

SURFICIAL GEOLOGY OF THE SHOHOLA 7.5-MINUTE QUADRANGLE, SULLIVAN COUNTY, NEW YORK

prepared by
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References Continued...

- Fogarty, Mark, 1987, The surficial geology of the North Branch Callicoon Creek Valley, Sullivan County, New York, Master's Thesis, CUNY Queens
- Heroy, W.B., 1974 History of Glacial Lake Warwaring, southeastern New York, in Coates, D.R., ed., Glacial geomorphology: Binghamton, State University of New York Publications in Geomorphology, p 277 – 292.

DESCRIPTION OF MAP UNITS

Holocene

- Af** Artificial Fill (Af)
Surficial sediment composed of coarse/fine and or crushed rock anthropogenically transported and used for construction purposes.
- Ha** Stratified silt, sand and gravel (Ha)
Sorted and stratified silt, sand, and gravel, deposited by rivers and streams. May include cobbles and boulders. Inferred as post-glacial alluvium and includes modern channel, over-bank and fan deposits
- Hw** Wetland Deposit (Hw)
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

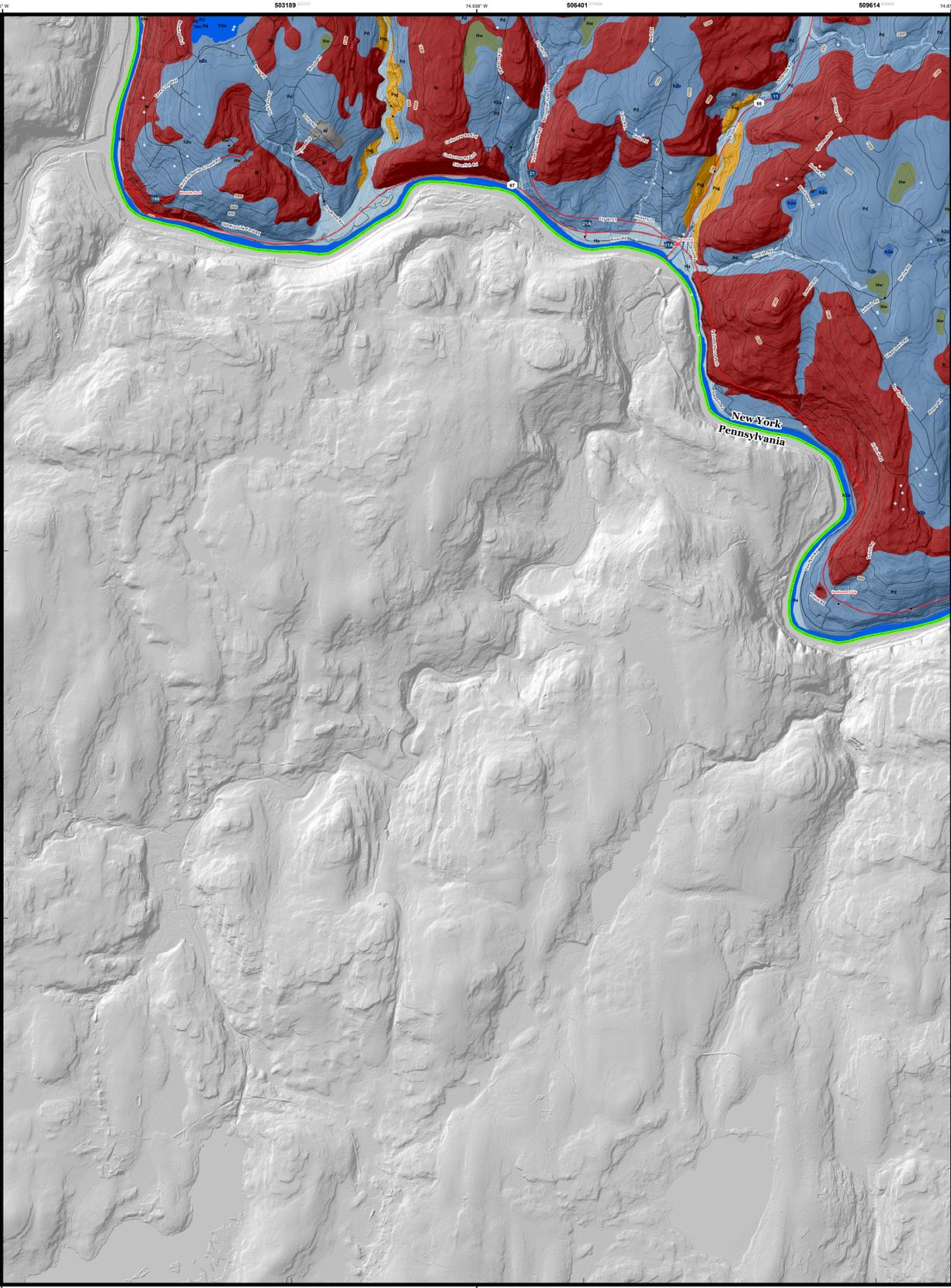
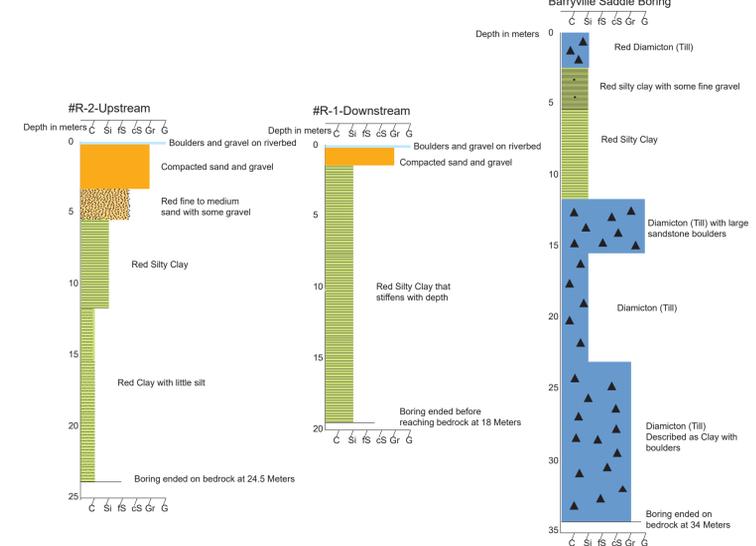
Pleistocene

- Psg** 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 or near former ice margins.
- Pd** Diamiction (Pd)
An admixture of unsorted sediment ranging from clay to boulders. Generally matrix supported, massive, clast-rich and interpreted as glacial till.

Pre-Pleistocene

- Br** Bedrock (Br)
Non-glacially derived, hard rock, pre-pleistocene in age. May be covered up to a meter in diamiction, sand and gravel, or sand and clay in areas marked as Br.

Shohola Quadrangle - Barryville Borings



Introduction

The geology of the Shohola 7.5-minute quadrangle was mapped in 2018 as part of the ongoing National Park Service project to inventory the geologic resources of their parks and managed areas. This map is part of the Phase II project of the mapping of the Upper Delaware Scenic and Recreational River (UDSRR) managed by the National Park Service in Sullivan and Orange Counties, New York. The purpose of this map was to identify and delineate various geologic formations in the Shohola Quadrangle with the intent that this information can guide the National Park Service and municipalities in land use, environmental, and natural resource decisions. The Shohola Quadrangle is in southeastern New York along the state border with Pennsylvania. The quadrangle was contained within the Town of Highland. The Hamlet of Barryville was the main community within the quadrangle. The remaining portions of the quadrangle is mainly wooded with large tracts of land for lumber and recreation.

The Shohola quadrangle is situated at the southern edge of the Catskill mountains physiographic province the landscape varies from flood plain river in the Upper Delaware River Valley to mountainous topography. The majority of the quadrangle is located in Pennsylvania across the Delaware River. The highest elevation is at 1,352 feet, or 412 meters, above mean sea level (amsl) in the north central portion of the quadrangle with the lowest elevation being 590 feet or 163 meters where the Delaware River exits the map to the east. The sediments found in the quadrangle includes sand, gravel, diamiction (till) and bedrock exposed throughout the quadrangle.

Methods

Field mapping for this quadrangle was completed during the Fall of 2018 to early 2019. Mapping efforts included traversing the quadrangles primarily by vehicle along roadways, with some mapping taking place on state land parcels and private land. Sample collection was taken by pick and shovel from outcrops in drainage ditches, road and streams cuts or within quarry/sand and gravel pits. Sample collection was also taken with a two-meter long hand auger to collect samples below the soil layer where possible. A total of 15 observation points were made during the mapping process, with 13 samples collected for grain size analysis.

Water wells (43 in total) from the Department of Environmental Conservation, an Engineering Boring from the Department of Transportation and Exploratory wells (4 in total) from New York City Department of Environmental Protection were also used to evaluate the subsurface geology of the Shohola quadrangle. The subsurface data from these wells were interpreted, and then translated from the well driller's description into a standardized lithologic (materials based) description. The location, thickness and depths of all lithologies were also recorded and used to create cross-sections and 3D borings logs within the quadrangle (See Barryville boring logs below).

Field data were digitized in ArcMap 10.6. Polygons were created based upon the lithology of the surface material and the sample and boring locations were plotted. The boring logs and map data were created using the Adobe Illustrator CS6 using the data created in the ArcMap program

Mapping

Shohola Quadrangle had the least amount of area mapped for Phase II. Much of the quadrangle area is within the UDSRR and consists of bedrock exposures, light brown sandy diamiction (till), silt rich red diamiction, and alluvium along streams and the Delaware River. Sand and gravel deposits in north-south oriented stream valleys of the Halfway Brook and Beaver Brook are continuous northward into the Eldred Quadrangle. The bedrock in the quadrangle is Upper Devonian aged sandstones with some red shales within the outcrops.

Barryville, NY in the Town of Highland had three test borings drilled during an assessment for a possible dam site as part of the New York City water supply (Fluhr, 1950). Two of the borings were drilled on a barge in the Delaware River and one was drilled on the Pennsylvania side of the river. One test boring referred to as #R-1-Downstream was drilled to 60 feet below the waterline. The initial few feet of drilling went through large boulders likely colluvium from the adjacent rock faces. Underlying the boulders was a four-foot layer of compacted gravel and fine sand. Then they drilled continuing down to the 60-foot total depth through red silty clay that increased in stiffness with depth. The second river borehole named #R-2-Upstream went through the similar grey sands and gravel to 11 feet where it changed to medium and fine red sands and some gravel to about 17 feet. Seventeen to forty feet in depth was red silty clay and from 40 to 81 feet deep was red clay with little silt. Bedrock was encountered in this borehole at about 81 feet. The third borehole known as Barryville Saddle Boring went through nine feet of red diamiction with gravel and boulders, interpreted as till. Nine to eighteen feet, decreasing in stiffness downward the reported material was red silty clay with some fine gravel. Increasing in stiffness down to 44 feet was red silty clay with no gravel reported. Forty-four to fifty-two feet below surface a layer of boulder rich till was encountered. Then till continuing to 77 feet. Followed by clay and sandstone boulders, interpreted as a more clay rich till, comprised the remainder of the unconsolidated section until reaching solid bedrock at 112 feet.

Surficial Map Units

Artificial Fill (Af)
This material is found throughout as artificial dams built to retain water and a large landfill in the upper part of quadrangle. This lithology is generally composed of coarse/fine, large cement mounds and/or crushed rock anthropogenically transported and used for construction purposes.

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 areas along the Delaware River and its tributaries. 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.

Pleistocene Sand and Gravel (Psg)
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 is upwards of 130ft thick in the valleys. Psg is found within the north-south valleys containing the modern-day tributaries for the Delaware River.

Pleistocene Diamiction (Pd)
This unit is a mixture of sediment grains that range from clay to boulders in size. In this quadrangle, all diamiction in interpreted to be glacial till, sediment deposited directly beneath the glacier and can be upwards of 265 feet thick. This material is found throughout the area and is the most abundant lithology within the quadrangle. It is generally matrix supported, sand-dominant and tan in color.

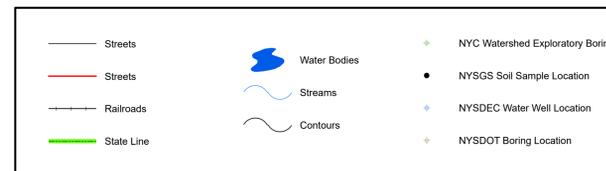
Summary and Discussion

The Shohola Quadrangle is located at the southern edge of the Catskill Mountains forming the New York/Pennsylvania border. The region is like the surrounding Catskill Mountains with greenish blue to dark grey sandstones with zones of crossbedding, and red shales of the Devonian Period Catskill Delta making up the bedrock of the mountains. The light brown to reddish brown diamiction, till, is deposited along the slopes of the mountain sides and some valley floors. The tributary valleys to the Delaware River contain sand and gravel deposits suggesting debris being deposited along the valley walls while glacial ice melted. Outwash fans or deltas were not observed during the mapping of this area suggesting stagnant glacial ice may have filled the valleys after glacial retreat. In the Barryville #R-1-Downstream and #R-2-Upstream borings there is silt and clays reported below the present-day river level this indicates the possibly existence of low energy slackwater conditions in with fine-grained materials could be deposited. In the Barryville Saddle Boring there are beds of silt and clay sandwiched by two till sections. The lower till could be evidence of an older glacial advance or an older glaciation through the area. The lack of glacial ice margins in the quadrangle makes it difficult to speculate when exactly the ice first advanced into and retreated from the area.

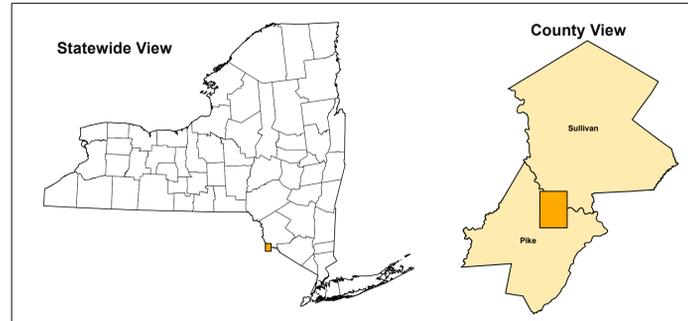
References:

- Fletcher, Frank W., 1964, Middle and Upper Devonian Stratigraphy of Southeastern New York, Doctoral Dissertation, The University of Rochester p197
- Fluhr, T. W., 1950, Core Borings in the Upper Delaware River Basin, New York State Geological Survey Open File No. 6qF615, p 10.
- Fluhr, T. W., 1953, J. Geology of New York City's water supply system - A progressreport: The Municipal Engineers Jour., v. 39, 4th quart, issue, p. 125-145.
- Fogarty, Mark, 1987, The surficial geology of the North Branch Callicoon Creek Valley, Sullivan County, New York, Master's Thesis, CUNY Queens

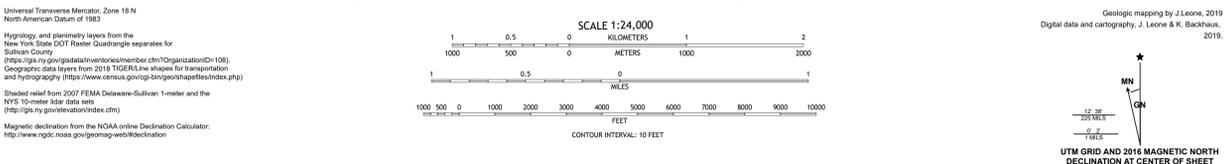
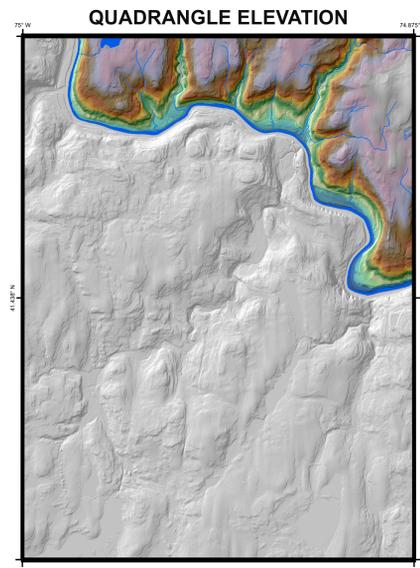
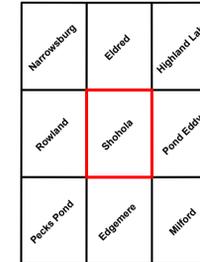
SYMBOLS



QUADRANGLE LOCATION



ADJOINING QUADRANGLES



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2019

NOTICE
This geologic map was funded in part by the National Park Service Task Agreement Number P17AC01044 for the Geologic Mapping in Upper Delaware Scenic and Recreational River Phase 2 in the year 2017. 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. 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 NYSED.

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1:75,000 scale; 2x vertical exaggeration
Shaded relief generated from 2007 Delaware and Sullivan Counties 1-meter lidar data set by the Federal Emergency Management Agency.