Surficial Geologic Map of the New Hampshire Part of the Windsor and Claremont North

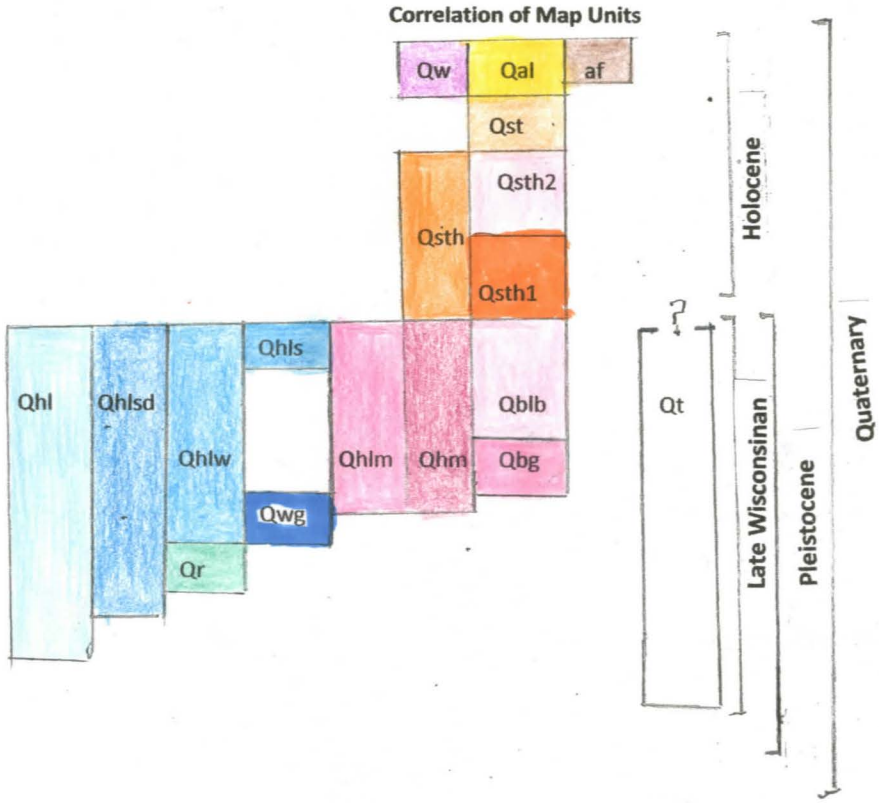
7.5-Minute Quadrangles, Vermont—New Hampshire

By

Carol T. Hildreth

2011

Correlation of Map Units



Surficial Geologic Map of the New Hampshire part of the Windsor and Claremont North 7.5' Quadrangles, Vermont-New Hampshire

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Description of Map Units

A thin, discontinuous layer of windblown sand and silt, generally mixed with underlying glacial deposits by frost action and bioturbation, is present near the ground surface over much of the area but is not shown.

af ARTIFICIAL FILL—Manmade. Material varies from natural sand and gravel to quarry waste to sanitary landfill, includes highway and railroad embankments and dredge spoil areas. This material is mapped only where it can be identified using topographic contour lines or where actually observed. Minor artificial fill is present in virtually all developed areas and bridge abutments throughout the quadrangle. Thickness of fill varies.

Qal STREAM ALLUVIUM (HOLOCENE)—Sand, silt, gravel and muck in floodplains along present rivers and streams. As much as 3 m (10 ft) thick. Extent of alluvium indicates most areas flooded in the past that may be subject to future flooding. In places the unit is indistinguishable from, grades into, or is interbedded with wetland deposits (Qw).

Qw WETLAND DEPOSITS (HOLOCENE)—Muck, peat, silt and sand deposited in poorly drained areas. Generally 0.5 to 3 m (1to10 ft) thick. In places the unit is indistinguishable from, grades into, or is interbedded with Stream Alluvium (Qal deposits).

Qst STREAM TERRACE DEPOSITS (HOLOCENE AND LATE PLEISTOCENE)—Sand, silt, gravel, and occasional muck on terraces cut into glacial deposits in major stream valleys. These terraces formed in part during late-glacial time as the streams cut down their channels through local base level deposits following the retreat of the ice sheet, and the base level of the Connecticut River, to which they ultimately drain, also dropped after the draining of Glacial Lake Hitchcock. In some places, erosional scarps are present and mapped in this unit: in which case, several terrace levels may be represented by this unit but are not mapped separately because they are very narrow and sparse. In places, these deposits may be thin or missing on the present terrace surface, in which case the terrace is directly underlain by the material that was eroded out to form the terrace. From 0 to 5 m (0 to 15 ft) thick.

Qsth HIGH STREAM TERRACE DEPOSITS (HOLOCENE AND LATE PLEISTOCENE)—Similar materials and origin as found on lower stream terraces (Qst, q.v.). These high stream terraces formed during different lowering stable phases of Glacial Lake Hitchcock. In the Connecticut Valley near the mouth of Walker Brook, two distinct high stream terraces can be distinguished: Qsth1 formed during an early lowering phase and Qsth2 during a later lower phase. In most other places in the map area, deposits of Qsth cannot be so easily differentiated.

Qsth Sand, silt, gravel, and occasional muck deposited in terraces higher than the Qst terrace deposits in the Connecticut Valley and its tributaries. From 0 to 5 m (0 to 15 ft) thick

Qsth2 Sand, silt, gravel, and occasional muck deposited in a terrace higher than the Qst terrace deposits near the mouth of Walker Brook in the Connecticut Valley. From 0 to 5 m (0 to 15 ft) thick.

Qsth1 Sand, silt, gravel, and occasional muck deposited in a terrace higher than the Qsth2 terrace deposits near the mouth of Walker Brook in the Connecticut Valley. From 0 to 5 m (0 to 15 ft) thick. (Note: This unit could possibly be a delta built into a low stable stage of Glacial Lake Hitchcock, but no exposures were found in the deposit to verify that hypothesis.)

GLACIOFLUVIAL AND GLACIOLACUSTRINE DEPOSITS (PLEISTOCENE)

GLACIAL-LAKE HITCHCOCK DEPOSITS (PLEISTOCENE)—Sand, gravel, silt and clay deposited by glacial meltwaters in contact with or beyond adjacent ice as kame-delta, shore, nearshore, glaciofluvial outwash, and bottom-set beds of Glacial Lake Hitchcock (GLH), whose level was controlled by a glacial drift dam at Rocky Hill, Connecticut, and a spillway at New Britain, Connecticut. Glacial Lake Hitchcock occupied the Connecticut Valley for several thousand years between around 15,000-16,000 years ago to perhaps about 12,000-11,000 years ago. The front of the Late-Wisconsinan ice sheet may have still been in contact with the lake near its northern end near Burke, Vt., when the Rocky Hill drift dam failed and the lake drained. Unit Qhl consists mostly of bottom-set beds, mostly silt and clay varves (rhythmic couplets generally less than an inch [2.5 cm] thick) whose overall thickness is as much as 76 meters [250 ft] (Campbell and Hartshorn, 1980). Units Qhls (near Saint Gaudens Road), Qhlm (Mill River area), Qhlw (Walker Brook area) and Qhlsd (Sugar River area) consist of kame-delta, delta, fan and glaciofluvial outwash deposits built into and graded to the lake. A topset-foreset (t-f) contact elevation of a GLH "stable phase" delta at Etna in the Enfield quadrangle northeast of this area was measured at 197.5 meters (657 ft) by Koteff and Larsen (1989)., and based on their measurements of t-f contacts throughout the valley, they calculated the water plane rises up to the N.21°W., in the amount of 0.9 m/km (4.74 ft/mi) graded to the "stable phase" 25 m (82 ft) New Britain, CT, spillway level. This water plane tilt was created by post-glacial uplift. In addition, several "Post-stable Phase" deltas have been identified in the valley, including a172-meter (565-ft) delta surface in the Sand Hill section of Hanover, NH, near Storrs Road. The water level(s) associated with units Qhls, Qhlm, Qhlw, and Qhlsd in this area have not been determined due to lack of exposure of t-f contacts in them.

Glaciofluvial deposits associated with meltwater streams entering GLH from the east include units Qhm (in the Mill River valley), Qwg (in the Walker Brook valley), and Qr (in the Redwater Brook valley}.

Qhl Silt, fine sand and clay lake-bottom and nearshore deposits; as much as 76 meters (250 ft) thick.

Qhls Sand, silt, and gravel in kame-delta, shore, nearshore, and outwash deposits near Saint Gaudens Road; as much as 30 meters (100 ft) thick.

Qhlm Sand, silt, and gravel in kame-delta, delta, shore, nearshore, and outwash deposits near the mouth of the Mill River; as much as 30 meters (100 ft) thick.

Qhm Sand, silt, and gravel deposited as outwash by glacial meltwater streams flowing down and, in places, across divides of the Mill River; as much as 6 m (20 ft) thick.

Qhlw Sand, silt, and gravel in kame-delta, delta, shore, nearshore, and outwash deposits near the mouth of Walker Brook; as much as 30 meters (100 ft) thick.

Qwg Sand, silt, and gravel deposited as outwash by glacial meltwater streams flowing down Walker Brook; as much as 6 m (20 ft) thick.

Qhlsd Sand, silt, and gravel in kame-delta, delta, shore, nearshore, and outwash deposits near the mouth of the Sugar River; as much as 30 meters (100 ft) thick.

Qr Sand, silt, and gravel deposited as outwash by glacial meltwater streams flowing down Redwater Brook (and in one place along the divide with Walker Brook); as much as 12 m (40 ft) thick

GLACIAL LAKE BLOW-ME-DOWN BROOK DEPOSITS (PLEISTOCENE) —Sand, gravel, silt and clay deposited by glacial meltwaters in contact with or beyond adjacent ice as kame-delta, shore, nearshore, glaciofluvial outwash, and bottom-set beds of Glacial Lake Blow-Me-Down Brook (GLBMDB), whose level was first controlled by a 940+ foot (287+ meter) elevation threshold in the hills SSW of Cornish Flat; GLBMDB meltwaters flowed thence down Mill River into GLH. As the ice front receded northward, GLBMDB found a lower outlet toward GLH through till deposits blocking the northern end of its valley (near the intersection of Farm and Columbus-Jordan Roads in the North Hartland quadrangle [Hildreth, 2010]); which outlet was eventually cut down to a level that drained GLBMDB completely. Unit Qblb consists of lake-bottom sand, silt, and clay deposits. Units Qbg is interpreted to be an ice-contact deposit (kame-delta, kame-moraine and/or glaciofluvial outwash) built into and graded to the lake outlet to the south. (Note: four more successively younger ice-contact deposits were identified in GKBMDB to the north [Hildreth, 2010].}

Qblb Silt, fine sand and clay lake-bottom and nearshore deposits; as much as 9 meters (30 ft) thick.

Qbg Sand, silt, gravel and till in kame-delta, kame-moraine, shore, nearshore, and outwash deposits; as much as 6 meters (20 ft) thick.

Qt TILL (PLEISTOCENE)—Light- to dark-gray, nonsorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles and boulders; a predominantly sandy diamicton containing some gravel and sand. Varying proportions of silt and sand form the matrix, which ranges from loose to compact and contains a variety of irregularly shaped rock fragments, most of which are less than 4 inches (10 cm) long. Most of the uplands in the quadrangle are mantled by till deposited directly by the ice sheet. Generally underlies most other deposits. Thickness varies and generally is less than 6 m (20 ft) but is more than 30 m (100 ft) under some drumlins and streamlined hills. Denny (1958, p. 76-77) described sandy and compact till in the valley of Stoney Brook, near the south edge of the Enfield map.

Bedrock Exposures. Not all individual outcrops are shown on the map. Solid dots indicate individual outcrops; ruled pattern indicates area of abundant exposures and areas where surficial deposits are generally less than 3 meters (10 feet) thick. Mapped in part from aerial photographs, soil surveys (Simmons and others, 1949), and previous geologic and materials maps (Denny, 1958; and Lyons, 1949).

153 Glacial striation – Point of observation is either at point of arrow or at dot at center of arrow. Line show ice-flow direction inferred from striations on bedrock, Number is azimuth (in degrees) of flow direction.

Qb/b Direction of meltwater or meteoric water flow over outwash, alluvium or till deposit.

940+ (287) Meltwater threshold of glacial deposits; arrow shows direction of drainage. Elevation given in feet (meters).

Contact – Boundary between units, approximately located.

MATERIALS OBSERVATIONS—Surficial materials in exposures, well holes and test holes. Letters indicate texture in decreasing order of abundance. Number indicates thickness in feet.

g = gravel, b = boulder, c = cobble, p = pebble,

s = sand (as separate beds; not including sand as matrix of gravel)

F = very fine sand, L = silt, Y = clay, t = till, st = sandy till

B = bedrock, R = refusal

WELL- AND TEST-HOLE DATA—Approximately located from New Hampshire Department of Environmental Services, Water Resource Division, Concord, N.H

40 Well or test hole reported as ending in bedrock or refusal. Number is reported depth to bedrock (in feet).

TEXTURE OF STRATIFIED DEPOSITS—Indicated to a depth of at least ½ meter (~1.5 feet).

Mixed sand and gravel

Sand

Sand, fine sand, silt and clay

Borrow pit

Borrow pit, abandoned

Quarry

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