CARTER DOME 7.5

Explanation

(48)

Qs: Swamp Deposits (Holocene)

Muck, peat, and silty sand deposited in poorly drained locations, generally 0.3 to 2 m (1 to 6 ft) thick, and in places indistinguishable from, grading into, or interbedded with stream alluvium. Locally pocketed wetlands of limited areal extent are abundant but not individually mapped for clear depiction of underlying units.

Qlsp: Glaciolacustrine Deposits, Glacial Lake Philbrook, Late-Stage, Late Wisconsinan (Pleistocene)

Horizontally interbedded sand and sandy to occasionally silty, fine gravel. Absence of cross-bedding and collapse structures suggests unit deposited in and graded to apparent water surface elevations of ancestral Glacial Lake Philbrook at ~ 488 m (1,600 ft) and ~475 m (1,560 ft). Heavily dissected by the Peabody River and its local tributaries. Up to 46 m (150 ft) thick. Overlies Qt ice-basal deposits in lowest areas and thinly overlies Qt ablation deposits at the base of adjacent slopes. Present floodplain variably overlain by 0.3 to 1.0 m (1 to 3 ft) of sandy-silty Holocene alluvium and marginal areas of vegetated hydric soils. Believed coeval with Qtocm (see below; Ref. 4).

Qtocm: Till, Late-Stage, Late Wisconsinan (Pleistocene)

Ice-contact, collapse-emplaced, hummocky, heavily dissected moraine-like complex overlying Qt and Qdc. Composed of tan to light brown, clast and matrix-supported, sandy to gravelly, sometimes silty till with abundant often very large (25 cu. meters; 800 cu.ft.), angular to subangular boulders. Predominant clast provenance from slopes above and nearby (Ref. 2, 4 & map text).

Qfgp: Glaciofluvial Deposits, Peabody River Valley, Late-Stage, Late Wisconsinan (Pleistocene)

Sandy-to-silty, cobbly to bouldery gravel interbedded with coarse to medium sand deposited by glacial meltwater flowing northeasterly within the Peabody River watershed. Up to 4 m (12 ft) but generally less than 2 m (6 ft) thick and variably overlain by 0.3 to 1.0 m (1 to 3 ft) of sandy-silty Holocene alluvium and marginal areas of vegetated hydric soil.

Qfgm: Glaciofluvial Deposits, Moose River Valley, Late-Stage, Late Wisconsinan (Pleistocene)

Sandy-to-silty, sometimes cobbly gravel interbedded with sandy silt deposited by glacial meltwater flowing easterly from the Bowman drainage divide in the Moose River valley. Up to 6 m (20 ft) thick and variably overlain by 0.3 to 1.0 m (1 to 3 ft) of sandy-silty Holocene alluvium and vegetated hydric soil.

Qdc: Colluvial Diamict, Late Stage, Late Wisconsinan (Pleistocene)

Matrix-supported diamict dominated at the surface and variably downward to ~ 6 m (20 ft) by subangular to rounded, variably weathered boulders and cobbles that grade further downward to cobbly, chaotic mixtures of silty to sandy, gravelly diamict and till (Qt). Unit often overlies Qt and is up to 18 m (60 ft) thick.

Qc & Qct: Colluvial Debris, Late-Stage, Late Wisconsinan To Recent (Pleistocene > Holocene)

Randomly distributed, bouldery to cobbly, clast and matrix-based diamicts and talus on (Qc) and beneath (Qct) unstable slopes subject to colluviation and debris/winter avalanche

Qkt: Kame Terrace, Late Stage, Late Wisconsinan (Pleistocene)

Very coarse to medium, cobbley to occasionally bouldery, well-sorted gravel and interbedded coarse to medium sand with occasional silt lenses and pods. Exposures display intricate cross-bedding and evidence of syn- and post-deposition collapse.

Qt: Till, Maximum To Late-Stage, Late Wisconsinan (Pleistocene)

Ice Ablation Facies: Ice-contact, ablation and collapse-emplaced, bouldery to pebbly glacial till with mixed matrix of tan to dark grayish brown, unsorted to poorly-sorted, generally loose to moderately compact sand, silt, and clay. Generally less than 3 m (10 ft) thick but up to 30 m (100 ft) thick beneath glacially streamlined features and hillocks. Deeply winnowed and dissected on steeper slopes, especially where reverse-slope subglacial drainage occurred during regional downmelting. Clasts, which are generally subrounded to subangular and largely unweathered, indicate mixed north and northwesterly provenance.

Ice-Basal Facies: Sub-glacially emplaced, pebbly to sometimes cobbley, densely to very densely compact, often fissile, glacial till with a matrix of light gray to tan clayey silt. Scattered exposures of very limited areal extent found on slopes and beds of deeply eroded stream channels are generally less than 0.5 m (1.5 ft) thick and commonly contain tightly-imbedded, sharply angular, unweathered clasts that are often weakly striated. Clasts indicate mixed north and northwesterly provenance. Rare exposures of this unit cannot be accurately shown at the scale of this map.

Qlp-Horizontal Hachure: Glaciolacustrine Deposits, Ancestral Glacial Lake Peabody, Illinoian (Pleistocene)

Isolated, laterally discontinuous, residual exposures of glaciolacustrine sediments in the middle to lower Peabody River valley believed deposited during the recessional phase of the Illinoian glaciation (Ref. 3 & text below). Unit consists of silty-clayey, sometimes sandy rythmites and variably developed varve-like deposits interbedded with cobbly, silty-sandy, sometimes clay-rich colluvial diamict. Unit is 2 to 4 m (6 to 12 ft) thick in the middle valley where it is unconformably overlain by glaciofluvial deposits (see Qfgp above), but is up to 18 m (60 ft) thick in the lower valley where sections are unconformably overlain by up to 30 m (90 ft) of ablation till deposited by the Late Wisconsinan glaciation which created significant lateral deformation in their upper 3 to 5 m (10 to 15 ft). Unit exposed only in eroded channel sections where upper-most contacts are exposed at 354 m (1,160 ft). Individual sections not mapped because of nearly vertical exposures. Unit's lateral extent beneath overlying deposits show by horizontal hachuring.

General Map Notes, Specialized Symbols

Bedrock & Small Wetlands: Areas of exposed outcrop and areally restricted wetlands are abundant but not separately mapped for clear depiction of adjacent units.

Stream Alluvium: Not common in steep mountainside channels eroded into clast-dominated diamicts and rare in high-energy fluvial environments. When present, combined with glaciofluvial units.

Artificial Fill: Manmade fill in Pinkham Notch and the lower Peabody and Moose River Valleys is not separately shown for clear depiction of underlying units.

Solid Line	Boundary Between Surficial Geologic Units: all are approximate or inferred due to often inaccessible terrain, varying gradational relationships, and poor exposures
●——— (136)	Fresh Glacial Abrasion Markings **(Ave. Orientation)**.
● **(xxx)**	Well Data **(Depth To Bedrock)**; NHDES, NH Geological Survey (NHGS)
● **(xx-yyy)**	Well Data, Closely-Located (**Depth Range To Bedrock**); NHGS
VC	Vestigial glacial cirque
(1)	Photograph Location
horiz hachure	Underlain by Illinoian glaciolacustrine & colluvial deposits (Ref. 3)
down rt. hachure	Underlain by heavily weathered granitic bedrock (Refs. 1, 2)
SGD	Slopes winnowed and eroded by widely distributed subglacial drainage

Selected References

1. Billings, M.P. and Fowler-Billings, K., 1975, Geology of the Gorham Quadrangle, New Hampshire-Maine. NH Dept. of Resources & Economic Development, Bulletin No. 6, 120 p.
2. Eusden, J.D., 2010, The Presidential Range; Its Geologic History and Plate Tectonics. Lyme, NH, Durand Press, 62 p. (with map, 1 sheet).
3. Fowler, B.K. 1999, Pre-Late Wisconsinan age for part of the glaciolacustrine stratigraphy, lower Peabody River valley, northern White Mountains, Gorham, New Hampshire. Geographie physique et Quaternaire, v. 53, no. 1, p. 109-116.
4. Fowler, B.K., 2011, Surficial Geology of Mt. Washington & the Presidential Range, 2010, New Hampshire. Durand Press, Lyme, NH (annotated map, 1 sheet).
5. Gerath, R.F., 1988, Bear Spring Brook meltwater channel, Gorham, *in* Brigham-Grette, J. ed., American Quaternary Association, Field Trip Guidebook, University of Massachusetts, Contribution No. 63: p. 136-137.
6. Thompson, W.B., in prep, Deglaciation features in the White Mountains, New Hampshire: 1:100,000-scale map.

Surficial Geology of the Carter Dome 7.5-Minute Quadrangle

The features of the quadrangle's surficial geology result from processes associated with alpine and continental glaciation before, during, and after the Late Wisconsinan Glacial Stage, the last to affect the region, followed by post glacial and more recent slope movement processes. The region's more gradual northwesterly slopes, steeper southeasterly slopes, and very limited glacial striation data show this last ice sheet flowed over it from the northwest. The lack of systematic moraines, the location and nature of ice-contact deposits, and heavily winnowed slopes show that, with the exception of the lower Peabody River valley (see below), the ice sheet did not retreat from this mountainous region. Instead, it down-melted in place, first thinning over higher areas and then separating around them. Loose glacial till and associated debris (ablation till) collapsed onto the exposed bedrock slopes as downmelting proceeded. It was then winnowed and sorted on steepest slopes and redistributed on lower slopes where it variously inter-fingers with or overlies unsorted ablation till. Thin deposits of very compact ice basal or lodgment till exist, but are rarely exposed. The most distinctive of the quadrangle's surficial features are described below from more or less the oldest to the youngest.

On the eastern slopes of the Carter-Moriah Range, between Middle Carter Mtn. (4,610 ft.) and Mt. Hight (4,675 ft.) lie two basins (VC), the subdued bowl-shapes and relatively flat floors of which suggest they were formed by alpine glaciation processes. Most workers believe these are vestigial or "fossil" glacial cirques, postulating they were formed/refreshed, deepened, and subdued by alpine glacial erosion during and after each of the glaciations that preceded the Late Wisconsinan. Field reconnaissance of their floors shows they lie at elevations below those known to have sustained alpine glaciers during this most recent glaciation.

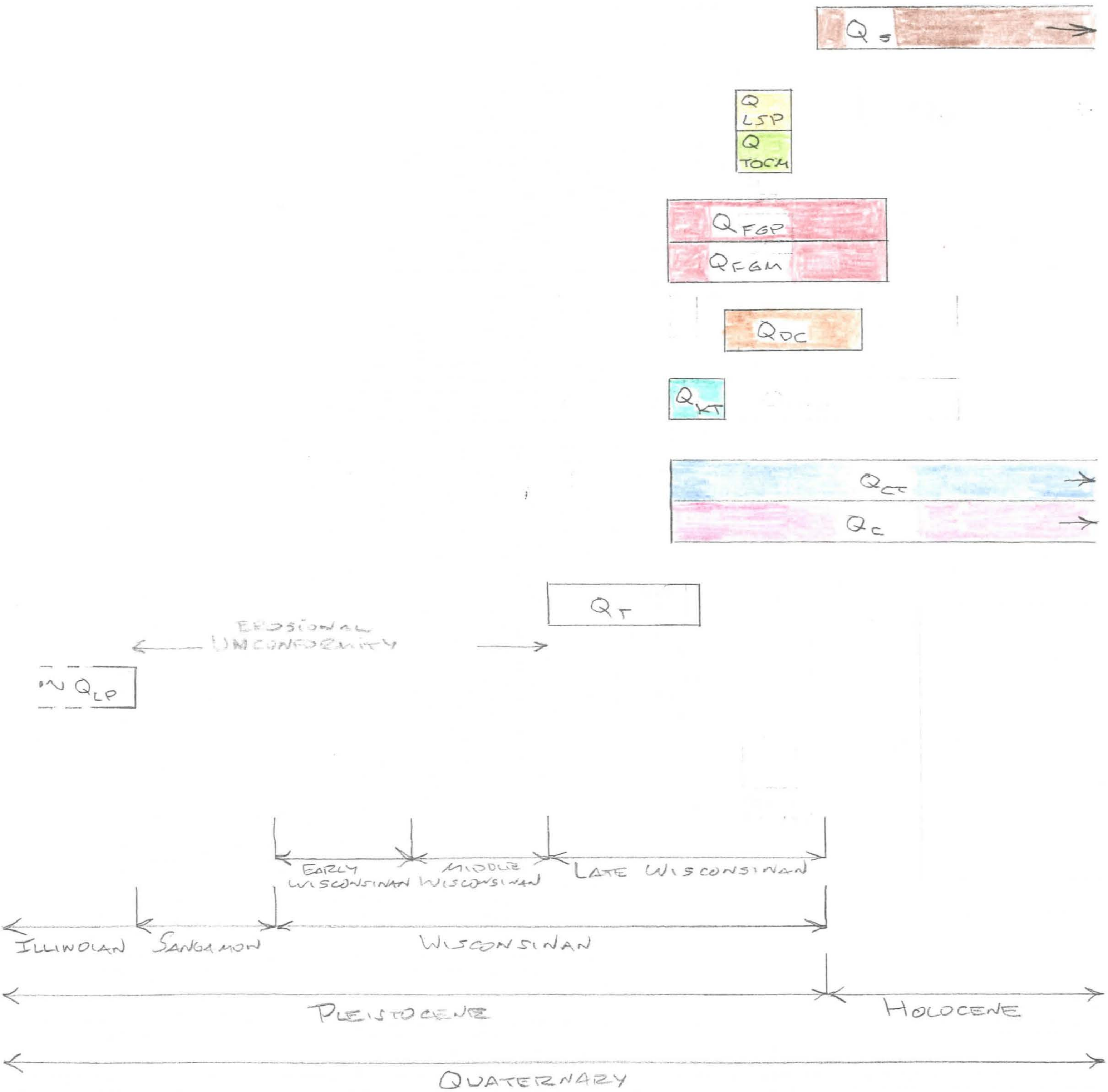
Isolated exposures of residual glaciolacustrine deposits are present in the middle and lower Peabody River valley (Qlp-horizontal hachure). These deposits are everywhere overlain by glaciofluvial gravel (Qfgp) except at the northerly end of the valley where they are overlain by up to 30 m (90 ft) of glacial till that was deposited by overriding ice of the Late Wisconsinan glaciation as it eroded and laterally deformed their upper portions (Ref. 3). The presence of this thick till suggests these deposits were emplaced before this last glaciation and therefore during the recession of the Illinoian ice sheet that preceded it by about 130,000 years. The deposits were likely emplaced in an ephemeral lake dammed between the retreating Illinoian ice sheet and the reverse slope of the valley with a highest water surface elevation of approximately 354 m (1,160 ft). While the features of its spillway were obliterated by subsequent glaciation, the extensive area of heavily weathered granitic bedrock near the northernmost glaciolacustrine exposures shows that it was likely located in this portion of the lower Peabody valley. It is possible that this residual granitic saprolite may also be a relic of late Illinoian time.

As the Late Wisconsinan ice downwasted across the northwesterly slopes of Mt. Moriah, a substantial volume of meltwater was trapped between the downmelting ice and these reverse slopes. Because of its large volume and entrapment by the basin-like shape of this slope, the meltwater found drainage paths toward the northwest beneath the adjacent ice. As the meltwater coalesced beneath the ice, it created numerous deeply incised channels on this slope.

The complex of kame terrace (Qkt), colluvial (Qdc), and glaciofluvial deposits (Qfgp) southeast of the Pine Mountain col show that a lobe of receding Late Wisconsinan ice at least 140 m (~460 ft) thick lingered in the Moose River valley to the northwest while ice in the lower Peabody valley was retreating northward into the Androscoggin Valley (Ref. 5). The kame terrace was deposited in a small ephemeral lake locally dammed between this southeast facing slope and a stranded mass of ice in the lower valley, which had been cut off from the retreating ice. When this stranded mass downwasted sufficiently and/or its damming mechanism partially failed, the small lake drained to a lower level in the valley and portions of the kame terrace and surrounding till slopes collapsed into the lowered lake and on top of the residual Illinoian glaciolacustrine deposits. At that point, the substantial volume of meltwater flowing over the col from melting ice in the Moose River valley heavily dissected these rearranged deposits, creating the deep channel in which the underfit flowage of Bear Spring Brook exists today. Evidence shows the lower portion of this deep channel was subsequently relocated to its present position as its central portion was in-filled from above. This in-filling diverted the stream's flow path toward the southeast and left the deep and largely abandoned channel to the northeast. After this lower lake later drained, the apron of glaciofluvial gravel was deposited across the toe of these combined deposits by the Peabody River. Subsequently, these deposits were dissected by the river as the local land surface rebounded from the weight of the previously overlying Late Wisconsinan ice sheet.

Work in the wider region (Refs. 4 & 6) has identified moraines 3 miles northwest of the Presidential Range that were deposited by late-glacial readvance or temporary standstill of retreating Late Wisconsinan Ice Sheet. It is proposed that near-glacial conditions created by the close proximity of this active ice may have lowered the elevation at which perennial snow and ice could exist for a period of time sufficient to supplement and reactivate residual ice in the most favorably sized and oriented glacial cirques in the region. Such is suggested by a feature near the western margin of the quadrangle (Qtocm), below the Great Gulf cirque just to the west. This feature consists of a group of hillocks strewn with very large boulders of rock types outcropping within and along the lower flanks of the cirque. Its location, hummocky topography, and apron of partially-abandoned distributary drainage toward the east from the cirque suggests it may be a terminal moraine. When emplaced, the feature displaced the West Branch of the Peabody River near the mouth of the cirque to the north and temporarily dammed the Peabody River at The Glen, creating an ephemeral lake. This lake quickly filled with coarsely-textured sediment and then rapidly drained through a channel eroded along its easterly flank. Once beyond the feature, the flow plunged back into the river's original course at Garnet Pool.

This feature is thought to postdate the Late Wisconsinan Ice Sheet because its loosely consolidated deposits could not have survived its overriding erosion. It is proposed the feature was emplaced by possibly supplemented and reactivated residual ice in the Great Gulf. The cirque is uniquely suited for this because it faces directly north and has by far the largest, deepest, and best melt-protected snow and ice catchment in the region. This could have permitted it to contain a late- or postglacial residual ice mass large enough to, once reactivated, to emplace this feature while less favorably sized and oriented neighboring cirques could not.



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