Overview of Planned Groundwater Modeling Activities

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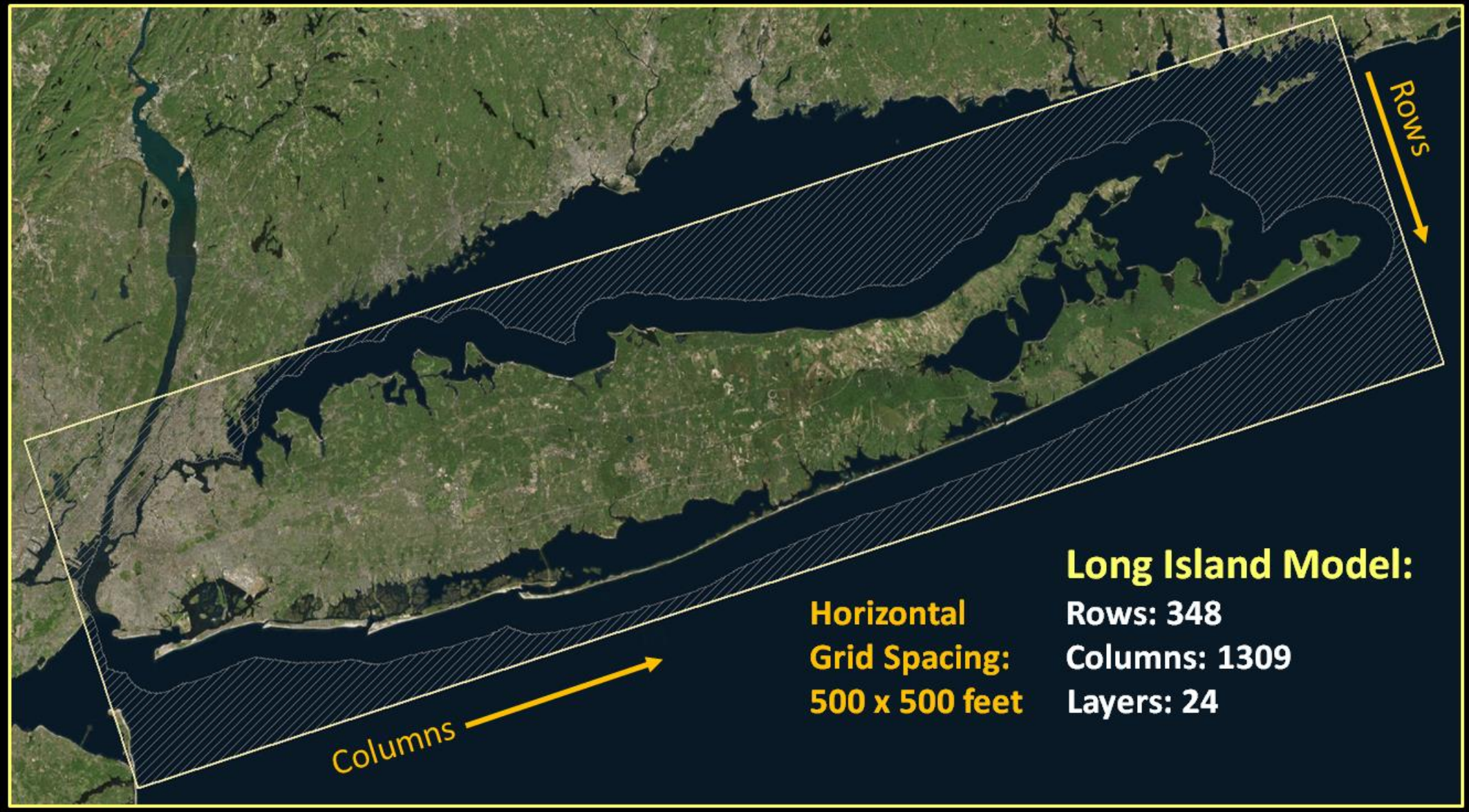
NEW YORK STATE | Department of Environmental Conservation

USGS

Long Island Regional Model Grid

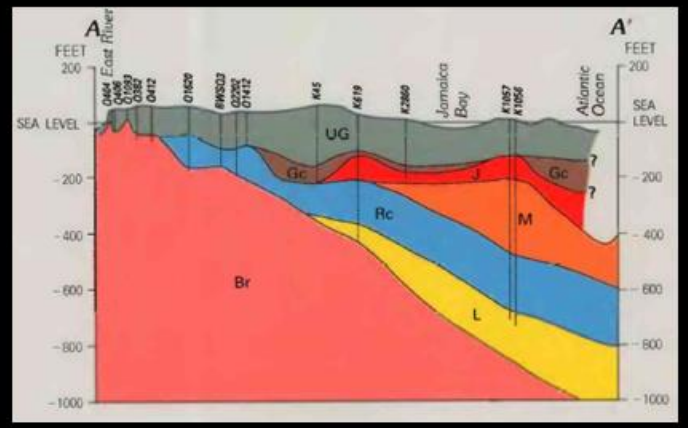


Modeling Components

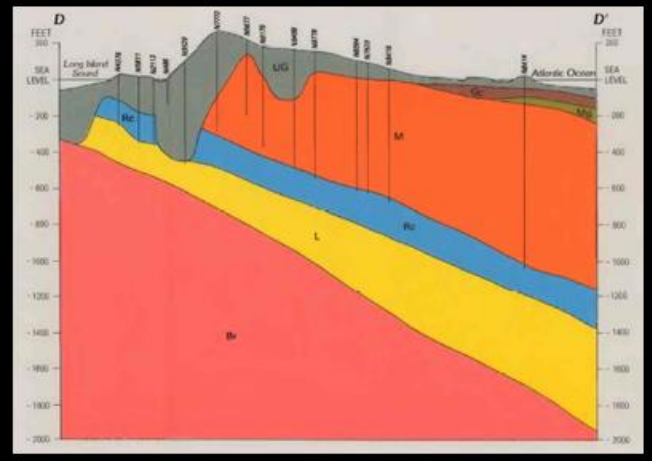
- Framework:
  - Existing information on hydrogeology (HA-709)
  - Hydrogeologic texture model
  - New hydrogeologic data/analysis from drilling program
- Boundaries:
  - Surface waters
  - Freshwater/saltwater interface
- Hydrologic Stresses:
  - Recharge: natural and wastewater returnflow
  - Groundwater pumping

Hydrogeologic Framework

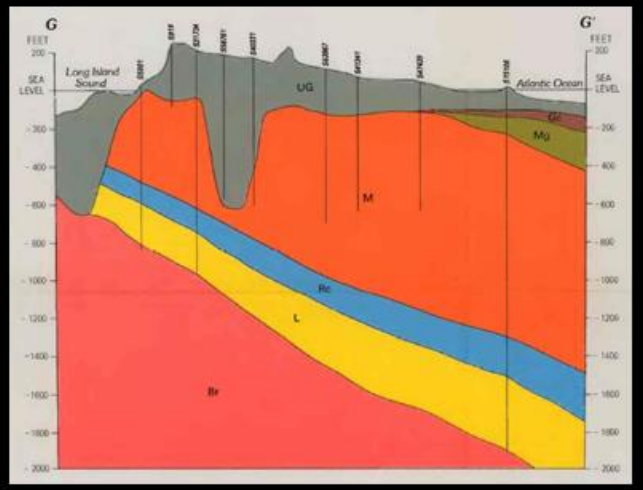
Hydrogeologic sections published in USGS report: HA-709



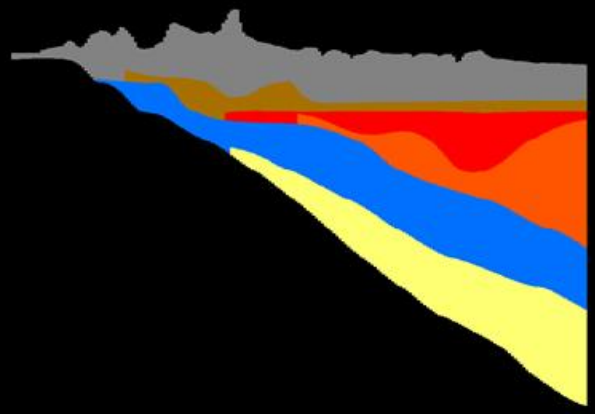
Queens

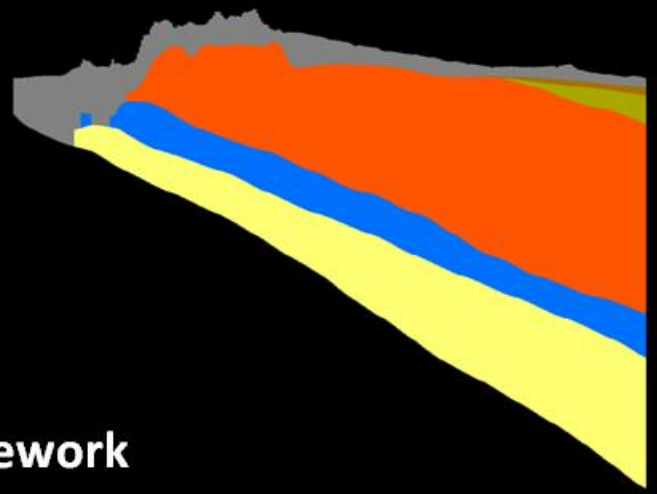


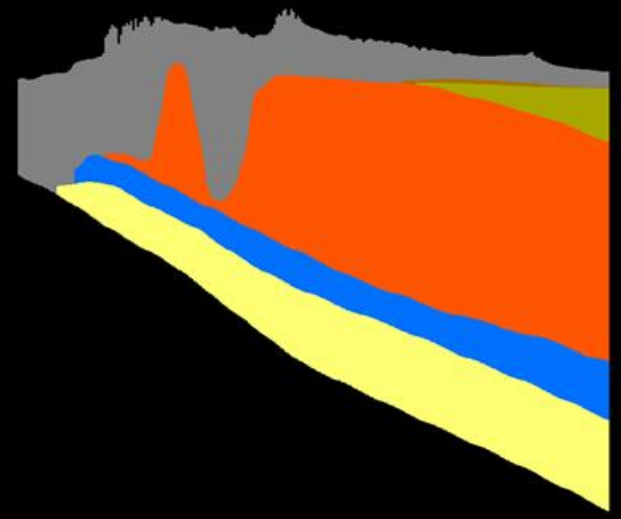
Nassau County



Suffolk County

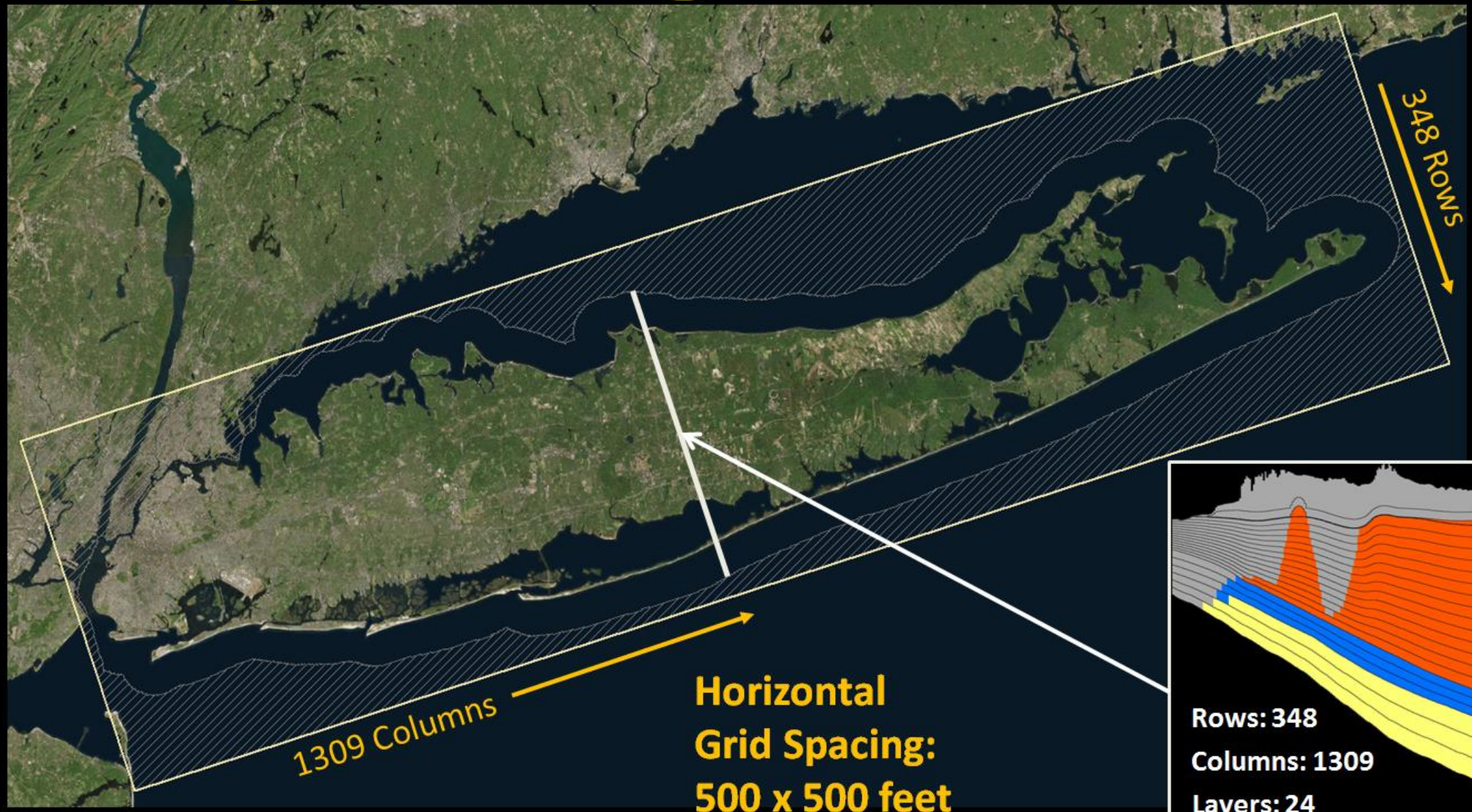




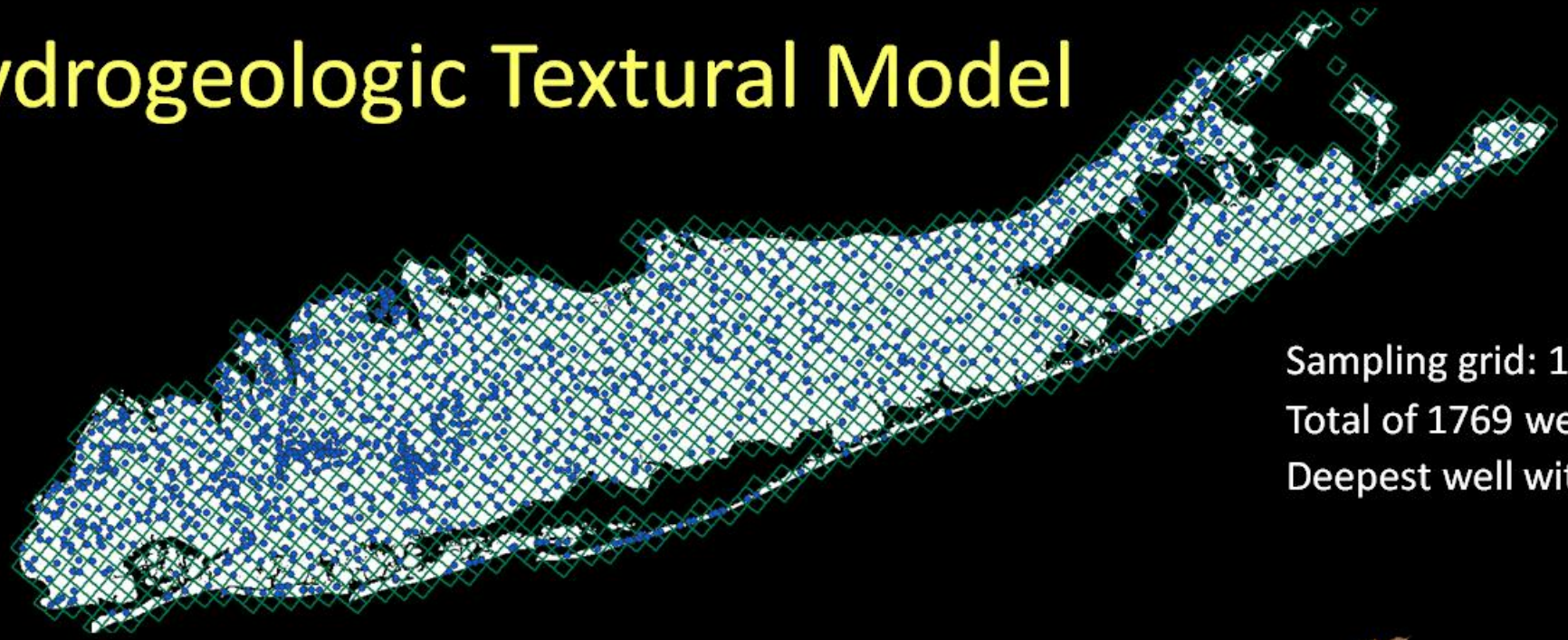


Model representation of framework

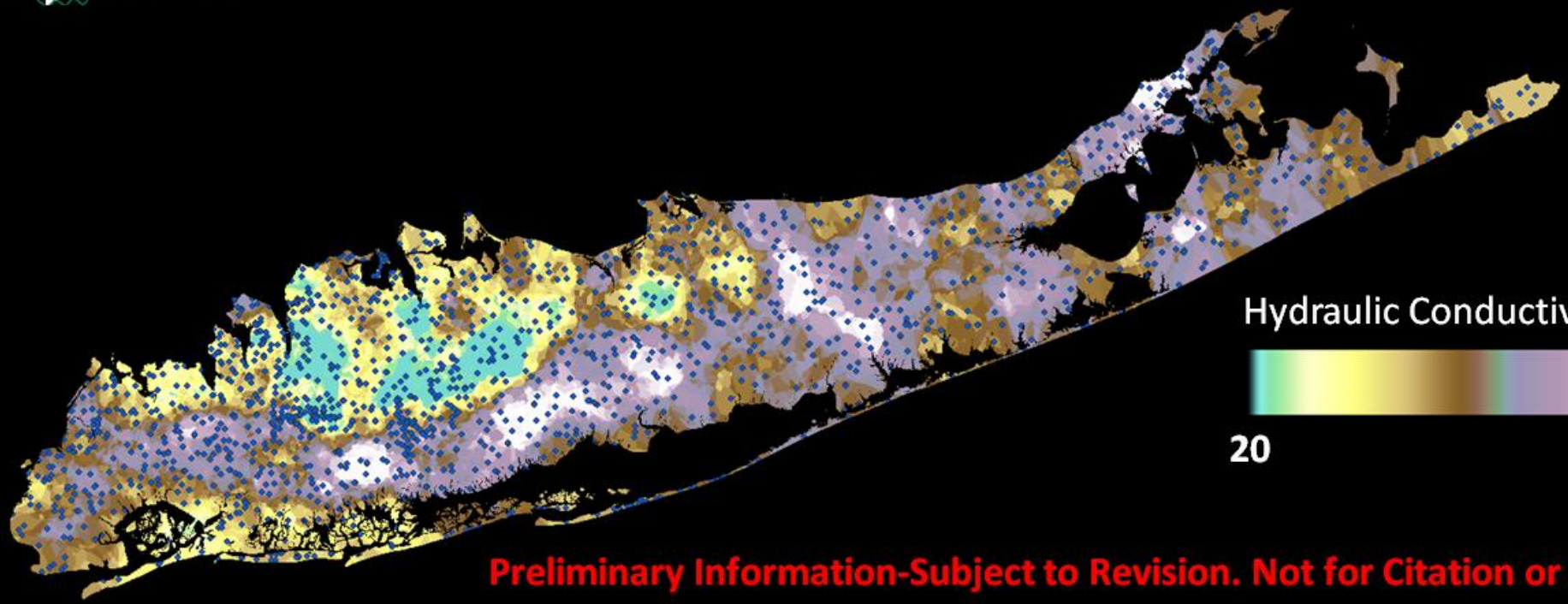
Long Island Regional Model Grid



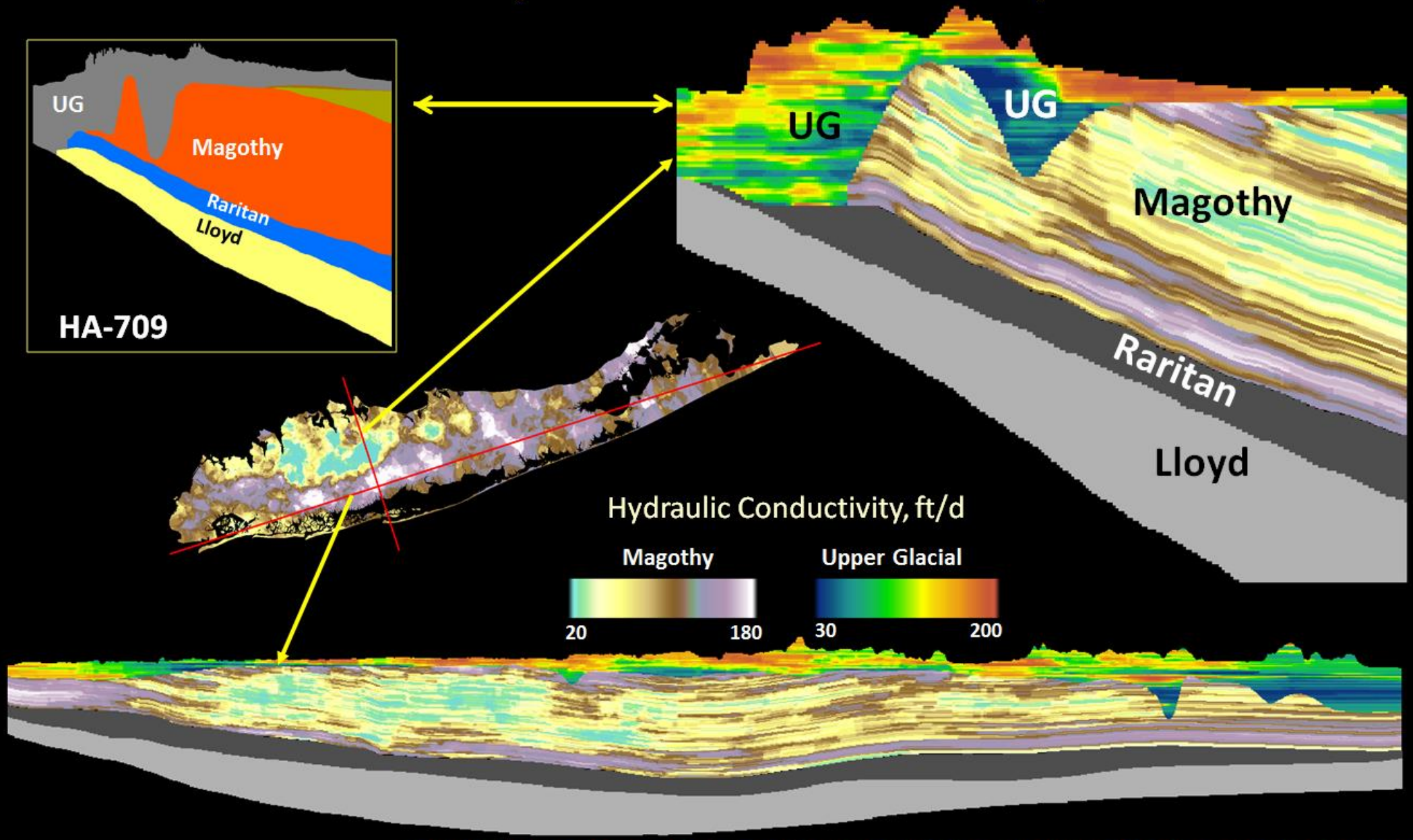
Hydrogeologic Textural Model



Sampling grid: 1 mile x 1 mile
Total of 1769 wells
Deepest well within individual cells

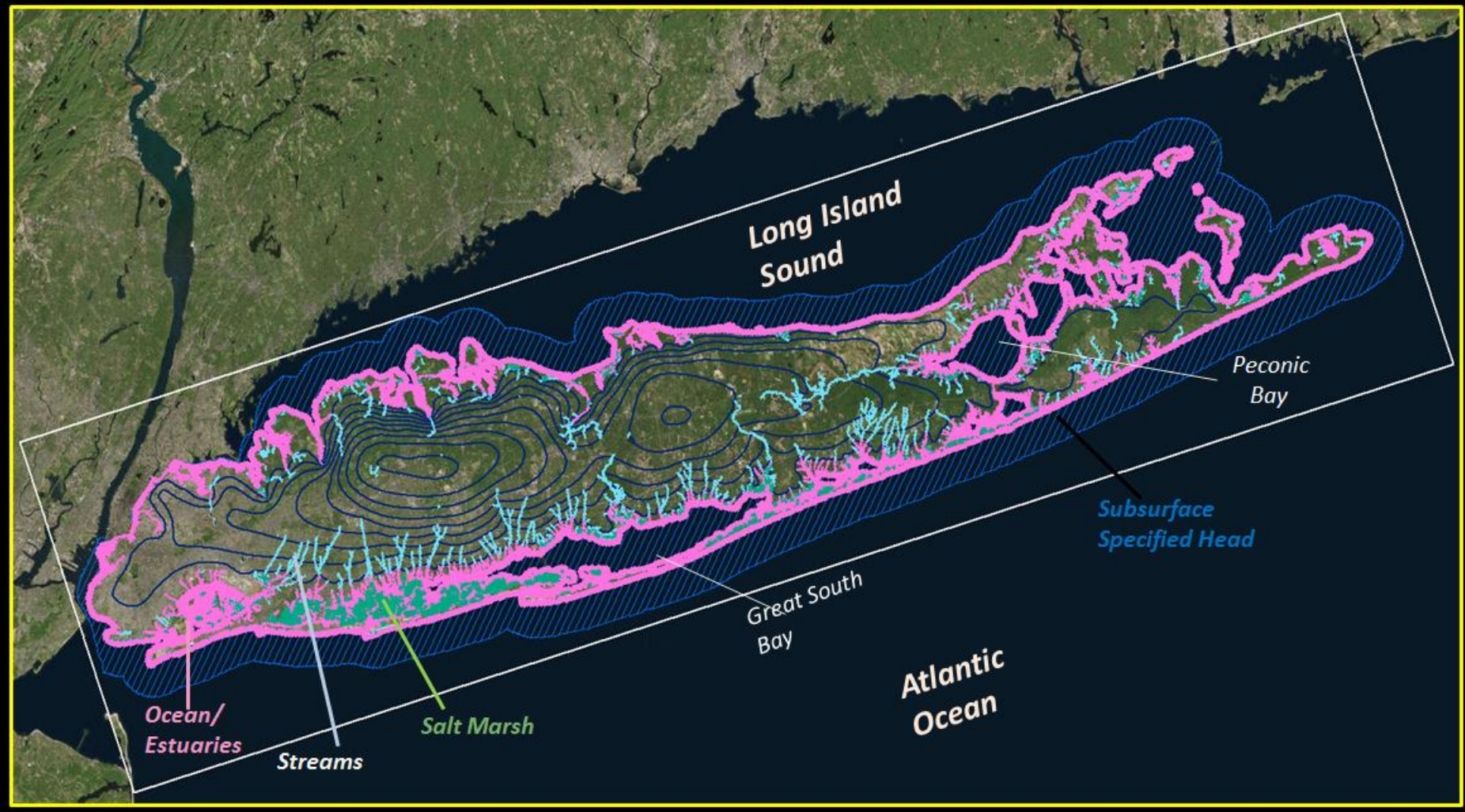


Texture Model: Hydraulic Conductivity Distribution



Model Boundaries

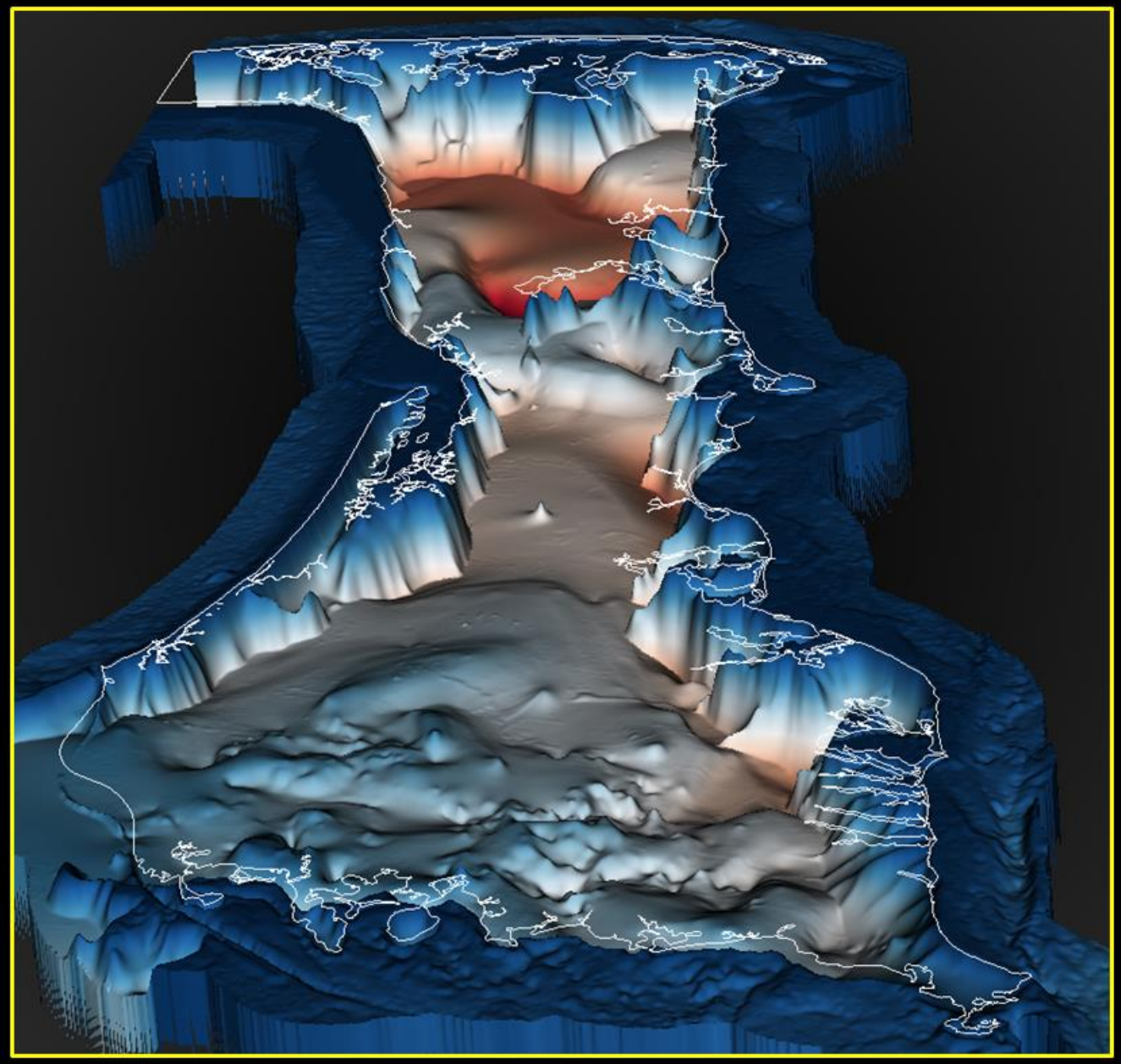
Surface-Water Features



Freshwater System: Current Sea Level Position

Bottom of Freshwater, Altitude, in ft

Cape Cod Example

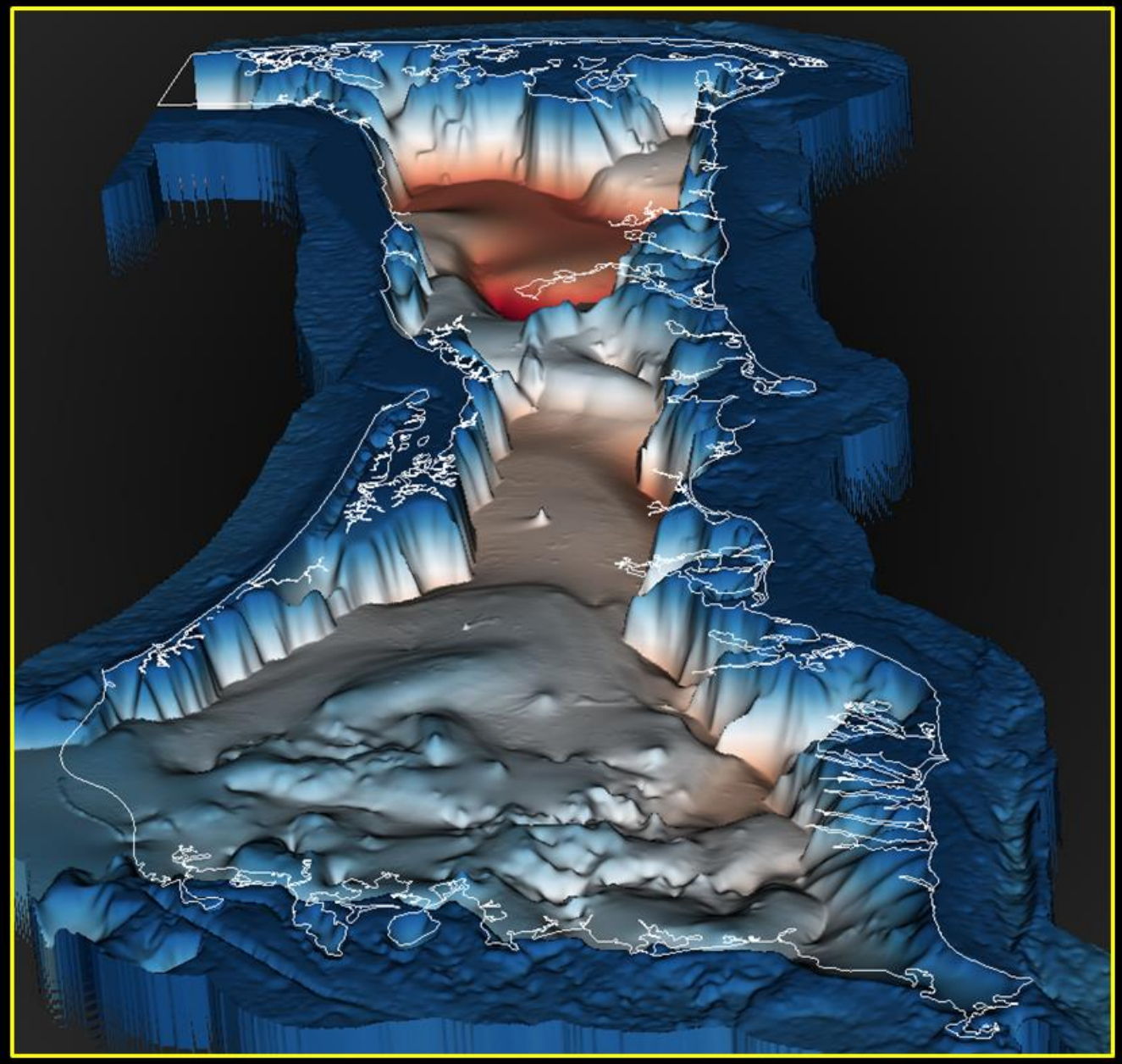


West → East

Freshwater System: Increased Sea Level Position

Bottom of Freshwater, Altitude, in ft

Cape Cod Example

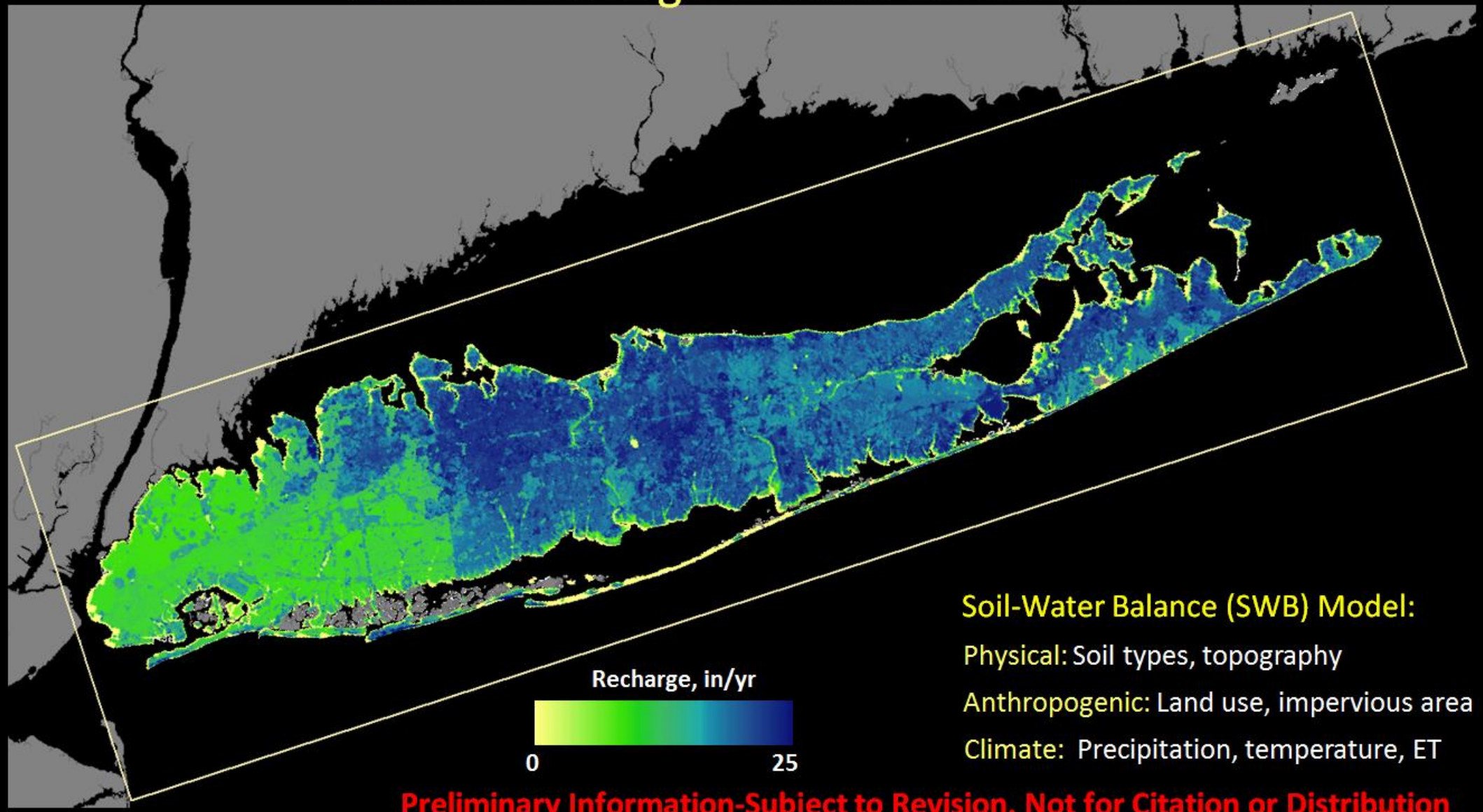


East

West

Hydrologic Stresses

Natural Recharge: Current Conditions



Soil-Water Balance (SWB) Model:

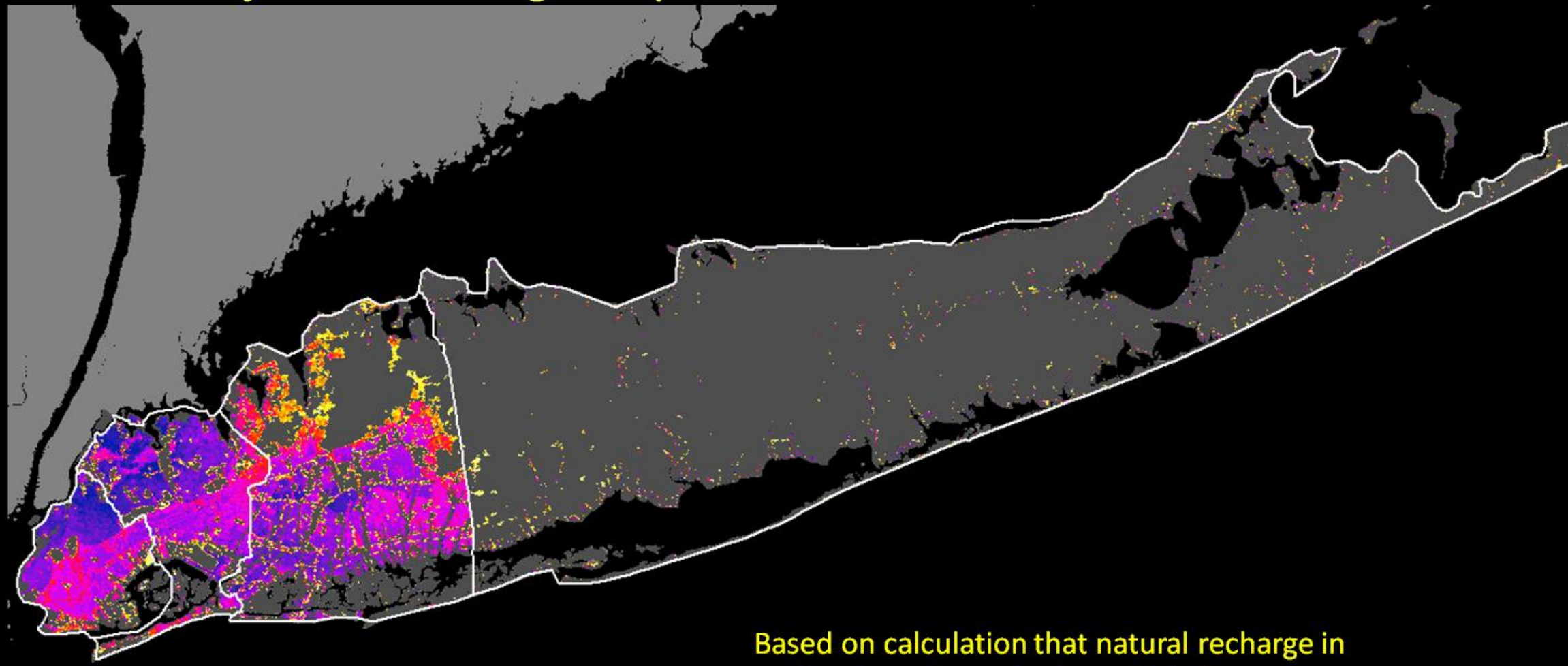
Physical: Soil types, topography

Anthropogenic: Land use, impervious area

Climate: Precipitation, temperature, ET

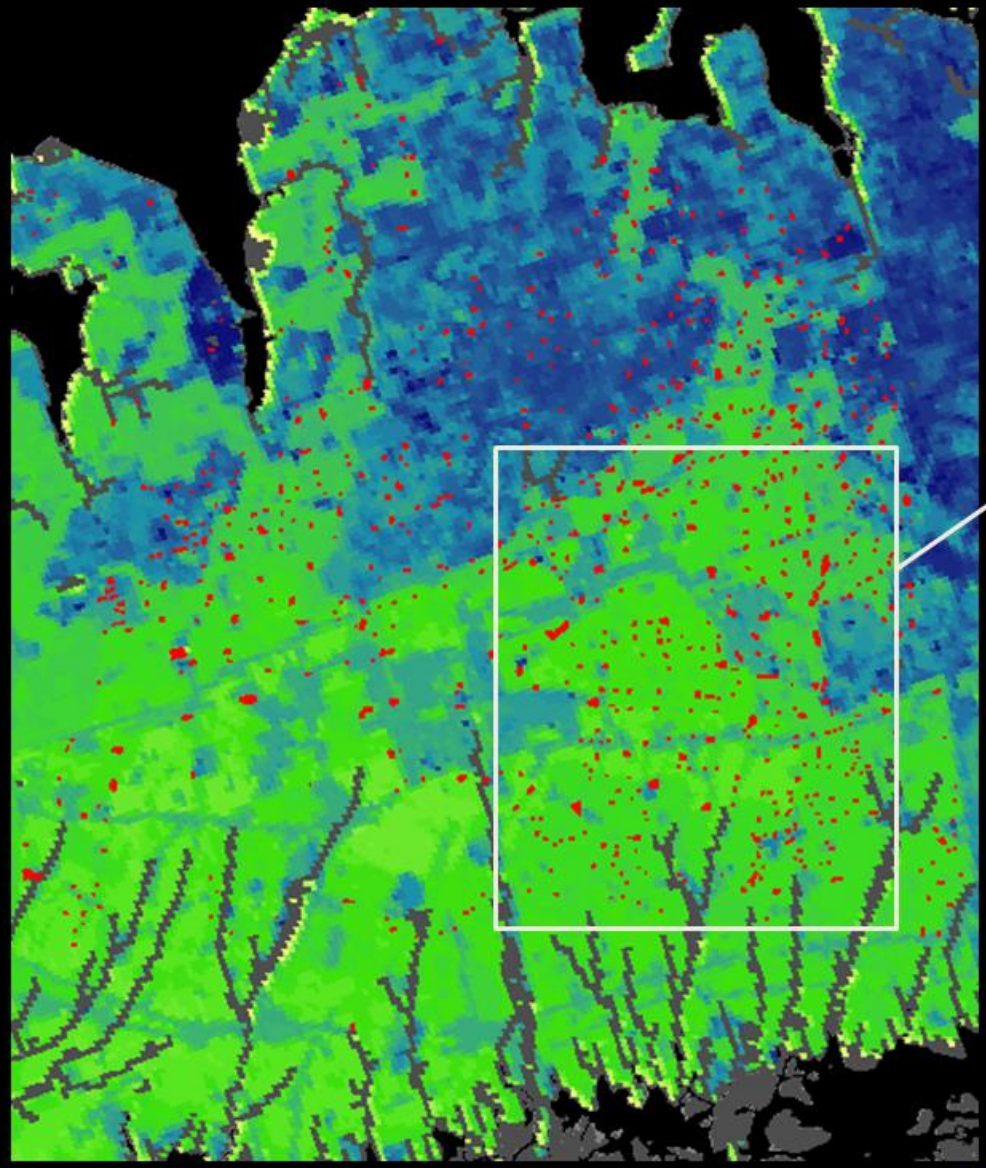
Hydrologic Stresses

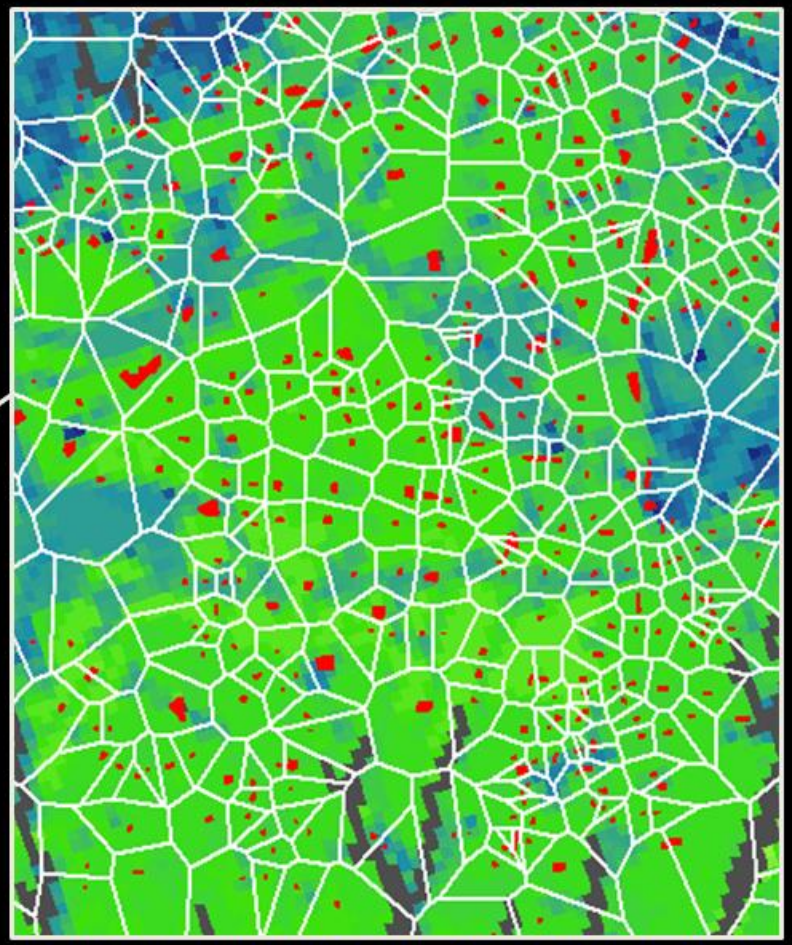
Rejected Recharge: Impervious Surface Effect



Based on calculation that natural recharge in undeveloped areas is about 25 in/yr

Nassau County Recharge Basins





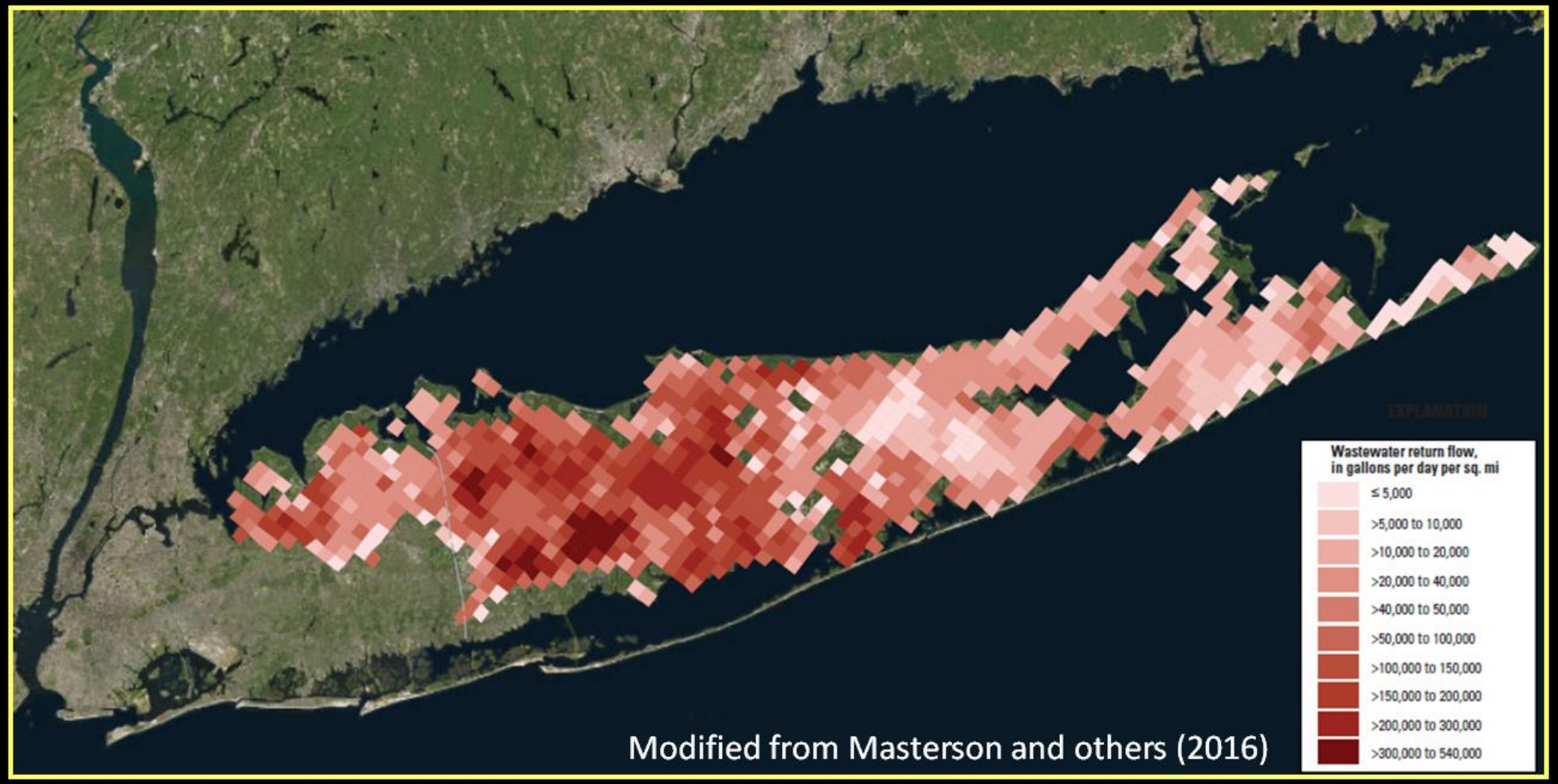
Assuming equidistant boundaries between basins

Rejected recharge, in/yr

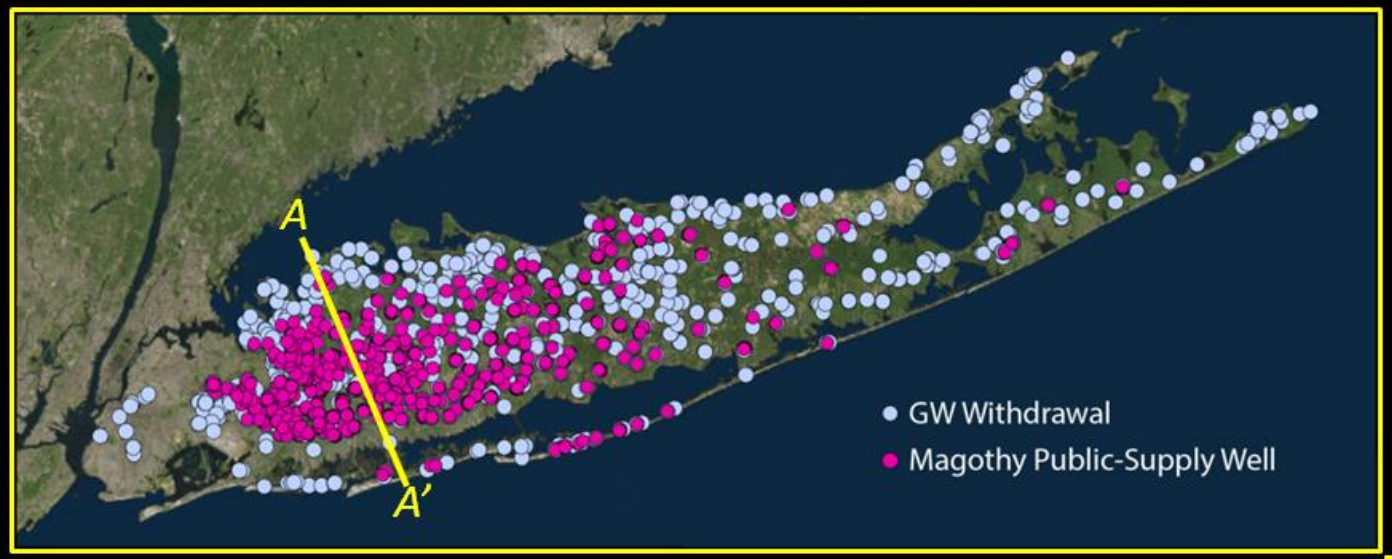
0 16

Hydrologic Stresses

Wastewater Returnflow: Current Conditions



Hydrologic Stresses: GW Withdrawals

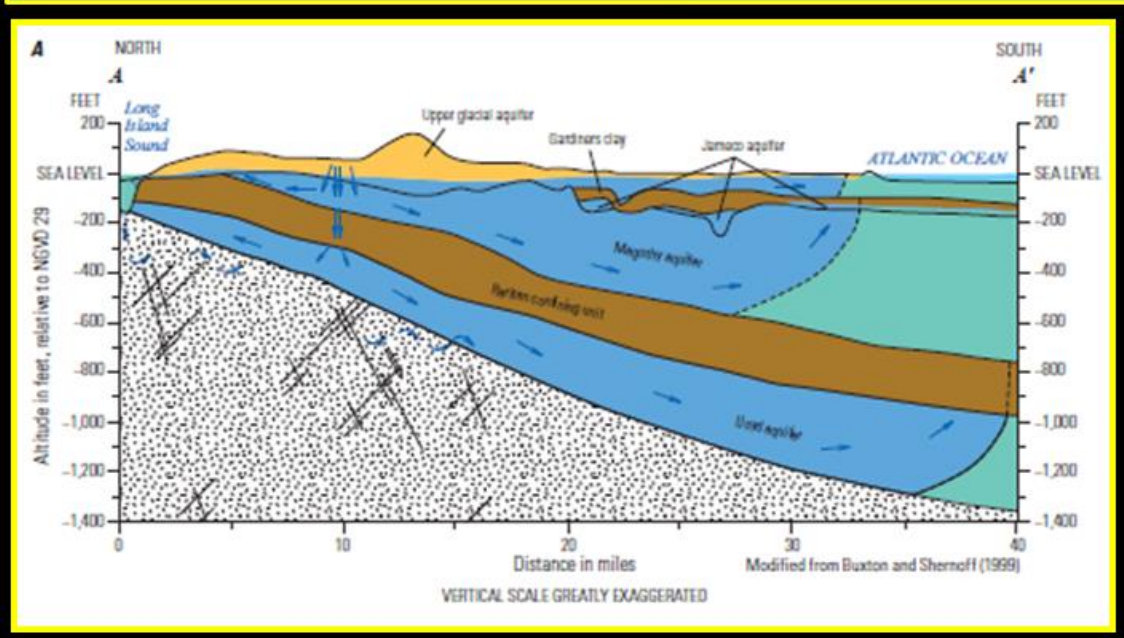


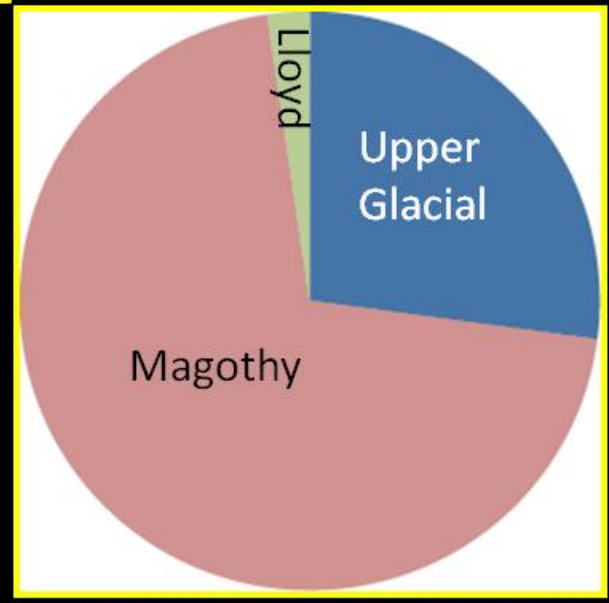
Total wells: 1548

Upper Glacial: 359

Magothy: 644

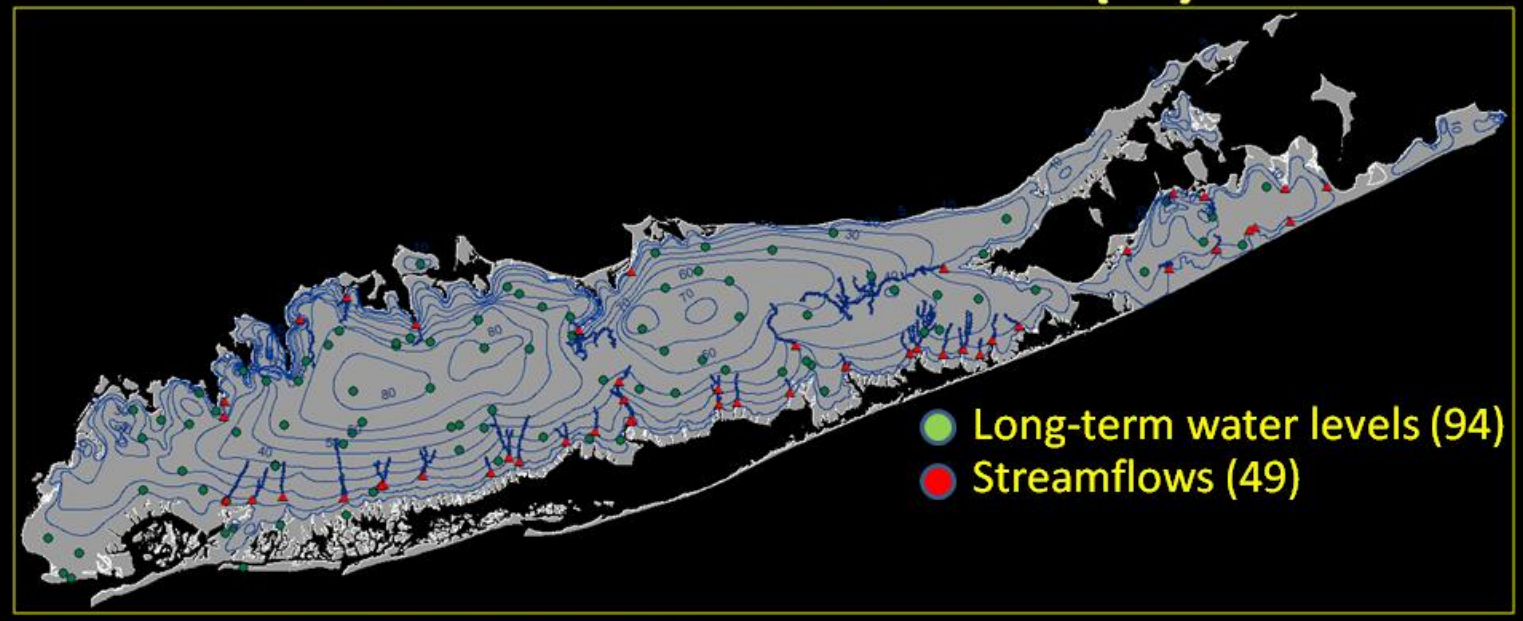
Lloyd, other: 545



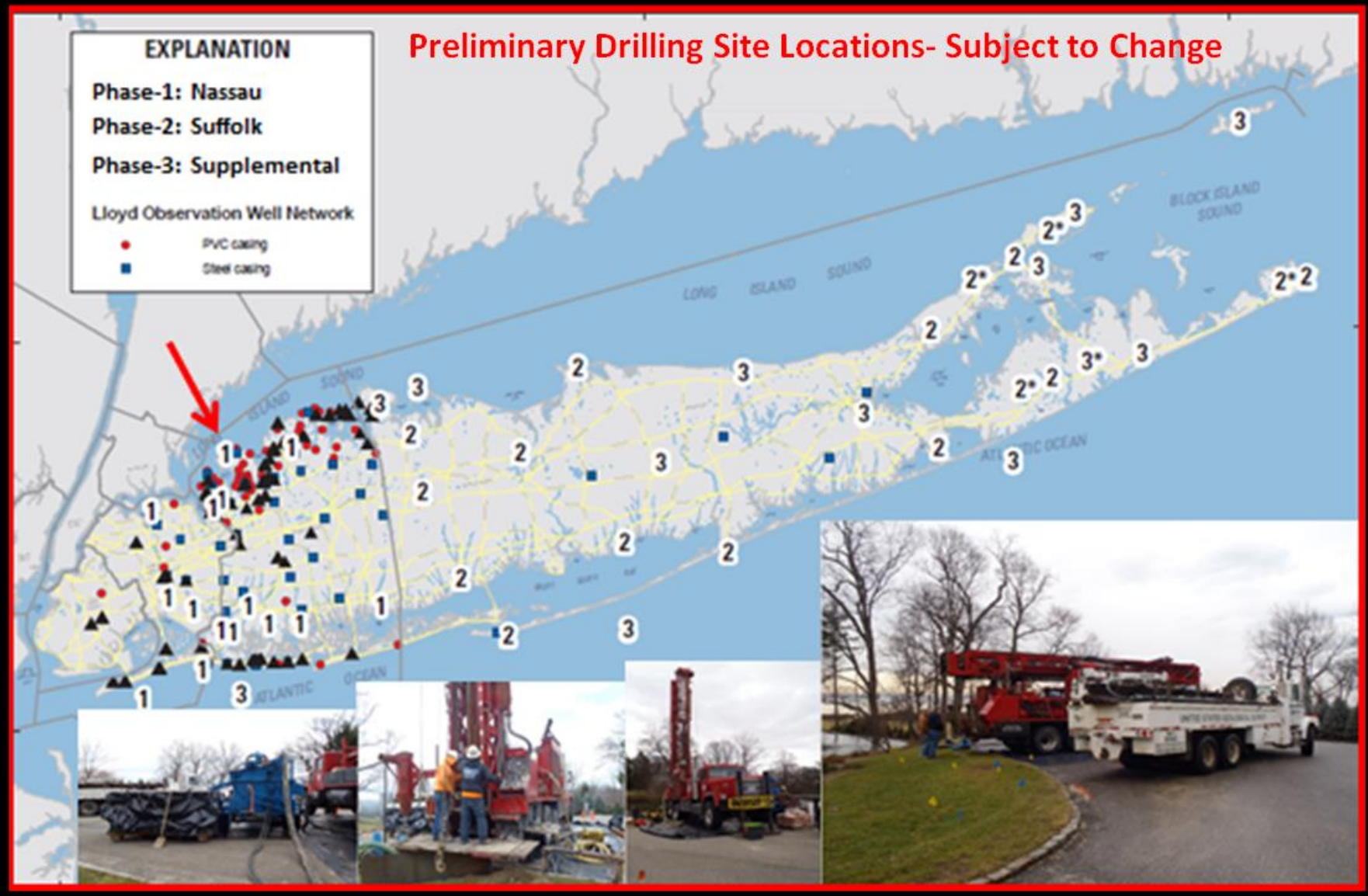


Total Withdrawals: ~400 Mgal/d

Model Calibration (1)



Model Calibration (2)



Groundwater Sustainability Scenarios

- Change in withdrawals:
  - Existing wells
  - New wells
  - Short-term, emergency reactivation of existing NYC wells
- Returnflow:
  - Wastewater
  - Recharge basins
  - Water reuse
- Climate change:
  - Sea-level Rise
  - Recharge (Changes to precip. and temp. regime)

Regional Sustainability Assessment:

Water Quantity:

- Calculate changes in water levels, streamflow, coastal discharge to be used for ecohydrological response assessment.

Water Quality:

- Determine potential areas susceptible saltwater intrusion and use groundwater age distribution for regional vulnerability/sustainability assessment.


Questions?