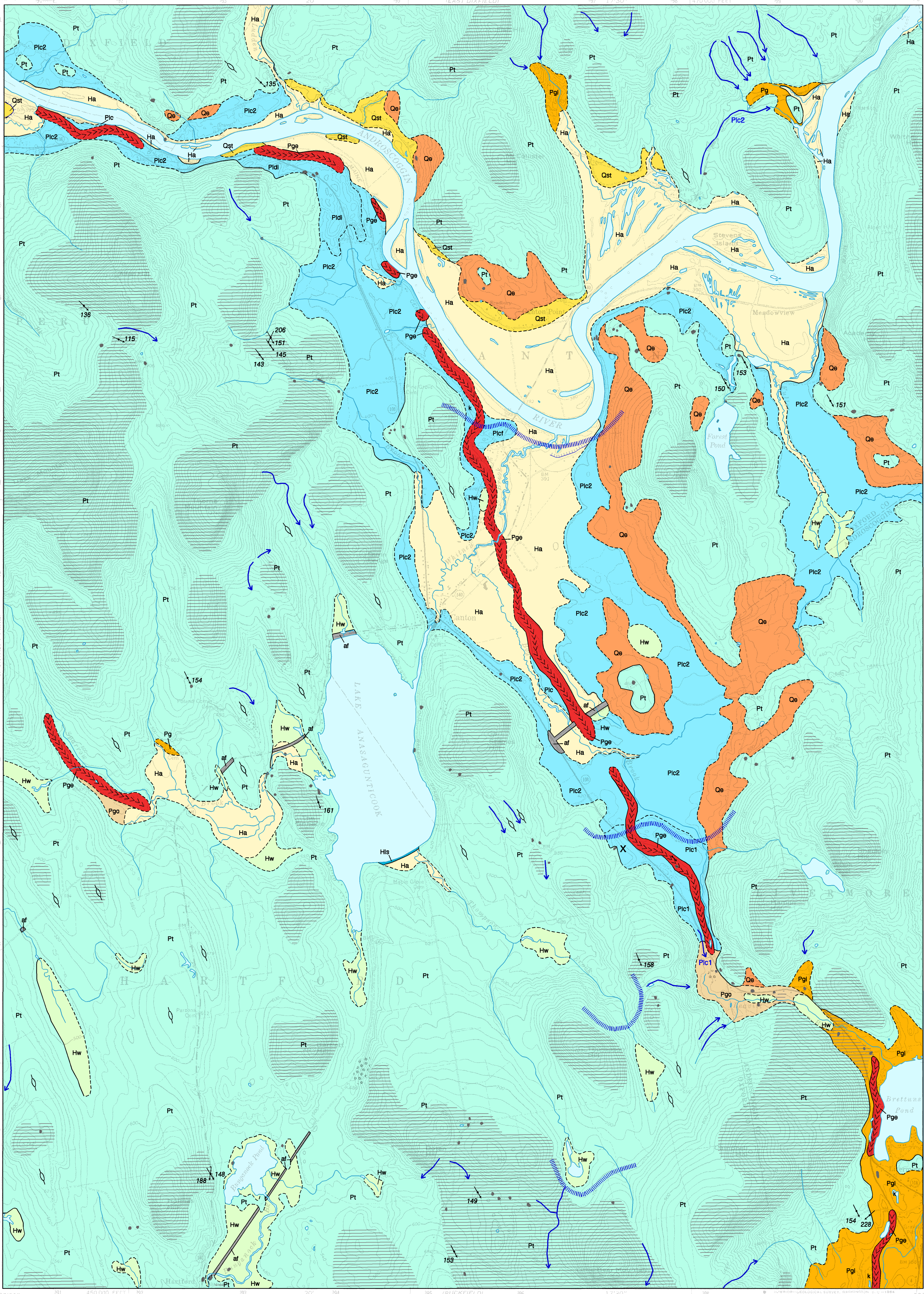
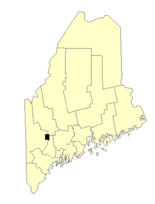
Surficial Geology



SOURCES OF INFORMATION

Surficial geologic mapping of the Canton quadrangle was conducted by Woodrow B. Thompson in 2005 for the STATEMAP program. Some of the data included here were collected by W. B. Thompson during reconnaissance surficial mapping in 1984 for the sand and gravel aquifer mapping program. Additional editing from fieldwork conducted by W. B. Thompson in 2008.



Quadrangle Location

SCALE 1 : 24,000

1 MILE — 7000 FEET — 1 KILOMETER

CONTOUR INTERVAL 20 FEET

TRUE NORTH

Topographic base from U.S. Geological Survey Canton quadrangle, scale 1:24,000 using standard U.S. Geological Survey topographic map symbols.

The use of industry, firm, or local government names on this map is for location purposes only and does not impute responsibility for any present or potential effects on the natural resources.

Ha	**Stream alluvium** - Sand, silt, gravel, and organic sediment. Deposited on the flood plain of the Androscoggin River and other modern streams. Unit includes some wetland areas.
Hw	**Wetland deposits** - Peat, muck, silt, and clay. Deposited by accumulation of organic-rich sediments in poorly drained areas on valley floors. Unit may grade into or include areas of stream alluvium.
Hls	**Lake shoreline deposit** - Sand and gravel deposited on beach at south end of Lake Anasagunticook.
Qst	**Stream terraces** - Sand and gravel terraces in the Androscoggin River valley. Formed by postglacial erosion and deposition along the river, and derived in part from reworking of glacial Lake Canton sediments (unit Plc_2).
Qe	**Eolian deposits** - Windblown sand deposited on hillsides along the Androscoggin River valley and on the east sides of the Bog Brook, Fuller Brook, and Leavitt Brook valleys. Includes sand ridges that parallel the prevailing wind direction (generally from the west) when the dunes formed. Unit Qe also includes irregular mounds and thin patches of windblown sand, locally interspersed with areas of till. Unmapped areas of eolian sand may occur elsewhere in the quadrangle.
Plc1 / Plc2	**Glacial Lake Canton deposits** - Sand, gravel, silt, and clay deposited in a lake that occupied part of the Androscoggin River valley and its tributaries. Includes sand and gravel deposited as deltas and subaqueous fans, and finer-grained lake-bottom sediments (sand, silt, and clay). The earlier and higher stage of Lake Canton (**Plc_1**) was controlled by a spillway at an elevation of ~480 ft, on the divide between Bog Brook and Leavitt Brook (just west of Route 108, on the Canton-Hartford town line). The lower lake stage (**Plc_2**) was controlled by a spillway at an elevation of ~410 ft. This spillway may have been located along the drainage channel that is followed by Route 140 north of Stevens Island. The Plc_2 stage of Lake Canton probably was dammed by glacial sediments that temporarily blocked the Androscoggin River in the northeast corner of the quadrangle, where the valley is very narrow and cuts through glacial till. It is possible that this lake stage was preceded by a brief and shallow marine estuarine phase, if the late-glacial marine submergence was high enough to extend into the Canton area, but no definite marine sediments have been found in this area. Lake Canton may have persisted into postglacial time.
Plcf	**Glacial Lake Canton fan deposit** - Ridge of sand and gravel that was built into Lake Canton at the edge of the last glacial ice sheet. This is probably a subaqueous fan, and may have been deposited when the lake stood at the higher (Plc_1) level.
Pg	**Glacial meltwater deposits** - Sand and gravel of uncertain origin; probably deposited by glacial outwash streams.
Pgo	**Outwash deposits** - Sand and gravel deposited by glacial meltwater streams in the Sparrow Brook and Leavitt Brook valleys.
Pldi	**Ice-contact glacial lake delta** - Sand and gravel deposited in a small glacial lake ponded between the southwest wall of the Androscoggin River valley and glacial ice in the center of the valley. This unit locally has a flat upper surface at an elevation of slightly over 500 ft.
Pgi	**Ice-contact deposits** - Miscellaneous sand and gravel deposits formed in contact with remants of glacial ice. May include glacial-stream and glacial-lake sediments, and probably some glacial-marine deltaic deposits (the latter in SE corner of quadrangle).
Pge	**Esker deposits** - Ridges of sand and gravel deposited by glacial meltwater streams in subglacial tunnels. A major esker system extends diagonally across the quadrangle from northwest to southeast. A second and much shorter esker is located in the Sparrow Brook valley.
Pt	**Till** - Loose to very compact, poorly sorted, massive to weakly stratified mixture of sand, silt, and gravel-size rock debris deposited by glacial ice. Locally includes lenses of waterlaid sand and gravel.
	Bedrock outcrops / thin-drift areas - Ruled pattern indicates areas where outcrops are common and/or surficial sediments are generally less than 10 ft thick (mapped partly from air photos). Dots show individual outcrops.
af	**Artificial fill** - Earth, rock, and/or man-made fill along roads and railroads.
	Contact - Boundary between map units. Dashed where approximately located.
	Scarp - Scarp separating adjacent terrace levels in sand and gravel deposits.
	Glacially streamlined hill - Symbol shows trend of long axis of hill, which is parallel to former glacial ice-flow direction.
135	**Glacial striation locality** - Arrow shows ice-flow direction inferred from striations on bedrock. Dot marks point of observation. Number is azimuth (in degrees) of flow direction. Flagged trend is older.
	Dip of cross bedding - Arrow shows average dip direction of cross bedding in esker deposit, which indicates direction of glacial stream flow. Dot marks point of observation.
k	**Kettle** - Depression resulting from melting of a block of glacial ice in area of sand and gravel deposits.
	Meltwater channel - Channel eroded by glacial meltwater stream. Arrow shows inferred direction of water flow.
Plc1	**Glacial Lake Canton spillways** - Labeled arrows show the outlets of Lake Canton.
>>>>>	**Crest of esker** - Chevrons show trend of esker ridge and point in direction of glacial meltwater flow.
	Ice-margin position - Shows an approximate position of the glacier margin during ice retreat, based on meltwater deposits, moraines, and/or positions of meltwater channels.
	Area of large boulders - Concentration of many large boulders on side of valley south of Lake Anasagunticook.
X	Location of large glacially transported boulder on southwest side of Route 108.

USES OF SURFICIAL GEOLOGY MAPS

A surficial geology map shows all the loose materials such as till (commonly called hardpan), sand and gravel, or clay, which overlie solid ledge (bedrock). Bedrock outcrops and areas of abundant bedrock outcrops are shown on the map, but varieties of the bedrock are not distinguished (refer to bedrock geology map). Most of the surficial materials are deposits formed by glacial and deglacial processes during the last stage of continental glaciation, which began about 25,000 years ago. The remainder of the surficial deposits are the products of postglacial geologic processes, such as river floodplains, or are attributed to human activity, such as fill or other land-modifying features.

The map shows the areal distribution of the different types of glacial features, deposits, and landforms as described in the map explanation. Features such as striations and moraines can be used to reconstruct the movement and position of the glacier and its margin, especially as the ice sheet melted. Other ancient features include shorelines and deposits of glacial lakes or the glacial sea, now long gone from the state. This glacial geologic history of the quadrangle is useful to the larger understanding of past earth climate, and how our region of the world underwent recent geologically significant climatic and environmental changes. We may then be able to use this knowledge in anticipation of future similar changes for long-term planning efforts, such as coastal development or waste disposal.

Surficial geology maps are often best used in conjunction with related maps such as surficial materials maps or significant sand and gravel aquifer maps for anyone wanting to know what lies beneath the land surface. For example, these maps may aid in the search for water supplies, or economically important deposits such as sand and gravel for aggregate or clay for bricks or pottery. Environmental issues such as the location of a suitable landfill site or the possible spread of contaminants are directly related to surficial geology. Construction projects such as locating new roads, excavating foundations, or siting new homes may be better planned with a good knowledge of the surficial geology of the site. Refer to the list of related publications below.

OTHER SOURCES OF INFORMATION

1. Thompson, W. B., and Locke, D. B., 2006, Surficial materials of the Canton quadrangle, Maine: Maine Geological Survey, Open-File Map 06-18.
2. Neil, C. D., 2006, Significant sand and gravel aquifers of the Canton quadrangle, Maine: Maine Geological Survey, Open-File Map 06-73.
3. Thompson, W. B., 1979, Surficial geology handbook for coastal Maine: Maine Geological Survey, 68 p. (out of print).
4. Thompson, W. B., and Borns, H. W., Jr., 1985, Surficial geologic map of Maine: Maine Geological Survey, scale 1:500,000.

Canton Quadrangle, Maine

Surficial geologic mapping by
Woodrow B. Thompson

Digital cartography by:
Susan S. Tolman

Robert G. Marvinney
State Geologist

Cartographic design and editing by:
Robert D. Tucker

Funding for the preparation of this map was provided in part by the U.S. Geological Survey STATEMAP Program, Cooperative Agreement No. 05HQAG0044.

Maine Geological Survey

Address: 22 State House Station, Augusta, Maine 04333
Telephone: 207-287-2801 **E-mail:** mgs@maine.gov
Home page: http://www.maine.gov/doc/nrimc/nrimc.htm

Open-File No. 08-82
2008
This map supersedes Open-File Map 07-100.

Figure 1. Granite ledge showing weathered glacial grooves trending 151°, next to road southwest of Academy Hill in Canton. Arrow indicates the ice flow direction.

Figure 2. View looking NNW down the gently sloping crest of a glacially streamlined till ridge, between Campbell Hill and Thompson Hill in Hartford. Ridges such as this one commonly have well-drained soils on thick till deposits, and many of them host apple orchards. A dug well near the old farm house seen here penetrated 28 feet of till.

Figure 3. Till exposure on east side of Ludden Brook valley in Canton. This till is stony and contains many thin lenses of light-colored sand.

Figure 4. Roadside exposure of oxidized till on west flank of Allen Hill in Peru. This is a lodgement till, deposited under great pressure at the base of the glacial ice sheet. It is very compact and difficult to excavate ("hardpan"). The scarcity of large stones and fissility (parallel fracture planes in weathered zone) are typical of many lodgement tills.

Figure 5. Large till stones were moved by early settlers to build walls such as this example in Peru. The abundance of stone walls in the woods of the Oxford Hills shows that cleared land was formerly much more extensive in this part of Maine.

Figure 6. Some glacial boulders were simply too large to remove from the fields. This fanciful boat-shaped rock is located on a hillside southwest of Route 108 in Peru.

Figure 7. Gravel pit showing cross section of esker ridge east of Bog Brook in Canton. The esker consists of sand and gravel deposited by a meltwater stream in a subglacial ice tunnel. This long esker system follows the Androscoggin River valley from Peru to Canton and then leaves the valley and passes through a gap in the hills in the southeast part of the quadrangle.

Figure 8. Anomalously large granite boulder in pit on northeast side of Route 108 in Canton. The boulder probably tumbled off the melting ice when the esker and glacial-lake deposits formed in this area. The well-stratified sand in the background was deposited into glacial Lake Canton.

Figure 9. Sand dune on east side of Bog Brook valley in Canton. Extensive windblown sand deposits occur on hillsides in this area. The prevailing westerly winds blew sand from waterlaid glacial deposits in the valleys and dumped it on the hills to the east. Most of the windblown sand probably accumulated in late-glacial time, prior to development of a forest cover. Sand dunes elsewhere in Maine have been reactivated in historical time, forming "desert" areas.

Figure 10. Interior of the sand dune in Figure 9, showing thin parallel, gently west-sloping, planar sand beds. This is typical of many windblown sand deposits in Maine. The dunes may resemble glacial-lake deposits, but often they can be distinguished by their lack of stones, nearby wind-polished (sandblasted) rock surfaces, dune topography, and/or location at higher elevations than any confirmed waterlaid deposits in the area.

Figure 11. Wetland surrounding Bunganock Pond in Hartford. The scattered boulders probably indicate small patches of till.

Figure 12. View looking west along the Androscoggin River in Canton, showing the modern floodplain (foreground) and older river terraces in the distance.