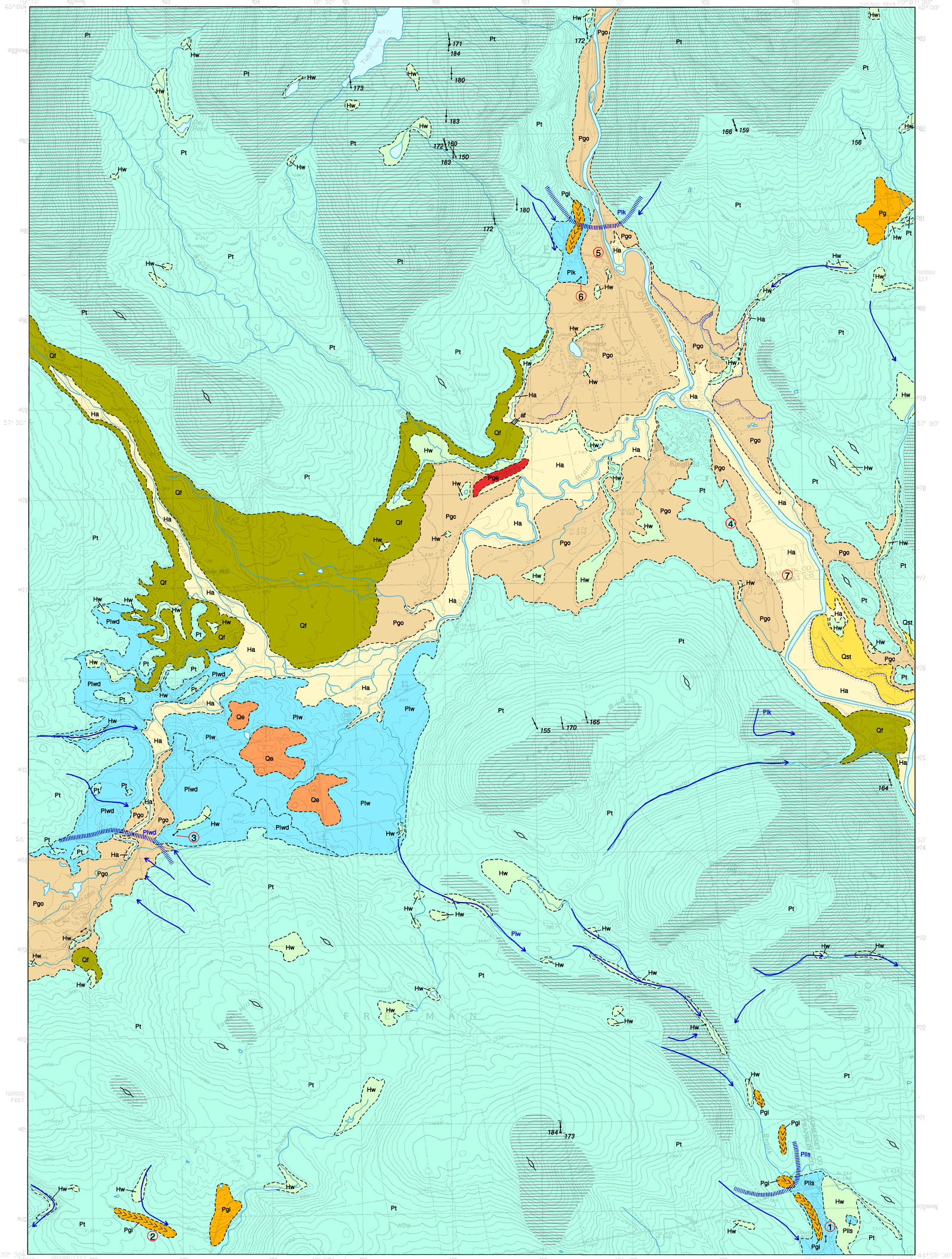
Surficial Geology



SOURCES OF INFORMATION

Surficial geologic mapping by Thomas K. Weddle completed during the 1990 and 2006 field seasons. Supplemental materials data were collected by Maine Geological Survey field assistants during the 1990 field season. Additional materials data sources include, but are not limited to, municipal water company records, U.S. Geological Survey Basic-Data Reports, Maine Geological Survey bedrock well database and published bedrock geology maps, Maine Department of Environmental Protection site files, Maine Department of Transportation highway construction records, the Maine Department of Human Services public water-supply well database, and test boring logs by Drumlin Environmental, LLC, on behalf of Poland Spring Bottling Company.

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 20 FEET

TRUE NORTH

Topographic base from U.S. Geological Survey Kingfield 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.

af — **Artificial fill -** Surficial sediments, rock fragments, or artificial materials, transported and dumped to build up road beds or impoundments.

Ha — **Alluvium -** Generally well-sorted and stratified sand, silt, and gravel deposited by modern rivers and streams.

Hw — **Wetland deposits -** Poorly drained areas with variable tree cover, commonly associated with standing water. Materials may include clay, silt, peat, or muck.

Qst — **Stream terrace deposits -** Sand and gravel deposits and erosion surfaces on former flood plains of the Carrabassett River. Formed when these streams flowed at higher levels than present.

Qe — **Eolian deposits -** Typically well-sorted sand. Deposited by wind action in late-glacial or postglacial time. Found commonly as a blanket deposit throughout the quadrangle, but is too thin to show on map.

Qf — **Alluvial fan -** Poorly sorted debris, derived mainly from glacial till and moved down slopes by streams in flood and by gravity.

Plwd / Plw — **Glacial Lake West Branch Carrabassett -** Sand and gravel deposited in a glacial lake in the West Branch Carrabassett River valley. Plwd is a delta having a generally flat top and consists of gravelly topset beds overlying inclined foreset beds deposited on the advancing delta front. Plw consists of lake bottom gravel, sand, silt, and clay.

Plk / Plls — **Glacial Lake Kingfield and Glacial Lake Lemon Stream deposits -** Sand and gravel deposited in glacial lakes that existed when glacial ice or a drift deposit or combination of both dammed the drainage in the Carrabassett River valley, and in the Lemon Stream valley, preventing the lake from draining northward. Includes deltaic, and lake-bottom deposits.

Pg — **Gravel of uncertain origin -** Sand and gravel deposit of uncertain origin.

Pgo — **Glacial outwash -** Sand and gravel deposited by glacial meltwater streams.

Pgi — **Ice-contact deposits -** Gravel and sand deposited near the glacier margin.

Pge — **Esker -** Ridges of massive to stratified, commonly interbedded, sand and gravel. Deposited by meltwater streams in subglacial and englacial conduits during retreat of the last ice sheet.

Pt — **Till -** Homogeneous to weakly stratified, locally compact, sandy sediment deposited directly from glacial ice. Very stony in places. Particle sizes range from silt, sand, and minor clay to large boulders.

Thin-drift deposits. Ruled pattern indicates areas where surficial sediments are generally less than 2m thick and where bedrock outcrops are common.

Contact - Inferred boundary between map units.

Ice margin position - Inferred position of the glacier margin during deposition of the indicated map unit. Letter symbol refers to deposits associated with the margin position.

Scarp - Hachured line indicates break in slope resulting from stream erosion.

Ice-flow indicator - Arrow with dot indicates glacially striated bedrock. Dot marks the point of observation; number is azimuth (in degrees) of ice flow direction. Flagged direction is older.

Paleocurrent direction - Average dip direction of cross bedding (including foreset beds in deltas) in sand or gravel. Indicates direction of flow of glacial meltwater. Dot marks point of observation.

Esker ridge - Shows trend of sand and gravel ridge deposited in a meltwater tunnel within or beneath glacial ice. Chevrons indicate direction of meltwater flow.

Meltwater channel - Channel eroded by glacial meltwater stream or glacial lake spillway. Typically steep-sided. Letter symbol refers to outlet channel associated with a glacial lake.

Streamlined hill - Symbol shows axis of a streamlined hill shaped by flow of glacial ice.

Photo location

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. Weddle, T. K., 2007, Surficial materials of the Kingfield quadrangle, Maine: Maine Geological Survey, Open-File Map 07-70.
2. Lewis, E. B., Locke, D. B., Neil, C. D., 2007, Significant sand and gravel aquifers in the Kingfield quadrangle, Maine: Maine Geological Survey, Open-File Map 07-76.
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.
5. Thompson, W. B., Crossen, K. J., Borns, H. W., Jr., and Andersen, B. G., 1989, Glaciomarine deltas of Maine and their relation to late Pleistocene-Holocene crustal movements, *in* Anderson, W. A., and Borns, H. W., Jr. (eds.), Neotectonics of Maine: Maine Geological Survey, Bulletin 40, p. 43-67.

Kingfield Quadrangle, Maine

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Figure 1A. A transverse exposure in an esker that supplied sediment to the Glacial Lake Lemon Stream delta, in southeast corner of quadrangle. Glacial fluvial streams in tunnels in the ice transport sediment to the ice margin where the material is deposited. The sediment was probably deposited within the tunnel near the ice margin.

Figure 1B. Sediment brought to the lake by ice-tunnel feeders was deposited into a glacial lake and constructed the delta. Here coarse-grained gravel on the left in the photo is overlain finer-grained gravelly sand. The inclined layers are termed foreset beds, and represent the actively building frontal slope of the delta, here dipping due south. As the foreset beds build up they eventually reach the lake surface and are overlain by stream-deposits termed topset beds; the contact between the two types of beds represents the approximate position of the lake surface. Here the topset beds are about three feet thick.

Figure 1C. Same exposure as in 1B but farther to the south. Note contact between topsets and foresets appears to thinning to the south, and that the upper surface of the delta also is beginning to gently dip southerly. The lake into which the delta was built formed in a valley ponded by ice to the north in the adjacent New Portland quadrangle; the lake was relatively short-lived and the delta ceased accumulating when the ice dam melted away.

Figure 1D. Transverse exposure in foreset beds dipping away from viewer. Lower half of exposure has thick, rhythmically bedded sand and silt layers that are overlain in the upper half of the exposure by thinner bedded coarse sand layers with matrix supported pebbles and cobbles within the beds.

Figure 1E. Glacial fluvial stream deposit south of the delta, laid down after the glacial lake drained (located just off the Kingfield quadrangle in the Strong quadrangle to the south). Spoil material mantles the upper one to two feet of the exposure here.

Figure 2. Coarse cobble gravel in an esker ridge in the southwest corner of the quadrangle. The very coarse nature of this deposit and its location near the crest of a drainage divide, and the proximity of it near deeply eroded meltwater channels in the Kingfield and adjacent Mt. Abraham, Phillips, and Strong quadrangles attest to it having been deposited under great hydrostatic pressure subglacially. Note folded shovel head in center of photo for scale.

Figure 3. Fine-grained shallow-dipping sandy foreset beds in the ice-contact Glacial Lake West Branch Carrabassett River delta, southwest quarter of the quadrangle. The foreset beds are dipping to the northeast; the ice margin was retreating back toward the drainage divide between the modern Carrabassett River and the Sandy River located on the adjacent Mt. Abraham and Phillips quadrangles to the west. The glacial lake was ponded by ice or a drift dam to the east in the Carrabassett River valley, and drained through a low between Freeman Ridge and Foster Hill down the Luce Brook valley.

Figure 4. Sandy diamicton with boulder and cobble clasts (also termed till by geologists and commonly called hardpan). This location is in an exposure on a worksite access road adjacent to Sunnyside Cemetery on Route 27, approximately 0.5 miles north of the Somerset County and Franklin County line.

Figure 5. Glacial fluvial stream deposit in northeast quarter of the quadrangle. The section exposed in the gravel pit has about 2 feet of coarse sandy pebble gravel overlying 4 feet of coarse cobble gravel. The sediment was deposited as outwash from glacial stream in the Carrabassett River valley after the glacial lake that occupied the valley drained. The outwash deposits incised and now overlie the glacial lake deposits, which are reported in test boring logs in the valley.

Figure 6A. Southwest-dipping foreset beds in gravel pit found in the northeast quarter of the quadrangle, looking west. The pebble gravel and sandy foresets are deposits of the Glacial Lake Kingfield delta that was formed after the Glacial Lake West Branch Carrabassett drained. However, there is no evidence for a dam in the Carrabassett River Valley that would have impounded Glacial Lake Kingfield to a level of about 700 feet asl, the elevation of the surface of the delta. A spillway (Plk) at about 680 feet asl located just north of Taylor Brook 2 miles south of Kingfield Center could have been the outlet for the lake. Note folding shovel for scale in slump at base of exposure.

Figure 6B. Close up of same exposure in 6A but looking east; folding shovel at base of section for scale.

Figure 7. View to the east toward the Carrabassett River, out of sight in photo, but located between the edge of the field and the white house in the distance. Abandoned stream channels on the surface of Holocene alluvial deposits are marked by ponded surface water after a heavy rain.