GLACIATION
and
Long Island

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Formation of Long Island

- Long Island (as an island) did not exist until 8,000-10,000 years ago.
- A line of hills existed. They were separated from what is now Connecticut by a river valley. The ancient east-flowing *Sound River* occupied the valley.
- Today these hills, composed of layers of sedimentary sloping from north to south, form the platform of Long Island. (The valley is Long Island Sound.)

2

Formation of Long Island (cont'd)

- Long Island is a creature of continental glaciation.
- Its surface features are glacial in origin.
- Its area varies with sea level and the extent of polar ice caps. (Geologists believe that LI was about 3 miles wider 5,000 years ago when sea level was lower.)
- Less permanent are the islands that flank its southern coast which are dependent on shifting sands and ocean currents.

3

The Last Ice Age

- The Pleistocene Epoch began about 1.6 million years ago.
- During this time, climates grew colder and sea level lowered.
- There were numerous ice ages starting about 100,000 years ago.
- The last advance of ice in North America was during the Wisconsin Stage of the Laurentide Ice Sheet.

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Pleistocene Ice Cap

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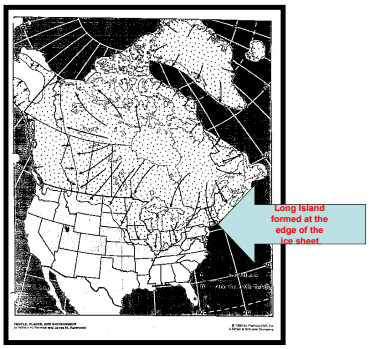
Extent of Ice Sheet over North America – 18,000 yrs ago



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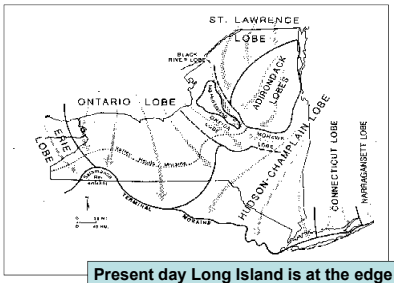
Laurentide Ice Sheet over NYS



Present day Long Island is at the edge of the ice sheet, formed by debris pushed south by various ice lobes.

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Glacial Dynamics

- 1. Ice sheets move away from their zones of accumulation and push forward in sections (lobes) under the pressure from their weight (called plastic flow). They also move down slope by slippage (called basil slip) as the weight of the ice melts its lowest levels and acts as a lubricant.
- 2. The forward edge of the ice sheet (ice front) acts as a "bulldozer", scouring the land, plucking loose rocks out of the ground and slicing all vegetation in its way.
- 3. All this material or debris is mixed with the ice as the ice moves forward and down slope.

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Glacial Dynamics (cont'd)

- 4. Moraines (unsorted glacial debris) are created.
- 5. The furthest advance of the ice front is marked by a ridge of glacial material called the terminal moraine.
- 6. The "retreat" of a glacier is the melting of the ice front, creating the *illusion* that the glacier is moving backward. (It melts in place, not backwards.)
- 7. As the ice melts, the material it picked up is exposed and dropped in place, creating a variety of glacial features.

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Glacial Dynamics (cont'd)

- 8. A recessional moraine is a low ridge of glacial material marking the position of the ice front's advance after a period of retreat.
- 9. Outwash is melt water that flows from the leading edge of the glacier. It carries debris which is sorted by the moving water and deposited in front of the moraines.
- 10. An outwash plain is a landform feature created by outwash. It ranges is thickness from several feet to several hundred feet. Deposits may be found tens of miles from the moraine.

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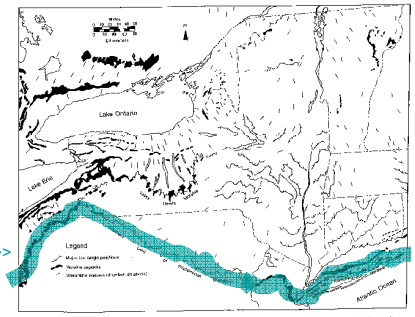
Moraine Deposits

Terminal Moraine>>



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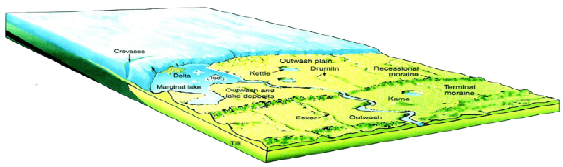
Edge of the Ice Sheet



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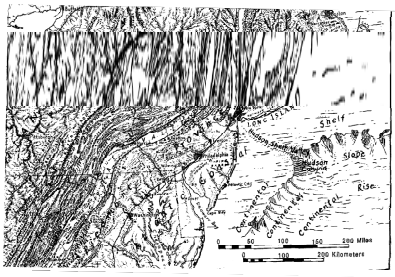
Physiographic Map of NE US



Glacial material was deposited on the (dry) continental shelf. Sea level was much lower.

The moraines mark the southernmost extent of continental glaciation.

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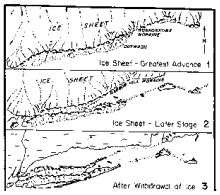
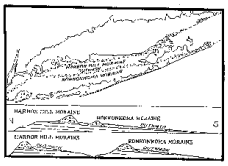
Creation of Long Island



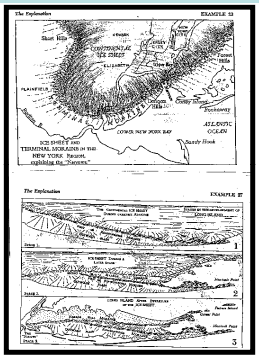


The Ronkonkoma and Harbor Hill moraines run from Staten Island to southern New England creating the base of Long Island and Cape Cod.

Long Island Sound was a glacial lake (a valley filled with fresh water from melting glaciers) with an overflow outlet near Fishers Island. Overtime the glacial lake drained, leaving a river that flowed to the sea.

As climate warmed, sea level rose. Salt water flooded the valley creating an estuary. The highest points of the moraines became islands. Sea level continued to rise, eventually linking LIS with NY Bay, creating Long Island

Glacial Features of SE NYS



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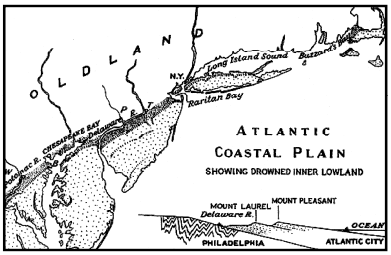
Long Island is part of the Atlantic Coastal Plain



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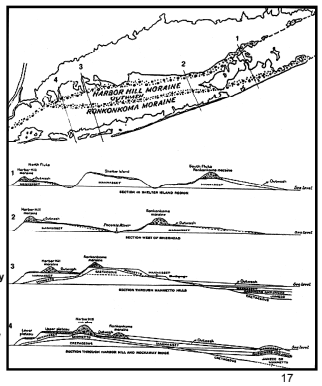
North-South Topographic Profiles across Long Island



1. The twin forks and Shelter Island
2. Central Suffolk County
3. Western Suffolk County
4. Central Nassau County

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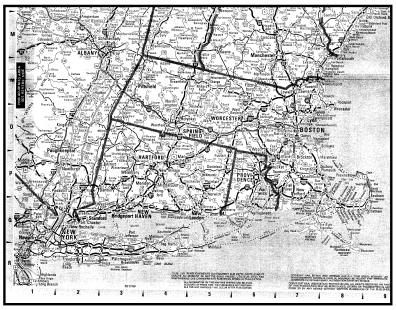
Long Island off the coast of New England and the position of LI Sound



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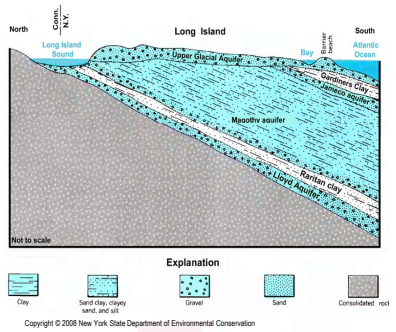
Major Units of the Long Island Aquifer



Layers of Long Island

- **Upper Glacial Aquifer**
- **Gardiners Clay**
- **Jameco Aquifer**
- **Magothy Aquifer**
- **Raritan Clay**
- **Lloyd Aquifer**
- **Bedrock**

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Physical make up of Long Island

- Created by glaciers.
- Bedrock deeply buried.
- Porous unconsolidated material (sand, silt, clay and gravel) form layers that hold water.
- Long Island is sur-rounded by salt water.
- Long Island receives an annual average of 44 in. of precipitation.

- There are 4 aquifers:
  - -Upper Glacial
  - -Jameco
  - -Magothy
  - -Lloyd
- There are 2 aquicludes:
  - -Gardiners Clay
  - -Raritan Clay
- The water table varies in depth under the surface.

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