

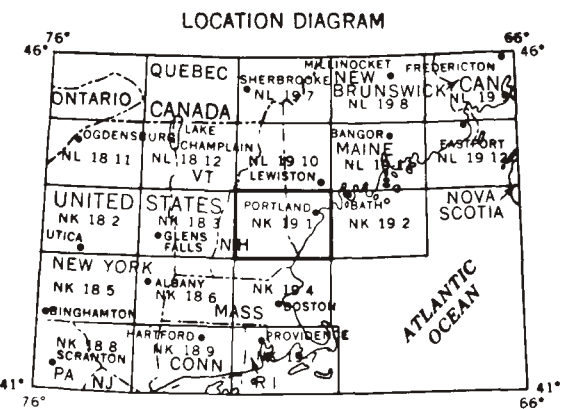
SURFICIAL GEOLOGY  
OF THE  
PORTLAND  
1° X 2° QUADRANGLE, MAINE

Compiled By :  
Woodrow B. Thompson, Maine Geological Survey

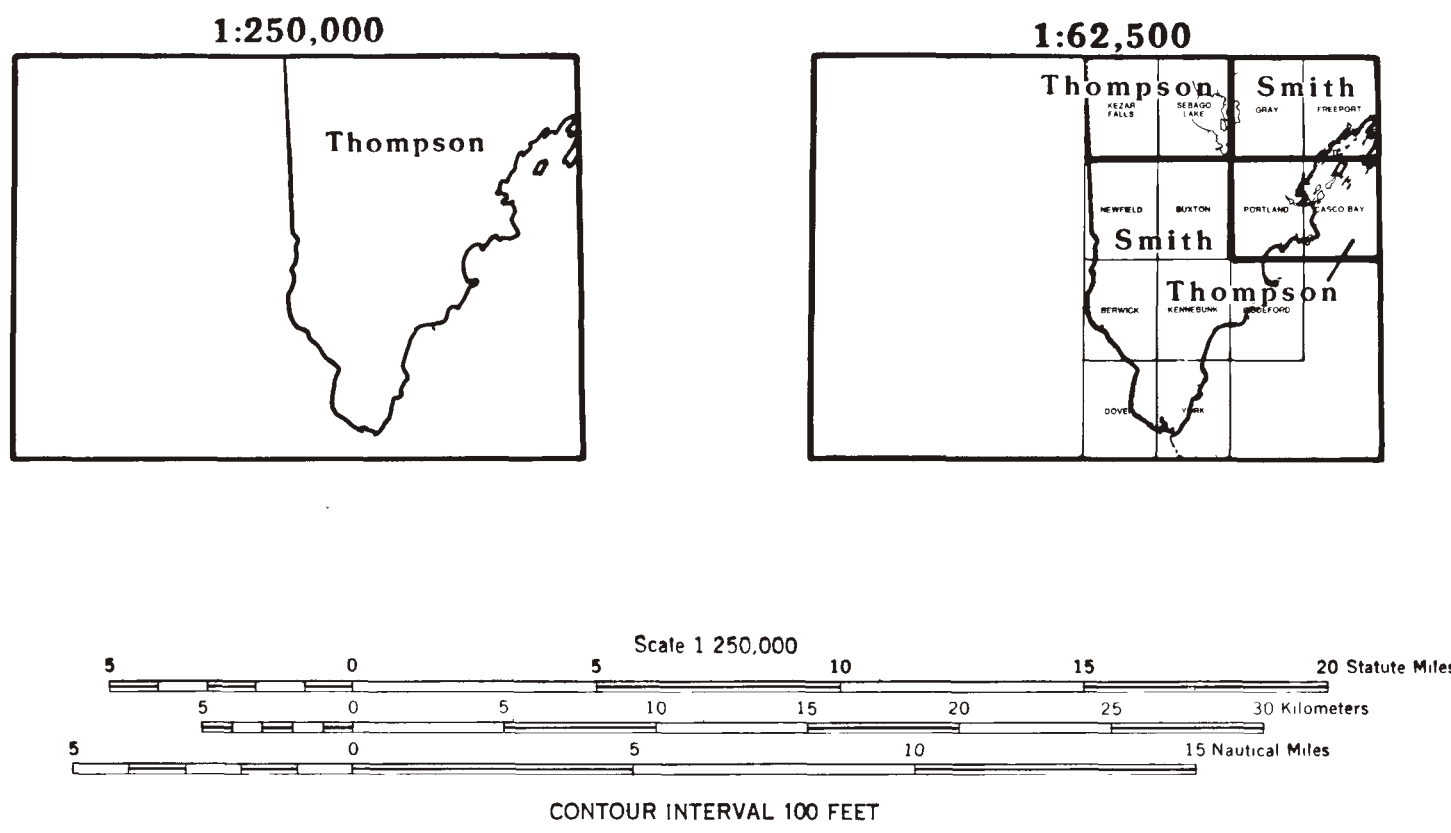
Area Compilers and Contributors :  
Geoffrey W. Smith, University of Ohio, Athens  
Woodrow B. Thompson, Maine Geological Survey

Maine Geological Survey  
DEPARTMENT OF CONSERVATION  
Augusta, Maine 04333  
Walter A. Anderson, State Geologist

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COMPILATION RESPONSIBILITY



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EXPLANATION

Geologic Unit	Materials	Topography	Origin
a	Stream alluvium (includes Holocene flood plain, stream terrace, and alluvial fan deposits)	Silt to gently sloping on flood plains and stream terraces; gently to moderately sloping on alluvial fans.	Deposited on flood plains and stream beds by postglacial streams.
s	Swamp, marsh, and bog deposits (includes both fresh-water and salt-water marshes)	Flat.	Formed by accumulation of sediments and organic material in depressions and other poorly drained areas.
b	Beach deposits	Sand and gravel.	Includes beach sediments formed by wave and current action, and sand dunes derived from these deposits.
eb	Emergent beach deposits	Sand and gravel.	Formed by wave erosion of till or other materials during the late-glacial marine submergence of parts of southern Maine.
e	Bolian deposits	Sand.	Windblown sand. Derived from wind erosion of glacial sediments and deposited in late-glacial to postglacial time.
L	Lake-bottom deposits	Silt, clay, and sand. Commonly well stratified, and may be rhythmically bedded.	Composed of sediments that washed out of late Wisconsinan glacial ice and accumulated on the floors of glacial lakes. Map unit may also include a few non-glacial lake deposits.
m	Glaciomarine deposits (fine-grained facies)	Silt, clay, sand, and minor amounts of gravel. Commonly a clayey silt (the Presumpscot Formation). Sand is dominant in some places, but may be underlain by finer grained sediments. Locally fossiliferous. Map unit includes small areas of till and other units that are not completely covered by marine sediments.	Composed of glacial sediments that accumulated on the ocean floor. Formed during the late-glacial marine submergence of lowland areas in southern Maine.
ms	Glaciomarine deposits (coarse-grained facies)	Sand, gravel, and minor amounts of silt.	Deposited where glacial meltwater streams and currents entered the sea. Includes glaciomarine deltas, subaqueous kames and fans (subaqueous outwash), and outwash that prograded into shallow marine waters and locally covered earlier glaciomarine silt and clay deposits.
go	Glacial outwash deposits	Sand and gravel.	Deposited by meltwater streams in front of the receding late Wisconsinan ice margin. Includes non-marine outwash plains, deltas, and fans.
g	Ice-contact glaciofluvial deposits (exclusive of eskers)	Sand, gravel, and silt.	Deposited by meltwater streams adjacent to stagnant glacial ice.

Geologic Unit	Materials	Topography	Origin
ge	Bakors	Individual or multiple ridges. Complex eskers may have anastomosing patterns and be gradational with other types of ice-contact deposits.	Chiefly deposited by meltwater streams flowing in tunnels within or beneath the late Wisconsinan ice sheet. Map unit also includes small undifferentiated areas of units "g" and "go".
gm	Stagnation moraine	Mostly till, but also includes variable percentages of undifferentiated sand and gravel.	Deposited during the dissipation of stagnant glacial ice.
om	End moraines	Till or sand and gravel. May be very boundary. Commonly interbedded with or overlain by glaciomarine sediments in areas that experienced late-glacial marine submergence. Only the largest end moraines and some dense clusters of smaller ones are shown here as a separate unit (em). Elsewhere, short lines mark the crests of moraine ridges, which are locally so numerous that only selected individuals are represented.	Deposited in the marginal zone of the late Wisconsinan ice sheet, by glacial ice and/or meltwater flowing out of the ice.
rm	Ribbed moraine	Till is the principal constituent, but stratified sediments are present in some of the deposits.	Origin uncertain. Deposited either at the margin of or beneath the late Wisconsinan ice sheet.
t	Till	Heterogeneous mixture of sand, silt, clay and stones. May include many boulders. Generally massive, but in many places contains beds and lenses of variably washed and stratified sediments.	Deposited directly by glacial ice.
Thin drift	Area of many bedrock outcrops and/or thin surficial deposits (generally less than 3 m thick). The type of surficial material is known or inferred.	Topography of these areas reflects the configuration of the bedrock surface, and ranges from smooth undulating hills to knobby terrain and high mountains.	Commonly the result of non-deposition of glacial sediments, but the surficial materials in some coastal areas have been largely removed by marine erosion in late-glacial time.
ldu	Thin drift, undifferentiated	Area of many bedrock outcrops and/or near-surface bedrock where the surficial materials have not been mapped.	Same as other thin-drift areas.
rk	Bedrock	Area of extensive bedrock outcrop, or where the bedrock lies less than 4 m thick over soil and vegetation. Surficial deposits are essentially absent. Particularly common on the ridge crests and steeper slopes of mountainous areas.	Same as the thin-drift areas.

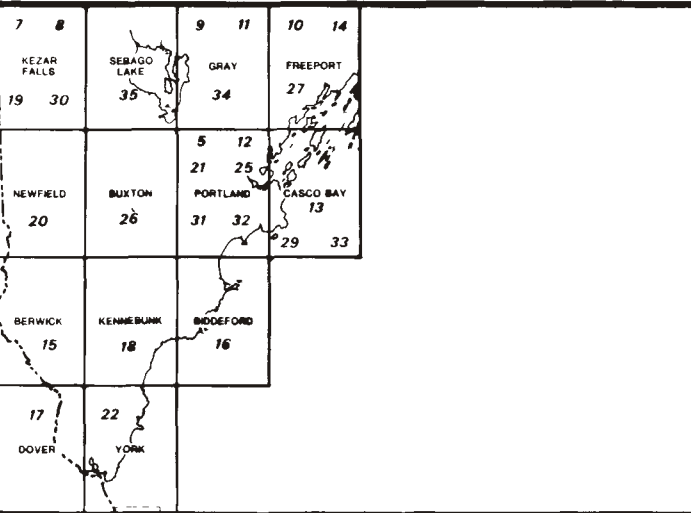
GEOLOGIC SYMBOLS

Contact	Boundary between adjacent map units.
Moraine ridge	Lines mark the crests of individual end moraines. Symbol also is used in conjunction with unit m to show orientation of drift ridges of uncertain origin.
Glacial striation locally	Includes striations, grooves, drag-and-tails, and other types of ice-flow indicators on bedrock outcrops. Dot indicates point of observation. Arrow-head is omitted where ice-flow direction is uncertain. Flange indicates older trends.
Glacially streamlined landform	Symbol shows long-axis orientation of drumlins, fluted hill ridges, roches moutonnées, and other hills that have been elongated parallel to the flow of glacial ice.
Cirque	Steep-walled, semicircular bedrock basin formed by glacial erosion in high mountainous areas.
Meltwater channel	Channel eroded by glacial meltwater stream. Arrow indicates known or inferred direction of stream flow.
▲ 288	Glaciomarine delta
▲ 345	Glaciolacustrine delta
▲ 609	Delta of uncertain origin

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SITES OF SPECIAL INTEREST

● Location of special site

This list includes locations of important stratigraphic sections of Pleistocene deposits in Maine, and places where good examples of certain glacial features can be seen. The sites were selected partly on the basis of accessibility, ease of observation, and relative permanence. Some features, such as eskers and DeGeer moraines, are so numerous that only a few of the best examples are included here.

Site	Town	Name/Description	Principal References
1	Eliot	Great Hill; pit exposure showing interior of drumlin.	Caldwell, Hanson, and Holland (4)
2	Kennebunk	Great Hill; coastal exposure showing two tills separated by radiocarbon-dated marine sediments.	Smith (24)
3	Kennebunk	Kennebunk landfill; type locality for Kennebunk Resurgence (Bloom); pit exposure showing DeGeer moraine and other glaciomarine deposits indicative of oscillatory ice-margin retreat (Smith).	Bloom (1); Borne (2); Smith (23)
4	Buxton	Group of prominent DeGeer moraines.	Bloom (1)
5	Portland	Portland fossil-wood locality; pit exposure showing spruce logs and other plant remains buried in the Presumpscot Formation.	Hyland, Thompson, and Stuckewitz (6)
6	Freeport	Remnant of Maine's modern eolian sand deposit with active dunes.	Caldwell (3)

RADIOCARBON-DATED SITES

Explanation of symbols used to designate sites on the map:

- Material in place between late Wisconsinan tills.
- Material that predates or is contemporaneous with the advance of the late Wisconsinan ice sheet.
- Material that postdates or is contemporaneous with the recession of the late Wisconsinan ice sheet.
- Material that approximately dates the onlay of the sea during the late-glacial marine transgression.
- Material that approximately dates the offlay of the sea.

Site	Name/Town	Date (yr B.P.)	Laboratory No.	Material	Reference
A	Great Hill (Kennebunk)	13,830 ± 100	GL-192	marine shells between tills	Smith (24)
B	Kennebunk	13,200 ± 120	Y-2208	shells in deformed glacio-marine sediments	Stuver and Borne (28)
C	Little Falls (Gorham)	11,400 ± 90	SI-4747	shells in marine sediments	Smith (24)