Gardiner Quadrangle, Maine

Surficial geologic mapping by
Woodrow B. Thompson

Digital cartography by:
Robert A. Johnston

Robert G. Marvinney
State Geologist

Cartographic design and editing by:
Robert D. Tucker

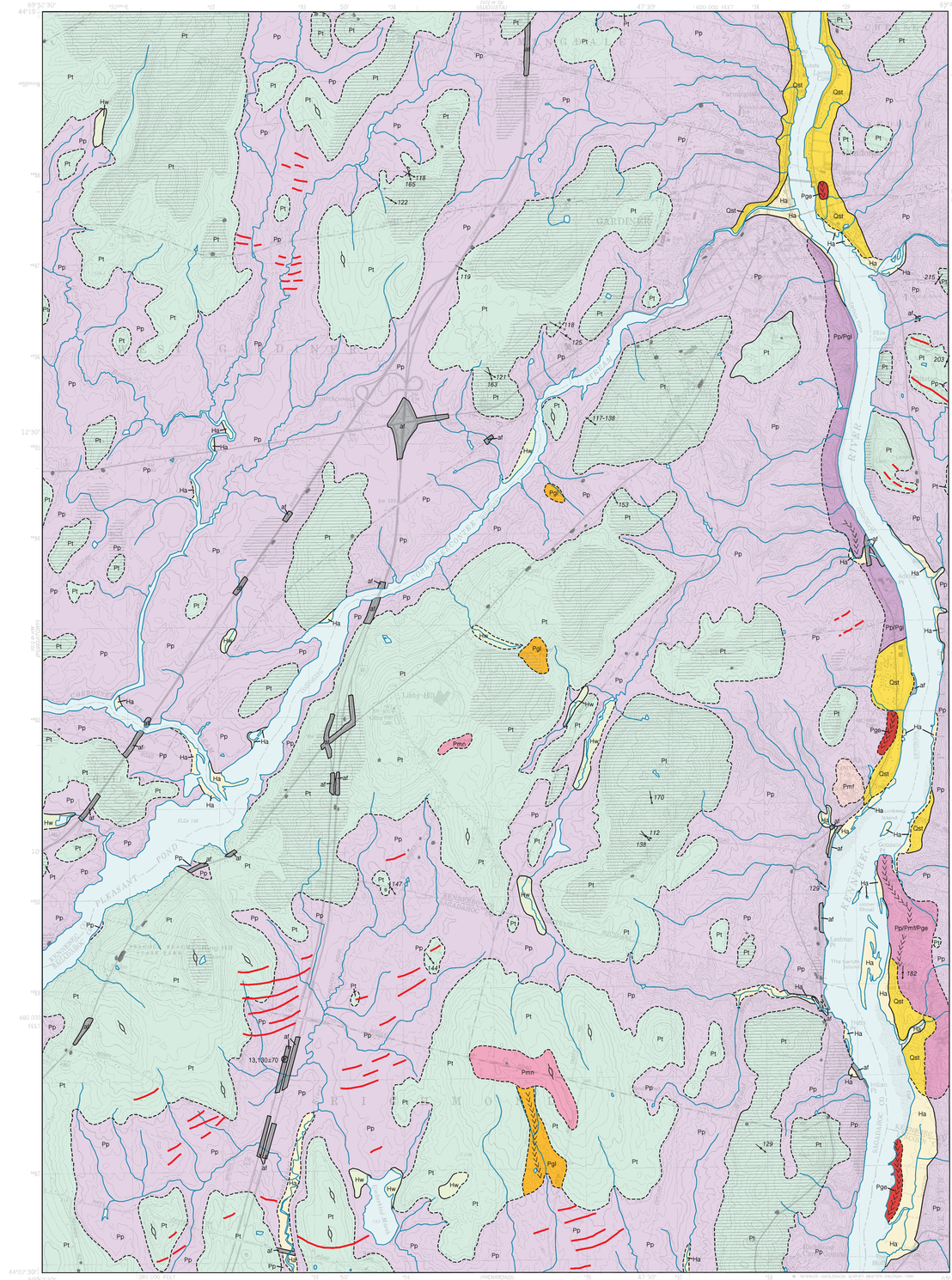
Funding for the preparation of this map was provided in part by the U.S. Geological Survey
STATEMAP Program, Cooperative Agreement No. 04HQAG0035.

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. 09-8
2009
This map supersedes
Open-File Map 07-103.

Surficial Geology



SOURCES OF INFORMATION

Surficial geologic mapping of the Gardiner quadrangle was conducted by Woodrow B. Thompson in 2004-05 for the STATEMAP program and modified by 2008 field data. Some of the data included here were collected by W. B. Thompson during reconnaissance surficial mapping of the Gardiner 15-minute quadrangle in 1975 and scattered observations during the 1980's and 1990's.

Quadrangle Location

SCALE 1 : 24,000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET

TRUE NORTH

Topographic base from U.S. Geological Survey Gardiner 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, gravel, and silt deposited on flood plains of the Kennebec River and other streams. May include some wetland deposits.

Hw **Wetland deposits** - Peat, muck, silt, and clay in poorly drained areas.

Qst **Stream terraces** - Sand and gravel deposited by the Kennebec River at elevations higher than the most recent flood plains.

Pmn **Marine nearshore deposits** - Sandy to gravelly sediments formed when marine processes reworked older glacial deposits during regression of the sea.

Pp **Presumpscot Formation** - Glaciomarine silt, clay, and sand deposited on the late-glacial sea floor.

Pmf **Glaciomarine fan** - Sand and gravel deposited as a submarine fan at the glacier margin during recession of the late Wisconsinan ice sheet in the Kennebec River valley.

Pp/Pgl **Presumpscot Formation overlying ice-contact deposits** - Sand and gravel (Pgi) deposited as eskers and/or glaciomarine fans adjacent to glacial ice in the Kennebec River valley. The ice-contact deposits are overlain by variable thicknesses of glaciomarine silt, clay, and sand (Pp). These units were not mapped individually because of poor exposure and complex stratigraphy.

Pp/Pmf/Pge **Presumpscot Formation overlying glaciomarine fan and esker deposits.** These deposits form a complex assemblage in the Kennebec River valley. A ridge of coarse esker gravel (Pge) in the valley bottom is generally buried by submarine fan deposits (Pmf) comprised of stratified sand and gravel. Variable thicknesses of glaciomarine silt, clay, and sand (Pp) overlie the sand and gravel units, and are locally overlain in turn by coarser sediments formed by wave and current action as relative sea level fell. These units could not be distinguished accurately at the scale of the map, due to their complex interrelations and limited fresh exposures. Bedrock has been exposed in some of the deeper gravel pits, and large portions of the sand and gravel units have been removed.

Pgi **Ice-contact deposits.** Miscellaneous sand and gravel deposits formed in contact with glacial ice.

Pge **Esker** - Sand and gravel deposited by glacial meltwater stream in a tunnel beneath the ice. Chevron symbols show inferred direction of former stream flow.

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. Boulders commonly present on ground surface.

Bedrock outcrops/thin-drift areas - Ruled pattern indicates areas where bedrock outcrops are common and/or surficial sediments are generally less than 10 ft thick. Mapped from air photos and ground observations. Actual thin-drift areas probably are more extensive than shown. Dots mark locations of small individual outcrops.

af **Artificial fill** - Variable mixtures of earth, rock, and/or man-made materials used as fill for roads. Shown only where large enough to affect the contour pattern on the topographic map.

Contact - Boundary between map units, dashed where location is approximate.

Moraine ridge - Line shows inferred crest of moraine ridge deposited along the retreating margin of the most recent (late Wisconsinan) glacial ice sheet.

Glacially streamlined hill - Symbol shows long axis of hill or ridge shaped by flow of glacial ice, and which is parallel to former 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.

>>>>> **Crest of esker** - Alignment of symbols shows trend of esker ridge. Chevrons point in direction of meltwater flow.

10,150±450 **Marine fossil locality** - Age in radiocarbon years.

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., 2005, Surficial materials of the Gardiner quadrangle, Maine: Maine Geological Survey, Open-File Map 05-2.
2. Neil, C. D., 1999, Significant sand and gravel aquifers of the Gardiner quadrangle, Maine: Maine Geological Survey, Open-File Map 99-36.
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.