DEPARTMENT OF CONSERVATION
Maine Geological Survey
Robert G. Marvinney, State Geologist

OPEN-FILE NO. 01-479

Title: *Surficial Geology of the Mechanic Falls Quadrangle, Androscoggin, Cumberland, and Oxford Counties, Maine*

Author: *Carol T. Hildreth*

Date: *2001*

Financial Support: Funding for the preparation of this report was provided in part by the U.S. Geological Survey STATEMAP Program, Cooperative Agreement No. 00HQAG0077.

Associated Maps: Surficial geology of the Mechanic Falls quadrangle, Open-File 01-478
Surficial materials of the Mechanic Falls quadrangle, Open-File 01-482

Contents: 6 p. report

Maine Geological Survey
Open-File 01-479

Surficial Geology of the Mechanic Falls 7.5-minute Quadrangle, Androscoggin, Cumberland, and Oxford Counties, Maine

Carol T. Hildreth
CTH Enterprizes
135 Washington Street
Holliston, MA 01746

INTRODUCTION

The Mechanic Falls 7.5-minute quadrangle has an area of about 133 km^2 (52 mi^2). It is located in southwestern Maine, within the Seaboard Lowland physiographic province, about 42 km (26 mi) northwest of Portland. Altitudes range from 91 m (240 ft), which is the level of the Little Androscoggin River where it exits the northeast edge of the quadrangle, to over 290 m (950 ft) at Pine Hill at the southwest edge of the quadrangle. Most of the map area is underlain by granitic bedrock of the Sebago pluton. The Sebago pluton is light-gray to pink, medium-grained, non- to slightly foliated, biotite-muscovite granite. The granite is intruded in places by Mesozoic pegmatite dikes and basalt or diabase dikes. In some places in the quadrangle, there are exposures of roof pendants of metasedimentary rocks that the Sebago pluton intruded during the Mississippian Period about 354 million years ago (Hussey, 1985). Rocks exposed in the northeast part of the quadrangle include folded metasedimentary rocks of Silurian age, which are intruded in places by small stocks of Devonian granite (Osberg and others, 1985).

Ridges in the Mechanic Falls quadrangle commonly were shaped by glacial ice flowing south-southeast and have been elongated in that direction. The topography in the study area is also controlled partly by jointing in the Sebago pluton and folding in the Silurian metasedimentary rocks. Major stream drainage in the quadrangle includes the northwest drainage of the Thompson Lake, Tripp Pond, and Hogan and Whitney Pond valleys into the Little Androscoggin River just north of the quadrangle. The Little Androscoggin flows southeastward through the northern part of the quadrangle and is joined in downtown Mechanic Falls by the northward-flowing Waterhouse Brook (which drains the Range Ponds); finally, the south-flowing Bog Brook joins the Little Androscoggin just before it exits the northeast edge of the quadrangle.

PREVIOUS AND CURRENT WORK

Early work on the surficial geology in this part of Maine was done generally at a reconnaissance level and at a smaller scale (Hanley, 1959; Prescott, 1968; Thompson and Borns, 1985; Smith and Thompson, 1980). Significant sand and gravel aquifers were mapped by Prescott (1968) and Williams and Lanctot (1987). The soil surveys of Cumberland, Oxford, and Androscoggin Counties (Hedstrom, 1974; Wilkinson, 1995; McEwen, 1970) facilitated fieldwork. Surficial geologic mapping has been completed at 1:24,000 scale in several adjoining quadrangles, including Raymond (Retelle, 1997), Norway (Thompson, 2000), Gray (Weddle, 1997), Casco (Hildreth, 2000), Minot (Hildreth, 2001), Oxford (Thompson, 2001b) and Lake Auburn West (Thompson, 2001a).

GLACIAL HISTORY

Southwestern Maine probably experienced several episodes of glaciation during the Pleistocene Ice Age, but virtually all evidence of previous glaciations in the Mechanic Falls area was obliterated during the last (late Wisconsinan) episode, when the Laurentide ice sheet advanced from the northwest to a terminal position on the continental shelf.

Evidence of glacial erosion within this area is noticeable mainly as south-southeast-trending glacial striations on freshly exposed bedrock surfaces. Ramp and pluck topography on bedrock knobs, such as Black Cat Mountain at the south edge of the quadrangle, also records south-southeast movement of the ice. In the Mechanic Falls area there are abundant drumlins and streamlined hills that have bedrock cores; these all are elongated in the same SSE direction.

After reaching its terminal position on the continental shelf, the late Wisconsinan ice sheet began to recede between

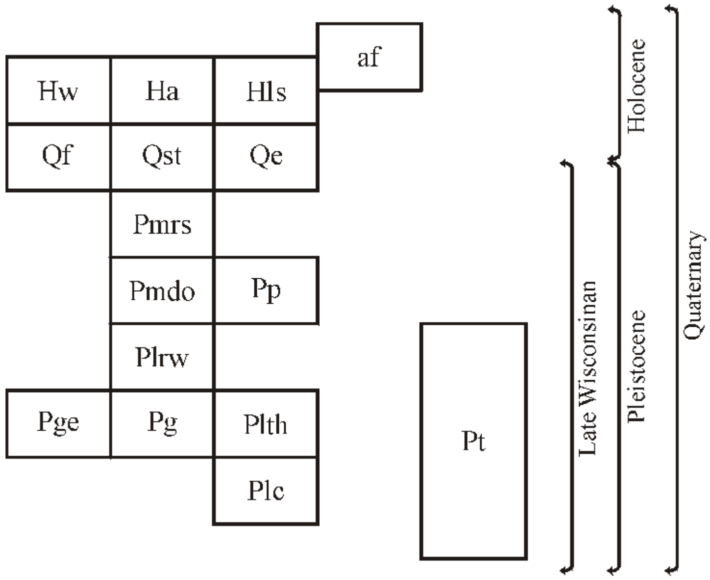

Figure 1. Correlation of map units, Mechanic Falls quadrangle.

15,000 and 17,000 years ago. Shells collected from glaciomarine sediments deformed by ice shove in the Freeport area (southeast of Mechanic Falls) have a radiocarbon age of 14,045 yr B.P. (Weddle and others, 1993). The ice sheet terminus is inferred to have reached the Mechanic Falls area a short time after that. As the ice sheet melted northward, sea level rose and inundated the entire Maine coastal zone, including the area of Thompson Lake and its tributaries, which is at the limit of maximum marine submergence for this part of Maine. As summarized by Thompson and Borns (1985), the marine submergence reached its maximum inland extent at about 13,000 yr B.P., and regressed from the area before 11,450 yr B.P. (Smith, 1985; Thompson and Borns, 1985), based on shells that indicate the approximate offlap of the late-Wisconsinan sea at Little Falls, Gorham, about 39 km (23 mi) south of Thompson Lake in the Mechanic Falls quadrangle.

GLACIAL AND POSTGLACIAL DEPOSITS

The succession of Pleistocene and Holocene surficial deposits in the Mechanic Falls area is given in the correlation chart (Figure 1) showing the relative ages of the map units.

Till (unit Pt)

Till (map unit Pt) occurs throughout the Mechanic Falls area. Its thickness is variable, as is its composition. The till was deposited from the glacial ice sheet and forms a blanket over the underlying bedrock; it is inferred to underlie younger deposits throughout the area. In most exposures in the Mechanic Falls area, this till is light olive-gray, sandy, stony, and moderately compact, showing weathering only in the uppermost few feet. The sandy texture reflects its derivation from coarse granitic rocks of the Sebago pluton.

Some drumlins are found in the Mechanic Falls area, but most hills that are drumlin-shaped (and oriented in the expected direction for drumlins relative to the direction of striations in the area) have bedrock cores that have been plastered with till. Many more of these rock-cored hills exist in the quadrangle than do true drumlins.

Esker deposits (unit Pge)

An esker deposit extends from the north edge of the quadrangle southeastward through the Lower Range Pond area. "This segmented ridge of sand and gravel was deposited by meltwater streams flowing south in a tunnel in the bottom of the last ice sheet. In places it is bordered by depressions (kettles) left when masses of glacial ice melted" (Thompson, 2000). Hogan, Whitney, Green, and Mud Ponds, as well as many unnamed smaller ponds and swamps along its flanks are examples of kettle holes. "The ridge is part of a branching esker system that can be traced from northwest of the Mahoosuc Range discontinuously south for many miles to a large glaciomarine delta complex in New Gloucester. Whether meltwater flowed simultaneously through this entire tunnel network is debatable, but it is likely that the esker segments formed progressively from south to north as the tunnel became clogged with sediment during deglaciation" (Thompson, 2000).

Some exposed segments of the esker are more than 50 ft (15 m) high, but in many places it is more or less buried by adjacent glaciomarine delta deposits. It is over 100 feet deep in one test hole near Green Pond, but most other subsurface data indicate a maximum depth of less than 70 ft (21 m). Pits contain mostly sand to pebble-cobble gravel, with occasional boulders. The esker is useful as a source of sand and gravel and as a municipal aquifer (Prescott, 1968).

A smaller esker system exists in The Heath area near the south edge of the map. Much of the lower elevation parts of this esker system are covered by younger ice-contact and glaciolacustrine deposits (Plth) of The Heath area. They may be as much as 40 ft (12 m) thick.

Glacial Lake Crescent deposits (unit Plc)

Predominantly sand, gravel, and silt deposits were laid down by southward-flowing meltwaters in the valley of Edwards Brook near the south edge of the quadrangle as part of a series of ice-contact and deltaic deposits. The streams that deposited these sediments emptied into glacial Lake Crescent, whose level was controlled by drift dams which blocked meltwater drainage in the southern end of the Crescent Lake valley in the Raymond quadrangle to the south. Unit Plc here is equivalent to units Plc5 and Plc6 mapped by Retelle (1997). The Plc deposits may be as much as 25 ft (8 m) thick.

Undifferentiated glacial deposits (unit Pg)

Small, thin deposits of sand, silt, and gravel laid down by glacial meltwaters in the valley of Potash Brook and in the Cleve Tripp Road area. They are uncorrelated and undifferentiated glaciofluvial outwash and/or ice-contact materials as much as 10 ft (3 m) thick.

Glaciolacustrine deposits of the Lower Range and Worthley Ponds area (Plrw)

Sand and gravel of unit Plrw was deposited as ice-contact fans and deltas by meltwater streams issuing from the ice margin into a shallow glacial lake that was dammed to the southeast by detached ice and glacial drift south of Worthley Pond in the Minot quadrangle. There are extensive pits in these deposits, some of which expose subaqueous fan deposits underlain by predominantly sandy materials. The deposits are as much as 40 ft (12 m) thick.

Glaciomarine delta (unit Pmdo)

A sandy outwash plain follows the valley of the Little Androscoggin River southward from Norway, where it is at an elevation of around 395 ft (120 m); it consists mostly of sand or pebbly sand with occasional gravel, and it is locally as much as 110 ft (34 m) thick (Thompson, 2000). The unit mapped as Pmdo in this quadrangle is inferred to be the southern extension of that deposit which was mapped by Thompson (2000) as a glaciomarine delta, though parts of it in the Mechanic Falls quadrangle may have been eroded during offlap of the sea. In places, unit Pmdo is overlain by dune deposits, some of which are thin and unmapped.

Much of unit Pmdo in the Mechanic Falls area is underlain by silt and clay of probable glaciomarine origin (Presumpscot Formation, unit Pp). One well hole near Hogan Pond indicates 26 ft (8 m) of sand overlies 66 ft (20 m) of silt and clay. For the most part, the underlying silt and clay is not exposed except in stream valleys that have cut down through the overlying sands, such as in the lower reaches of Waterhouse Brook and where it joins the Little Androscoggin River in the town of Mechanic Falls.

Glaciomarine bottom deposits (Presumpscot Formation) (unit Pp)

Materials consisting of predominantly silt and clay with locally sandy beds and intercalations are interpreted here as late-glacial submarine (marine mud) deposits of the Presumpscot Formation. These deposits were derived from glacial meltwaters and laid down on the bottom of the late-glacial sea following the retreat of the ice sheet from the area and prior to uplift of the area above the sea. The silt and clay commonly lie beneath units Pmdo and Pmrs in the quadrangle. For example, a test well near Hogan Pond in unit Pmdo indicates 26 ft (8 m) of Pmdo sand over 66 ft (20 m) of silt and clay, which is interpreted as unit Pp. Unit Pp is exposed in the lower reaches of Waterhouse Brook, in the valley of the Little Androscoggin River in the town of Mechanic Falls, and in the valley of Bog Brook. In places, Pp is overlain by thin unmapped dune deposits.

In this unit, east of Bog Brook, at the intersection of River Road with a small side street that branches to the north at the very east edge of the quadrangle, there is a road cut that exposes a high-angle east-west normal fault with the south block being the down-dropped block. This is apparently a small slump block. A swale in the hillside looking west from the intersection seems to mark the trace of the fault and a mound in the field west of the intersection is probably the debris flow material near the toe of the slump block. Part of the road cut also exposes slight folding of the bedding with an orientation that is consistent with the interpretation of minor slumping here. The time of slumping is not known, but does not appear to be recent.

Marine regressive sand deposits (unit Pmrs)

Sand plains (unit Pmrs) with thin deposits of sand and minor gravel are interpreted as reworked marine delta and fan deposits graded by streams to falling sea level during late-glacial time, long after the glacier left the immediate area. Following deposition of the Presumpscot Formation (unit Pp), glacial sediments were reworked and sandy stream deposits were laid down at elevations below the earlier marine limit, often on top of marine clay. Commonly these deposits are less than 10 ft (3 m) thick. They overlie parts of units Pdmo and Pp and may be overlain by thin unmapped dune deposits in places.

Eolian deposits (unit Qe)

When sea level fell and exposed the glacial outwash and marine regressive sand deposits, wind erosion was extensive before vegetation was able to take root and anchor the sediments. As a result, generally thin deposits of windblown sand formed, mostly on the east sides and tops of hills in the area, indicating a prevailing westerly or northwesterly wind regime at the time. The major deposits in the quadrangle are near the northern edge, apparently derived from the Pmdo unit in the Oxford quadrangle. Only the larger Qe deposits are mapped here. A particularly thick dune deposit (about 25 ft [8 m]) caps the north crest of the western-most hill at the north edge of the map, and other thick dune deposits flank the northern end of the large till hill east of that. Thin dune deposits are far more extensive than the areas mapped as Qe in the Mechanic Falls quadrangle, because they are patchy and not easily recognized except in excavations, which are sparse. Detailed mapping of all these dune deposits in the area may help decipher the complex history of their formation.

Stream terrace (unit Qst)

In cutting down its channel to its present level, the late-glacial and modern Little Androscoggin River cut into glacial deposits and built or carved stream terraces along its path, parts of which are preserved as elevated terraces along margins of the modern flood plain. Some of the Qst area may be inundated during major floods, but most appears to be high enough to miss being flooded during ordinary flooding. Where the terrace is underlain by alluvial material, it may contain as much as 15 ft (5 m) of sand and gravel.

Holocene lakeshore deposits (Hls)

Modern beach and nearshore deposits (Hls) have formed along scattered stretches of shoreline especially as spits of headlands and islands, as pocket beaches, and as baymouth bars on the large lakes in the quadrangle. Deposits are generally less than 6 ft (2 m) thick.

Wetland deposits (unit Hw)

Freshwater swamp deposits characterized by accumulations of fine-grained organic-rich sediments, deposited in low, flat, poorly drained areas are scattered throughout the quadrangle. Little information is available on the thickness of these deposits in the Mechanic Falls area, though Cameron and others (1984) report that peat deposits in southwestern Maine generally average less than 20 ft (6 m). In places the unit is indistinguishable from, grades into, or is interbedded with alluvium (Ha). It should be noted that both swamp (Hw) and alluvial deposits (Ha) are coincident along many stretches of flood plains in this area, particularly in the Little Androscoggin River valley, Waterhouse Brook, and Winter Brook.

Stream alluvium (unit Ha)

Sand, gravel, silt, and organic material deposited by modern streams in their flood plains. The extent of alluvium indicates areas that flooded in the past that may be subject to flooding in the future. In places the unit is indistinguishable from, grades into, or is interbedded with wetland deposits (Hw). It should be noted that both swamp (Hw) and alluvial deposits (Ha) are coincident along many stretches of flood plains in this area, particularly in the Little Androscoggin River valley, Waterhouse Brook, and Winter Brook.

Artificial fill (unit af)

Areas where the original ground surface is covered by a substantial thickness of imported material, both man-made and natural, are mapped as artificial fill (unit af). The material varies from natural sand and gravel or till to quarry waste and landfill debris. The thickness varies, but usually doesn't exceed 20 ft (6 m).

ACKNOWLEDGMENTS

The author heartily thanks Woodrow B. Thompson for his patient assistance in completing this project. He contributed advice, support, background materials, field notes and maps, and had several consultations and field trips in the area with the author. Regardless, the author is wholly responsible for the interpretations given herein.

REFERENCES

Cameron, C. C., Mullen, M. K., Lepage, C. A., and Anderson, W. A., 1984. Peat resources of Maine - Volume 4: southern and western Maine: Maine Geological Survey, Bulletin 31, 123 p.

Hanley, J. B., 1959, Geologic map of the Poland quadrangle, Maine [surficial geology]: U. S. Geological Survey, Geologic Quadrangle Map, GQ-120, scale 1:62,500.

Hedstrom, G., 1974, Soil survey of Cumberland County, Maine: U. S. Department of Agriculture, Soil Conservation Service, 94 p., scale, 1:20,000.

Hildreth, C. T, 2000, Surficial geology of the Casco quadrangle, Maine: Maine Geological Survey, Open-File Map 00-141, scale 1:24,000 p.

Hildreth, C.T, 2001, Surficial geology of the Minot quadrangle, Maine: Maine Geological Survey, Open-File Map 01-480, scale 1:24,000.

Hussey, A. M., II, 1985, The bedrock geology of the Bath and Portland 2-degree map sheets, Maine: Maine Geological Survey, Open-File Report 85-87, 82 p., map, scale 1:250,000.

McEwen, B. W., 1970, Soil survey of Androscoggin and Sagadahoc Counties, Maine: U. S. Department of Agriculture, Soil Conservation Service, 83 p., scale 15,840.

Osberg, P. H., Hussey, A. M., II, and Boone, G. M. (editors), 1985, Bedrock geologic map of Maine: Maine Geological Survey, scale 1:500,000.

Prescott, G. C., Jr., 1968, Ground-water favorability areas and surficial geology of the lower Androscoggin River basin, Maine: U.S. Geological Survey, Hydrologic Investigations Atlas, HA-285, scale 1:62,500.

Retelle, M. J., 1997, Surficial geology of the Raymond quadrangle, Maine: Maine Geological Survey, Open-File Map 97-57, scale 1:24,000.

Smith, G. W., 1985, Chronology of late Wisconsinan deglaciation of coastal Maine, *in* Borns, H. W., Jr., Lasalle, P., and Thompson, W. B. (editors), Late Pleistocene history of northeastern New England and adjacent Quebec: Geological Society of America, Special Paper 197, p. 29-44.

Smith, G. W., and Thompson, W. B., 1980, Reconnaissance surficial geology of the Poland 15' quadrangle, Maine: Maine Geological Survey, Open-File Map 80-25, scale 1:62,500.

Thompson, W. B., 2000, Surficial geology of the Norway quadrangle, Maine: Maine Geological Survey, Open-File Map 00-135, scale 1:24,000.

Thompson, W. B., 2001a, Surficial geology of the Lake Auburn West quadrangle, Maine: Maine Geological Survey, Open-File Map 01-391, scale 1:24,000.

Thompson, W. B., 2001b, Surficial geology of the Oxford quadrangle, Maine: Maine Geological Survey Open-File Map 01-393, scale 1:24,000.

Thompson, W. B., and Borns, H. W., Jr. (editors), 1985, Surficial geologic map of Maine: Maine Geological Survey, scale 1:500,000.

Weddle, T. K., 1997, Surficial geology of the Gray quadrangle, Maine: Maine Geological Survey, Open-File Map 97-58, scale 1:24,000.

Weddle, T. K., Koteff, C., Thompson, W. B., Retelle, M. J., and Marvinney, C., 1993, The late-glacial marine invasion of coastal central New England (northeastern Massachusetts-southwestern Maine): Its ups and downs, *in* Cheney, J. T., and Hepburn, J. C. (editors), Field trip guidebook for the northeastern United States [1993 Boston GSA]: University of Massachusetts, Department of Geology and Geography, Amherst, MA, Contribution No. 67, p. I-1 to I-31.

Wilkinson, D. E., 1995, Soil survey of Oxford County area, Maine: U. S. Department of Agriculture, Soil Conservation Service, 296 p., scale 1:20,000.

Williams, J. S., and Lanctot, E. M. (compilers), 1987, Hydrologic data for significant sand and gravel aquifers in parts of Androscoggin, Cumberland, Oxford, and York Counties, Maine, Map 1: Maine Geological Survey, Open-File Report 87-1b, 4 plates, scale 1:50,000.

APPENDIX A
GLOSSARY OF TERMS USED ON MAINE GEOLOGICAL SURVEY SURFICIAL GEOLOGIC MAPS

compiled by
John Gosse and Woodrow Thompson

Note: Terms shown in italics are defined elsewhere in the glossary.

Ablation till: *till* formed by release of sedimentary debris from melting glacial ice, accompanied by variable amounts of slumping and meltwater action. May be loose and stony, and contains lenses of washed sand and gravel.

Basal melt-out till: *till* resulting from melting of debris-rich ice in the bottom part of a glacier. Generally shows crude stratification due to included sand and gravel lenses.

Clast: pebble-, cobble-, or boulder-size fragment of rock or other material in a finer-grained *matrix*. Often refers to stones in glacial till or gravel.

Clast-supported: refers to sediment that consists mostly or entirely of *clasts*, generally with more than 40% clasts. Usually the clasts are in contact with each other. For example, a well-sorted cobble gravel.

Delta: a body of sand and gravel deposited where a stream enters a lake or ocean and drops its sediment load. Glacially deposited deltas in Maine usually consist of two parts: (1) coarse, horizontal, often gravelly topset beds deposited in stream channels on the flat delta top, and (2) underlying, finer-grained, inclined foreset beds deposited on the advancing delta front.

Deposit: general term for any accumulation of sediment, rocks, or other earth materials.

Diamicton: any poorly-sorted sediment, containing a wide range of particle sizes, e.g. glacial *till*.

Drumlin: an elongate oval-shaped hill, often composed of glacial sediments, that has been shaped by the flow of glacial ice, such that its long axis is parallel to the direction of ice flow.

End moraine: a ridge of sediment deposited at the margin of a glacier. Usually consists of till and/or sand and gravel in various proportions.

Englacial: occurring or formed within glacial ice.

Eolian: formed by wind action, such as a sand dune.

Esker: a ridge of sand and gravel deposited at least partly by meltwater flowing in a tunnel within or beneath glacial ice. Many ridges mapped as eskers include variable amounts of sediment deposited in narrow open channels or at the mouths of ice tunnels.

Fluvial: Formed by running water, for example by meltwater streams discharging from a glacier.

Glaciolacustrine: refers to sediments or processes involving a lake which received meltwater from glacial ice.

Glaciomarine: refers to sediments and processes related to environments where marine water and glacial ice were in contact.

Head of outwash: same as *outwash head*.

Holocene: term for the time period from 10,000 years ago to the present. It is often used synonymously with "postglacial" because most of New England has been free of glacial ice since that time.

Ice age: see *Pleistocene*.

Ice-contact: refers to any sedimentary deposit or other feature that formed adjacent to glacial ice. Many such deposits show irregular topography due to melting of the ice against which they were laid down, and resulting collapse.

Kettle: a depression on the ground surface, ranging in outline from circular to very irregular, left by the melting of a mass of glacial ice that had been surrounded by glacial sediments. Many kettles now contain ponds or wetlands.

Kettle hole: same as *kettle*.

Lacustrine: pertaining to a lake.

Late-glacial: refers to the time when the most recent glacial ice sheet was receding from Maine, approximately 15,000-10,000 years ago.

Late Wisconsinan: the most recent part of *Pleistocene* time, during which the latest continental ice sheet covered all or portions of New England (approx. 25,000-10,000 years ago).

Lodgement till: very dense variety of till, deposited beneath flowing glacial ice. May be known locally as "hardpan."

Matrix: the fine-grained material, generally silt and sand, which comprises the bulk of many sediments and may contain *clasts*.

Matrix-supported: refers to any sediment that consists mostly or entirely of a fine-grained component such as silt or sand. Generally contains less than 20-30% clasts, which are not in contact with one another. For example, a fine sand with scattered pebbles.

Moraine: General term for glacially deposited sediment, but often used as short form of "*end moraine*."

Morphosequence: a group of water-laid glacial deposits (often consisting of sand and gravel) that were deposited more-or-less at the same time by meltwater streams issuing from a particular position of a glacier margin. The depositional pattern of each morphosequence was usually controlled by a local base level, such as a lake level, to which the sediments were transported.

Outwash: sediment derived from melting glacial ice, and deposited by meltwater streams in front of a glacier.

Outwash head: the end of an *outwash* deposit that was closest to the glacier margin from which it originated. *Ice-contact* outwash heads typically show steep slopes, *kettles* and hummocks, and/or boulders dumped off the ice. These features help define former positions of a retreating glacier margin, especially where *end moraines* are absent.

Pleistocene: term for the time period between 2-3 million years ago and 10,000 years ago, during which there were several glaciations. Also called the "Ice Age."

Proglacial: occurring or formed in front of a glacier.

Quaternary: term for the era between 2-3 million years ago and the present. Includes both the *Pleistocene* and *Holocene*.

Striation: a narrow scratch on bedrock or a stone, produced by the abrasive action of debris-laden glacial ice. Plural form sometimes given as "striae."

Subaqueous fan: a somewhat fan-shaped deposit of sand and gravel that was formed by meltwater streams entering a lake or ocean at the margin of a glacier. Similar to a *delta*, but was not built up to the water surface.

Subglacial: occurring or formed beneath a glacier.

Till: a heterogeneous, usually non-stratified sediment deposited directly from glacial ice. Particle size may range from clay through silt, sand, and gravel to large boulders.

Topset/foreset contact: the more-or-less horizontal boundary between topset and foreset beds in a *delta*. This boundary closely approximates the water level of the lake or ocean into which the delta was built.