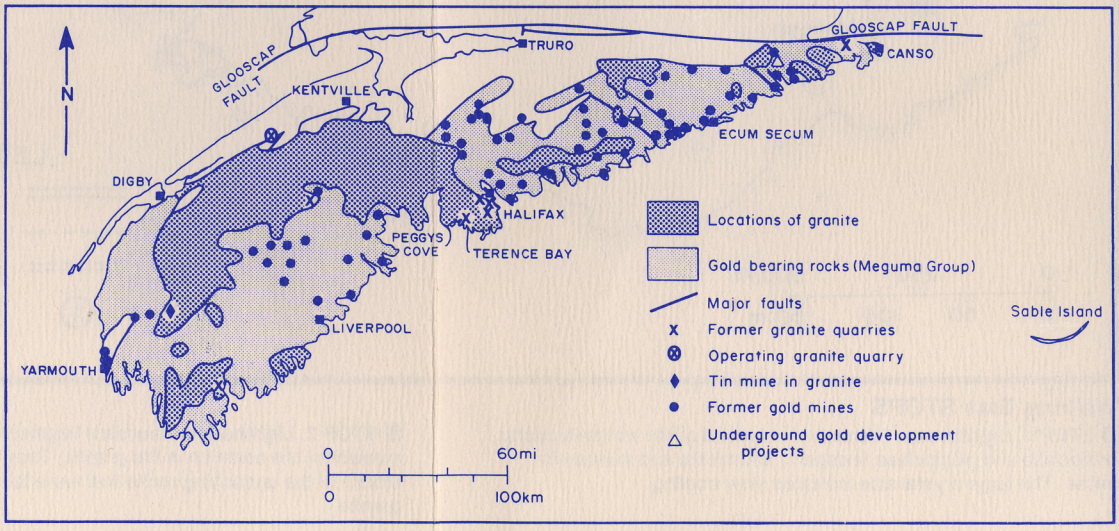
Glaciers Sculpted the Landforms

A huge ice sheet, several kilometres thick, covered much of Nova Scotia between 10,000 and 70,000 years ago. Glacial action yielded distinctive erosional and depositional features.

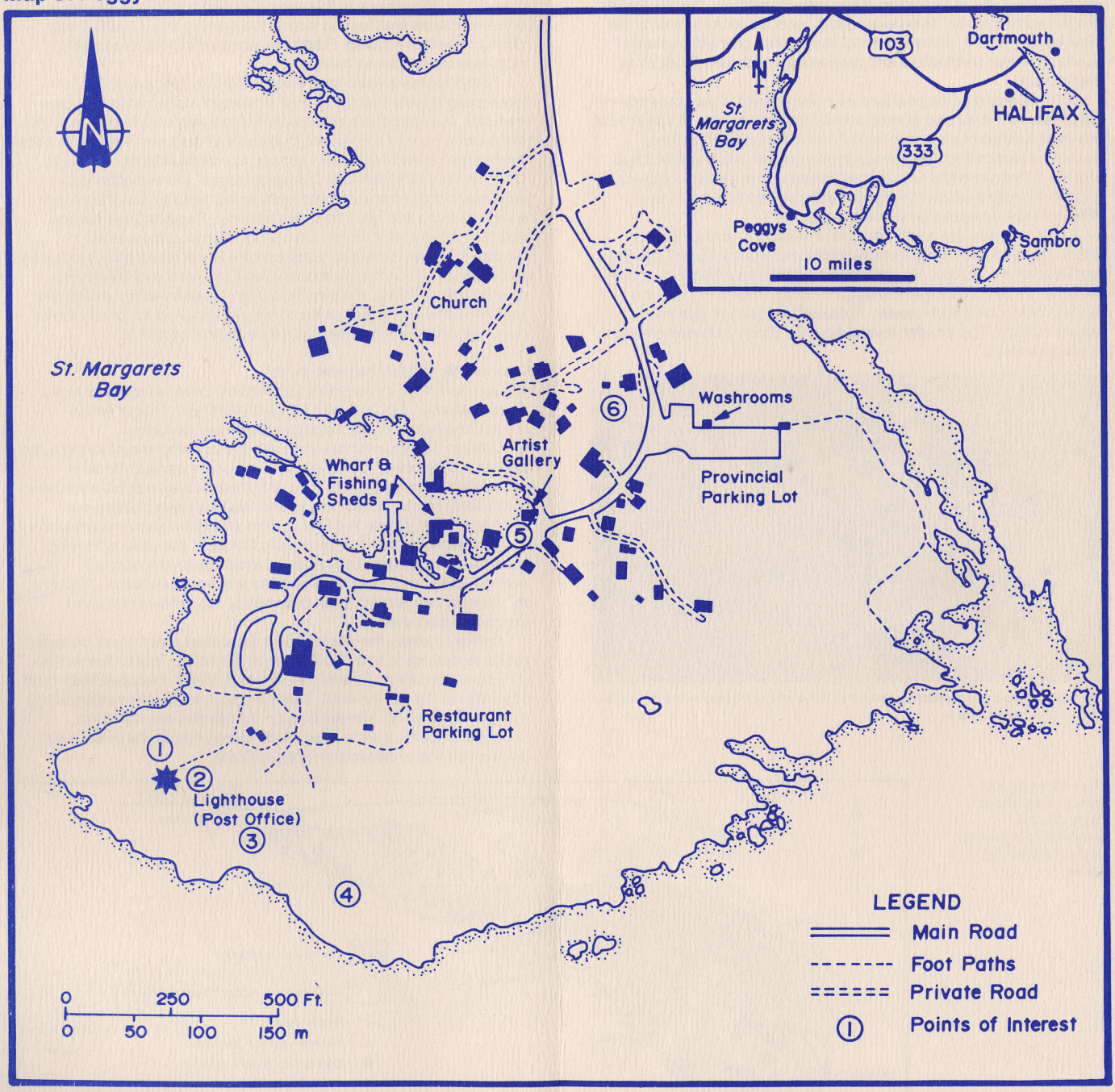
Erosion of the landscape included the gouging and plucking out of boulders and rocks, so that depressions were carved. Roches moutonnées are mounds of rock which have been named because of their resemblance to reclining sheep. Such a mound displays a gradual smooth slope on the side from which the glacier came and a rough steep slope on the other side. Rocks at the base of moving glaciers left scratches called glacial striations on the bedrock surface. Bogs and small marshy lakes are also features of glaciation; they formed because of poor drainage of the hollows that were eroded by glacial action.

As they moved, the glaciers also deposited a mixture of unsorted rocks, gravel, sand and clay known as glacial till. This till formed hill-like drumlins such as Citadel Hill, McNabs Island, Georges Island and other hills in the Halifax area. There is also a series of drumlins along the east coast of St. Margarets Bay. As the glaciers retreated, boulders or erratics were deposited. Today, numerous erratics can be seen on the landscape of Peggys Cove.

Map showing the areas of southern Nova Scotia underlain by granite and gold bearing rocks.



Map of Peggys Cove area



Walking Tour STOPS

■ **STOP 1. Lighthouse.** Granite is composed of the minerals quartz, orthoclase and plagioclase feldspars, and biotite and muscovite micas. The large crystal size indicates slow cooling.

■ **STOP 2. Lighthouse.** Abundant fragments of pre-existing rocks (xenoliths) are common in the granite. They represent small and large blocks of the underlying rocks that were torn off by the intruding granite.

■ **STOP 3. On the Rocks.** Dykes and veins cut the granite in great abundance here. Many are made up of a coarse grained rock called pegmatite which contains large crystals of quartz, orthoclase and plagioclase feldspars, tourmaline and muscovite. Some veins are composed of a finer grained rock called aplite. The veins of aplite and pegmatite are younger than the granite.

■ **STOP 4. On the Rocks.** Visible here are large roches mountonnées or "sheep backs", formed by glacial erosion. Rocks lodged in the base of the glacier left scratches (glacial striations) on the granite. From this position one can see many large and small boulders called glacial erratics which were deposited by the glacier as it melted.

■ **STOP 5. Peggys Cove.** The Cove results from glacial erosion along a set of closely spaced fractures. The orientation is WNW and is parallel to other coves and valleys along the coast.

■ **STOP 6. deGarthe Memorial Provincial Park.** The granite ledge was carved by the late artist William E. deGarthe as a monument to the fishermen of the region.

Glaciation near Peggys Cove. Large and small boulders (erratics) once carried by the glaciers were dropped all over the landscape. Many of the rock surfaces were striated by the movement of the glaciers over them.

INTERESTED IN MORE INFORMATION?

Additional information on the Peggys Cove region can be obtained by calling the Metro Tourist Association at (902) 835-0677.

To learn more about the local geology, refer to the pamphlet "Geology of the Halifax-Dartmouth Area" available from the Nova Scotia Department of Mines and Energy, the Nova Scotia Museum and the Nova Scotia Government Bookstore.

For further information on rocks, minerals or mining in Nova Scotia, please call the Nova Scotia Department of Mines and Energy at (902) 424-4700.

Nova Scotia

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