New York State Museum

Mark Schaming, Director

North American Datum of 1983

and hydrograpghy

and NYS 10m DEM

Hygrology, and planimetry layers from the New York State DOT aster Quadrangle separates for Tioga and Tompkins Counties New York State Geological Survey

Geographic data layers from 2018 TIGER/Line shapes for transportation (https://www.census.gov/cgi-bin/geo/shapefiles/index.php) Shaded relief from Tompkins County SWCD 2m, Susquehanna Basin 2m, (http://gis.ny.gov/elevation/index.cfm) CONTOUR INTERVAL: 10 FEET Magnetic declination from the NOAA online Declination Calculato http://www.ngdc.noaa.gov/geomag-web/#declination **UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET**

SURFICIAL GEOLOGY OF THE SPEEDSVILLE 7.5-MINUTE QUADRANGLE, TIOGA AND TOMPKINS COUNTIES, NEW YORK

James R. Leone, Karl J. Backhaus and Andrew L. Kozlowski

SURFICIAL GEOLOGY OF THE SPEEDSVILLE 7.5-MINUTE QUADRANGLE, TIOGA AND TOMPKINS COUNTIES, NEW YORK

prepared by Karl J. Backhaus and James R. Leone

Supported in part by the U.S Geological Survey Cooperative Agreement Number G18AC00232 National Cooperative Geologic Mapping Program (STATEMAP)

The Speedsville 7.5-Minute Quadrangle was mapped as part of the 2018 National Cooperative Geologic Mapping Program funded STATEMAP project (award #G18AC00232). This quadrangle was one of twelve quadrangles to mapped as part of the Tompkins County Surficial Geologic mapping project currently being undertaken by the NYSGS starting in 2018 and concluding sometime in the early to mid-2020's and also one of fifteen quadrangles to be mapped as part of the Tioga County Surficial Geologic Mapping project starting in 2019 and finishing in 2024. The purpose of this map was to identify and delineate various surficial and geologic materials with the intent that this information can guide municipalities in land use, environmental and natural resource decisions across its roughly 68 square mile area.

The Speedsville quadrangle is in southeastern Tompkins County and north-central Tioga County in the Finger Lakes Region of New York State. The Town of Caroline Center, Town of Speedsville and Village of Upper Fairfield are the main municipalities within this quadrangle. This portion of Tompkins County is largely mountainous and rural with much of the quadrangle being tracts of state-owned forest and private rural farmland. The Shindagin Hollow and Potato Hill State Forests can be found within this quadrangle. The mapping area is situated within the Alleghany Plateau physiographic province is generally high elevation ridges to the south and west of the Town of Caroline, and flat lying/hummocky topography in the valleys between them. There is roughly 940 feet of elevation change between the highest peak at Bald Mountain at 1,870 feet to the Willseyville Creek Valley floor at 930 feet. The Willseyville, Boyer, Doolittle, West Branch of the Oswego Creeks and Cole Book are the largest water bodies in the area.

Bedrock in the area is generally grey shales and sandstones that are Devonian in age (Rickard and Fisher, 1970). The predominant bedrock found in the quadrangle were grey to blue shales with intermittent sandstone beds. Limestones were found outcropping in two spots, but relatively thin in size. According to the Finger Lakes sheet of the Geologic Map of New York State, the bedrock in the quadrangle is comprised of the Cashaqua and Middlesex Shales, Beers Hill Shale; Grimes Siltstone, Dun Hill, Millport and Moreland Shales, Geneseo Shales and the Ithaca Formation - shale, siltstone and the Sherburne Siltstone (Rickard and Fisher, 1970).

The surficial geologic units in this quadrangle were previously mapped at 1:250,000 scale and were reported to be outwash sands and gravels, kame deposits, kame moraine, till, thin till over rock, rock and till moraines (Cadwell et al, 1986). No geologic mapping has been completed at a higher resolution than that of Cadwell et al., (1986). A previous small-scale study was conducted in the Willseyville Creek Trough by Miller and Karig, (2010) observed similar surficial units with the addition of a kame moraine and a large alluvial fan unit.

To create the surficial geology map of the Speedsville quadrangle, preliminary field maps were created using the ESRI ArcMap 10.6 software and consisted of all available topographic data (roads, lidar surface terrain and hydrography) to plot all field data on including field stops, bedrock outcrops and important site information. Surficial soil sampling employed the use of a five and a half foot hand auger to allow sampling below the variably thick organic soil horizon (below the topsoil). Another tool used is an entrenching shovel and pick. This tool was used to remove topsoil and/or eroded sediments off of outcrops or exposures to expose fresh sediments for analysis. At each field stop, the coordinates (latitude and longitude in decimal degrees) were taken using a Garmin GPS 66st, descriptive notes on the sediment found, whether a sample and/or a high-resolution, scaled photo were taken, and the time at which the stop was taken were logged into a field notebook (TPK_FN4 & TPK_FN5).

At most of the field sampling sites, a soil sample was taken for grain-size analysis. This employee the use of either one or two processes: dry-sieve or wet-sieve analysis. These processes followed the procedure outlined by Bowles (1978), while only using a seven-tiered sieve stack (#5, #10, #18, #35, #60, #120, #230, and Pan) for both dry- (mechanical) and wet- (hydrometer) sieve analysis. The predominantly cohesive (fine-grain dominant) samples were sorted using the wet-sieve analysis, while the cohesionless (coarse-grain dominant) samples were sorted using the dry-sieve analysis.

The final surficial geologic map, cross-section and elevation maps were produced using the ESRI ArcMap and Adobe Illustrator CS6 programs. The cross-sections were created in ArcMap using the XActo Cross-section 10 tool developed by Jennifer Carell, formerly of the Illinois Geologic Survey, and then exporting the cross-section into Adobe Illustrator to connect the stratigraphic units. The surficial geologic map was created by scanning the mylar sheet (TPK_MY4) drafted from the geologic field map. Polygons were then produced by digitizing this map in ArcMap and colored according to surficial geologic units found within the quadrangle. The final map was drafted in Adobe Illustrator and exported as a PDF file.

A total of 100 field stops were taken, with 69 samples for grain-size analysis (see Appendix), within the quadrangle. Some stops contained more than one sample as they exhibited stratigraphy either in an exposure or at depth with the hand-auger. The final count for lithologies found during field sampling was: 100 stops were diamicton, 25 were sand and gravel, 18 were bedrock, 8 were glaciolacustrine sediment, five were sand and five were alluvium. The surficial geologic units found within the quadrangle are as follows:

This unit is generally composed of coarse/fine, large cement mounds and/or crushed rock anthropogenically transported and used for construction purposes. This material is used in artificial dams, built to retain water, and large, raised roadbeds for bridges within the quadrangle.

Holocene Alluvium (Ha) and Holocene Wetland Deposits (Hw)

Post glacial sediments occupy the low areas or land depression throughout the quadrangle. Ha is associated with fluvial process in creek valleys throughout the quadrangle. This lithology generally consists of stratified silt, sand, and gravel. Hw is associated with low areas and depressions in the highlands of the quadrangle where wetlands form due to poor drainage. This lithology consists of peat, marl, clay or sand in these areas of poor drainage.

Stratified, fine-grained sediment consisting of fine sand, silt and clay size particles. Inferred to be deposited in mid shore to deep-water settings of glacial lakes. May include marl, rhythmites, and varves. Plsc is only found in an exposure along Honeypot Road in the central region of the quadrangle interbedded with fine-sand and diamicton.

Well sorted and stratified sand, deposited by fluvial, lacustrine or eolian processes. Inferred as deposits associated with distal glacial environments. Well-sorted sand deposits were observed down-slope from deposits of coarser sand and gravel deposits (Psg), likely due to a decrease in energy during deposition.

Characterized as well-sorted and stratified sand and gravel this unit is interpreted to be deposited by glacial meltwater at or very near the glacier and can be found several meters in elevation higher than the present-day river valley floors. Psg is found in the Willseyville Creek, West Branch Owego Creek and the valley where Prospect Valley Road runs through. Psg is also found along County Route 115 in the north-central section of the quadrangle.

Geologic mapping by K. Backhaus, J. Leone, and A. Kozlowski, 2019

Digital data and cartography, K. Backhaus, 2019.

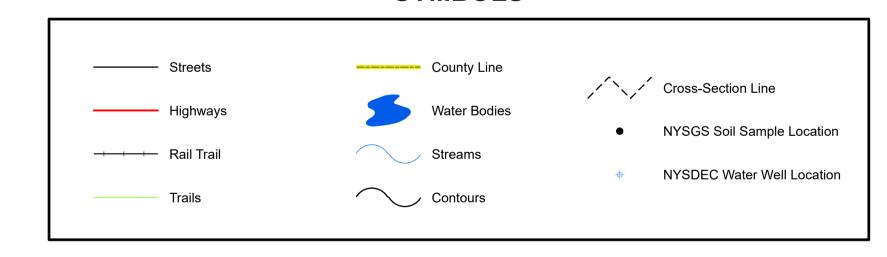
This unit is a mixture of sediment grains that range from clay to boulders in size. In this guadrangle, all diamicton in interpreted to be glacial till, sediment deposited directly beneath the glacier. It is generally matrix supported, sand-dominant, and tan, grey, bright blue and reddish brown in color. Diamicton is found throughout the quadrangle independent of elevation and underlies much of the other surficial geologic units within the quadrangle.

Summary and Conclusions:

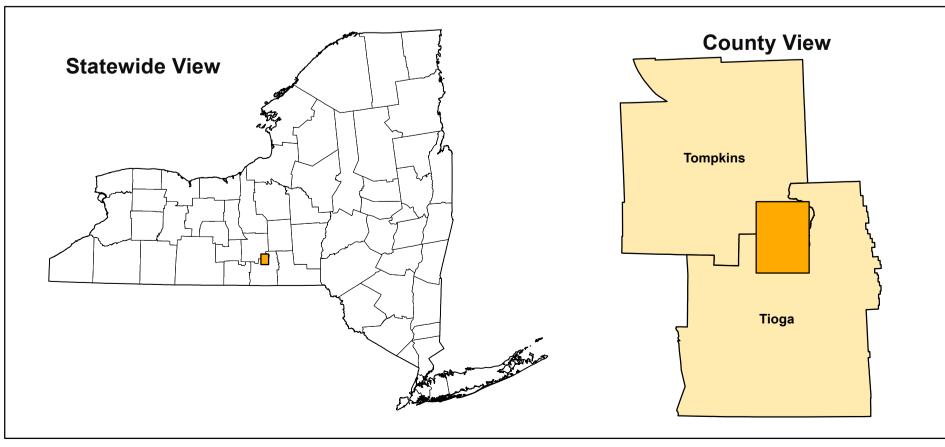
The Speedsville quadrangle is mostly mountainous terrain with narrow, deep valleys trending North to South in Tompkins County. These mountains are comprised of Devonian shales, sandstones and limestones and have undergone high amounts of erosion since their lithification. Due to the heavy erosion, bedrock generally outcrops at the summits, in deep ravines and some road cuts and are generally comprised of black and grey shales with interbeds of sandstone and limestone. Bedrock valleys are common in this guadrangle with the deepest and narrowest along Shindagin Hollow Road with outcrops of grey interbedded shale and sandstones. Atop the bedrock, the most common lithologic unit is diamicton (Pd). The diamicton is made up of mostly mottled, brown and rust color sand-rich dominant diamicton. Gravel clasts ranged in size from pea gravel to boulder in size. This lithologic unit, while widespread, can be diagnostic in showing the movement and interaction of the Laurentide Ice Sheet in this quadrangle based on its sediment characteristics. The diamicton found in most areas of the quadrangle is indicative of lodgement tills due to their density, bimodal distribution of grains, and contained predominantly local bedrock clasts and many contain faceted clasts. Sand and gravel (Psg) are the next more abundant lithologic unit within the quadrangle and are sporadically in the valleys of the quadrangle. The largest deposit is along the Willseyville Creek valley along the western border of the quadrangle. Other deposits lie within the unnamed valley and creek where Prospect Valley Road just east of the Willseyville Creek Valley. A large deposit along the West Branch Owego Creek continues into the quadrangle from the Dryden quadrangle to the north (Backhaus, et. al., 2019). Other smaller deposits are found in the area of County Route 115 in the north-central region of the quadrangle. Lastly, small alluvial fan deposits (Ps) are found in the West Branch Owego Creek Valley in the northeast corner of the quadrangle. Glaciolacustrine sediment (Plsc) was found in one exposure along Honeypot Road. This exposure has interbedded and folded glaciolacustrine, fine-sand and diamicton units and indicated either compressional stress from an advancing ice-sheet or mass-wasting over time.

Upon field mapping within the Speedsville quadrangle evidence was discovered that this area had undergone multiple glacial cycle as seen in the exposure with the folded glaciolacustrine, diamicton and fine-sand units interbedded with one another along Honeypot Road. These exposures suggest at least two advances and one retreat of the ice sheet. An OSL sample will need to be taken within the fine-sand unit to try and date when the fine-sand unit was deposits. Further work is to be done in the Willseyville Creek Valley as an OSL here will help constrain the deposition of these units and their relation to the deltas and moraines in valleys to the North and West. Field work will also be repeated when the 2-meter lidar is available in most of the quadrangle. During this mapping season over 50% of the quadrangle only had lidar data at a 10-meter resolution available while the rest was 2-meter.

SYMBOLS



QUADRANGLE LOCATION



This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program STATEMAP award number G18AC00232 in the year 2019.

The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily presenting the official policies, either expressed or implied, of the U.S. Government.

ADJOINING QUADRANGLES

Bowles, J.E., 1978, Engineering Properties of Soils and Their Measurement", McGraw Hill Book Company, New York, Second Ed., 213pp. Backhaus, K.J., Kozlowski, A.L., and Leone, J.R., 2019, The Surficial Geology of the Dryden 7.5-Minute Quadrangle, Cortland, Tioga and Tompkins Counties, New York. New York State Museum, Map and Chart Series, No. 121. 1:24,000 scale.

Cadwell, D.H., and Muller, E.H., 1986, Surficial Geologic Map of New York, Finger Lakes Sheet, New York State Museum, Map and Chart Series, No. 40. 1, 250:000 scale.

Miller, T.S., and Karig, D.E., 2010, Geohydrology of the Stratified-Drift Aquifer System in the Lower Sixmile Creek and Willseyville Creek Trough, Tompkins County, New York, United States Geological Survey, Scientific Investigations Report, No. 2010-5230, 66p.

Rickard, L.V., and Fisher, D.W., 1970, Geologic Map of New York, Finger Lakes Sheet, New York State Museum, Map and Chart Series, No. 15.

DESCRIPTION OF MAP UNITS

Surficial sediment composed of coarse/fine and or crushed rock anthropogenically transported and used for construction purposes.

alluvium and includes modern channel, over-bank and fan deposits Peat, muck, marl, silt, clay or sand deposited in association with wetland environments. Various sediments can be present at transitional boundaries from one facies to another

Stratified, fine-grained sediment consisting of fine sand, silt and clay size particles. Inferred to be deposited in mid shore to deepwater

Sorted and stratified silt, sand, and gravel, deposited by rivers and streams. May include cobbles and boulders. Inferred as post-glacial

Pleistocene

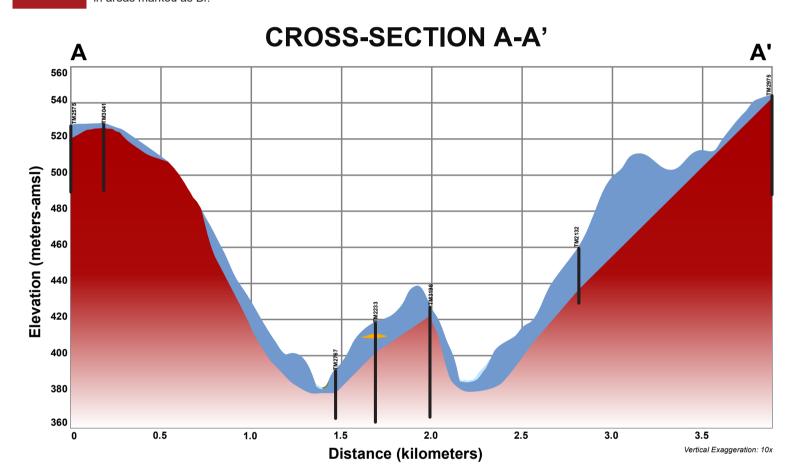
Well sorted and stratified sand, deposited by fluvial, lacustrine or eolian processes. Inferred as deposits associated with distal glacial

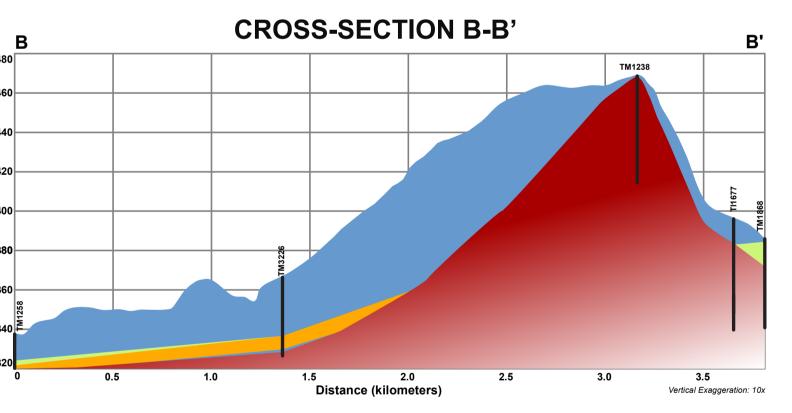
settings of glacial lakes. May include marl, rythmites, and varves. Stratified sand and gravel (Psg) Well-sorted and stratified sand and gravel. May include cobbles and boulders. Inferred to be delta, fan or lag deposits in glacial channels

An admixture of unsorted sediment ranging from clay to boulders. Generally matrix supported, massive and clast-rich.

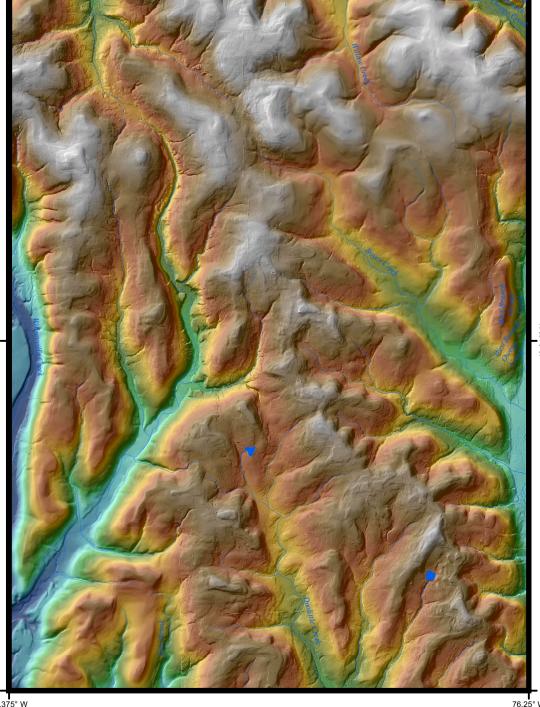
Pre-Pleistocene

Non-glacially derived, hard rock, pre-pleistocene in age. May be covered up to a meter in diamicton, sand and gravel, or sand and clay





QUADRANGLE ELEVATION



1:75,000 scale; 2x vertical exaggeration

Feet-amsl

ISSN:0097-3793; ISBN:978-1-55557-366-9

Shaded relief generated from 2008 Tompkins County Soil and Water Conservation District 2meter and NYS 10m lidar data sets.

While every effort has been made to ensure the integrity of this digital map and the factual data upon which it is based, the New York State Education Department ("NYSED") makes no representation or warranty, expressed or implied, with respect to its accuracy, completeness, or usefulness for any particular purpose or scale. NYSED assumes no liability for damages resulting from the use of any information, apparatus, method, or process disclosed in this map and text, and urges independent site-specific verification of the information contained herein. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by New York State Museum Map & Chart No. 123