

T12.4 GLACIAL DEPOSITS AND RESOURCES

Glacial and post-glacial events in Nova Scotia (T3) have produced a wide variety of glacial deposits and features inland, along the coast and in the province's offshore waters. Glacial features, such as drumlins and eskers, have influenced settlement patterns by providing agricultural land, good sites for housing development and workable aggregate resources. Materials range from large till with cobbles or boulders to fine-grained sand deposits. Glaciation was also responsible for the large numbers of glacial lakes in Nova Scotia formed by erosion and damming by deposits that obstructed water flow (see T8.2).

The most important areas, from an economic standpoint, are the glacial-retreat and post-glacial deposits, which include ablation till, glacio-fluvial and alluvial deposits (see T3.4). These deposits are found throughout the entire province and constitute the main source of (nonquarry) aggregate material. Glacial till is also the basis of many of the soil formations in the province (see T12.9).

HISTORICAL CONTEXT

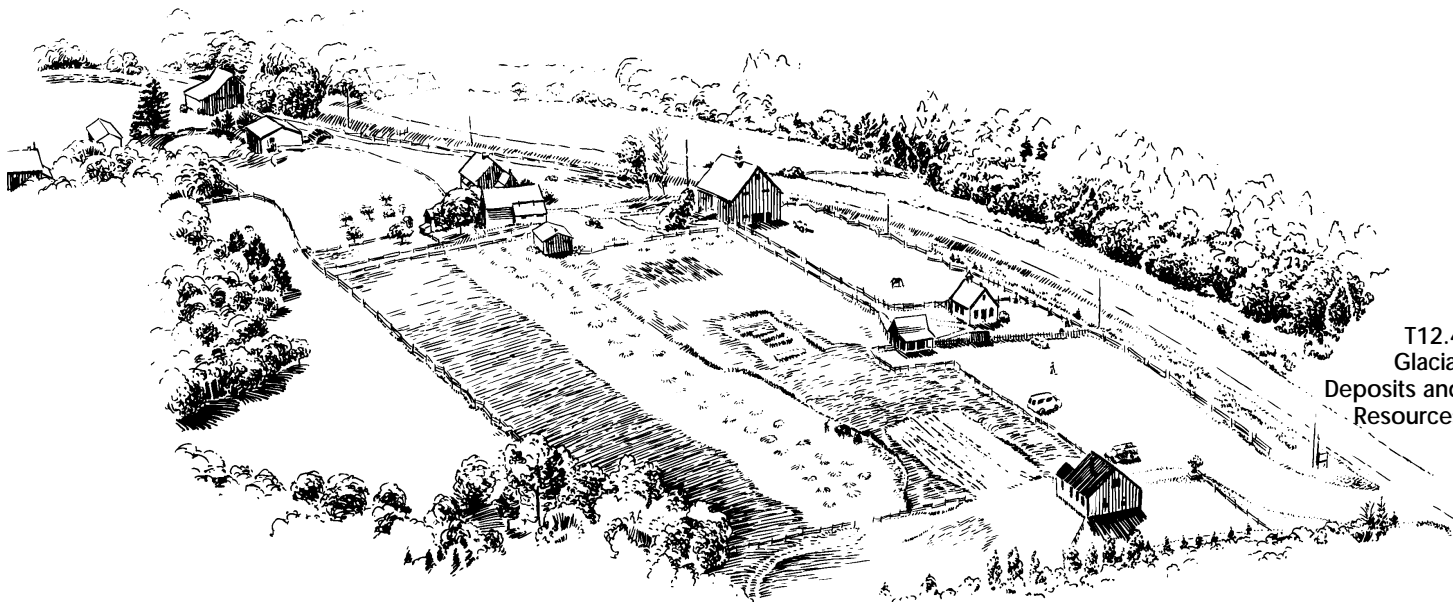
1700s

During the 1700s, there was an increased interest in colonization and development in Nova Scotia. Along the Atlantic Coast, there are few tidal marshes equiva-

lent to those dyked by the Acadians in the Bay of Fundy and Northumberland Straits (see T12.7). To meet their need for food and shelter, the colonists cleared areas that had thick till and workable soil—the drumlin fields along the South Shore. These fields, which contain numerous rounded hills up to twenty acres in area, were glacially developed from slate bedrock, and their unconsolidated material provided good drainage for agriculture. In addition to the tree stumps, colonists had to remove stones from the till to permit ploughing. These stones were piled at the edge of fields and were often built into walls, which remain as evidence of farming, even though the land may since have regenerated to forest.

Apart from the cleared drumlins, the areas settled were agriculturally unproductive. Lunenburg (Unit 434) was established in 1753 as an agricultural community to support Halifax. Studies of the Lunenburg drumlin field indicate that the only land cleared and farmed was on the drumlins.¹

Drumlins also supported excellent stands of pine, spruce, hemlock and hardwoods, which supplied lumber for local use by the colonists and for timber markets. These forests were burnt, and the ashes provided nutrients for hay, grain, turnip and potato crops, which in turn fed cattle, horses, sheep, hogs and people.



T12.4
Glacial
Deposits and
Resources

Figure T12.4.1: Ross Farm is a locally managed museum, part of the Nova Scotia Museum, restored to represent drumlin farming during the 1800s.

1800s

Drumlins were considered prime lands to accommodate the extensive grants issued in the 1800s. Once coastal areas were developed, settlers followed the drumlin fields inland, continuing to clear and farm. Ross Farm, near New Ross, Lunenburg County (Unit 434), is a classic example of a drumlin landscape community settled by soldiers discharged from the army and granted land in Nova Scotia around 1815 (see Figure T12.4.1).

Settlers in the 1800s also began farming river valleys, such as the Annapolis Valley (District 610), where the melting ice cap on the South Mountain left thick deposits of glacial-outwash materials on the valley floor.

Other deposits provided quarrying materials for building or repairing roads and buildings. "Barrow pits", where accessible deposits were quarried casually by horse and wagon, were common from the late 1800s. The production of silica sand first occurred in 1908 at the Belmont operation, west of Truro (District 620).

1900–1950

In the 1900s, agricultural production dropped steadily on drumlin farms in various areas of the province, as urbanization changed food-import patterns and drew people from the country to the city. For example, in 1951, Queens County drumlin farms (Units 432 and 433) produced only half the hay and grain of ninety years previously, 1/3 as many hogs, 1/5 as many cattle, 1/10 as many sheep and only 1/23 as much milk.

As drumlin farms were abandoned, spruce and fir trees gradually spread across the unmanaged land. The oldfield habitat (H5.2) is often associated with abandoned farms on drumlins.

THE USE OF GLACIAL DEPOSITS TODAY**Forestry**

Glacial-till areas still provide productive lands for forestry. The tops of drumlins have the best site conditions for hardwood forests and have lasting value for hardwood production and parkland areas, for example, provincial park reserves and Kejimikujik National Park.

People are using abandoned agricultural lands for Christmas-tree farming. Monocultures of pine and Balsam Fir are conspicuous on drumlins in southwest Nova Scotia, particularly around the Bridgewater area (Unit 433).

Development

Drumlins are often prime sites for housing development, as they provide good soil for on-site sewage, good drainage and, often, attractive views for potential buyers. Many of the island and coastal headlands of the South Shore (Unit 832) and Halifax area (Unit 833) are drumlins coveted as prime real estate.

Recreation

District 830, characterized by beaches and islands, abuts the drumlin areas of Lunenburg County. Where drumlins are attacked by the sea, they provide the primary sources of sediment for our sand beaches (see T7.3). Interference with the natural process of reworking sediments can degrade beaches valued for their recreational potential (see T12.7).

Beach Mining

Beach mining is tied to the accessibility of material and has historically occurred where roads and rail lines cross beaches and sand dunes (see T12.7). Prior to the mid-1950s, beaches and inshore coastal areas were the principal source of sand and gravel in Nova Scotia. The mining of aggregates from the beach face, dunes and bluffs is considered to have been one of the most damaging activities to beach development in the province.² The removal of sand and gravel affects the deposition of materials downstream as the source of materials decreases. Other changes can occur where the extensive removal of aggregates exposes the backshore to increased wave action on dunes and to the subsequent erosion and flooding of backshore habitats in severe storms, e.g., Lawrencetown Beach, Halifax County (Unit 833), and Glace Bay (Unit 531). The beach at Cow Bay, Halifax County (Unit 833), was quarried for sand and gravel between 1954 and 1966. This effectively obliterated part of the spit-system beach, which had not recovered as of 1988.

During the 1960s, growing public concern about degradation of beaches eventually resulted in prohibition of the removal of beach material under the Beaches Protection Act of 1975. This piece of legislation, although aimed at the protection of a resource, has been instrumental in maintaining part of Nova Scotia's coastal landscapes.

Quarrying

Nova Scotia has many important deposits of materials that provide key ingredients to a host of construction materials and secondary products. The most useful mineral-aggregate deposits, such as sand and gravel, are composed of the more durable rocks, including granites and quartzites. These deposits

are restricted to the flanks of the Avalon Uplands (Region 300) and the northern slopes of the Region 400—the Atlantic interior (see T2.2).

Kames and eskers are a major source of sand and gravel in the province. Four deposits are commercially exploited around Sydney (Unit 531), Folly Lake (Unit 311 and Gays River (sub-Unit 511a) in Colchester County, and Yarmouth (Unit 831).³ Many smaller operations are located throughout the province (see plate T12.4.1). This resource is used for road building, sewage projects, commercial-site preparation, parking lots, residential construction (including foundation preparation and drainage) and backfill.

Apart from glacial deposits, sand and gravel may also be found in ice-contact deposits, glacial deposits, modern-stream alluvium, weathered bedrock and marine deposits.

Glacio-fluvial clays are another economically viable resource in Nova Scotia. The Lantz clay pit in Hants County (sub-Unit 511a) is a local industry supporting Shaw Bricks and Lorenzen Pottery. Many of the houses in the area are built of red brick.

In Nova Scotia, the extent to which production can be supported by onshore materials is limited. An example of this limiting factor occurred in the 1980s, during the proposed Bay of Fundy damming

project, when it was determined that Nova Scotia's deposits could not provide the necessary quantities of materials.

OFFSHORE METALLIC AND INDUSTRIAL-MINERAL POTENTIAL

The surficial geology of the continental shelf contains extensive deposits of sand and gravel, which were formed by marine reworking of glacial drift (see T 3.5). This untapped resource offers significant potential for an offshore sand-and-gravel industry in the future, particularly if social pressures continue to reduce access to and development potential of land-based quarry sites.

Placer Gold Deposits

Placers are concentrations of gold or other heavy minerals often associated with sand and gravel deposits. The gold was eroded from Meguma bedrock by glacial processes and deposited in tills on the continental shelf. The tills have been reworked, particularly during the last marine transgression, by marine processes, and the gold is concentrated into placers located in gravel lag deposits or in bedrock joints. Known placer deposits are typically located



Plate T12.4.1: Sand-and-gravel-quarry near Wolfville, (sub-Unit 511a). This aerial view shows the depth of the deposit in relation to the surrounding trees and the different sizes of the material excavated. Photo: R. Merrick.

where the gold-bearing anticlines of Meguma bedrock extend onto the continental shelf, e.g., The Ovens, Lunenburg County (Unit 832), and the Country Harbour vicinity, Guysborough County, (Unit 842).

Sand and Gravel

Sand and gravel deposits on the continental shelf cover Georges Bank, Browns Bank, LaHave Bank, Emerald Bank, Sable Island Bank, Banquereau (Unit 931), Middle Bank, Canso Bank, Misaine Bank and Scatarie Bank (Unit 921). The deposits, up to 50 m thick, consist of fine-to-coarse, well-sorted sand, grading to rounded gravels.⁴

There are also smaller local deposits of sand and gravel that may have potential for development, e.g., a sand-wave field at Scots Bay off Cape Split, Kings County (District 720/Unit 912)⁵.

Environmental Concerns

The main environmental concerns regarding marine mining off Nova Scotia are the impacts on traditional fishing grounds and on coastal erosion. Fisheries concerns relate to direct destruction of fish stocks or spawn, destruction of habitat at any stage in the life cycle or interference with fishing-vessel navigation. Coastal erosion problems may be caused by the interruption of sediment supply to beaches, which can cause or exacerbate coastal erosion.



Associated Topics

T2.2 The Avalon and Meguma Zones, T2.7 Offshore Geology, T3.4 Terrestrial Glacial Deposits and Landscape Features, T3.5 Offshore Bottom Characteristics, T7.1 Modifying Forces, T7.3 Coastal Landforms, T8.2 Freshwater Environments, T12.3 Geology and Resources, T12.7 The Coast and Resources, T12.9 Soil and Resources

Associated Habitats

H2.2 Boulder/Cobble Shore, H2.3 Sandy Shore, H5.2 Oldfield, H5.3 Cliff and Bank

References

- 1 Martin, L. (1966) *Glaciers, Drumlins and Deserted Farms*. Nova Scotia Museum, Halifax.
- 2 Ricketts, P. (1988) "Shoreline changes and associated coastal management issues in the Maritime provinces." In D. Day et al (eds.), *Geographical Perspectives on the Maritime Provinces*. Saint Mary's University, Halifax.
- 3 Prime, G. (1991) *Aggregates in Nova Scotia*. Nova Scotia Dept. of Natural Resources, Halifax.
- 4 King, L.H. (1970) *Surficial Geology of the Halifax-Sable Island Map Area*. Marine Sciences Branch, Dept. of Energy, Mines and Resources, Ottawa. (Paper 1).
- 5 Miller, R. and G. Fader (1990) Cruise Report 89-009 Phase 3, Sand Wave Field, Scots Bay—F.R.B. *Navicula*. (Open File Report Geological Survey of Canada No. 2298).

Additional Reading

- Miller, C. K. and J. H. Fowler (1987) "Development potential for offshore placer and aggregate resources of Nova Scotia, Canada." *Marine Mining* 6:121-139.
- Stea, R.R., S. Pecore and G.B.J. Fader (1993) Quaternary Stratigraphy and Placer Gold Potential of the Inner Scotian Shelf. Nova Scotia Dept. of Natural Resources, Mines and Energy Branches, Halifax. (Paper 93-2).