SURFICAL GEOLOGY OF THE CABOT 7 ½ MINUTE QUADRANGLE, VERMONT
By
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Report and Map Plate

Summary of Significant Findings

The location of the area is shown in Figure 1. The stream network and the approximate extent of glacial Lake Winooski are shown in Figure 2.

Glacial till in the study area is generally dense with a fine-sand to silt matrix. Clasts in the till are also predominantly of local origin. Granitic boulders from the Woodbury Granite bodies are widely distributed in the western third of the quadrangle (Figure 3). The till is of highly variable thickness, but large areas of the uplands consist of thin till and bedrock. Many of the first-order streams have cut down to bedrock (Figure 4).

Boulder-floored glacial meltwater channels were observed at several locations to the west of East Long Pond and Nichols Pond (Figure 5). Several other meltwater channels in the northern third of the map were delineated from stereoscopic interpretation of aerial photos.

Several discontinuous ice-contact sand and gravel deposits are found in the quadrangle. Kames, kettle holes, and a small esker are seen on the surface of the deposit on the north shore of Nichols Pond in Woodbury (Figure 6). A large sand and gravel deposit is exposed at the Walden Town Pit to the west of Smith Corner. The pit exposes probable esker sand and gravel that is overlain faulted lacustrine medium and fine sands which are in turn overlain by lacustrine medium sand to silty very fine sands (Figures 7 and 8). These lacustrine deposits are above the level of glacial Lake Winooski and were thus probably formed in a short-lived lake that filled the Perkins Meadow Brook valley.

Glacial lake deposits occur in the Winooski River valley south of Cabot Village, in the northwest portion of the quadrangle near Hardwick Village, and in the north-central portion of the quadrangle (northwest of South Walden). Those in the Winooski River valley are clearly part of a northern arm of glacial Lake Winooski. The deposits near Hardwick Village are also probably formed by an arm of the lake. The shorelines of this Late Pleistocene water body have been tilted by post-glacial isostatic rebound and are accordingly projected using shoreline tilt of 4.7 feet per mile to the N21W from a threshold at Williamstown Gulf (after Larsen, 1987). As projected, these shorelines fall below the upper limits of some of the lacustrine deposits. In particular, a well-developed terrace at the cemetery east of Hardwick Village extends above the projected shoreline. This is consistent with observations made in other parts of the Winooski Valley and suggests that revisions are needed to the direction and magnitude of the tilt. It is unclear if the deposits to the northwest of South Walden were formed in glacial Lake Winooski or in an as-yet unmapped higher-level lake.

The surficial deposits in the Winooski River valley in the vicinity of Lower Cabot are much thinner than those in the Winooski Valley bottom to the south and west in the Marshfield and Plainfield quadrangles.

At Lower Cabot the deposits are generally less than 6 to 10 meters thick while at Plainfield and East Montpelier they exceed 30 meters in many locations.

Striations and grooves in bedrock indicated that ice motions range from 140 to 192°. Compared to the Woodbury quadrangle to the west, striations and grooves were uncommon and poorly developed. However, enough were seen to see that the patterns are similar. No cross-cutting relationships were observed in this study area, but in the Woodbury quadrangle at station WO872 the 194° striations cross-cut the 164° striations and are thus younger. This relationship has been seen at other sites in the region and might suggest an earlier regional ice flow trending roughly 160° with a later more southerly re-orientation of flow.

As discussed in Larsen and others 2003), there is substantial evidence in central Vermont for a late Wisconsinan readvance, which appears to correlate with the Bethlehem-Littleton readvance in New Hampshire. More recent discoveries of thick dense till over lacustrine sediments at several locations in Washington County support this interpretation (Dunn and others, 2011; Dunn and others, 2015). Thick deposits in some of the valleys are reminiscent of till-over-lacustrine sequences seen in nearby areas, but no clear evidence of a readvance was found during this study.

Early reconnaissance surficial mapping within the Plainfield 15-minute quadrangle by Paul MacClintock is reported by Stewart and MacClintock (1969) and shown on Doll (1970). This mapping delineated an extensive moraine complex (Danville Moraine) that extends across the northeastern portion of the quadrangle . Mapping by Springston and Haselton in the St. Johnsbury 7.5 minute quadrangle (1999a and b) to the east of the study area casts doubt on the existence of this moraine. No evidence in support of the moraine was found during this mapping. Where examined, the areas that had been mapped as moraine were generally thin, dense, silt-matrix till. Bedrock outcrops were common in these areas. Further work in the Joes Pond quadrangle will provide additional opportunities to examine this moraine question.

Unlike in the Woodbury quadrangle to the west, there is no clear evidence that any of the valleys functioned as major glacial drainage routes. However, the lacustrine deposits in the northern portions of the quadrangle were poorly exposed and additional work may reveal more indications of eskers and other ice-contact deposits.

References

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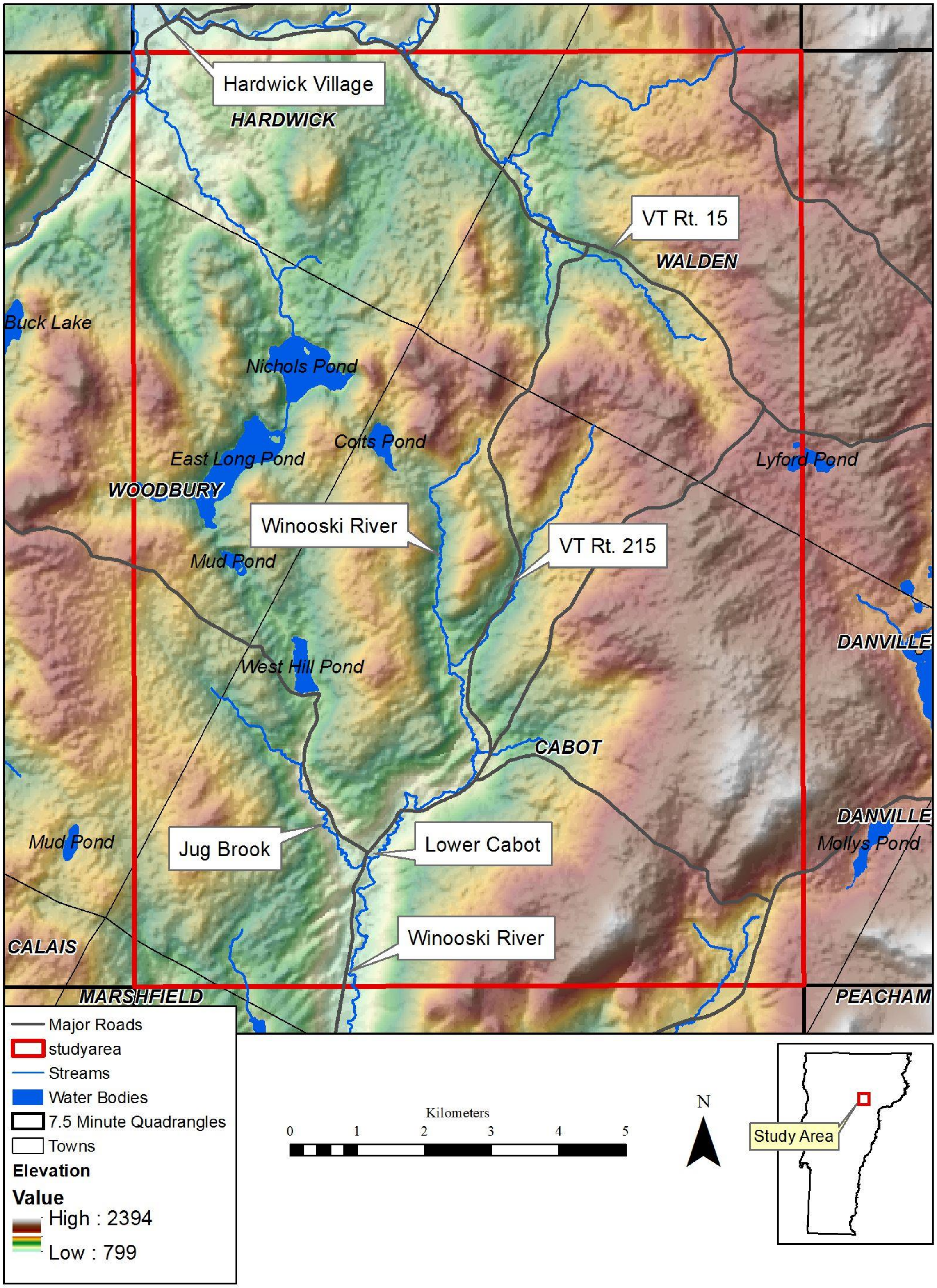


Figure 1. Location map.

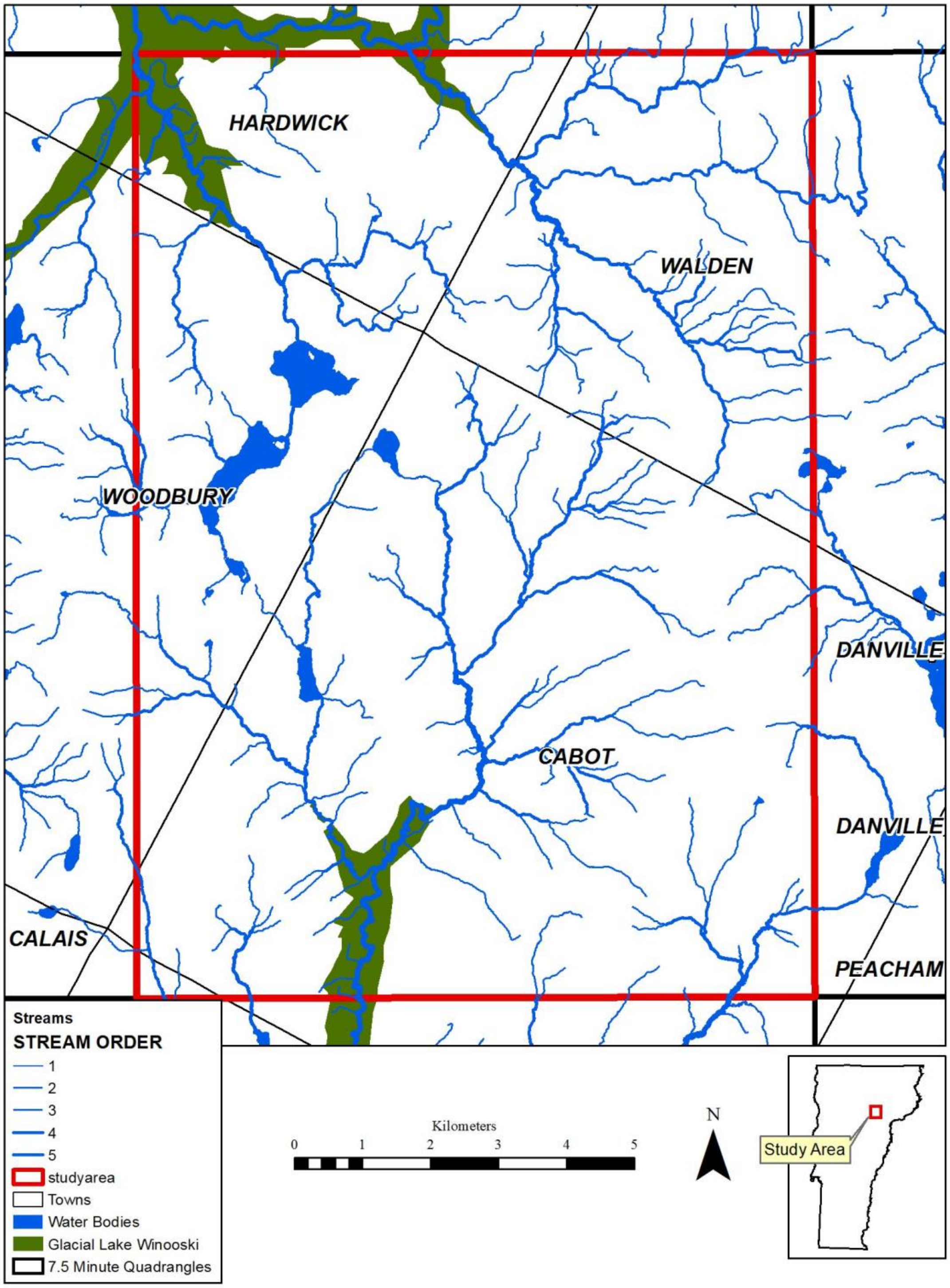


Figure 2. Waterbodies and extent of glacial Lake Winooski. Glacial Lake Winooski shorelines have been tilted by post-glacial isostatic rebound and are accordingly projected using shoreline tilt of 4.7 feet per mile to the N21W from a threshold at Williamstown Gulf (after Larsen, 1987).

Figure 3. Large granitic boulder west of East Long Pond in Woodbury. The western third of the area contains abundant granitic glacial boulders derived from the nearby Woodbury Granite exposures.

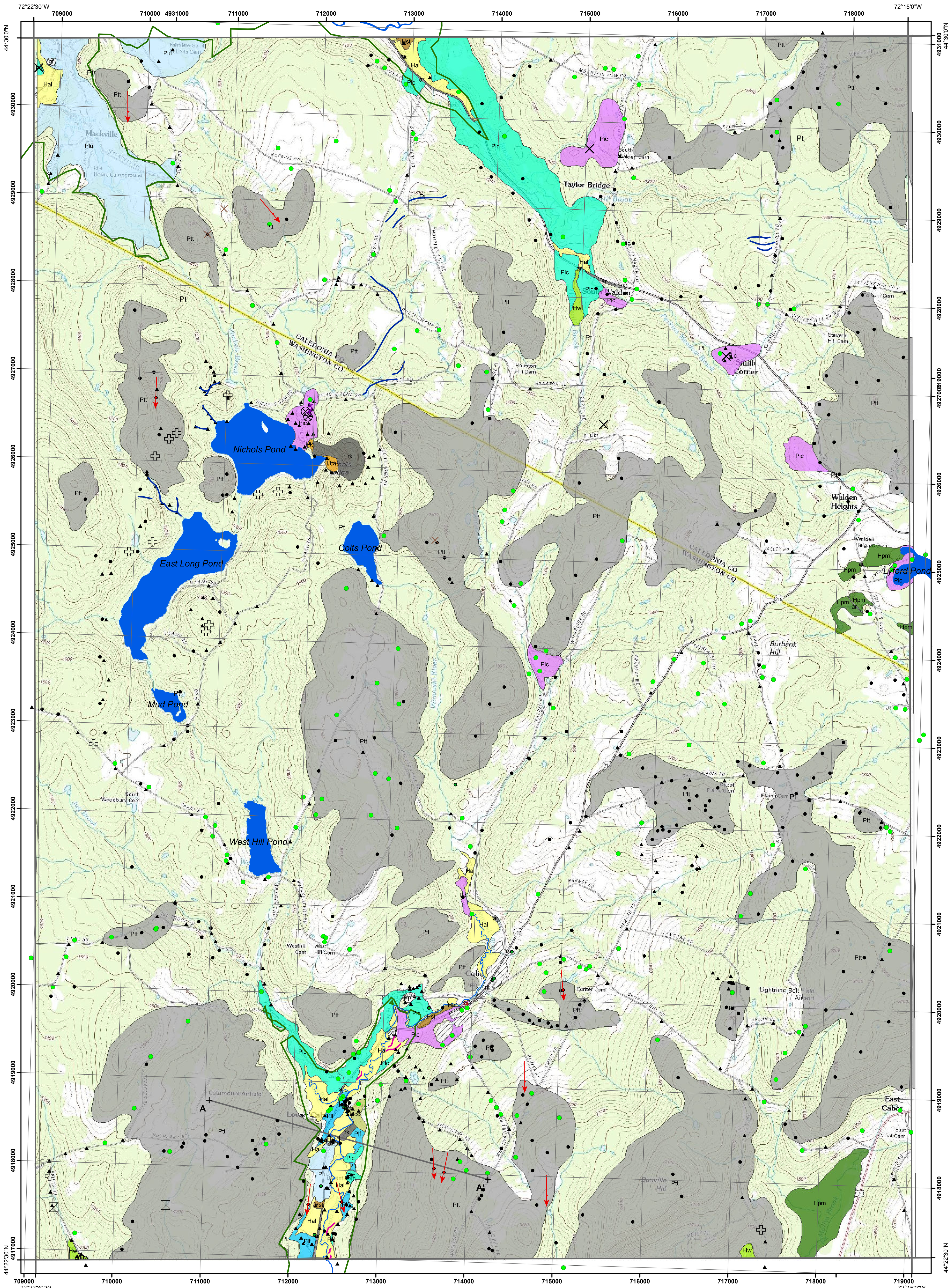
Figure 4. Bedrock grade control in stream east of Cabot village, Site CA-337.

Figure 5. Bouldery meltwater channel southwest of Nichols Pond in Woodbury. View looking up channel to SSW.

Figure 6. Kames underlain by ice-contact sand and gravel deposits on the northeast side of Nichols Pond, Woodbury.

Figure 7. Collapsed ice-contact sand and gravel at the Walden town Pit west of Smith Corner.

Figure 8. Faulted ice-contact sands at the Walden Town Pit. Material ranges in size from medium sand to silty very fine sand.



DESCRIPTION OF MAP UNITS

Holocene Deposits

ar — Artificial Fill. Artificially-emplaced earth along road beds, embankments and in low-lying areas.

gf — Graded or Filled. Area of extensive artificial excavation or filling.

Hal — Alluvium. Silt, sand, and gravel deposited by modern streams. Deposits include stream channel and bar deposits and finer-grained floodplain deposits. Wetland deposits are common within these areas and are not distinguished. Thickness in the tributaries is typically less than 3 meters, although the depth may be much greater in the valleys of the larger streams.

Hw — Wetland Deposits. Accumulations of clastic sediment and/or organic matter. Commonly overlaying other sediments such as alluvium, lacustrine deposits, or till. Only a few of the larger deposits are shown.

Hpm — Wetland Deposits, Peat or Muck. Thick accumulation of organic matter with minor clastic sediment. Commonly overlaying other sediments such as alluvium, lacustrine deposits, or till. Thickness of organic horizon ranges from 0.3 meter to greater than one meter.

Hst — Stream Terrace Deposits. Silt, sand, pebble, cobble, and boulder gravel deposited on terraces above the modern floodplains of streams. They represent former floodplains that have been dissected by younger streams.

Hta — Talus. Fans or aprons of fallen rock at the base of cliffs. May contain colluvial (slope-wash) deposits as well. Of variable thickness.

Hco — Colluvium. Fans or aprons of sediment at the base of steep slope segments. Slope-wash deposits of variable thickness.

Pleistocene Deposits

Plu — Lake Deposits, undifferentiated. Coarse- to fine-grained lake deposits. Largely deposited in arms of glacial Lake Winooski, excerpt in the northern part of the study area to the east of Hardwick village, where the deposits may grade to a higher-level glacial lake.

Plc — Lake Deposits, Coarse-grained. Well-sorted sand, pebbly sand and/or sandy gravel deposited in shoreline, shallow waters, or lake bottom environments of glacial Lake Winooski or in higher-level glacial lakes of limited areal extent. Parts of the coarse-grained deposits between Lower Cabot and Cabot in the Winooski River valley and in the lower Jug Brook valley may be delta or shoreline deposits, but more detailed mapping would be needed to distinguish these.

Plf — Lake Deposits, Fine-grained. Clay, silt, and very fine to fine sand deposited in deeper waters. Commonly varved. Deposited in lake bottom environments of glacial Lake Winooski or in higher-level glacial lakes of limited areal extent.

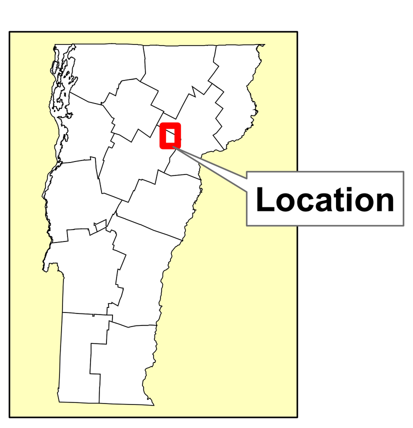
Pic — Ice-contact Deposits. Unsorted to poorly-sorted sand, gravel, and silt deposited in contact with glacial ice. Kettle holes and a small esker are visible on the ice-contact deposits north of Nichols Pond. A probable esker buried by collapsed lacustrine sands and silts is exposed in the sandpit west of Smith Corner in Walden.

Pt — Till. Dense to very dense, unsorted to very poorly sorted, fine-sand- to silt-matrix till. Surface boulders are common, with boulders of the local Woodbury Granite common in the western third of the study area. Thickness of the till is highly variable, from less than 3 meters to greater than 30 meters.

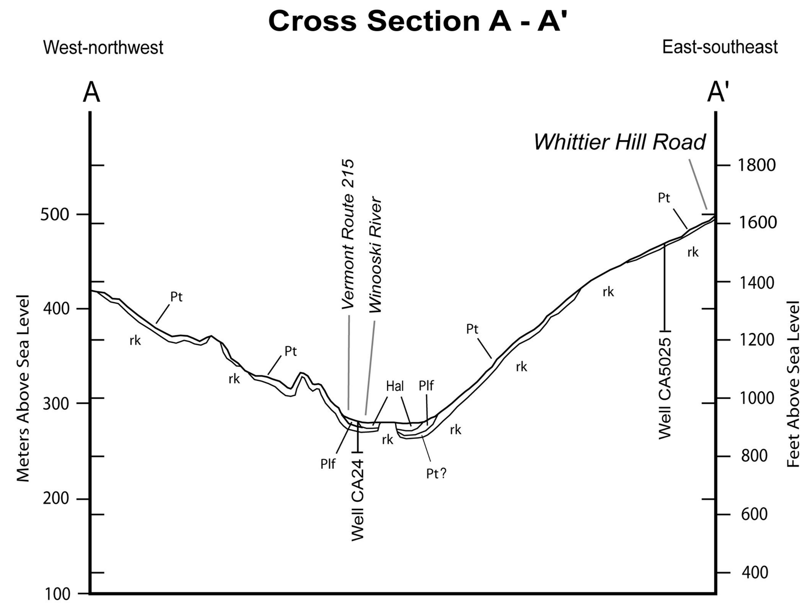
Ptt — Till, Thin. Descriptions as in preceding unit. Thickness highly variable but generally less than 3 meters and bedrock outcrops are very common.

rk — Bedrock. Area of extensive bedrock exposures. Most outcrops visited during this study are indicated by the point symbols described below.

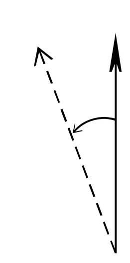
- Field Site
- Bedrock Outcrops
- Glacial Striation
- Water Well
- Borings
- Kettle Hole
- Granitic Glacial Boulder
- Sand or Gravel Pit
- Bedrock Quarry
- Dam Site
- Cross Section Line
- Abandoned Stream Channel
- Projected Glacial Lake Winooski Shoreline
- Esker
- Meltwater Channel
- Quadrangle Boundaries
- Water Bodies



Cross Section A - A'

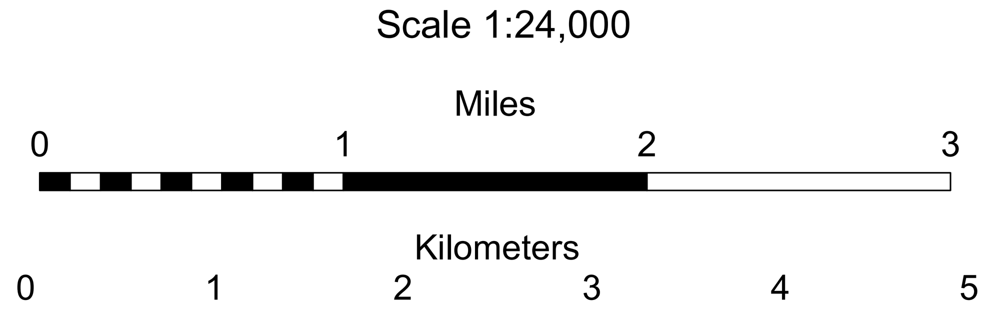


Horizontal Scale = 1:24,000
Vertical Exaggeration = 2.5 X



Magnetic declination
14.8 degrees west, 2016

Scale 1:24,000



Contour Interval 20 feet

Base map from U.S. Geological Survey.
Coordinate System: Vermont State Plane, meters, NAD 83.
Geographic coordinates shown at topo corners are in NAD 83.
Grid overlay on map is UTM, Zone 18N, NAD83.
Digital cartography by George Springston, May 29, 2016.

Bedrock outcrop locations are from Konig (1961) and this study.

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Reference:
Konig, R.H., 1961, Geology of the Plainfield quadrangle: Vermont Geological Survey Bulletin no. 16, Montpelier, 86 p. plus 2 plates (1:62,500).

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Surficial Geologic Map of the Cabot 7 1/2 Minute Quadrangle, Vermont

by

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