

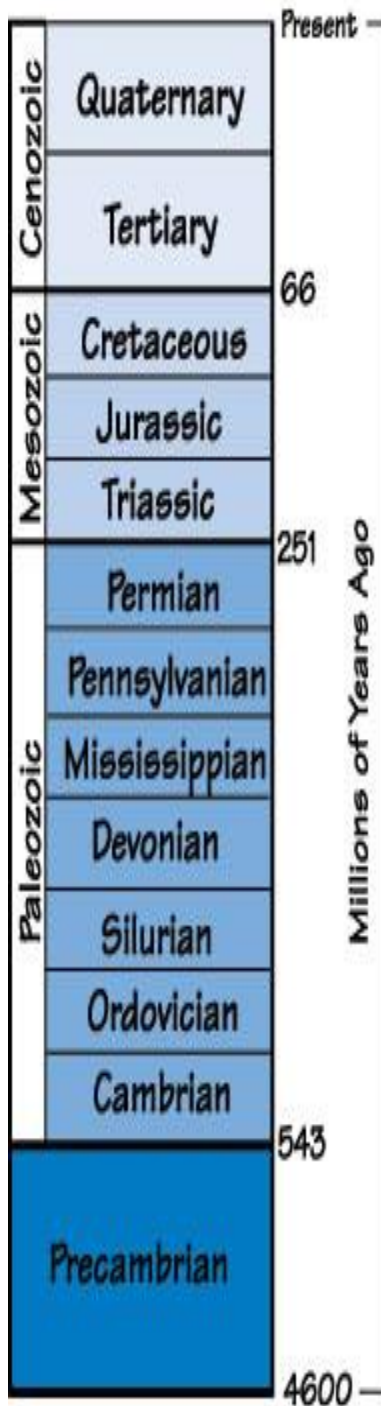
“The Hackensack River Past, Present, and Future”

Geological and social history,
plus some nice images from kayak
trips on the river.

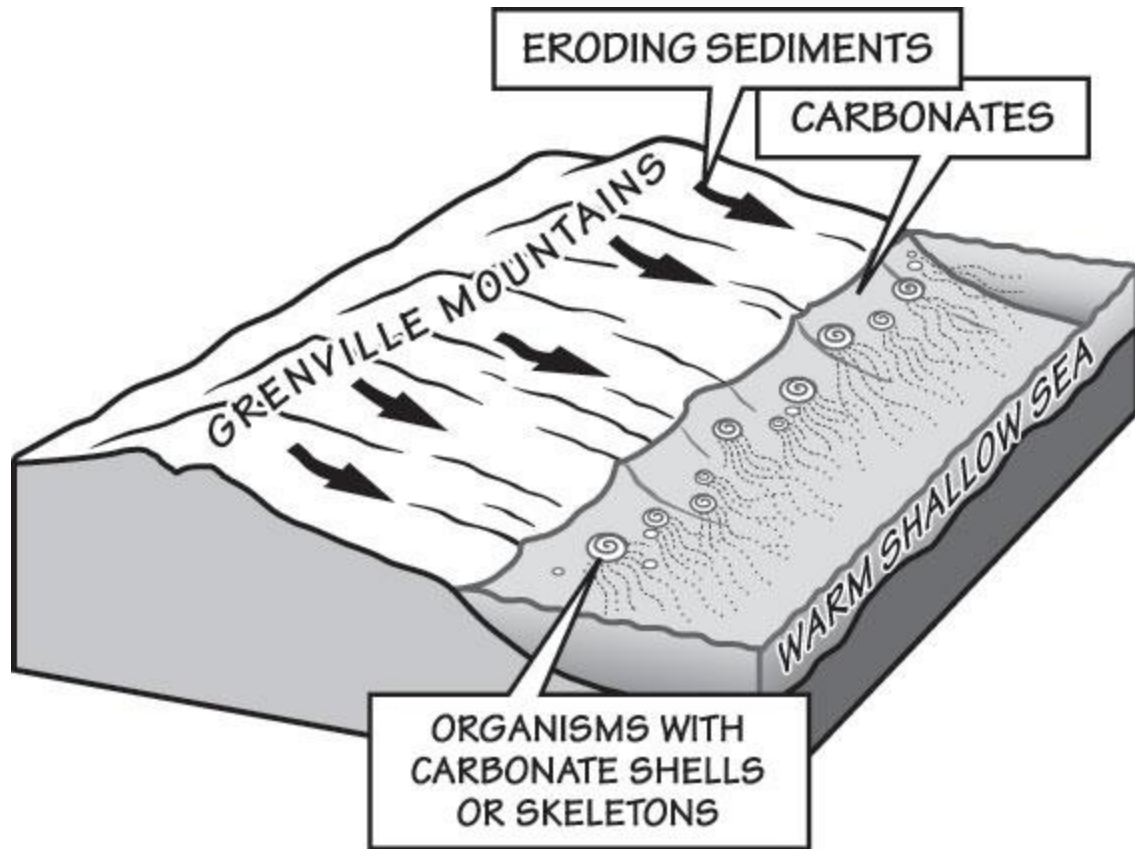
Be warned—this is not in strict
chronological order

- Michael J Passow
- Earth2Class Workshops
- Lamont-Doherty Earth Observatory of
Columbia University
- Palisades, NY 10964



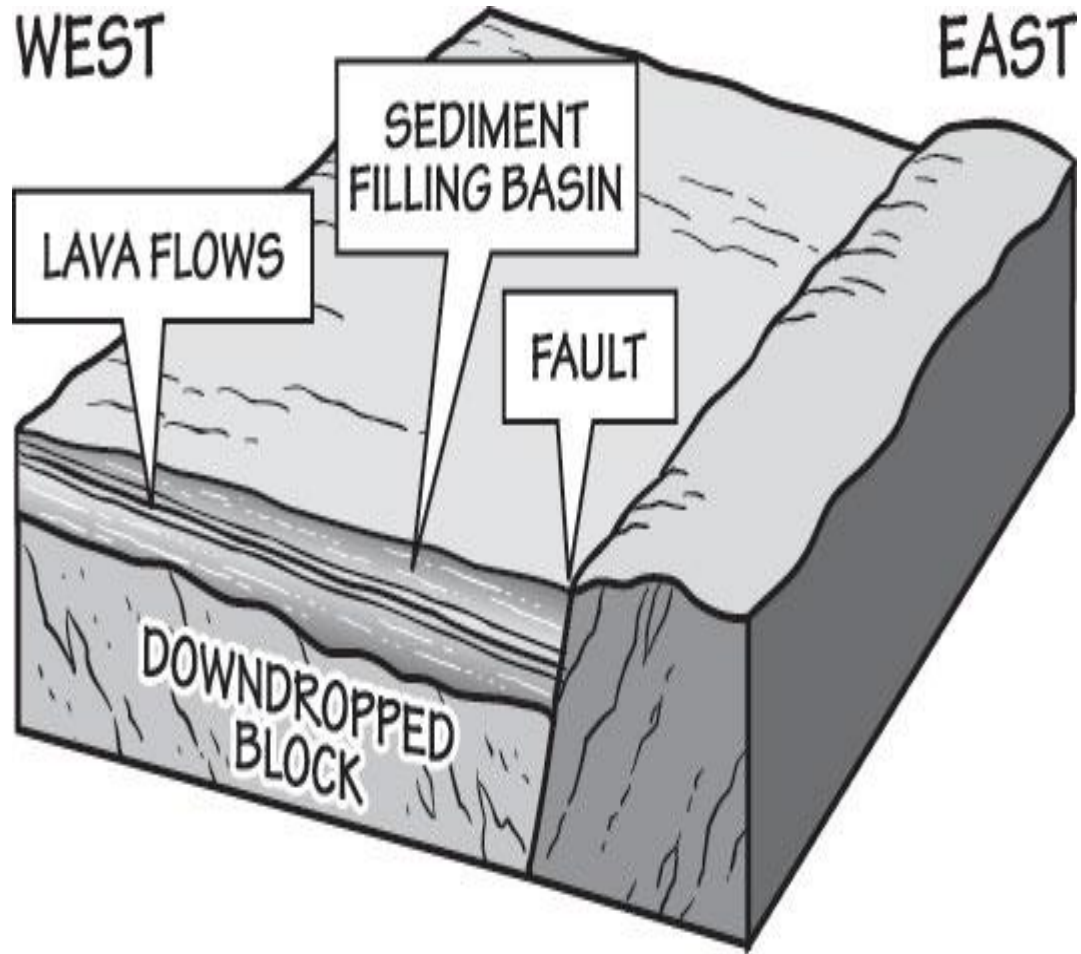


The geologic time scale is based on the study of rock layers. Most of the rocks in Bergen County formed during the Triassic-Jurassic Period (250 -200 mya), although the Ramapo Mountains that form the boundary between Bergen and Passaic Counties are of PreCambrian Age (1 bya). Over many of these rocks are Quaternary glacial deposits, left after the great ice sheets retreated about 10,000 years ago.

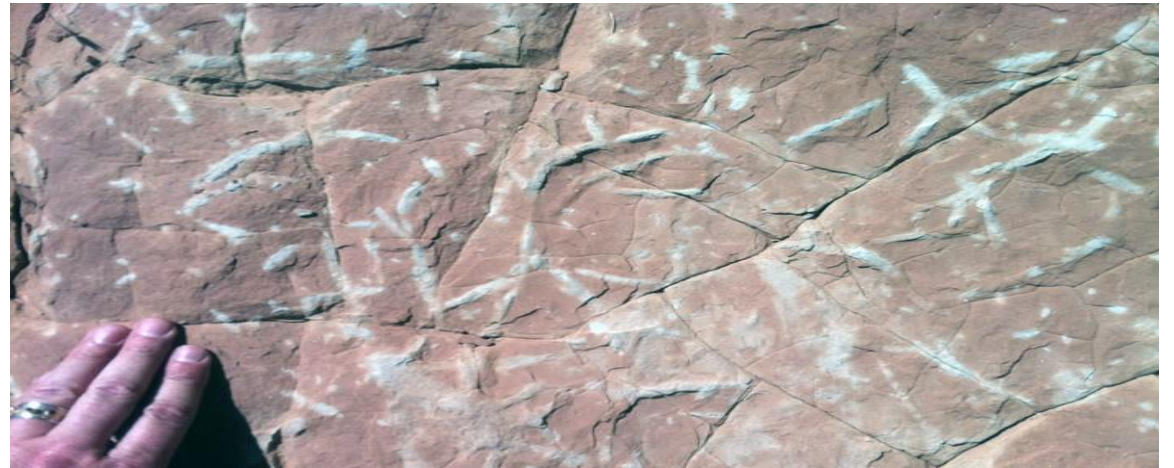


During the PreCambrian Period (about 1 billion years ago, high mountains (as high as the modern Rockies) formed along what was to become Eastern North America. Locally, the eroded remnants of these Grenvillian mountains are the Ramapos of NJ, the Hudson Highlands, and farther north, the Adirondacks.

To the east lay a warm, shallow sea in which biologic and chemical processes deposited calcium carbonates. They were later transformed into a soft marble that allowed for the creation of the Harlem River and Spuyten Duyvil on the east and north of Manhattan.

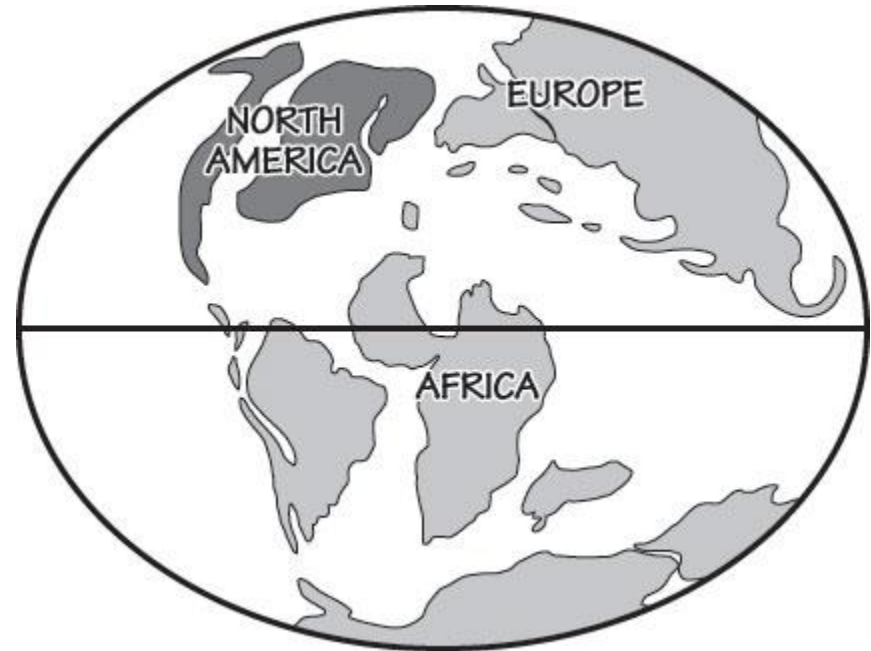
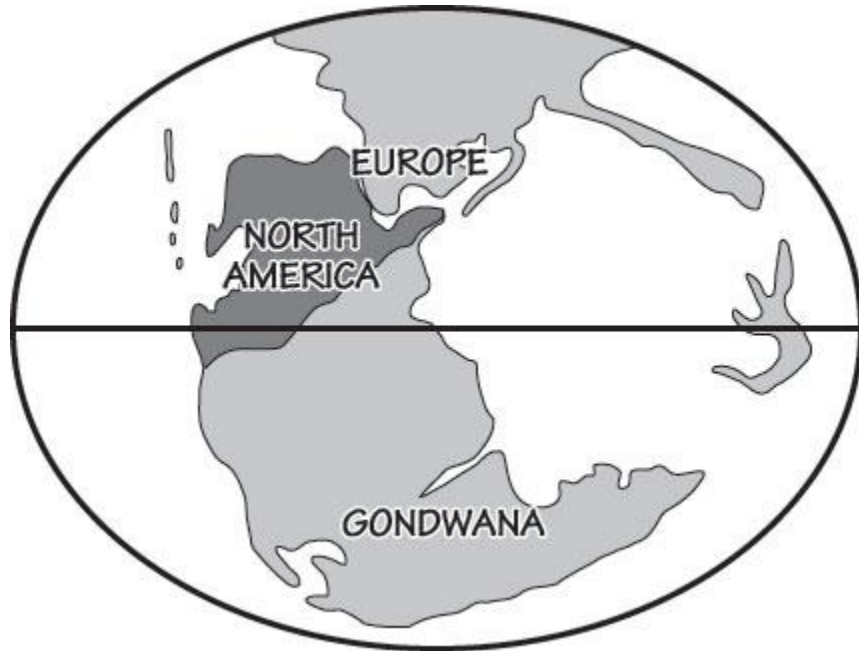


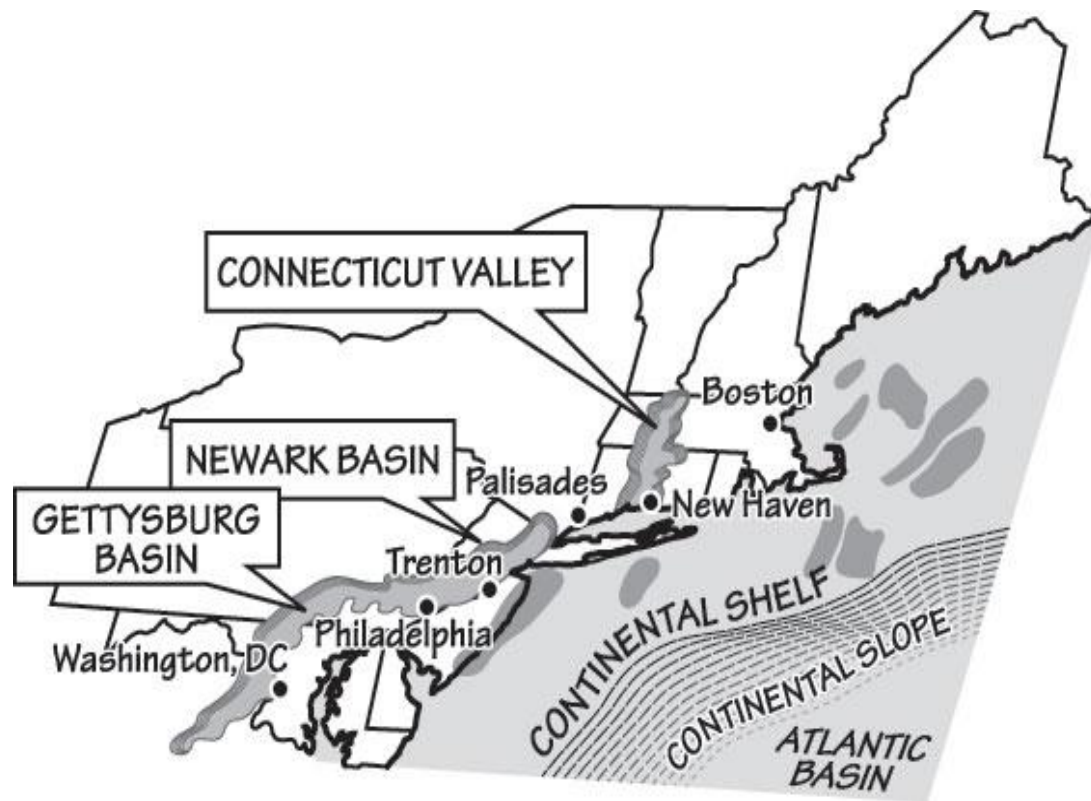
Over millions of years, the Grenvillian mountains were eroded and most of their sediments were deposited by streams into a basin created when earthquakes 'downdropped' a block of the surface. Into this basin, lava flows were released and subsequently buried. Some of these became the Watchungs near Paterson and the Palisades along the eastern edge of the basin. Much of the time, the basin was covered by shallow lakes in which fish and invertebrates, such as worms lives, trying to avoid the earliest dinosaurs, who left footprints as they crossed the lakes.



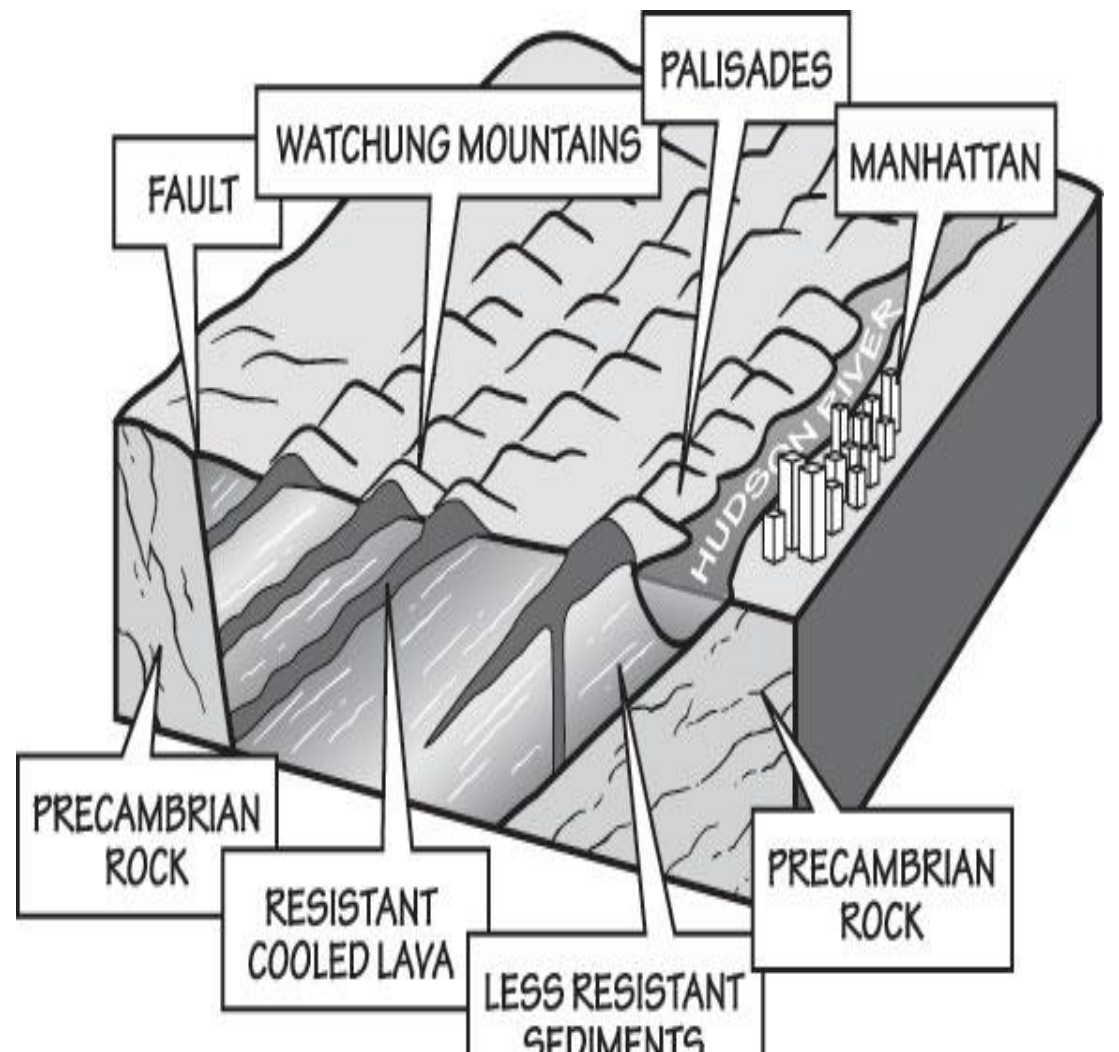


It was during this period that North America began to separate from Africa and Europe.



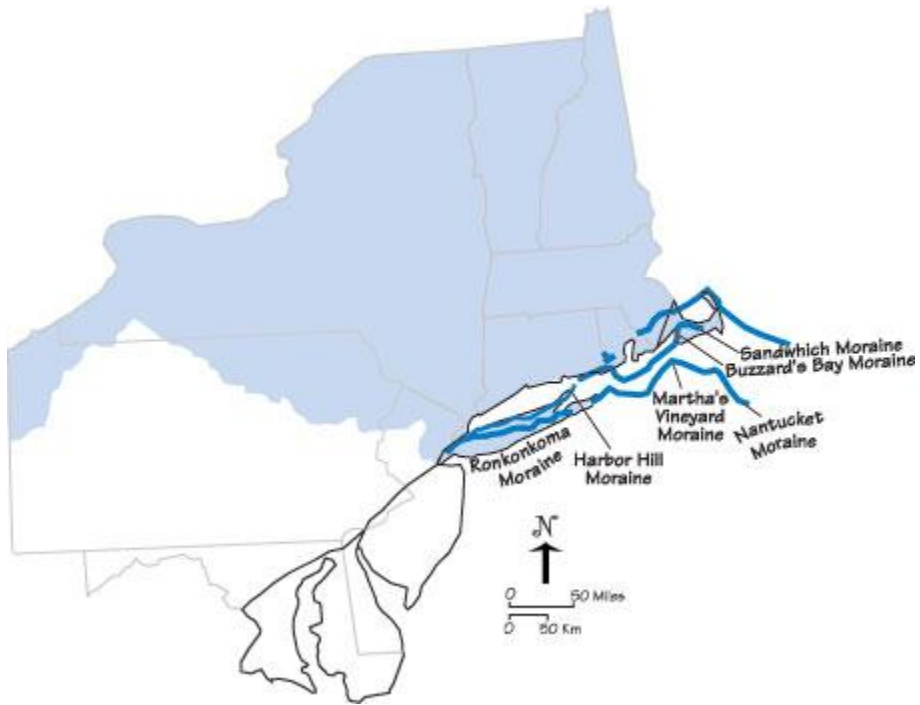


Our Newark Basin is largest of many along the East Coast, from Alabama to New Brunswick.



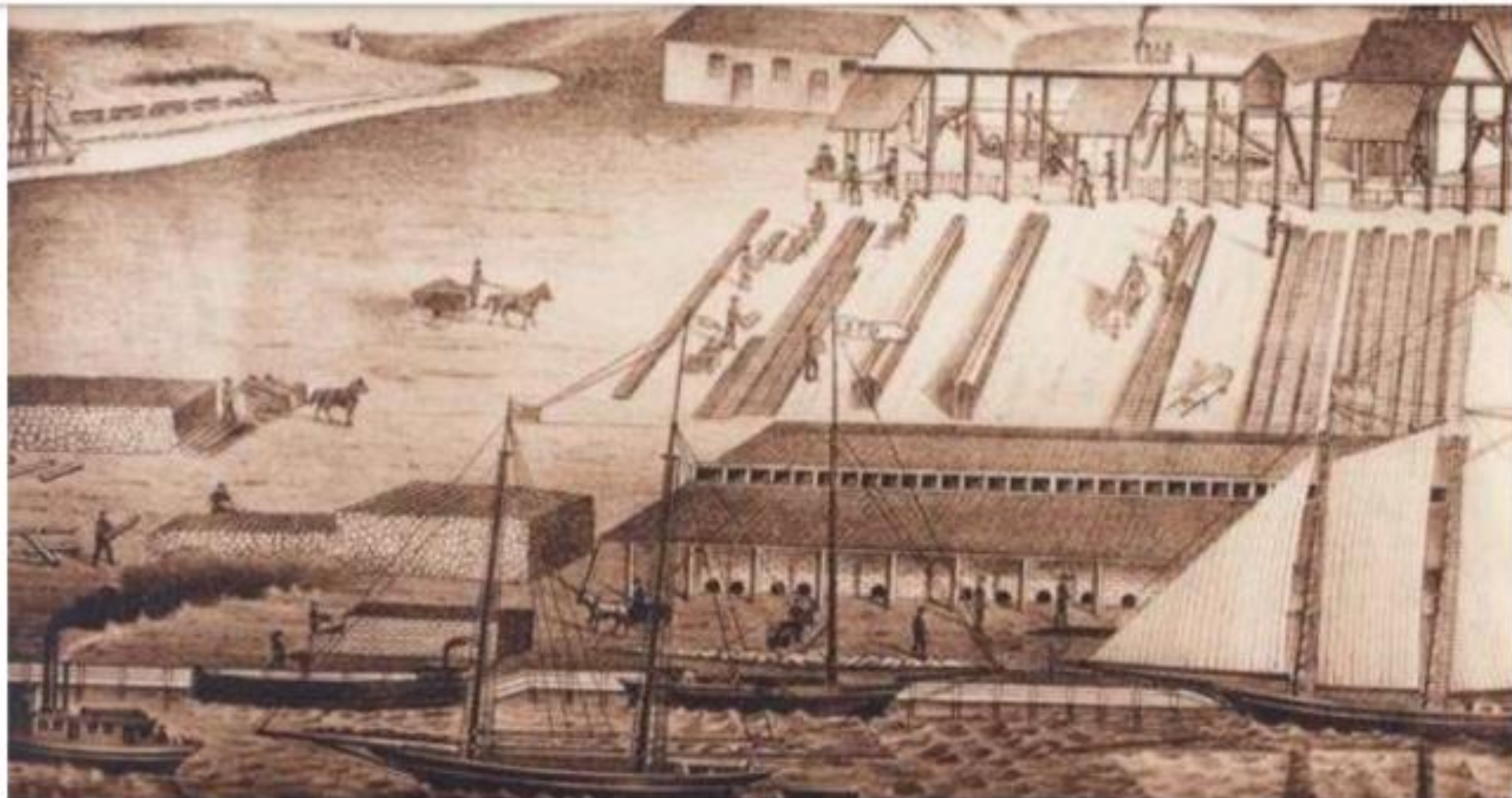


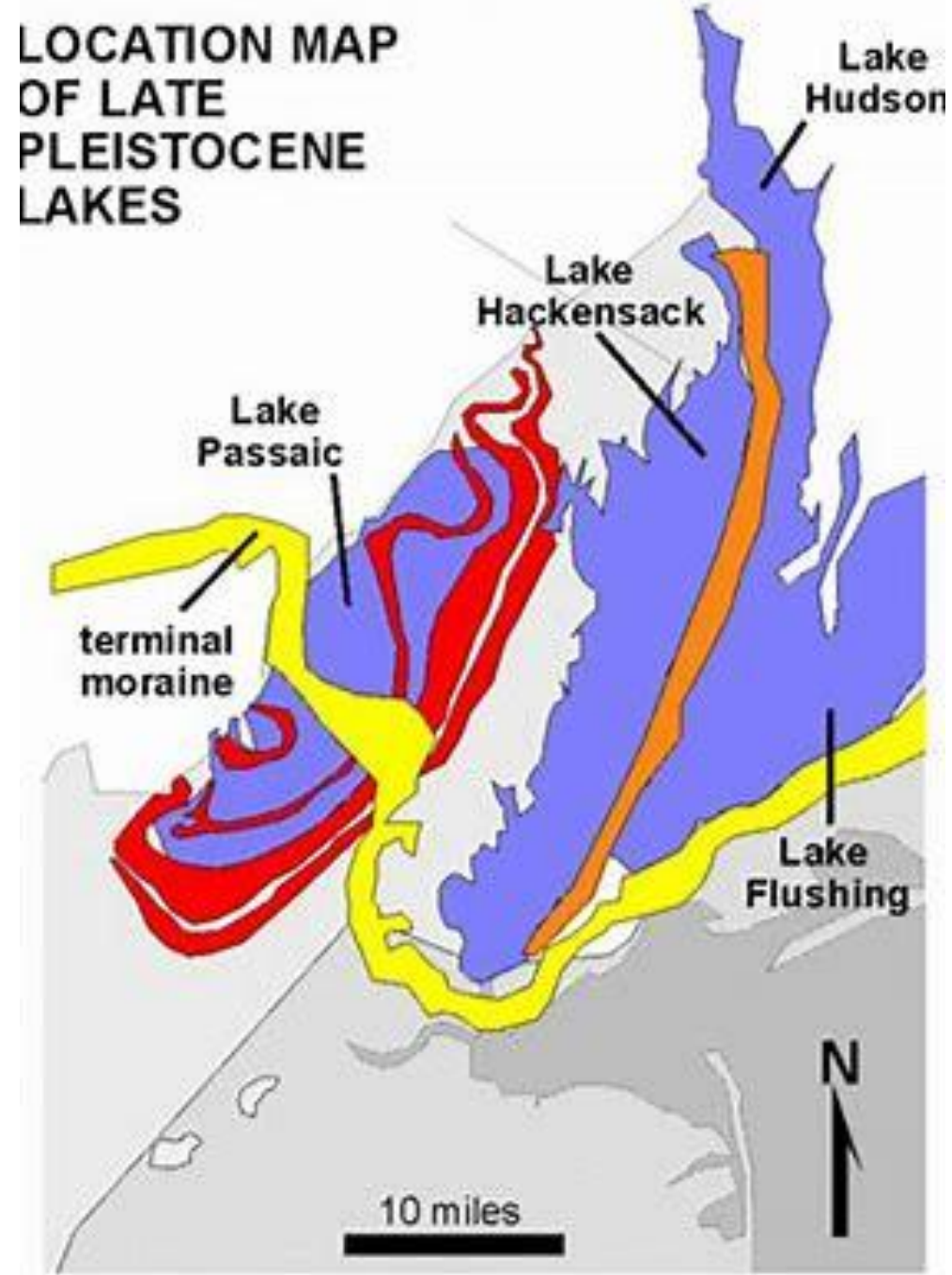
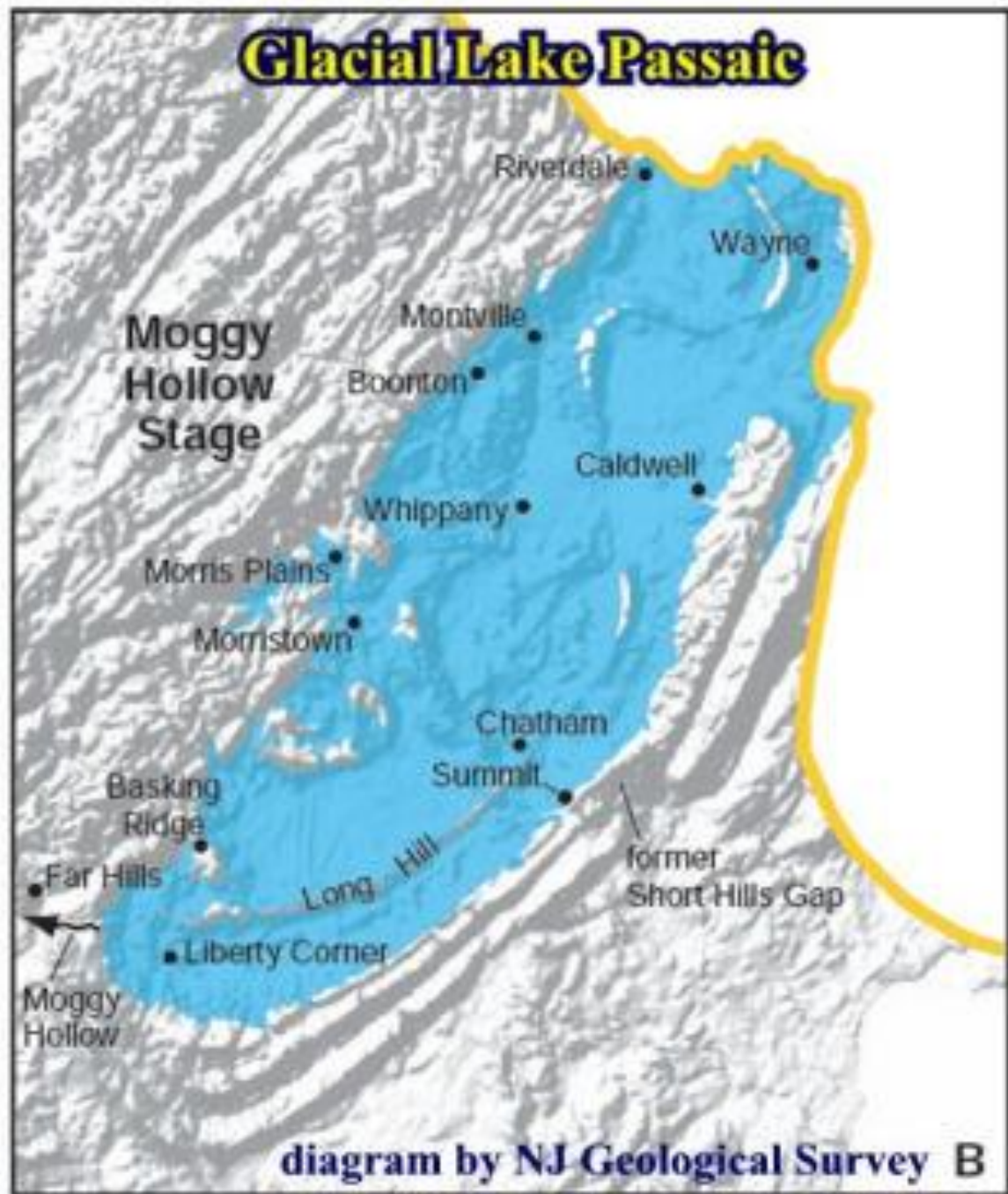
At some point, the ancestral Hudson River cut westward through the Palisades in the Spalkill Gap and eroded much of what became Bergen County. This old course lies under the mud and sediments in the Hackensack Meadowlands and entered NY harbor south of Staten Island, where the current Raritan flows.



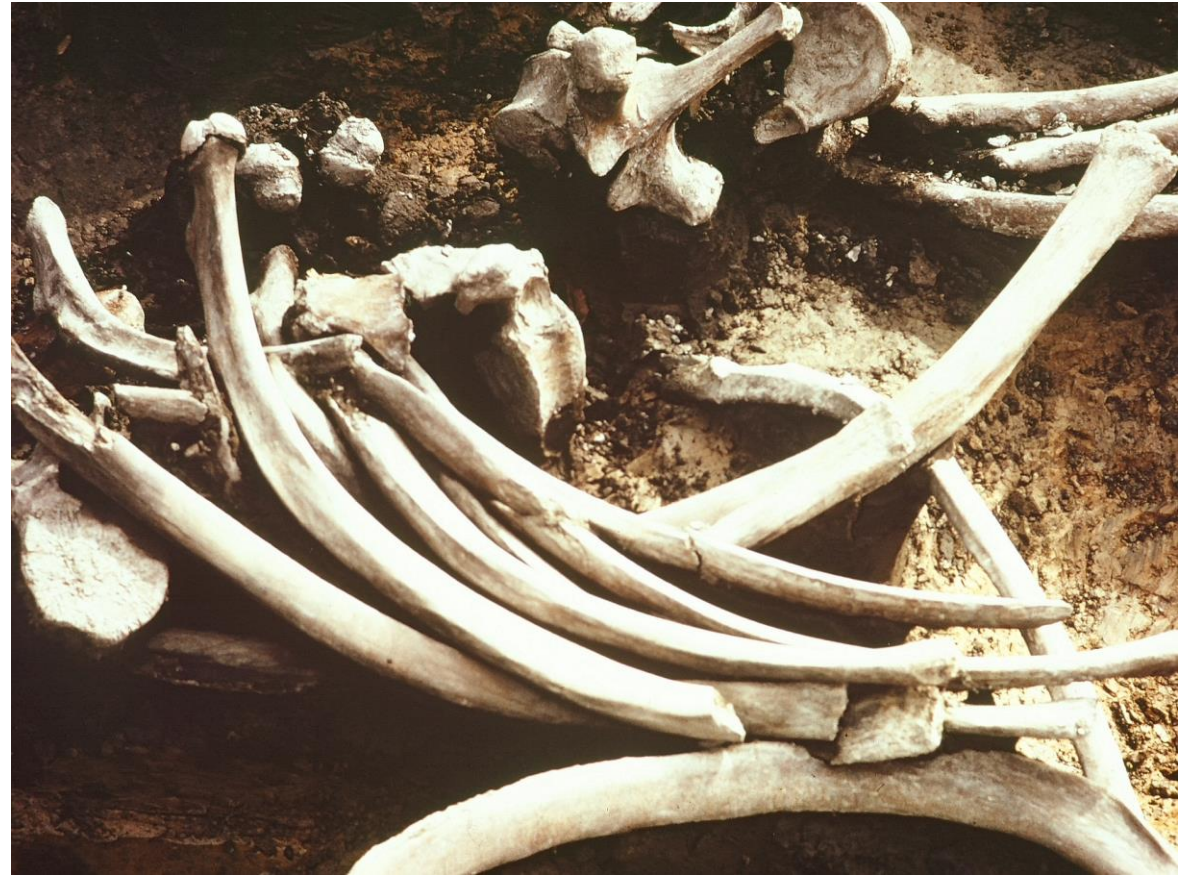
At some point about 20,000 years ago, much of North America was covered by ice sheets 1,000 to more than 3,000 feet thick. At the edge of the glaciers, piles of rubble “terminal moraines” formed long hills. These are the basis for Long Island and Martha’s Vineyard to our east, and Short Hills to our south. Most of these on land have been eroded and are discontinuous.

In many places behind the terminal moraines and other higher features, such as the Watchungs, glacial lakes formed as the ice sheet melted. Many of these were about 200 feet deep. The freeze-and-thaw patterns led to annual layers of clay (varves) that enable us to know the lakes lasted for more than 2,500 years. The clay was later used to make bricks.









March 1974





Jasper Francis Cropsey "Hackensack Meadows: 1890

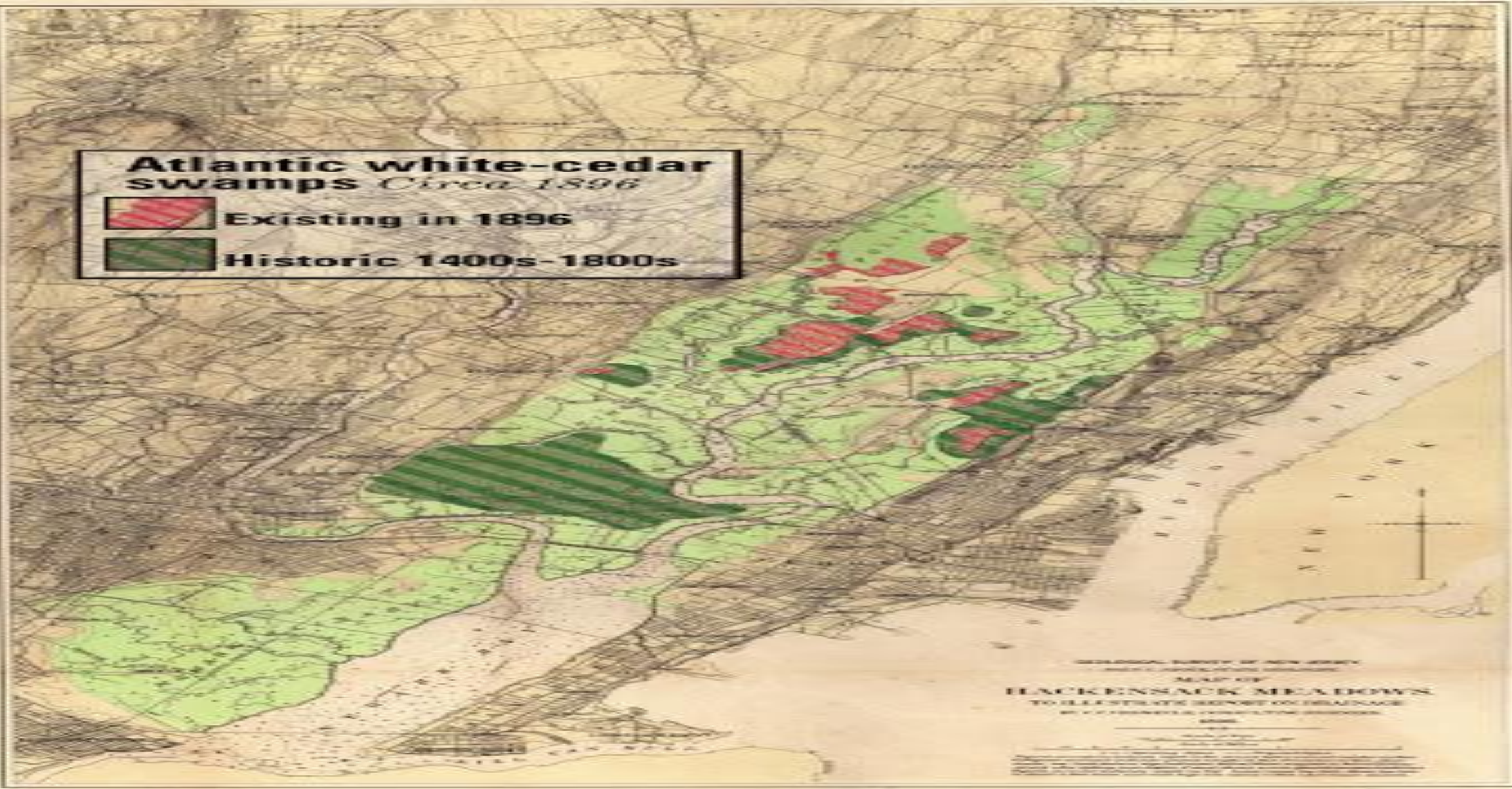
Atlantic white-cedar swamps *Circa 1896*



Existing in 1896



Historic 1400s-1800s



GEOLOGICAL SURVEY OF NEW JERSEY
BUREAU OF GEOLGICAL AND MINERAL RESOURCES
MAP OF
HACKENSACK MEADOWS
TO ILLUSTRATE DENOTE OF DRAINAGE
BY T. F. HARRIS & COMPANY, ENGINEERS
1896

Scale of Feet
1 inch = 100 feet
1 mile = 63,360 feet
1 square mile = 640 acres
1 acre = 43,560 square feet
1 cubic foot = 7.48 gallons
1 cubic yard = 27 cubic feet
1 ton = 2,000 pounds
1 bushel = 2150.42 cubic inches
1 cord = 128 cubic feet
1 acre-foot = 43,560 cubic feet
1 acre-foot = 325,851 gallons
1 acre-foot = 108,330 bushels
1 acre-foot = 2,239.67 tons
1 acre-foot = 108,330 bushels
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1 acre-foot = 2,239.67 tons



[\[Not\] Bridge at New Bridge | Bergen County Historical Society \(bergencountyhistory.org\)](http://bergencountyhistory.org)























COUNTY OF HUDSON

LAUREL HILL PARK

**THE USE OF THIS
BOAT LANCH IS
RESTRICTED TO
VESSELS 24 FEET
AND LESS**

\$200.00 FINE

ORDINANCE 213-5-1982



**HACKENSACK RIVER
SENSITIVE AREA
HELP PROTECT &
PRESERVE OUR
ENVIRONMENT
TOWN OF SECAUCUS
ENVIRONMENTAL
ADVISORY COMMITTEE**









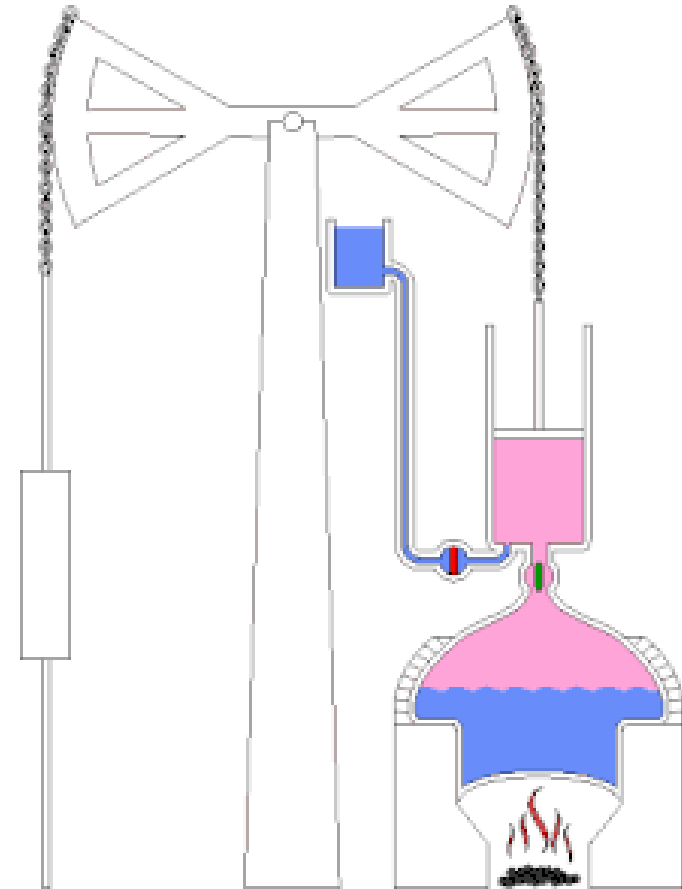
Remnants of the Schuyler mine, North Arlington, 1940s. (NJ State Geologist image)

Let's begin with real estate: Back in 1668, a man named William Sandford purchased a tract of land between the Hackensack and Passaic (then called the Pasawack) Rivers — 30,000 acres of land, rich in timber and meadows and fish and furry game. Half of this property was then sold to Nathaniel Kingsland, and in 1708, the southern part of the tract was bought by Arent Schuyler, who traveled down to this area from his hometown of Albany.

Here, Schuyler established a plantation, worked by slaves, one of whom made a most interesting discovery circa 1712-1714. On the land near what is now North Arlington's Porete Ave., an elderly man found an odd-looking greenish-blue chunk of stone, which he brought to Schuyler.

<http://www.theobserver.com/2013/12/mining-north-arlingtons-past/>

- To pump water out of the mine as it went deeper, mine operators smuggled the first steam engine in the Colonies (illegal to produce copper).



Secaucus = Pig Farms



“The Bridge that Saved the Country” New Bridge







<https://www.bergencountyhistory.org/steuben-house-cont?lightbox=dataItem-k9k28k0t>

<https://www.facebook.com/97133583299/photos/a.112494568299/10158452911378300/>



BERGEN COUNTY HISTORICAL SOCIETY
founded 1902
Historic New Bridge Landing
Bergen County,
Where America Begins

"War of Outposts at New Bridge"

Battle of New Bridge Landing, New Jersey, March 23, 1780

by Jeff Trott

USS LING

- <https://youtu.be/zlEjHhH9NEY>

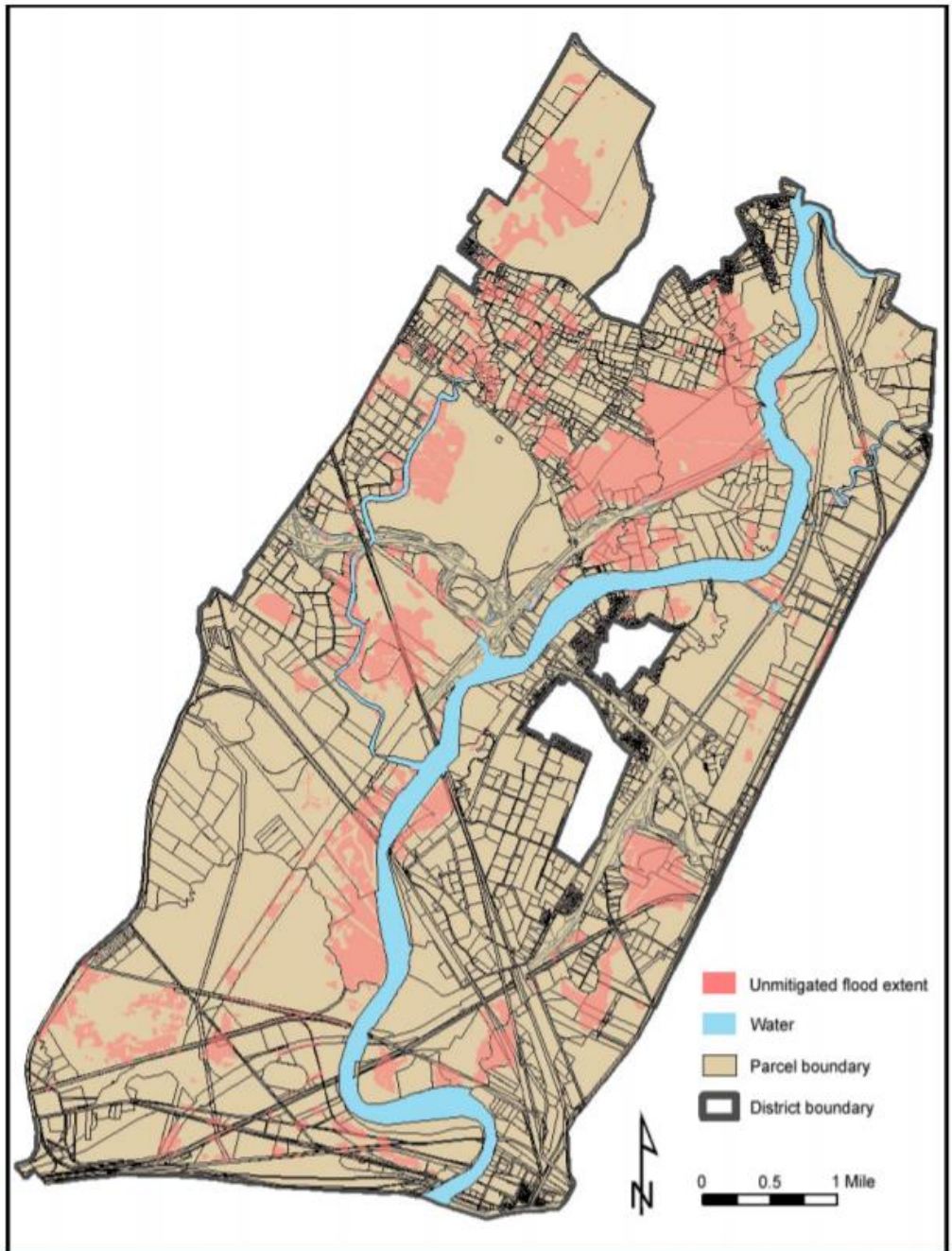


The resulting distribution represents approximately fifty years of high tide sea surface observations independent of sea level rise. The distribution was then related to mean sea level for the 1960-1978 epoch and the 1982-2001 epoch as measured by NOAA, and a predicted sea level rise of 25 cm (present through 2020). In order to assess the effects of sea level rise, the sea surface elevation was determined for storm events with a frequency of one year, two years, ten years and twenty five years. The results are summarized in Table 1. It should be emphasized that these water level predictions are based upon measurements collected at the Battery in New York and adjusted to a point on the Hackensack River in Carlstadt, New Jersey. *These water level predictions do not take into account any surface runoff.*

| Benchmark Epochs and High Tide Sea Surface Elevation (feet) | | | |
|---|-----------|-----------|------------|
| Events | 1960-1978 | 1983-2001 | 25 cm rise |
| 1 Year | 6.1 | 6.3 | 7.1 |
| 2 Year | 6.7 | 6.9 | 7.7 |
| 10 Year | 7.6 | 7.8 | 8.6 |
| 25 Year | 7.8 | 8.0 | 8.8 |

Table 1: Adjusted sea level elevations at Carlstadt, New Jersey

From the table above, it can be seen that the twenty five year high tide event that occurred from 1960 through 1978 is currently a ten year high tide event, and will likely become a two year high tide event under the conditions of the 25 cm projected sea level rise.



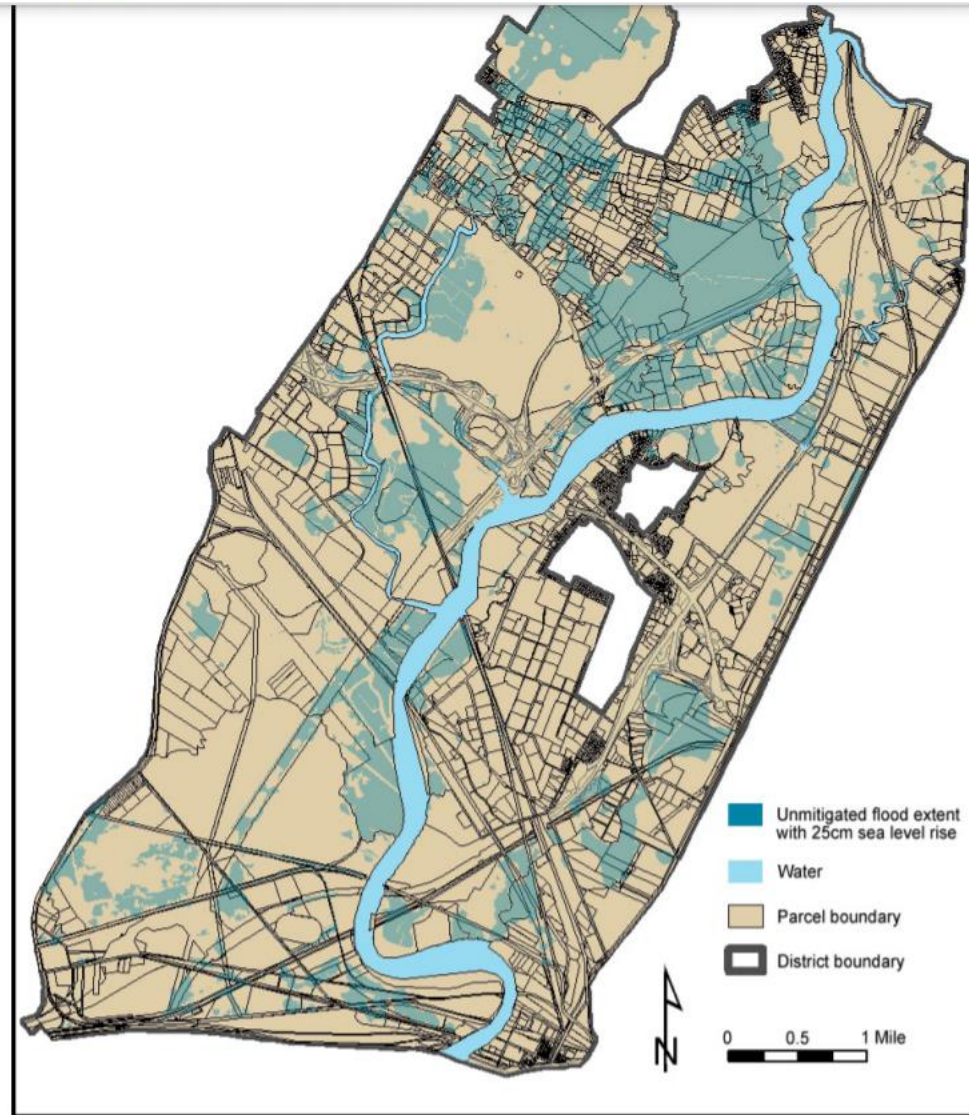


Fig. 6. Possible extent of mean high tide District flood zones after a 25 cm sea level rise with existing tidal gates rendered ineffective due to sea level rise.









For additional information

- From the Ice Age to Sea Level Rise—Connecting the Hackensack River's Past, Present, and Future

https://earth2class.org/site/?page_id=9247

- Hackensack Riverkeeper

<https://www.hackensackriverkeeper.org/>

- Meadowlands Environmental Center

<https://www.njsea.com/meadowlands-environment-center/>