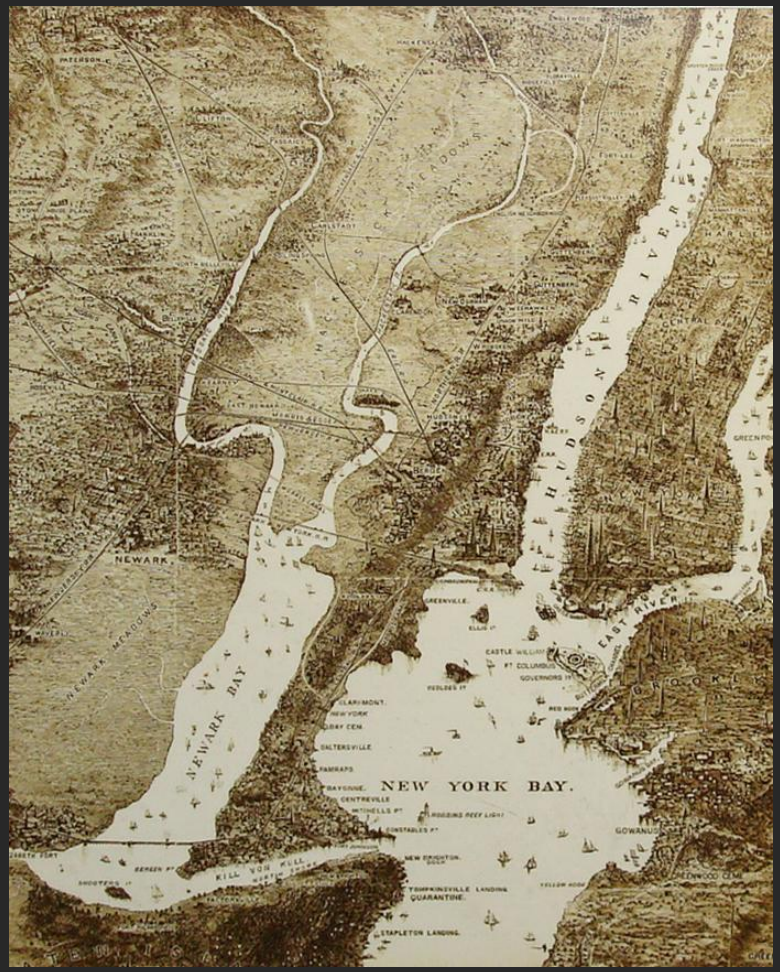
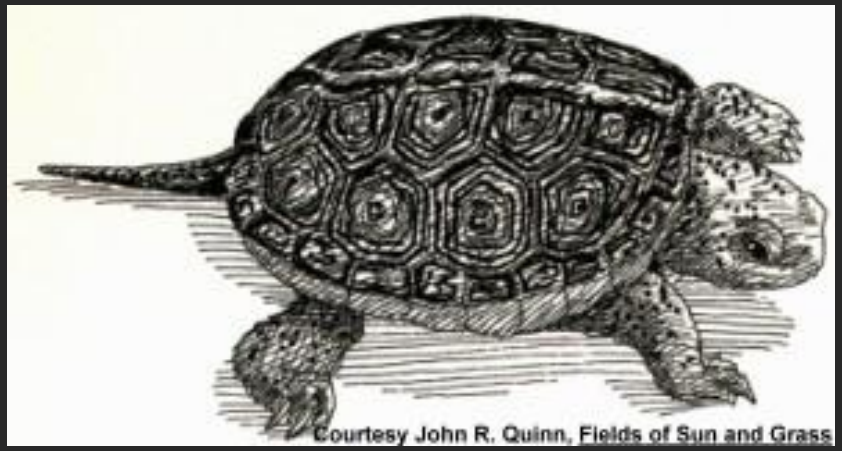
# Terrapins in the Meadows: The History of Diamondback Terrapins (*Malaclemys terrapin*) in the NJ Hackensack Meadowlands





Courtesy John R. Quinn, Fields of Sun and Grass

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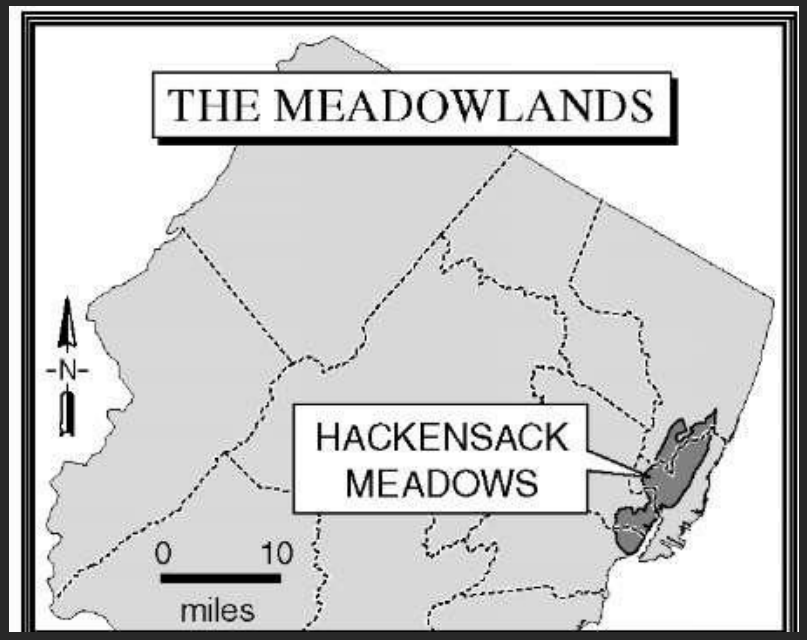
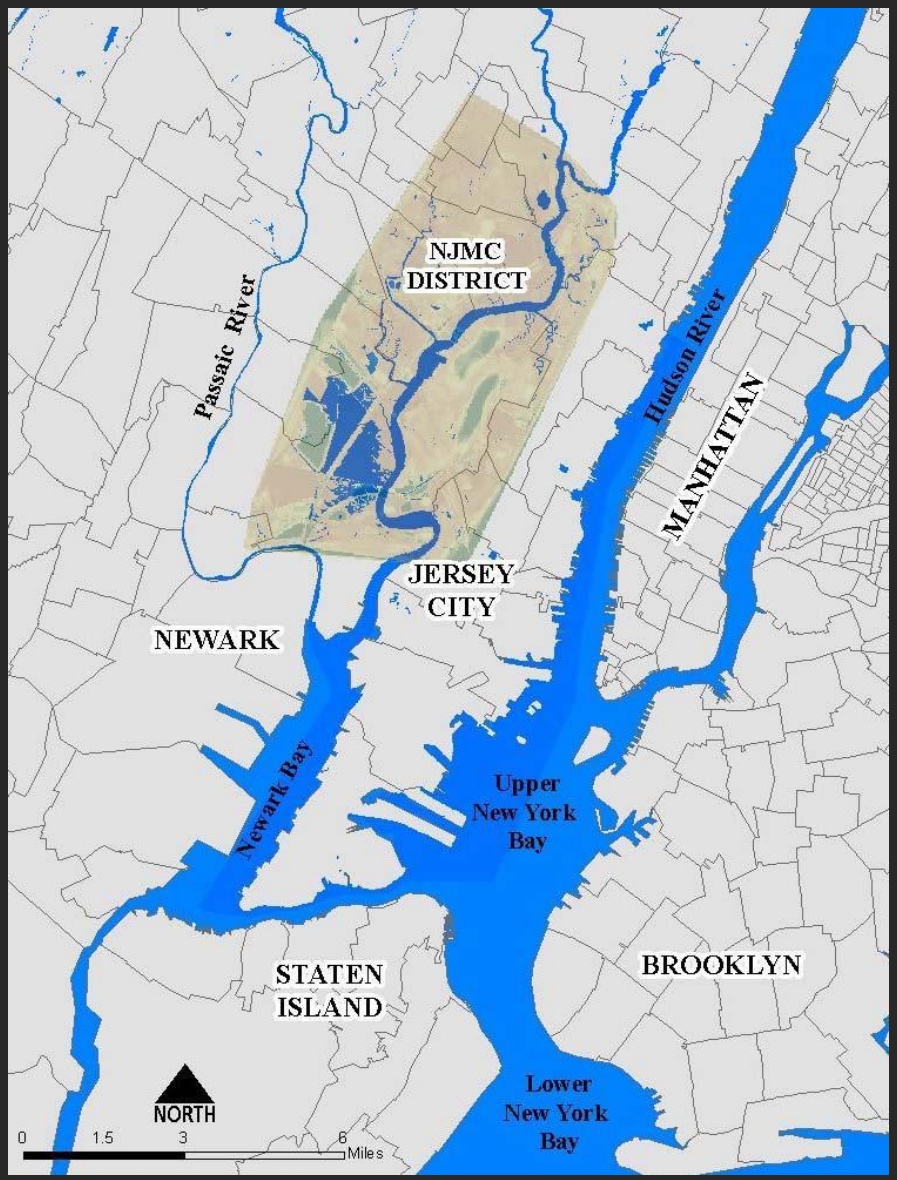
MONTCLAIR STATE UNIVERSITY

New Jersey Meadowlands Commission

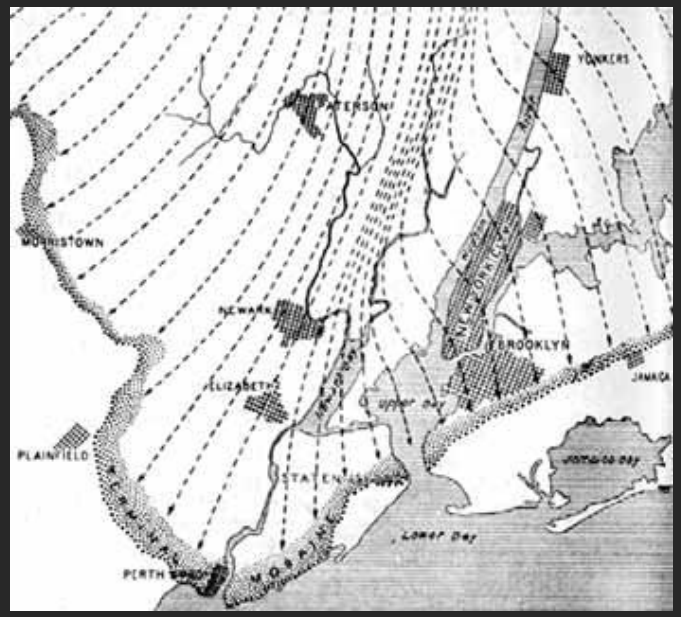
# NJ Hackensack Meadowlands

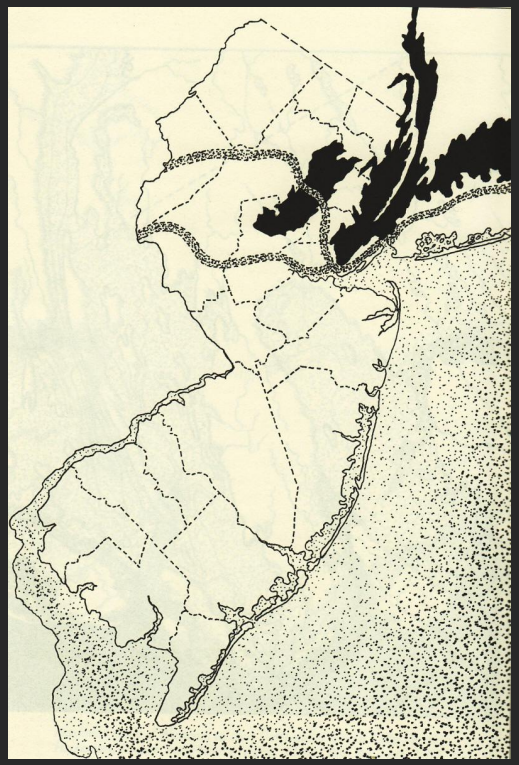


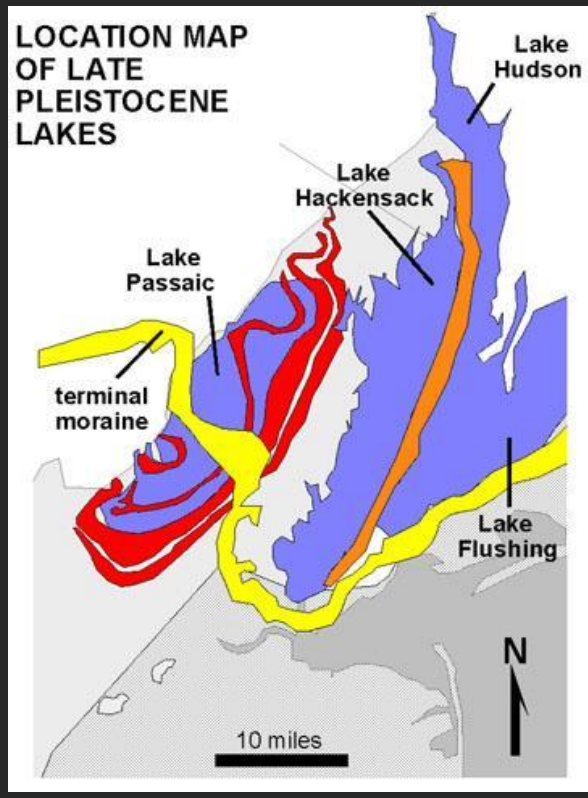
# Formation of the Meadowlands

- Wisconsin glacier main contributor to formation of Meadowlands



- Glacier retreated between 15,000 and 10,000 years ago and left glacial lakes, one of which was Glacial Lake Hackensack



# Formation of the Meadowlands

- Drained around 8,000 to 10,000 years ago

- Freshwater meadows composed of sedges, grasses and alders, and swamps of black ash probably characterized bed of drained lake

# Formation of the Meadowlands

- Northern bogs of larch and black spruce followed the ash….

- …which was then followed by Atlantic white cedar swamps

# Formation of the Meadowlands

- Europeans arrived and the white cedar swamps were decimated

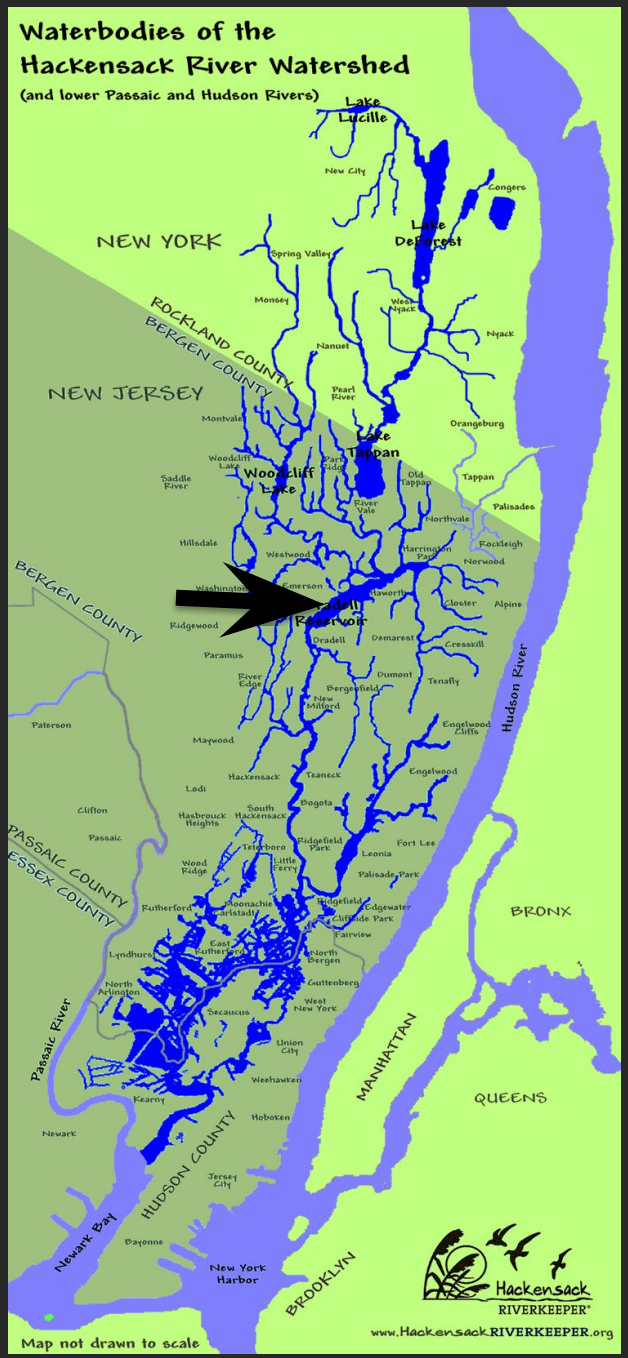
- Dikes, drainage ditches, excluding the tide from the confluence of Hackensack and Passaic Rivers north to Kingsland Creek (by the late 1890's)

- Construction of dams along the river to create millponds; diversion of freshwater into municipal water systems; dredging

# Formation of the Meadowlands

- Phragmites-dominated fields

- Oradell Dam constructed in 1922 led to a drastic reduction in the flow of freshwater



# Formation of the Meadowlands

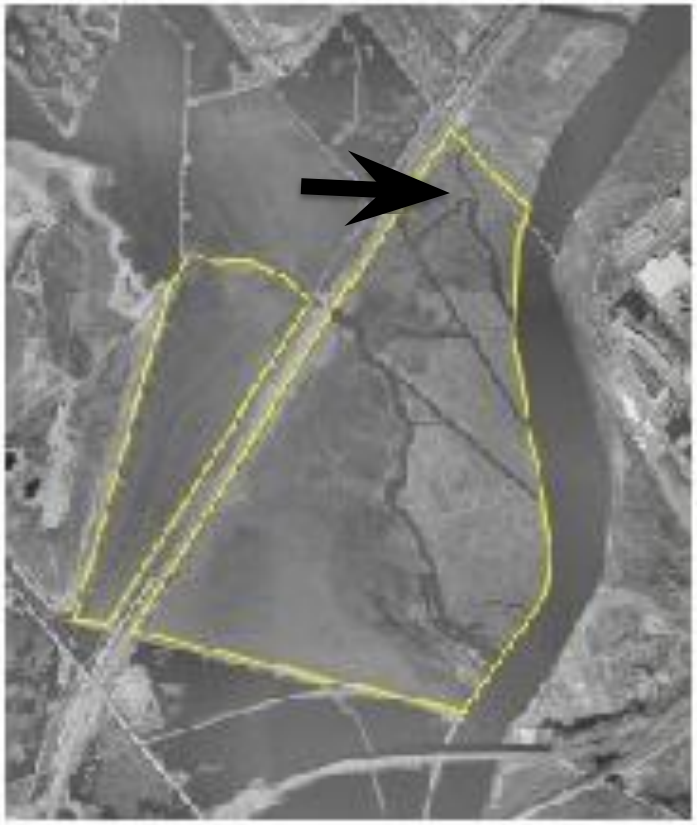
- Campaign to eradicate mosquitoes led to drastic transformations in the Meadowlands

- Additional dikes , tide gates and drainage ditches were built to drain the marshes to prevent mosquito  breeding, from about 1914 to 1950

# Formation of the Meadowlands

- 1950s storm destroyed tide gates, etc. Tidal flow returned to Sawmill Creek and Kingsland Creek and this area was turned into a brackish salt marsh


- *Spartina alterniflora*, decrease in *Phragmites*



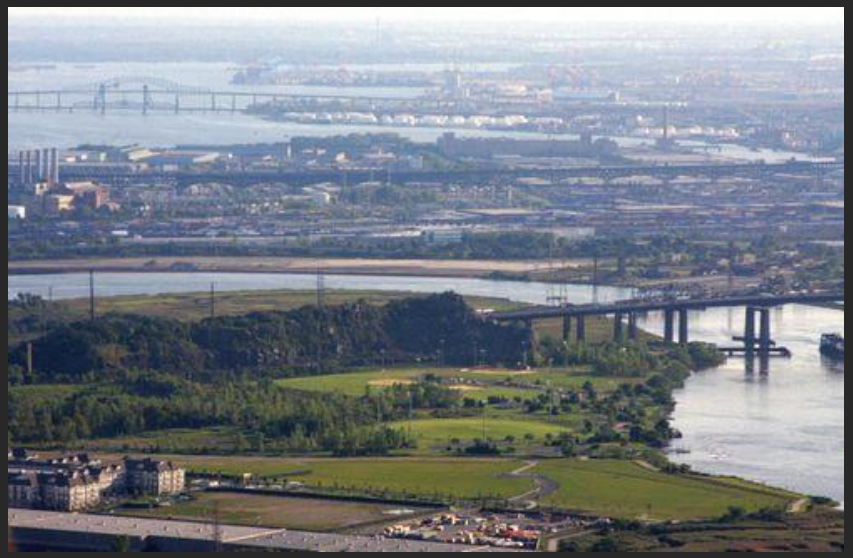
# Reptiles in the Meadowlands

- Already in the 1890s, records of Snapping turtles…Hotel on Paterson Plank Road that served Snapping turtle soup


- Box turtles in the woods at the edge of Overpeck meadows (1957)

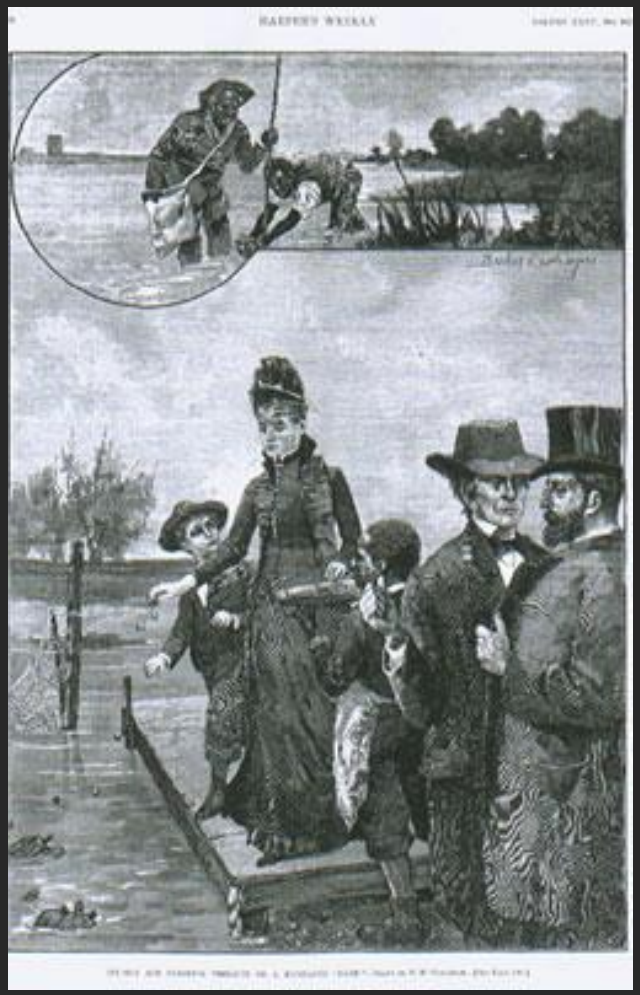
# Reptiles in the Meadowlands

- Snake Hill, early Dutch settlers called it that because of snakes
- Even Native Americans: Secaucus comes from the Lenape words *Sika* (“fright”) and *Aki* (“land”)



# Diamondback Terrapins

- Native Americans used terrapins for meat, remains found in shell middens of northeast coast



- Early settlers also used terrapins; were so abundant that they were fed to slaves and indentured servants

# Diamondback Terrapins

- Terrapin soup became a delicacy and terrapins were highly sought after

TERRAPIN.

Six medium sized terrapins, six eggs, half pound butter, one quart cream, salt, pepper and vinegar to taste; add cream last. Boil the eggs hard; cream yolks, pepper, salt and vinegar together. Put terrapin on fire and when boiling add the cream and boil.

MISS SKILES.



TERRAPIN.

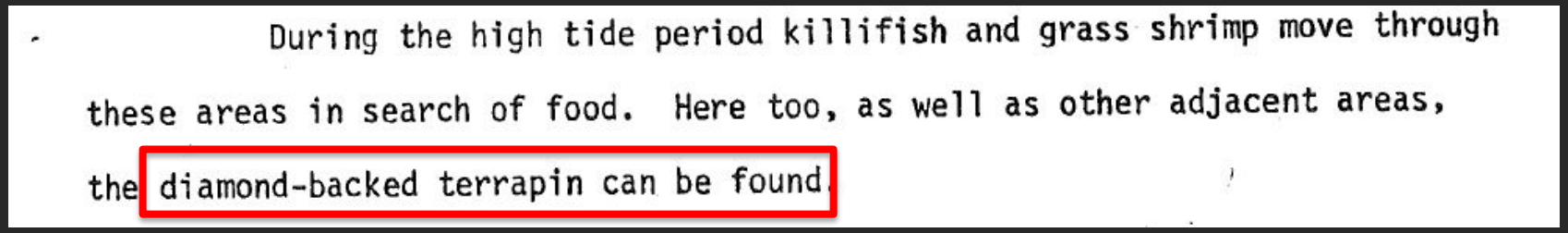
PUT the terrapin, alive in boiling water and boil fifteen minutes, or until you can pull off the the outer skin and the toe nails. Then put them in fresh boiling water, add a teaspoonful of salt and boil slowly until the shells part easily and the flesh on the legs is quite tender. When done, take out, remove the under shell and let stand until cool enough to handle; then take them out of the upper shells, carefully remove the sand bags, bladders, the thick, heavy part of the intestines and the gall sacks, which are found imbedded in one lobe of the liver, and throw them away. In removing the gall sack, be very careful not to break it, as it would spoil the terrapin. Break the terrapin into convenient sized pieces, cut the small intestines into tiny pieces and add them to the meat; add the liver broken up, also the eggs in the terrapin. Put into a stewing pan with the juice or liquor it has given out while being cut. For one quart of meat, boil six eggs for twenty minutes, mash with cream. Put meat to simmer, add eggs, about three-fourths of a quart of cream or milk, half a pound of butter; season with salt and pepper; madeira wine to taste. Caramel to color. About one dessertspoonful of flour mixed with cream to thicken. Add wine last thing before serving.

E. S. Winslow

# Meadowlands

- NJ Division of Fish, Game and Shellfisheries conducted a study of the marshland in the Kingsland/Sawmill marshes in 1972-1973 and did NOT report the presence of terrapins

- First mention of Diamondback terrapins in the Meadowlands was in a 1975 report by the Hackensack Meadowlands Development Commission ("Wetland Bio-Zones of the Hackensack Meadowlands: An Inventory") :



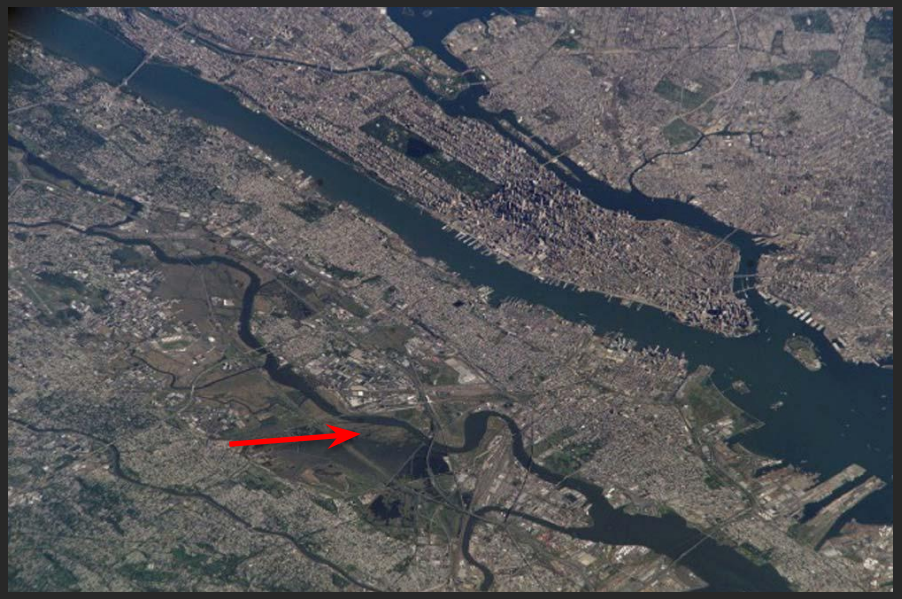
During the high tide period killifish and grass shrimp move through these areas in search of food. Here too, as well as other adjacent areas, the diamond-backed terrapin can be found.

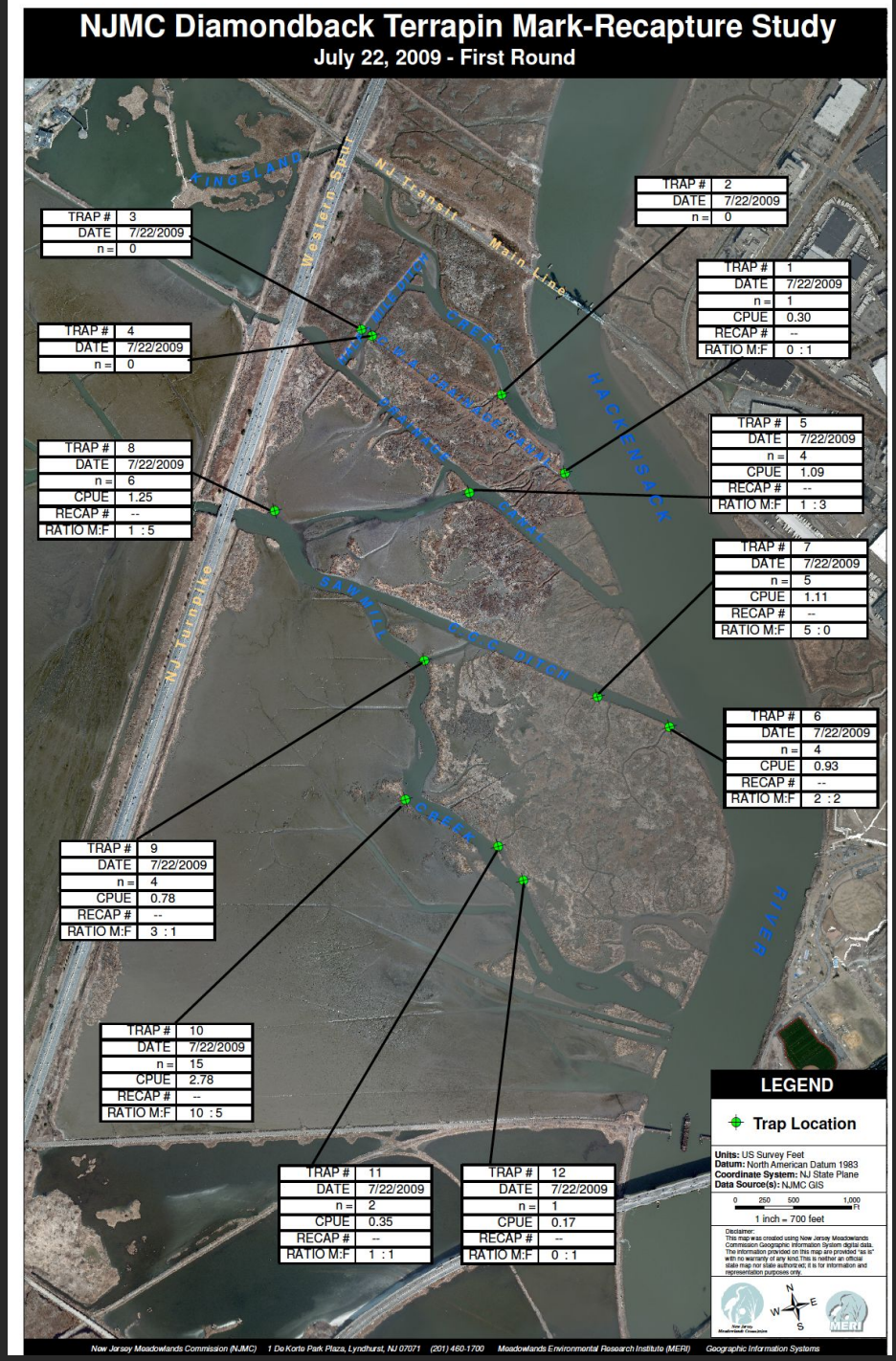
# Meadowlands

- In  the same area where no terrapins were reported in the early 1970s and were only marginally mentioned in the mid-1970s:


# Meadowlands

- Mark Recapture study by the NJ Meadowlands Commission





# Meadowlands

- Mark Recapture study by the NJ Meadowlands Commission
- 19% recaptures
- 1.16:1 ratio of females to males

**TABLE 1**
**NJMC DIAMONDBACK TERRAPIN MARK-RECAPTURE STUDY**
**SUMMARY OF TRAPPING RESULTS**

| Trapping Date | Total # of Terrapins captured | # of re-captures | Total # tagged on this date | Cumulative total # tagged | Males | Females |
|---|---|---|---|---|---|---|
| 7/22/09 | 42 | – | 42 | 42 | 23 | 19 |
| 7/30/09 | 69 | 0 | 69 | 111 | 37 | 32 |
| 8/25/09 | 17 | 1 | 16 | 127 | 11 | 6 |
| 6/11/10 | 33 | 8 | 25 | 152 | 14 | 19 |
| 6/18/10 | 17 | 0 | 17 | 169 | 7 | 10 |
| 6/25/10 | 12 | 3 | 9 | 178 | 4 | 8 |
| 7/6/10 | 41 | 4 | 24 | 202 | 25 | 16 |
| 7/20/10 | 77 | 13 | 63 | 265 | 34 | 43 |
| 8/17/10 | 41 | 8 | 32 | 297 | 20 | 20 |
| 8/26/10 | 24 | 3 | 21 | 318 | 12 | 12 |
| 9/16/10 | 2 | 1 | 1 | 319 | 1 | 1 |
| 6/8/11 | 32 | 4 | 28 | 347 | 17 | 15 |
| 6/23/11 | 94 | 16 | 77 | 424 | 53 | 41 |
| 7/6/11 | 71 | 10 | 61 | 485 | 35 | 36 |
| 7/20/11 | 73 | 16 | 56 | 541 | 32 | 41 |
| 8/11/11 | 116 | 16 | 100 | 641 | 43 | 73 |
| 8/24/11 | 46 | 11 | 35 | 676 | 22 | 24 |
| 6/12/12 | 47 | 9 | 38 | 714 | 20 | 27 |
| 6/26/12 | 74 | 16 | 58 | 772 | 37 | 37 |
| 7/12/12 | 59 | 8 | 51 | 823 | 24 | 35 |
| 8/7/12 | 97 | 21 | 76 | 899 | 31 | 66 |
| **TOTALS** | **1084** | **168** | **899** | | **502** | **581** |

# Terrapins in Northern NJ and NY

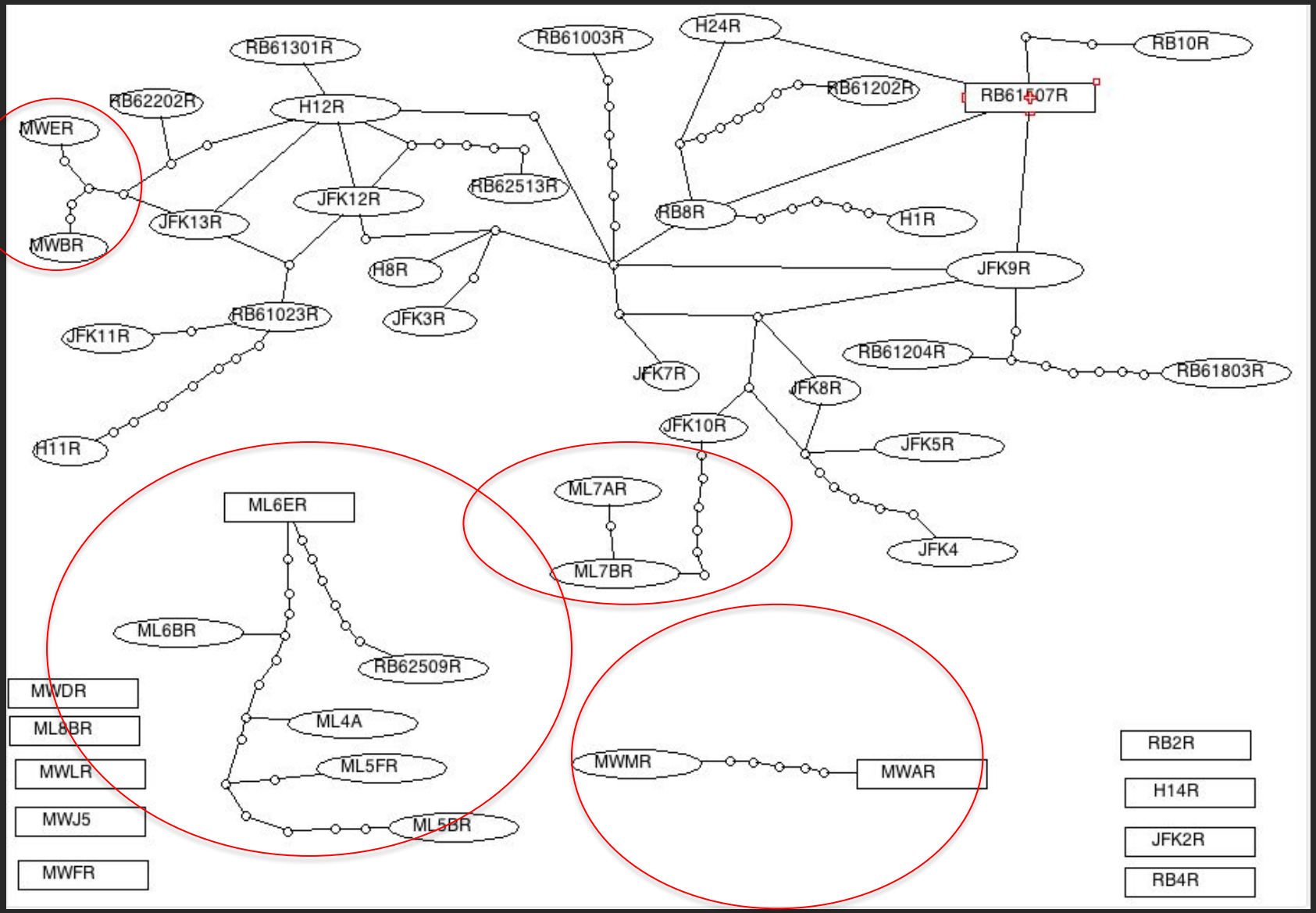
- One of the largest populations of terrapins in the Northeast is found in Jamaica Bay, NY

Heavily industrialized, similar to the Meadowlands

- Hudson River and Bay separates terrapins in the Meadowlands from Jamaica Bay

# Meadowlands

- TCS analysis of mitochondrial DNA (Dloop)



# Conclusions and Future Directions

- Terrapins in the Meadowlands show some affinity with Jamaica Bay terrapins, but aren't as closely related to them as all the NY turtles are among themselves
- Genetic affinity may be due to population bottleneck effect
- Nesting surveys
- Microsatellite data to further understand dispersal patterns
- Paternity analysis using Meadowlands hatchlings

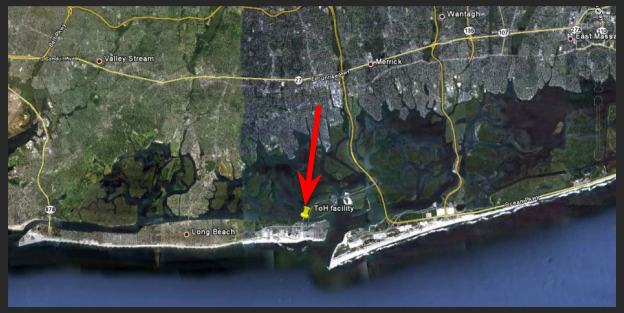
# Acknowledgements


- Russell L. Burke, Hofstra University
- Alexandra Kanonik, Queens College
- Kirsten Monsen-Collar, Montclair State University
- Roger Wood

- The Wetlands Institute
- The NJ Meadowlands Commission

# Jamaica Bay Terrapins


- Consistent monitoring of JB terrapins since 1998




- Population estimate based only on nesting females


Source: Alexandra Kanonik, Queens College