

FIELD TRIP I: DEGLACIATION OF CENTRAL LONG ISLAND*

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This trip covers the geology of a south to north transect through the sequence of late Wisconsinan glacial deposits--the Terminal Moraine, Recessional Moraines, Outwash Plains, Proglacial Lakes and a Prominent Meltwater Channel-- in central Long Island. The Connetquot Rivers which drains southcentral Long Island from north to south, and the Nissequogue River, which flows through northcentral Long Island from south to north, have nearly coalescing drainage basins in central Long Island (Figure 1. The route crosses, from south to north, the USGS 7.5' Quadrangle Maps: Bay Shore East, Central Islip and Saint James). These two underfit rivers together appear to cinch the waist of Long Island and reveal an intriguing stream valley system that originated as a late-glacial meltwater channel draining a series of proglacial lakes north of the terminal moraine, flowing through a gap in the moraine and across the outwash plain and continental shelf.

The trip straddles the arbitrary geographic boundary between eastern and western Long Island. Geologically, it is situated east of the late Wisconsinan Interlobate Zone between the Hudson and Connecticut glacial lobes in the vicinity of Huntington. The Interlobate Zone resulted in the complex of interlobate morainal deposits, meltwater channel gravels and proglacial lake beds that make up the north-south range of hills: Manetto Hills, Half Hollow Hills and Dix Hills. The route of the field trip lines up roughly with the axis of the last interlobate angle between the receding glacial lobes and trends northward toward the interlobate angle formed at the inferred junction of the Sands Point Moraine of the Hudson Lobe and the Roanoke Point Moraine of the Connecticut Lobe projected beneath Smithtown Bay. The deposits were eroded by meltwater flowing southward from the proglacial lake in what is now Long Island Sound, and later submerged by the rising postglacial sea.

While the Connetquot and Nissequogue rivers seem to originate miles apart, as depicted on the topographic maps, their valleys begin on either side of a divide located near a broad gap in the Ronkonkoma Moraine, the terminal moraine, both at elevations of about sixty feet. They are separated by a tract of pitted outwash and meltwater channel deposits formed on residual ice. The two valleys have meandering stream patterns and are incised north and south of the gap into outwash and lacustrine deposits. If interpreted as a single meltwater channel that traversed the Island from north to south, the combined river valley reveals a broad meander pattern eroded into the glacial deposits that form its outside banks. The origin of this drainage is interpreted from the geomorphology and sedimentary deposits of this area.

Stop 1. 0.0 miles. The trip starts at the entrance to Heckscher State Park (Bay Shore East Quadrangle). Follow the roadway loop through the park for four and one-quarter miles.

0.0-5.6 miles. The outwash plain underlies the park, salt marshes and the bay to the south. A filled-in, crescent beach forms the south shore of the park. The Connetquot River estuary drains into Nicoll Bay over one mile to the northeast, but prior to Holocene submergence the river probably meandered to the southwest against the Heckscher shore. A few miles to the south, Fire Island forms the barrier beach that encloses Great South Bay.

5.6-5.7 miles. Turn right on Rt. 27 and then right again on Great River Road. Great River Road follows the west bank on the outside curve of the southernmost meander of the river, beginning south of Sunrise Highway. The west bank is the steep side (outside) of the meander loop, and it rises about fifteen feet above the river. The topography of the river valley is somewhat obscured by development. Turn around near the golf course and proceed northward to Montauk Highway, Rt. 27A.

7.9 miles. Turn right (east) on Rt. 27A, essentially following the meander curve but well above the cut bank. **Note:** the field trip follows the meanders of the meltwater channel valley in reverse of the order in which they formed.

9.4 miles. Junction with Sunrise Highway, Rt. 27. Turn right (east) on Rt. 27 and cross the Connetquot River valley near Lower Pond. The river has been dammed here to form Lower Pond and East Pond. The river bottom is partially hidden by development and highway ramps to the south. To the north, stands of trees and shrubs mask the

* **SOURCES.** The field trip and geologic interpretations are from my forthcoming book "Western Long Island Geology." References include numerous published bulletins, professional papers, monograph chapters, guidebook articles and maps; see citations in the Bibliography of Long Island Geology.

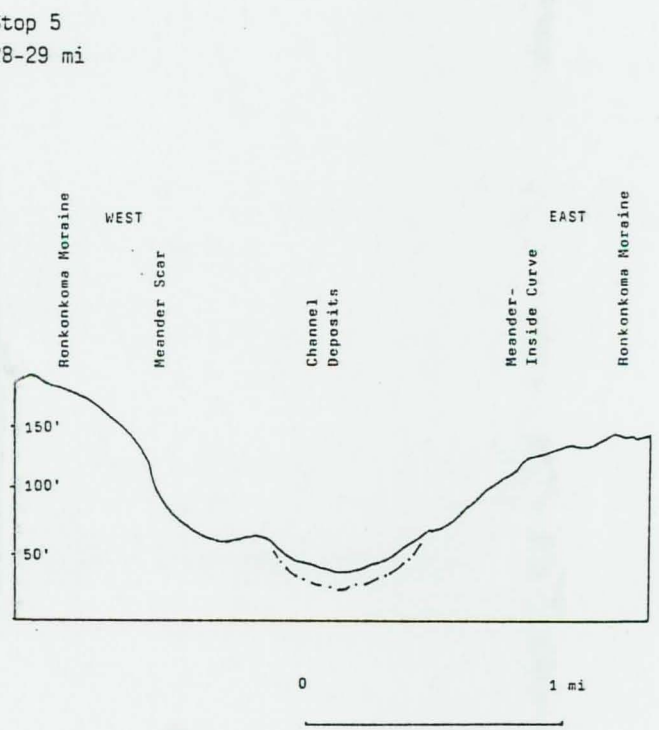
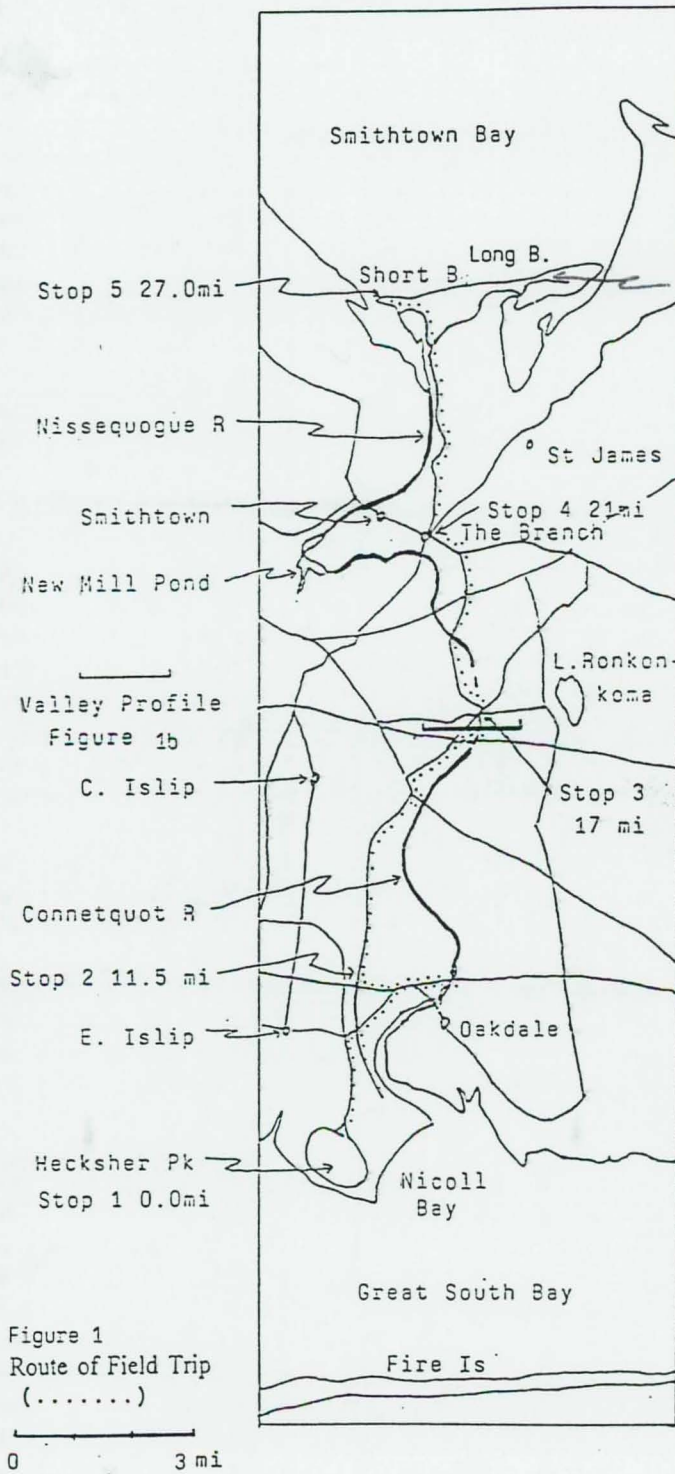


Figure 1b Profile of Meltwater Channel Meander at Ronkonkoma Moraine Gap

Figure 1. Route of Field Trip 1.

ponds and the channel. At the next stop light turn left (west) on Rt. 27. Proceed westward toward Connetquot Avenue.

Stop 2. 11.5 miles. Turn right (north) on Connetquot Avenue. Stop where convenient to become oriented to the terrain. Note that while the river meanders are easily followed on the topographic map, extensive housing development hides the valley. The road follows the western margin of the Connetquot valley, passing the Bayard Cutting Arboretum and the Connetquot State Preserve (Central Islip Quadrangle). The Connetquot River, while gently meandering on its flood plain, has been dammed for mill ponds and a fish hatchery. A well defined, west-trending valley meander forms the river's reach and a low eroded bank in the outwash between the Long Island Railroad tracks and the village of North Great River. But it is against the easterly bend of the valley, located in the State Preserve to the south, that meltwater carved a twenty foot escarpment. The breadth of the valley meanders compared with the width of the Connetquot channel shows the river to be decidedly underfit in this segment. Evidently, a much more robust, meltwater-laden river established the meander pattern and shaped this much broader valley. The fifty-foot contour line and the adjacent contour lines outline the valley morphology from meander to meander northward from the State Preserve to the Ronkonkoma Moraine.

14.5 miles. Connetquot Avenue turns right.

Alternate Stop 2. Junction with Veterans Memorial Highway, Rt. 454. Bear right on Rt. 454 about 0.2 miles to sign: "Headwaters of Connetquot River." The valley can be entered from a gate east of the sign with permission from the State Park Preserve, as indicated. Turn back (northwest) on Rt. 454.

15.2 miles. Turn right (northeast) on Nichols Road which crosses the outwash plain between the Ronkonkoma Moraine to the north and the rapidly narrowing river valley to the east.

15.6 miles. Note the water recharge basin to the left.

16.5 miles. Cross the Long Island Expressway.

Stop 3. 17.0 miles. Roughly where Nichols Road, Terry Road and Vanderbilt Motor Parkway converge in a triangular intersection, about 0.4 miles north of the Long Island Expressway, Rt. 495, the headwaters of the Connetquot River are now buried in drains under the roadways. The watershed begins in a significant gap in the Ronkonkoma Moraine. Stop, if traffic allows, as near the gap as possible. The late-glacial meltwater channel was incised through the moraine as meltwater carved an easterly meander sixty feet above present sea level (Figure 1b). In a short excursion to the east, Vanderbilt Motor Parkway ascends the Ronkonkoma Moraine (Figure 2a). To the west, the Parkway crosses the gap and climbs the meander-scarred moraine--although not easily seen due to the highly developed character of the terrain.

17.1 miles. Turn left (northwest) on Terry Road. The road goes up a hill that follows the meander scar. The evidence of meander erosion shows that meltwater flowed at this higher elevation during the interval of valley widening. Upstream, the valley turns sharply from the northwest against the steep proximal slope of the moraine, incised by a seventy foot-high meander scar. The northern half of this meltwater-formed meander has become, in the context of the modern drainage, the headwaters of the north-flowing Nissequoque River drainage, a region of wetlands and ponds within the fifty-foot contour line. The river valley casts two broad meanders over the relatively flat basin enclosed by the Ronkonkoma Moraine to the south and the recessional moraines of the last glaciation to the north--the Stony Brook Moraine to the northeast and the Northport Moraine to the northwest). These moraines may be recessional moraines of the Connecticut and Hudson lobes of the glacier, respectively, or segments of the moraine of a sublobe that formed between the main lobes at this stage of glacial recession (Figure 2b). This lowland, characterized by meanders incised into a plain of low relief, wetlands and pitted outwash, is underlain by lake clays deposited on the floor of a proglacial lake formed between the terminal moraine and the ice front during deglaciation. Continue northward on Terry Road from the intersection.

18.1 miles. Intersection with Townline Road. Terry Road enters the hummocky topography of the moraine.

19.1 miles. Intersection with and merge left into Smithtown Blvd.

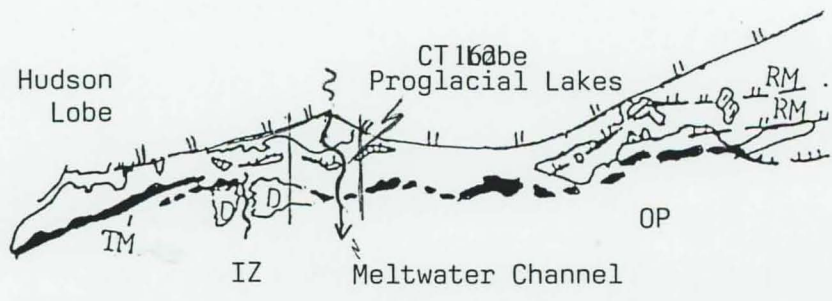
19.6 miles. Intersection with Smithtown By-Pass; continue on Terry Road.

20.0 miles. Note the exposure of a kame along the roadside.

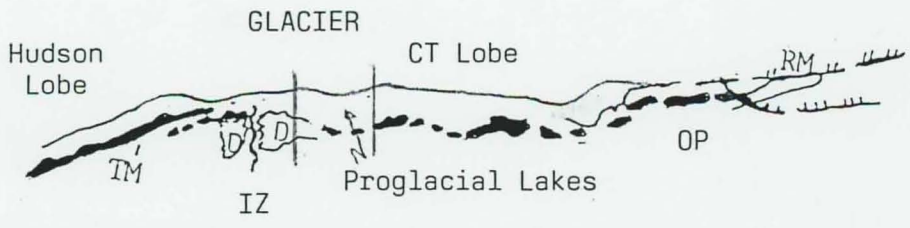
20.2 miles. Another kame can be seen to the north. Erosion of sand and gravel forms slides on the slopes.

20.4 miles. Intersection with Middle Country Road, Rt. 25. Turn left (west) on Rt. 25.

Stop 4. 21.0 miles. Junction of Rt. 25 with Rt. 111, Rt. 25A and Nissequoque Road in the village of The Branch, just east of Smithtown. Stop where convenient to consult the topographic map (Central Islip Quadrangle), get your bearings, and consider these features. Terry Road and this segment of Rt. 25 follow the edge of a proglacial lake basin that formed between the Ronkonkoma Moraine and the receding ice front during the late Wisconsinan. The



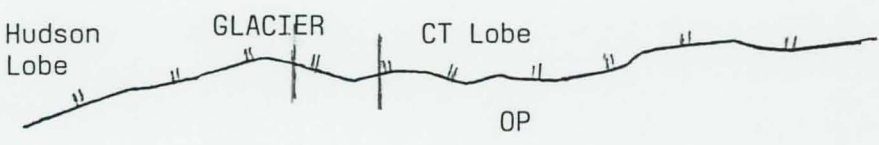
d) Sands Point, Roanoke Point Ice Margin, ca 20 ka



c) Oyster Bay, Northport, Stony Brook, Mt Sinai Ice Margin

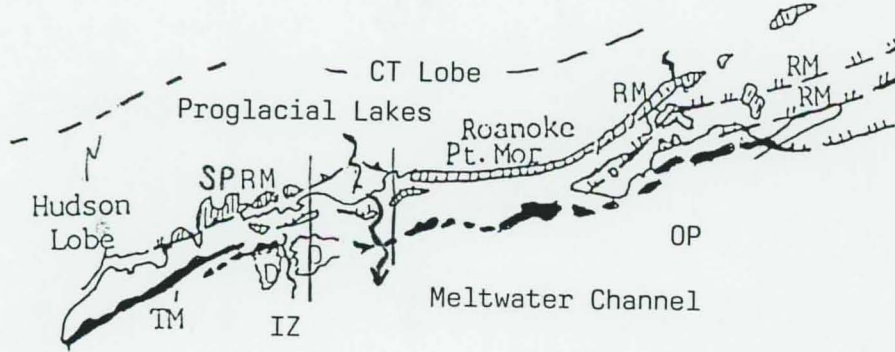


b) Late Wisconsinan Terminal Moraine

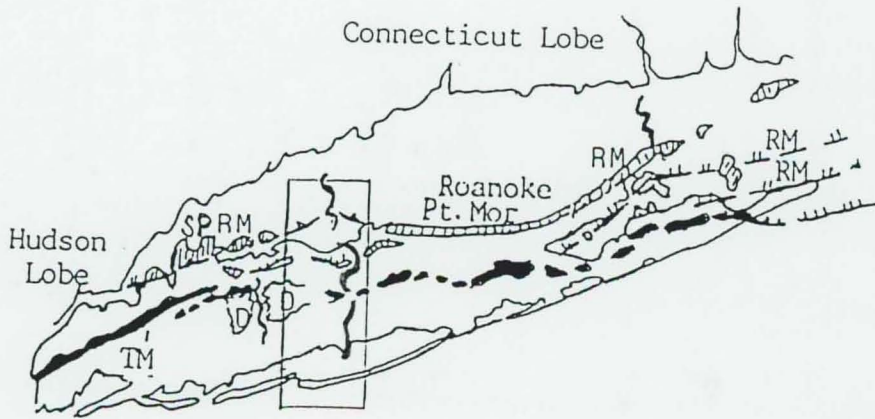


a) Late Wisconsinan Ice Margin, ca 22 ka

Figure 2. Moraines, ice margins and proglacial lakes in central Long Island.



e) Sands Point, Roanoke Point Recessional Moraines, ca 20 ka

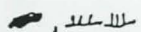
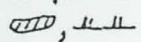



f) Long Island Moraine Map

Legend:

IZ-
 {- Interlobate zone; D: Delta

0 50 mi

TM: Terminal Moraine 
 RM: Recessional Moraine 

 FIELD TRIP AREA

OP: Outwash Plain

Figure 2. Moraines, ice margins and proglacial lakes in central Long Island. Continued.

roads curve against the meander-cut valley wall. The underfit channel of the Northeast Branch of the Nissequogue River first wanders northward through (former) wetlands before making a broad northward curve.

The channel is divided into several small ponds formed from dammed-up stream segments. It then heads westward, south of Smithtown, to New Mill Pond, also the result of a dam, and then turns northward across the flat channel bottom and flood plain deposits where the valley narrows significantly. While clearly seen on the topographic map, the channel is obscured on the east side by housing, office buildings and a shopping center. The poor drainage on the proglacial lake-bottom clay beds, cf. the Smithtown Clay, of late Wisconsinan age, serves as a reminder of the geologic history of this lowland. Emerging from the lake basin southwest of Smithtown, the valley turns northeastward. The narrow river channel is incised into the outwash with high banks on either side. The river can be seen south of and parallel to Rt. 25, west of the Rt. 25-Rt. 25A fork, west of Smithtown, where it flows northeastward through a young hardwood forest established on the flood plain. It then crosses Rt. 25 just east of the Rt. 25-Rt. 25A fork, about one mile west of the Rt. 111 intersection.

The narrow valley persists through a broad eastward meander north of Smithtown where the meltwater channel cut through the recessional moraine. The modern Nissequogue River actually meanders in a confined belt on its own marsh-covered flood plain, but through steep valley walls of the meltwater channel up to one hundred feet high. The river becomes tidal near Mill Creek, and tidal flats cover channel deposits northward to the river mouth. Where the Nissequogue River enters Smithtown Bay, it is restricted by sand bars from both the east and west sides. On the east side, a northwest-hooking spit, Short Beach, indicates the dominant direction of littoral drift. The spit has forced the river outlet to bend further westward; the west sand spit has, in turn, confined the westward discharge.

21.1 miles. Immediately after crossing the intersection take the left fork, Nissequogue River Road, and proceed northward (Saint James Quadrangle). Pass the old cemetery on the right.

21.6 miles. Within a short distance, the road rises onto the distal slope of the recessional moraine, the Stony Brook Moraine. The river lies near the interlobate angle, but Nissequogue River Road and adjoining roadways cut through successive, washboard ridges of the Stony Brook Moraine for over three miles between here and the north shore. This segment of the Stony Brook Moraine is typically hummocky and has numerous kettles.

23.3-23.6 miles. A good view of the river to the west (left) and the eroding roadcut in the moraine on the east (right) side. Merge with River Road.

24.0 miles. Views of Nissequogue tidal estuary to west.

25.6 miles. River Road intersects Moriches Road.

Optional route #1: Northwest to Short Beach. Bear left into Horse Race Lane, and then Boney Lane at 26.1 miles.

26.8 miles. The road descends the kame moraine to the level of the salt marsh, and then enters Smithtown Short Beach.

Stop 5. 27.0 miles. Park and walk to the beach. Consider the variety of coastal landforms (Figure 44). To the southwest, a bluff has been cut into the moraine by coastal processes. To the northeast, you can see the topography of the Roanoke Point Recessional Moraine forming distant bluffs on the Old Field headland. The successive ridges of this eroded westernmost extension of the moraine are apparent from this perspective. Try to imagine the confluence of the Roanoke Point and Sands Point moraines to the north in what is now Smithtown Bay in late-glacial time before the deposits were erased by meltwater streams and later by coastal currents. To the east, large erratics in the Bay are a reminder of the continuing erosion of the moraine and recent increments of sea level rise. Today, bay currents are dominantly east to west along this beach. From the parking lot follow the dune ridge westward to the riveredge and the boat ramp.

27.2 miles. Here you can observe the estuary and the meanders of the meltwater channel valley south of the Short Beach spit. The Nissequogue River estuary, the drowned and silting mouth of the north-flowing river, is confined by two sand bars. Short Beach trends east to west and then northwest on the east side and forces the river to the northwest; the opposing Sunken Meadow Beach on the west side channels Sunken Meadow Creek eastward parallel to the bar and into the estuary

Optional route #2: Northeast to Long Beach. 1.0 25.6 miles. Right on Moriches Road.

26.1 miles. Left on Long Beach Road. Long Beach Road cuts northeasterly across the last prominent ridge of the Stony Brook Moraine.

Stop 5a. 28.0 miles. The eroded edge of the moraine, at the base of Long Beach, reveals a 100' high bluff with an exposure of thin meltout till over outwash.

Stop 5b. 28.0-29.5 miles. Long Beach. Stony Brook Harbor, the mouth of a north-trending stream valley cut into the Stony Brook Moraine, is diverted eastward through Porpoise Channel by the one and one half mile long, Long Beach sand bar. This estuary is also silting in. On the east side of Smithtown Bay, Long Beach forms a narrow inlet along with West Meadow Beach, a spit that trends southward along the Setauket coast from the distal margin of the Roanoke Point Moraine at Old Field to the northeast. The Roanoke Point Moraine forms the headland in a series of washboard ridges. As mentioned, the geographic extension of the trends of the Roanoke Point Moraine from the east and the Sands Point Moraine from the west meets in an interlobate angle near the northcentral margin of Smithtown Bay (Figure 2c)