# BARNEGAT BAY SUBAQUEOUS & NEW JERSEY COASTAL ZONE SOIL SURVEY (CZSS)

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# WHY MAP SUBAQUEOUS AND COASTAL SOILS?

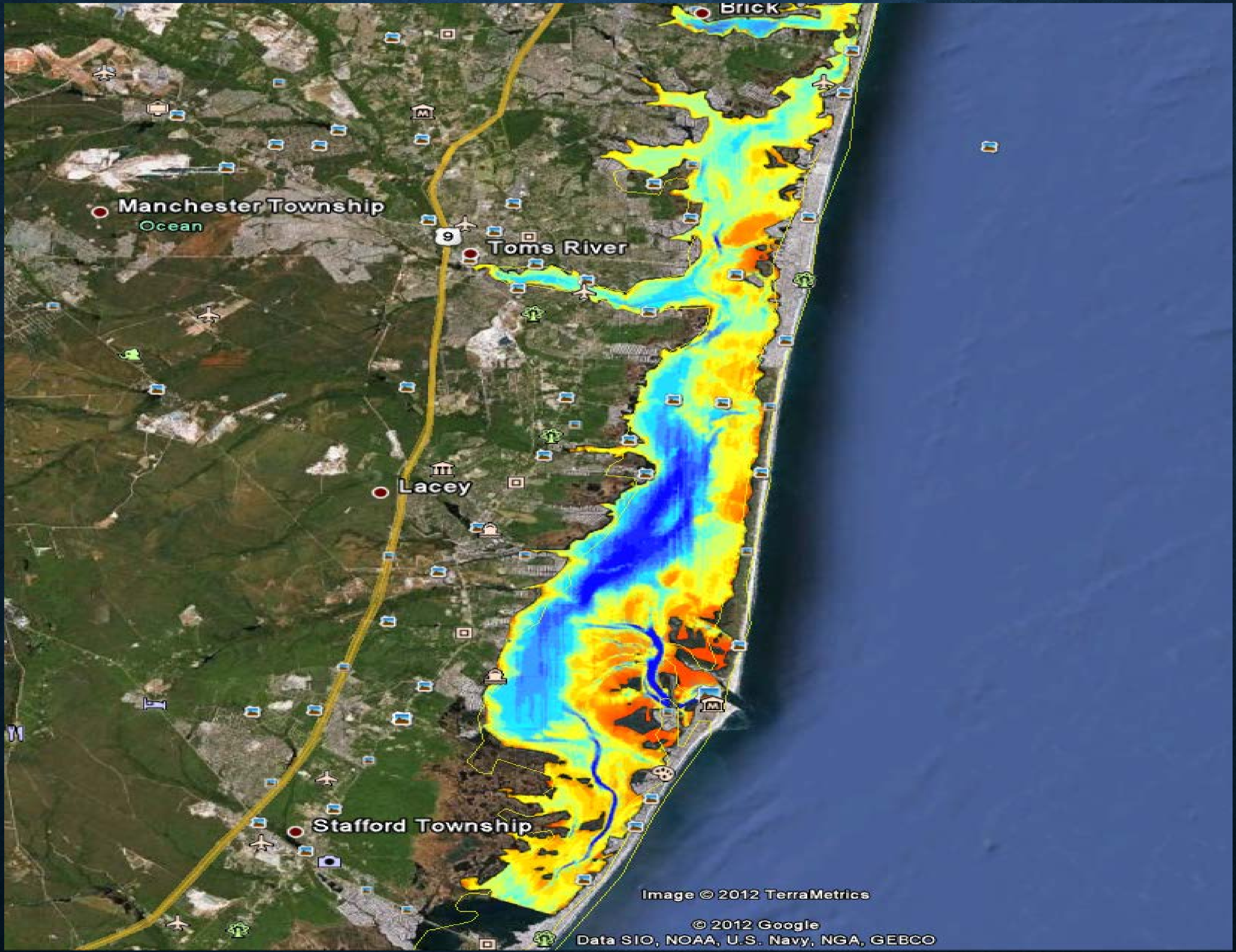
- **Coastal development, sea level rise (climate change), carbon / blue carbon sequestration , living shoreline / thin layer deposition restoration, aquaculture, shellfish and seagrass restoration, baseline data, etc.**

- Accurate inventories of these soils resources are a tool for future projects.
- Despite intense land use in CZ’s a data gap exists for consistent, accurate, and detailed soils information.
- I’m sure you can think of additional reasons for the need for this type of data.

# SUBAQUEOUS SOIL

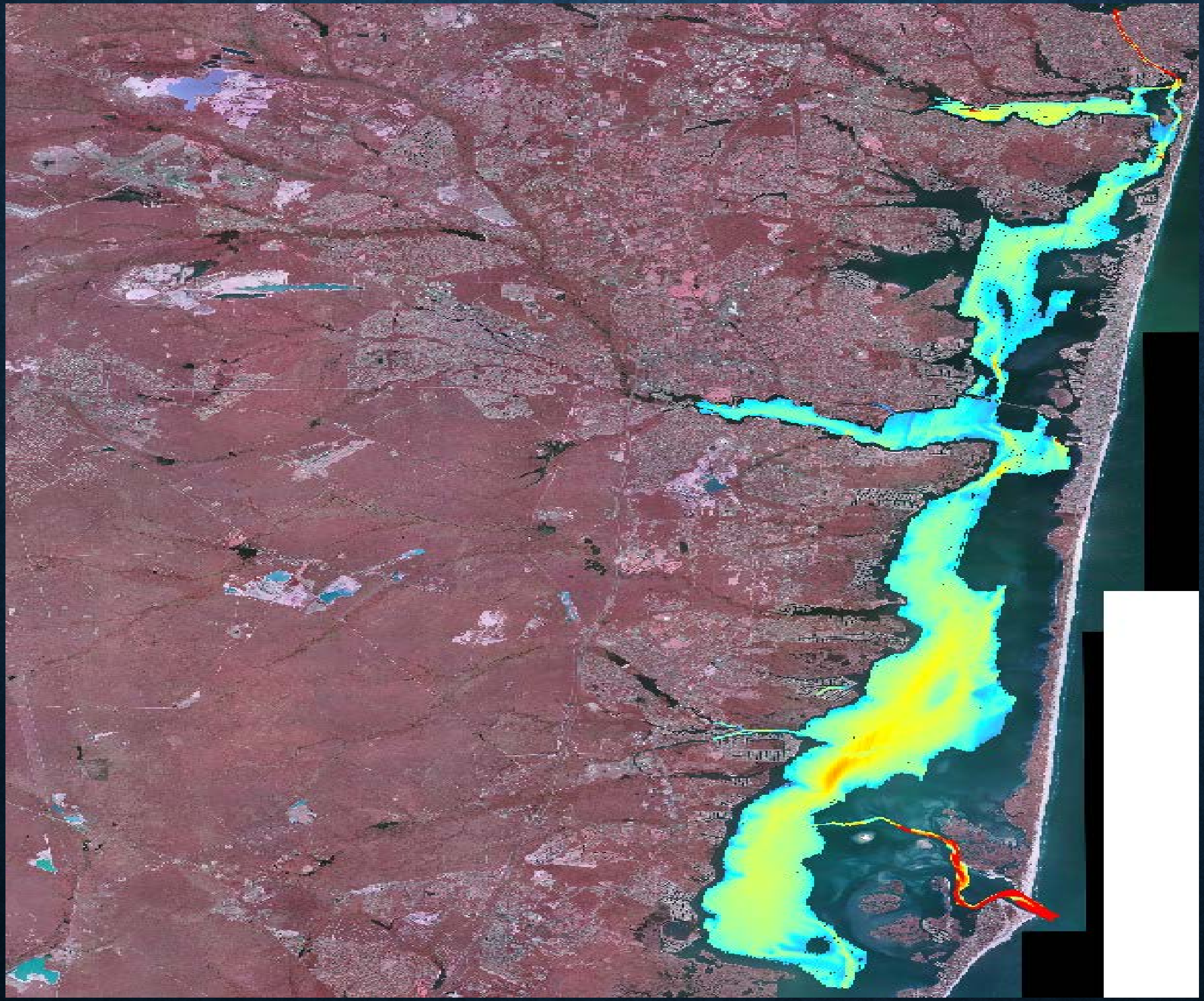
- Sediments with a positive water potential at the soil surface for more than 21 hours of each day. The water column is shallow (< 2.5 m / 8.2 feet). Wassists and Wassents.
- Soil must be capable of or presently supporting rooted plants in the natural environment and / or they must show evidence of horizonation due to soil forming processes.
- Four soil forming processes exist: additions, losses, transfers, and transformations are active in subaqueous environments.

# BATHYMETRIC MAPS (NOAA 1934 - 1936)

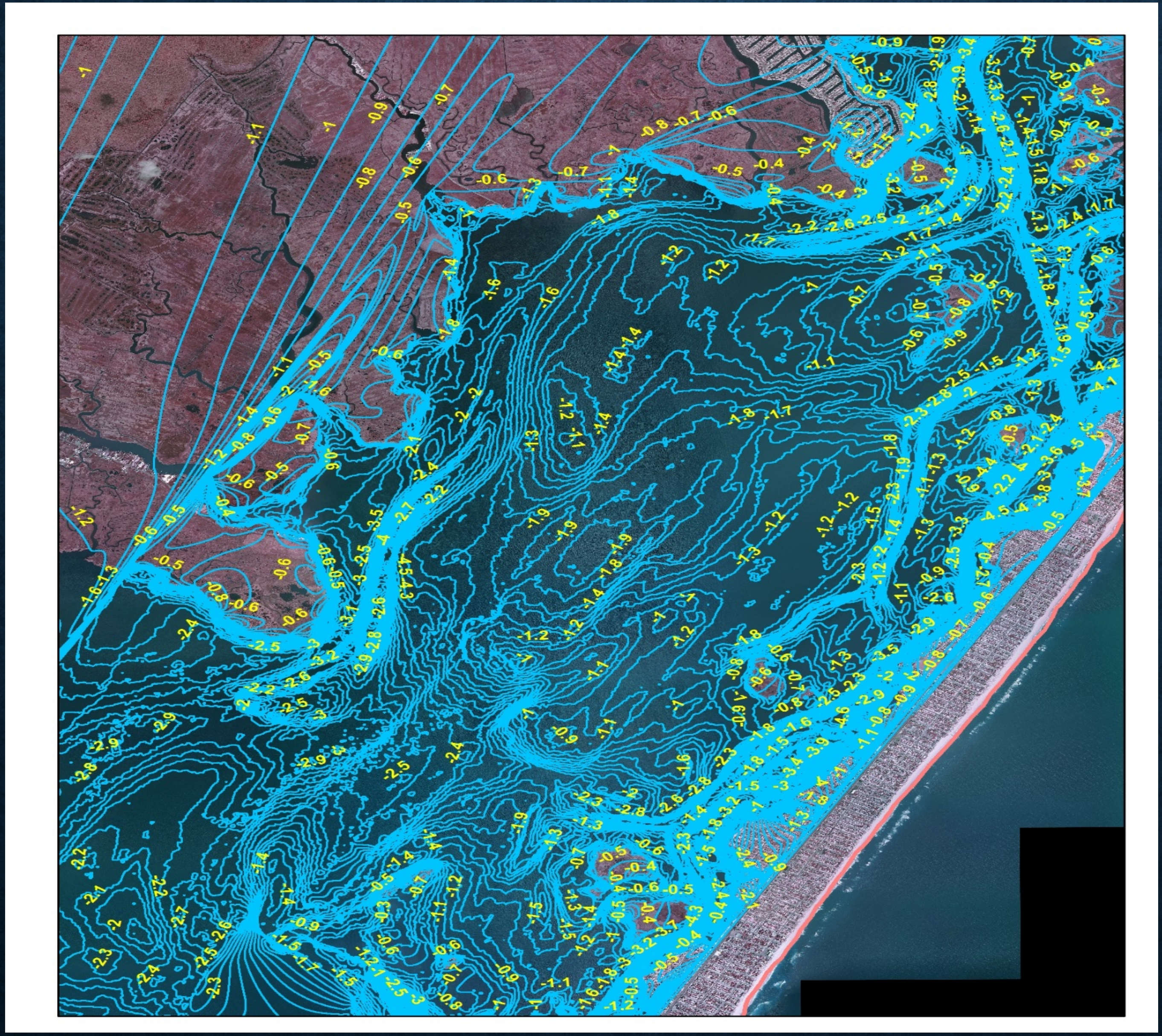


# BATHYMETRIC MAPS (USGS 2014)

USGS TO ALSO GENERATE BACKSCATTER AND SEISMIC DATA.

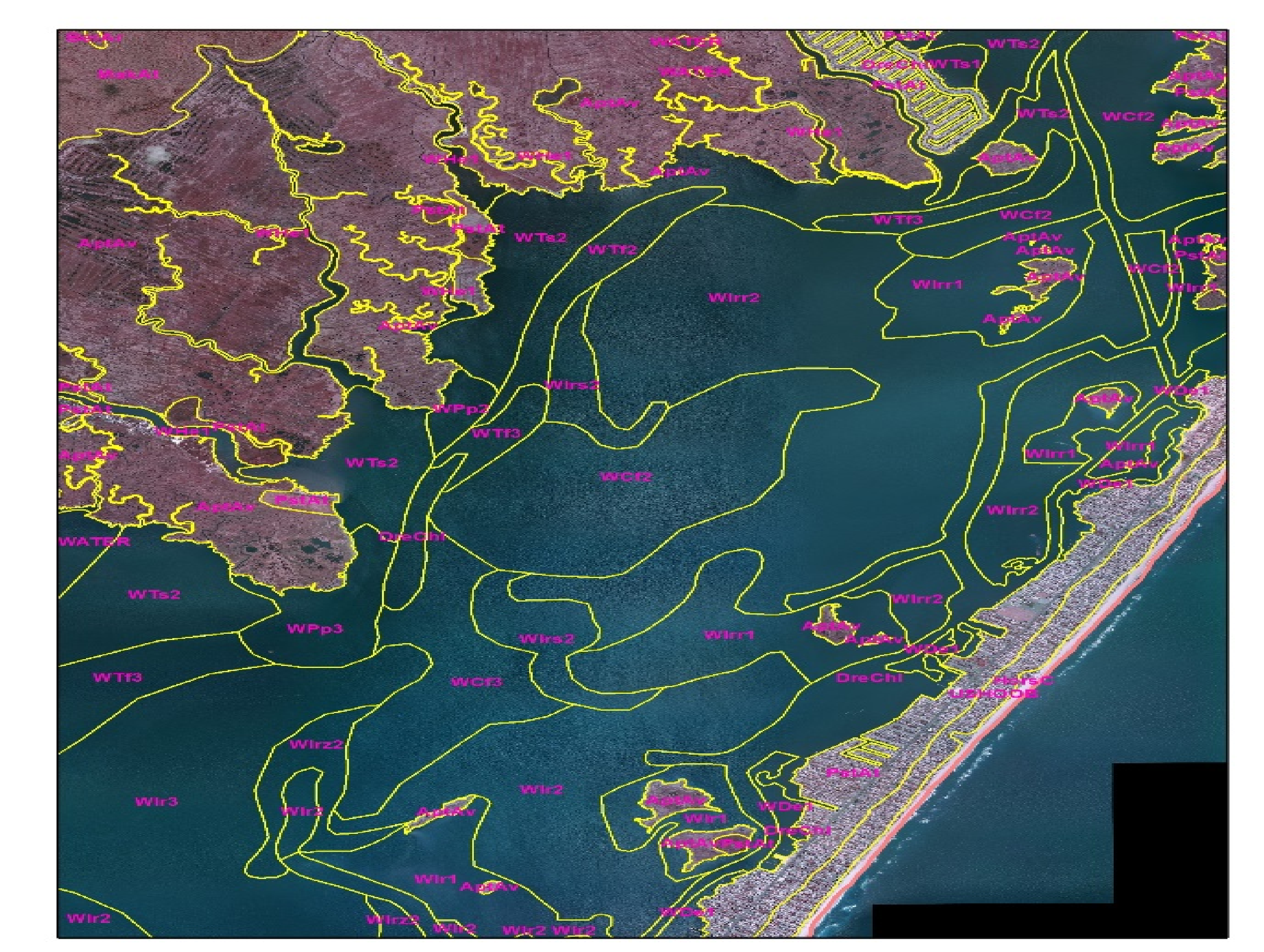


# PRE-SANDY USGS EAARL-B LIDAR 2015 (DS885)



The better the topo-bathy layer the better the subaqueous soil survey product.

# BARNEGAT BAY SUBAQUEOUS SOIL SURVEY



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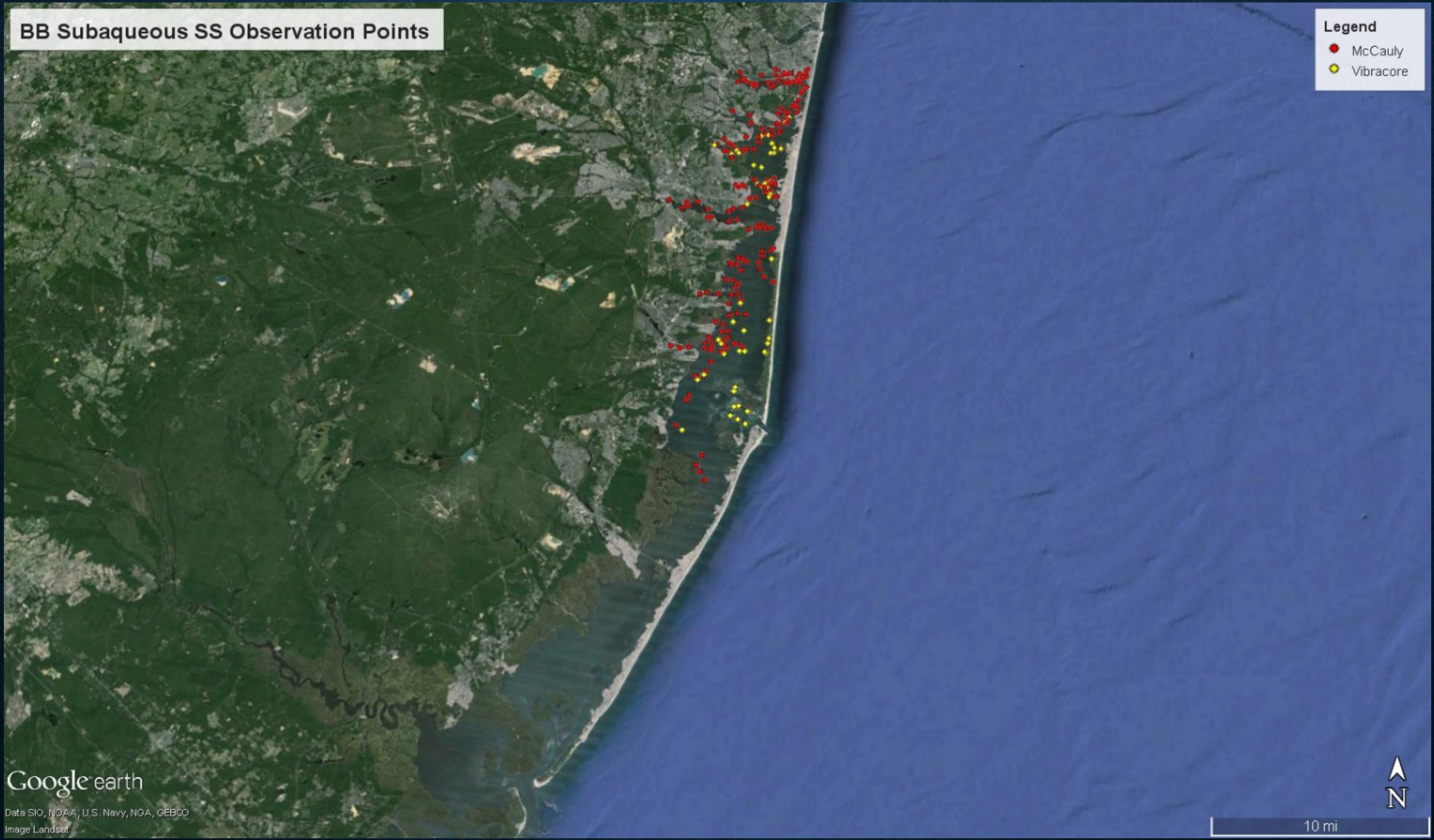


# BARNEGAT BAY SUBAQUEOUS SOIL SURVEY

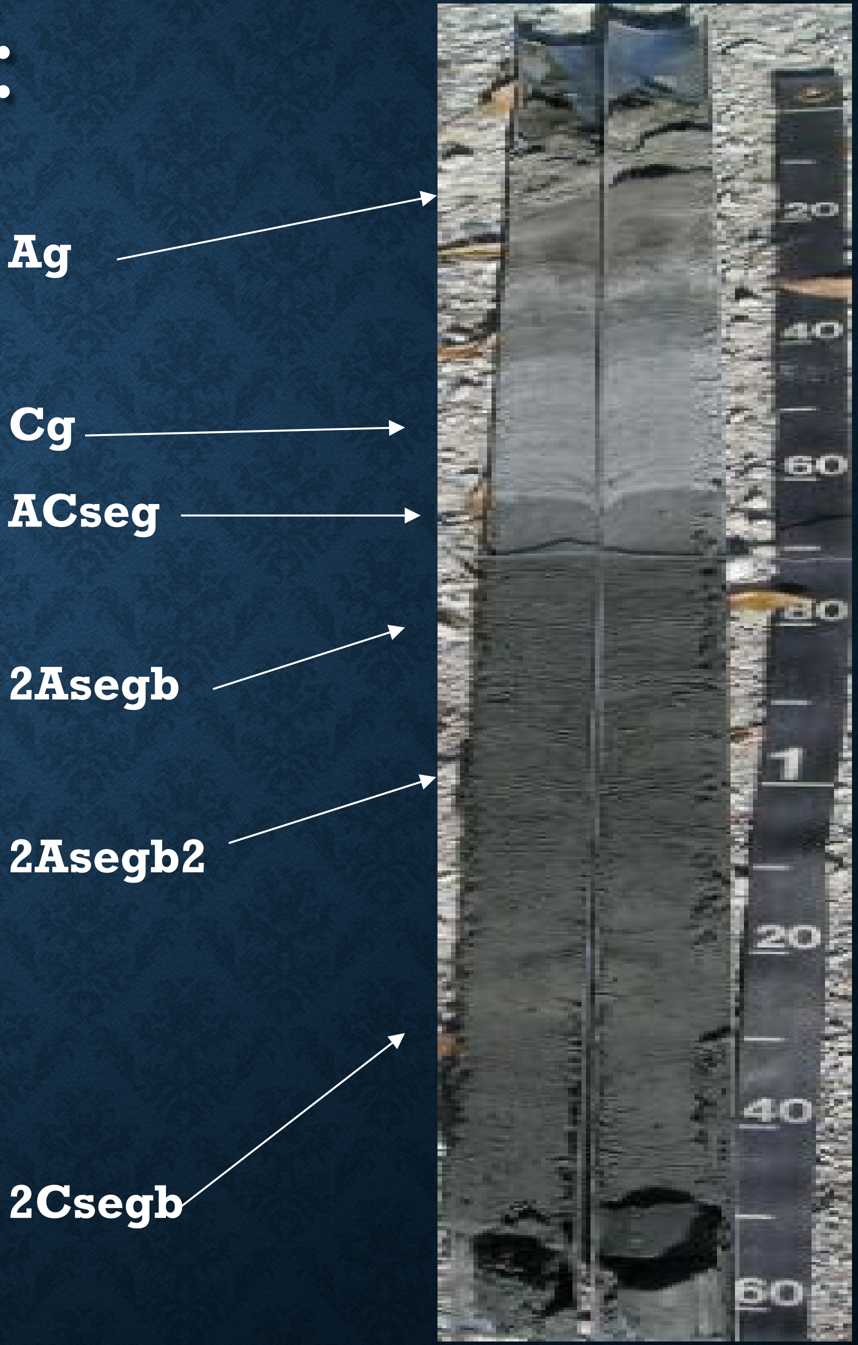
Cottman | Indian River | Indian River | Figgs | Truitt | Demas | Demas | Cottman | Indian River tax. | Indian River

# BARNEGAT BAY SUBAQUEOUS SOILS LEGEND

| MUSYM | MU Name | MU Acreage | MU Polygon Count | Landform | Taxonomic Class |
|---|---|---|---|---|---|
| WCf2 | Cottman mucky fine sandy loam, 1 to 2 meter water depth | 6599.0 | 10 | Lagoon Bottom Barrier Side | Coarse-loamy, mixed, subactive, nonacid, mesic Haplic Sulfiwassents |
| WCf3 | Cottman mucky fine sandy loam, 2 to 3 meter water depth | 3136.7 | 3 | Lagoon Bottom Barrier Side | Coarse-loamy, mixed, subactive, nonacid, mesic Haplic Sulfiwassents |
| DreChl | Dredge Channel (Long Neck soil series to be developed) | 7353.9 | 83 | Dredge Channel | Anthropogenic Feature |
| WDe1 | Demas loamy sand, 0 to 1 meter water depth | 1140.2 | 19 | Storm Surge Washover-fan Flat | Siliceous, mesic Sulfic Psammowassents |
| WHe1 | Herring Creek mucky silt loam, 0 to 1 meter water depth | 2565.3 | 25 | Estuarine Tidal Creeks | Fine-silty, mixed, subactive, nonacid, mesic Thapto-Histic Sulfiwassents |
| WHe2 | Herring Creek mucky silt loam, 1 to 2 meter water depth | 2105.5 | 4 | Estuarine Tidal Creeks | Fine-silty, mixed, subactive, nonacid, mesic Thapto-Histic Sulfiwassents |
| WHe3 | Herring Creek mucky silt loam, 2 to 3 meter water depth | 338.4 | 2 | Estuarine Tidal Creeks | Fine-silty, mixed, subactive, nonacid, mesic Thapto-Histic Sulfiwassents |
| WIr1 | Indian River sand, 0 to 1 meter water depth, flat | 6993.0 | 34 | Flood-tidal Delta Sand Flat (active) | Siliceous, mesic Fluventic Psammowassents |
| WIr2 | Indian River sand, 1 to 2 meter water depth, flat | 427.5 | 6 | Flood-tidal Delta Sand Flat (active) | Siliceous, mesic Fluventic Psammowassents |
| WIr3 | Indian River sand, 2 to 5 meter water depth | 850.4 | 3 | Flood-tidal Delta Channel (active) | Siliceous, mesic Fluventic Psammowassents |
| WIrr1 | Indian River sand, 0 to 1 meter water depth, relict flat | 6578.1 | 20 | Flood-tidal Delta Sand Flat (relict) | Siliceous, mesic Sulfic Psammowassents* |
| WIrr2 | Indian River sand, 1 to 2 meter water depth, relict flat | 2551.1 | 9 | Flood-tidal Delta Sand Flat (relict) | Siliceous, mesic Sulfic Psammowassents* |
| WIrs1 | Indian River sand, 0 to 1 meter water depth, relict slope | 314.1 | 3 | Flood-tidal Delta Slope (relict) | Siliceous, mesic Sulfic Psammowassents* |
| WIrs2 | Indian River sand, 1 to 2 meter water depth, relict slope | 1414.3 | 11 | Flood-tidal Delta Slope (relict) | Siliceous, mesic Sulfic Psammowassents* |
| WIrz2 | Indian River sand, 1 to 2 meter water depth, slope | 962.4 | 7 | Flood-tidal Delta Slope (active) | Siliceous, mesic Fluventic Psammowassents |
| WMt1 | Metedeconk mucky peat, 0 to 1 meter water depth | 424.4 | 3 | Estuarine Tidal Creek | Euic, mesic Typic Sulfiwassists |
| WPp1 | Pasture Point sandy loam, 0 to 1 meter water depth | 102.1 | 1 | Submerged Wave-cut Platform | Coarse-loamy, mixed, subactive, nonacid, mesic Haplic Sulfiwassents |
| WPp2 | Pasture Point sandy loam, 1 to 2 meter water depth | 669.0 | 4 | Submerged Wave-cut Platform | Coarse-loamy, mixed, subactive, nonacid, mesic Haplic Sulfiwassents |
| WPp3 | Pasture Point sandy loam, 2 to 3 meter water depth | 201.0 | 1 | Submerged Wave-cut Platform | Coarse-loamy, mixed, subactive, nonacid, mesic Haplic Sulfiwassents |
| WSn1 | Sinepuxent sand, 0 to 1 meter water depth | 248.2 | 11 | Dredge-deposit Shoal | Coarse-loamy, siliceous, subactive, nonacid, mesic Typic Sulfiwassents (Anthropogenic Feature) |
| WTf2 | Tingles-Figgs complex, 1 to 2 meter water depth | 1820.1 | 4 | Lagoon Bottom | Fine-silty (Tingles); Fine-loamy, mixed, subactive, nonacid, mesic Fluventic Sulfiwassents (Figgs) |
| WTf3 | Tingles-Figgs complex, 2 to 3 meter water depth | 4551.8 | 6 | Lagoon Bottom | Fine-silty (Tingles); Fine-loamy, mixed, subactive, nonacid, mesic Fluventic Sulfiwassents (Figgs) |
| WTf4 | Tingles-Figgs complex, 3 to 4 meter water depth | 1249.4 | 2 | Lagoon Bottom | Fine-silty (Tingles); Fine-loamy, mixed, subactive, nonacid, mesic Fluventic Sulfiwassents (Figgs) |
| WTn2 | Tingles mucky silt loam, 1 to 2 meter water depth | 205.8 | 1 | Lagoon Bottom | Fine-silty, mixed, subactive, nonacid, mesic Fluventic Sulfiwassents |
| WTn3 | Tingles mucky silt loam, 2 to 3 meter water depth | 450.9 | 1 | Lagoon Bottom | Fine-silty, mixed, subactive, nonacid, mesic Fluventic Sulfiwassents |
| WTr1 | Trappe sand, 0 to 1 meter water depth | 365.0 | 8 | Submerged Mainland Beach or WCP's | Siliceous, mesic Sulfic Psammowassents |
| WTs1 | Truitt-Southpoint-Tumagan complex, 0 to 1 meter water depth | 3603.9 | 3 | Mainland Cove | Fine-silty, mixed, subactive, nonacid, mesic Fluventic Sulfiwassents (Truitt); Fine-silty, mixed, subactive, nonacid, mesic Thapto-Histic Sulfiwass |
| WTs2 | Truitt-Southpoint-Tumagan complex, 1 to 2 meter water depth | 7449.1 | 15 | Mainland Cove | Fine-silty, mixed, subactive, nonacid, mesic Fluventic Sulfiwassents (Truitt); Fine-silty, mixed, subactive, nonacid, mesic Thapto-Histic Sulfiwass |
| | **Total** | **64670.60** | **299** | | |

# SOIL FORMATION: SOIL HORIZONS

- Organic (Oa or Oe) and mineral (A and C) horizons.
- Predominantly dealing with AC type soils (Entisols - Wassents).
- Numerous buried A and O horizons.
- Some subaqueous and submerged soils have buried B horizons.



# COASTAL ZONE SOIL SURVEY

- Detailed re-map of the coastal soils (dunes, marshes, beaches) and initial soil survey mapping on the subaqueous
- Build interpretations for coastal uses (thin layer dep, living shoreline, revise flooding potentials, sedimentation, etc.)
- This would be the only data* that provides this level of seamless detail and information for the coastal zone
- How = use traditional soil survey methods along with remote sensing technologies (Lidar, pictometry, DEM's, high resolution imagery, etc.)
- Please help make CZSS a reality!!

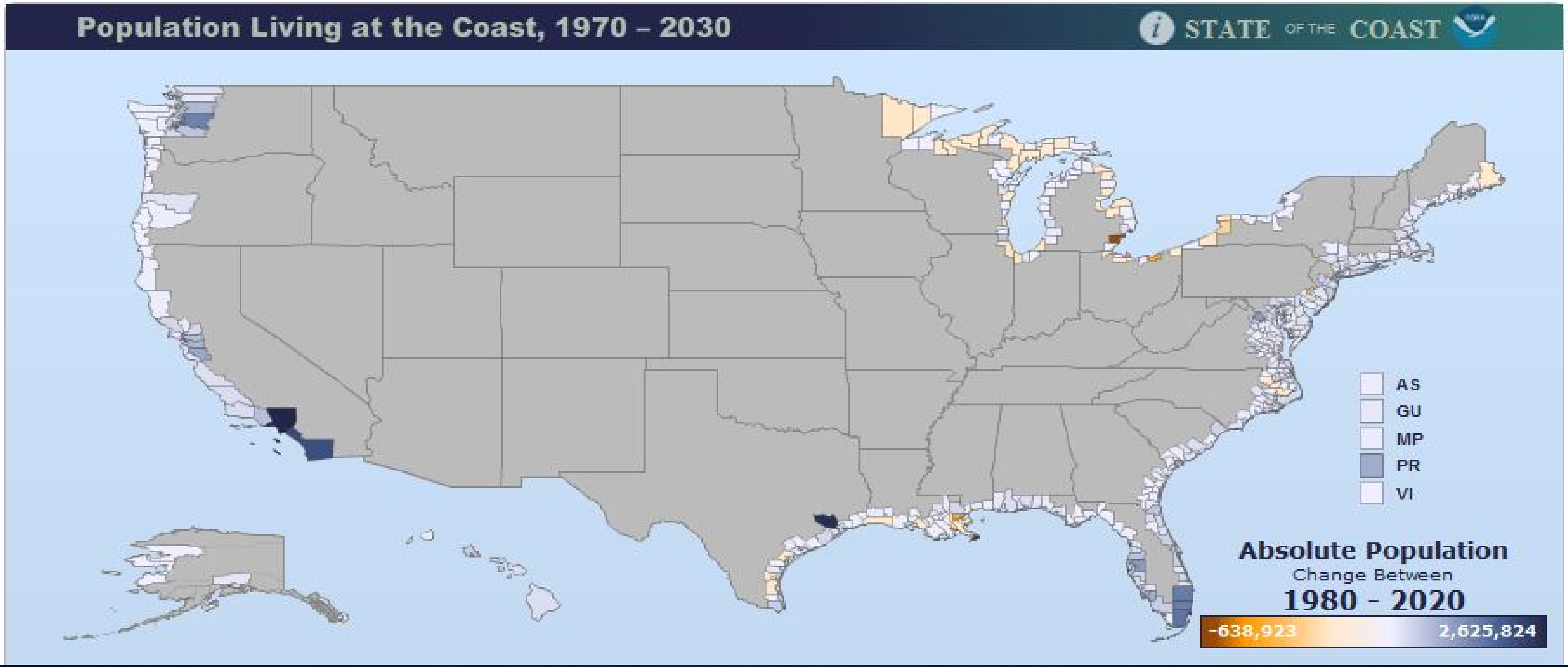
# COASTAL ZONE SOIL SURVEY – WHY?

**39%**
Percent of the nation's total population that lived in Coastal Shoreline Counties in 2010 (less than 10% of the total land area excluding Alaska).
*Source: U.S. Census Bureau, 2011*

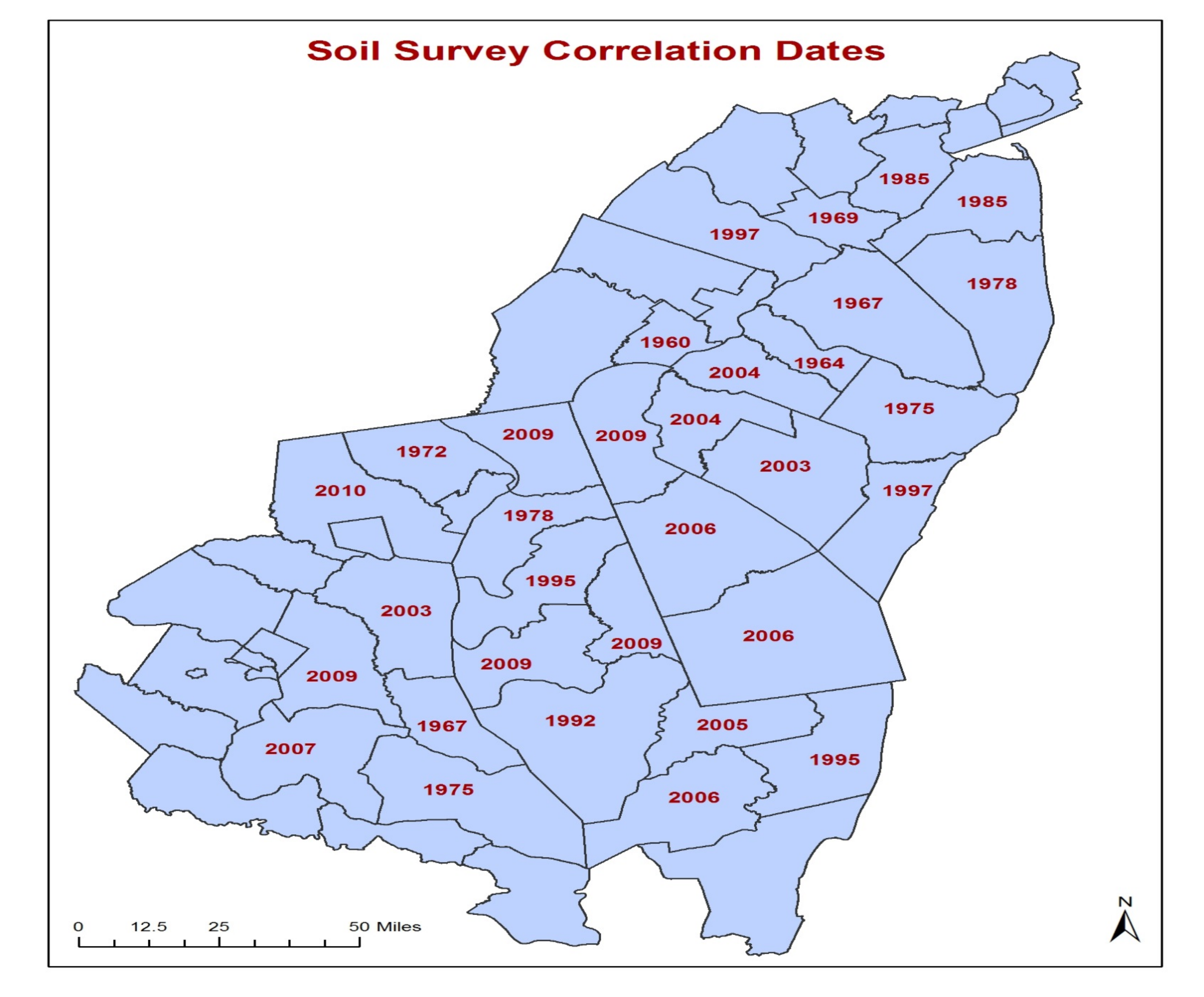
**34.8 million**
Increase in U.S. Coastal Shoreline County population from 1970 to 2010 (or a 39% increase).
*Source: U.S. Census Bureau, 2011*

**446 persons/mi²**
Average population density of the Coastal Shoreline Counties (excluding Alaska). Density in U.S. as a whole averages 105 persons/mi².
*Source: U.S. Census Bureau, 2011*

**37 persons/mi²**
Expected increase in U.S. Coastal Shoreline County population density from 2010–2020. Expected increase for entire U.S. is 11 persons/mi².
*Source: Woods & Poole, 2011; NOAA, 2012*



# COASTAL ZONE SOIL SURVEY



# SOIL SCIENCE DIVISION 2015 PRIORITIES

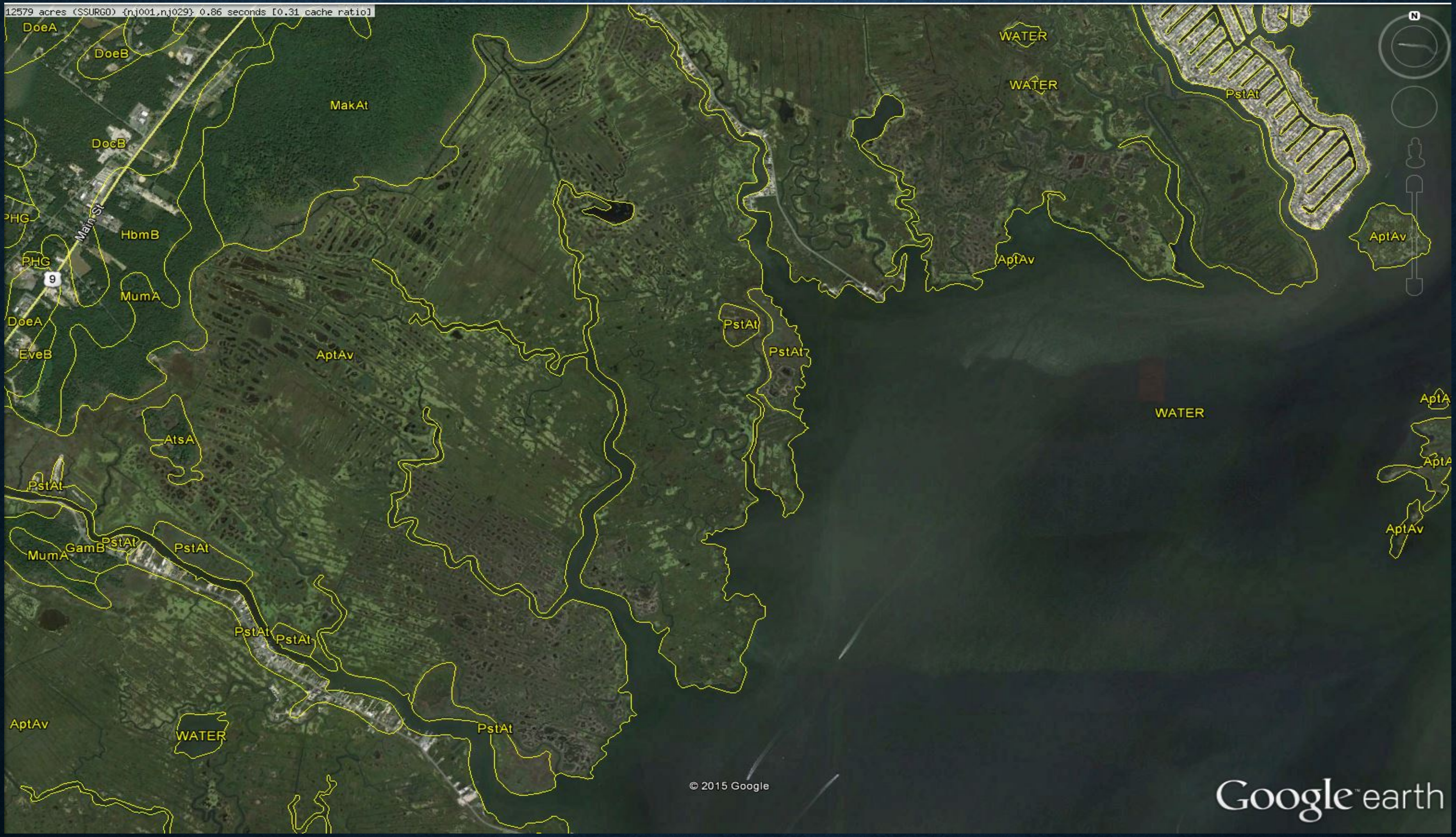
1. Strengthen the National Cooperative Soil Survey (NCSS) with partners.
2. Sharpen the focus of technical soil services.
3. Increase the integration of soil science with USDA and NRCS climate change initiatives. (please help make CZSS a reality)
4. Accelerate the Soil Survey Data Join Recorrelation (SDJR) initiative.
5. Accelerate the development of ecological site products.
6. Formulate a plan to accelerate the foundational (initial) soil inventory on all lands.

# COASTAL ZONE SOIL SURVEY – SPATIAL DEFICIENCIES


# COASTAL ZONE SOIL SURVEY

- Top priority on coastal zone: Remap undifferentiated / complex map units to series. Map high/low marshes/halinity classes and understand OMWM sites vs. undisturbed marsh (conduct sampling). Line / polygon work.
- Adjust beaches and dunes to current ortho (or National Shoreline). Mineralogy (Quartzi vs Udi). Soil Temp class (mesic or thermic)
- Utilize Lidar, High res aerial and Pictometry.
- Map storm surge zones as phases (barrier island residents).
- Tabular: Populate data – coastal features should have some flooding/erosion.
- Look at interps to check if accurate.

# SALT MARSH - OPEN MARSH WATER MANAGEMENT (OMWM)



# SALT MARSH - OPEN MARSH WATER MANAGEMENT (OMWM)

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- 4 COMPONENTS of these systems in which we (NRCS) have little data for:

1. Water – subaqueous soil component
2. Marsh – spoil placement soil component
3. Marsh – undisturbed salt marsh soil component
4. The Marsh OMWM island


# COASTAL ZONE SOIL SURVEY – SALT MARSH

# COASTAL ZONE SOIL SURVEY – SALT MARSH

# COASTAL ZONE SOIL SURVEY – SALT MARSH

- AptAv – What is it? Does this adequately capture the soils of all the salt marshes in NJ? Does this mapunit take into account the OMWM sites? We (NRCS) do not have documentation for this mapunit. Where's the B / where's the D? Can we correlate these soils to project success and failure?
- Appoquinimink – Thapto-histic Sulfaquents (40%)
- Transquaking – Typic Sulfihemists (30%)
- Mispillion – Terric Sulfihemists (25%)


**Map Unit Composition**
Map units consist of 1 or more soil types, commonly referred to as "components".

| Component Name |
| --- |
| Soil Type 1 **Appoquinimink** |
| Soil Type 2 **Transquaking** |
| Soil Type 3 **Mispillion** |
| Soil Type 4 **Hammonton** |

*Note: links to horizon data marked with an * are approximate.*

**Map Unit Data** What is a Map Unit?
Cartographic information about this map unit.

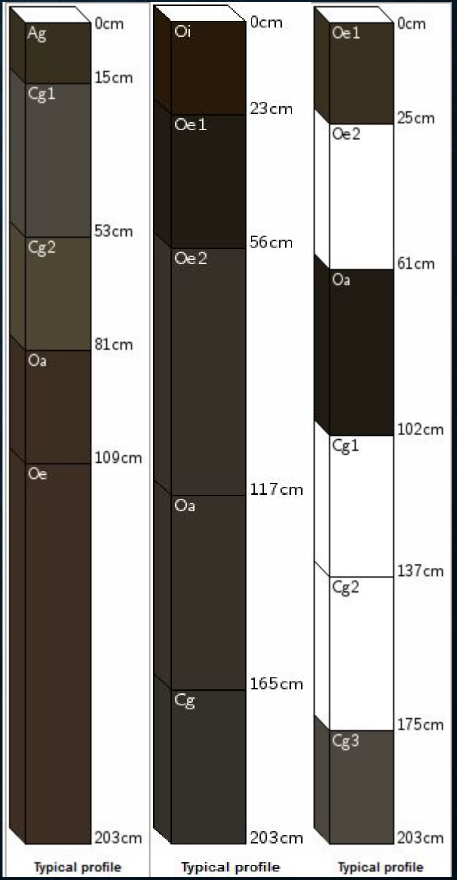
| | |
| --- | --- |
| **Map Unit Name:** | *Appoquinimink-Transquaking-Mispillion complex, 0 to 1 percent slopes, very frequently flooded* |
| **Map Unit Type:** | *Complex* |
| **Map Unit Symbol:** | *AptAv* |
| **Map Unit Area:** | *acres (26606ac. total in survey area)* |

Raw Map Unit Data
Raw Component Data (All Components)

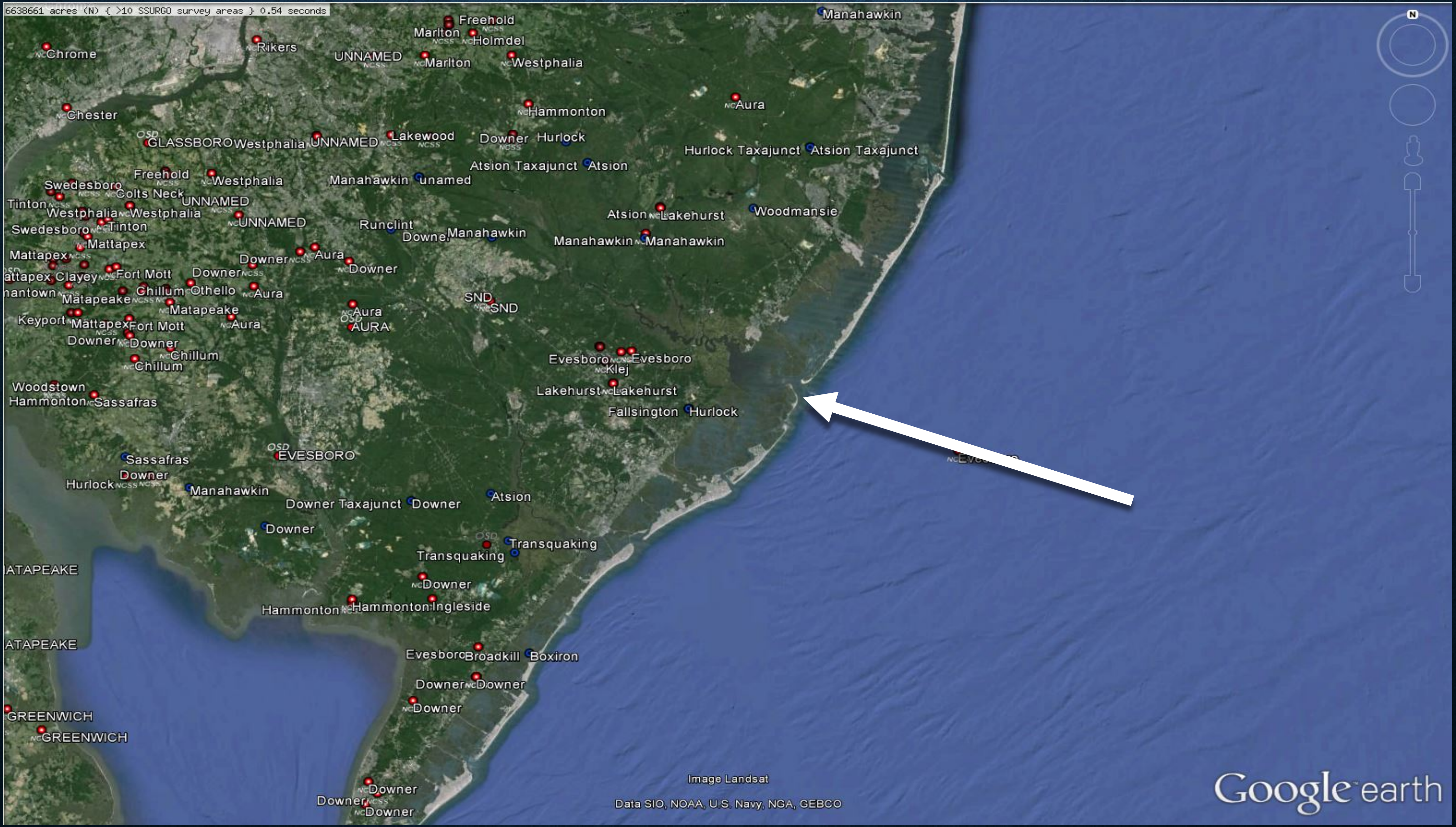
**Map Unit Aggregated Data**
Generalized soils information within this map unit.

| | |
| --- | --- |
| **Farmland Class:** | *Farmland of unique importance* |
| **Available Water Storage (0-100cm):** | *31.72 cm* |
| **Max Flood Freq:** | *Very frequent* |
| **Drainage Class (Dominant Condition):** | *Very poorly drained* |
| **Drainage Class (Wettest Component):** | *Very poorly drained* |
| **Hydric Conditions:** | *95* |
| **[Annual] Min. Water Table Depth:** | *n/a* |
| **[April-June] Min. Water Table Depth:** | *n/a* |
| **Min Bedrock Depth:** | *n/a* |

Raw Aggregated Map Unit Data

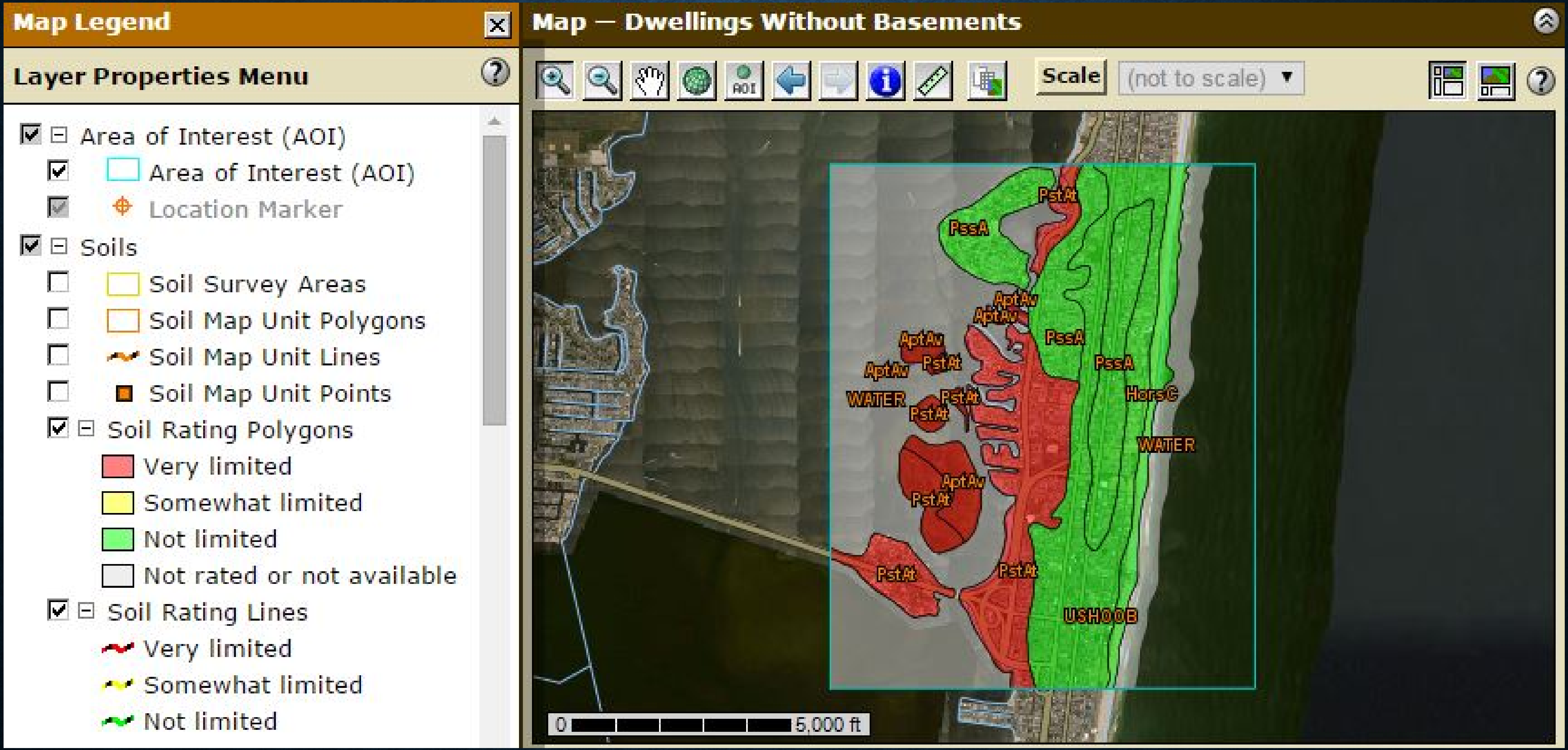


# COASTAL ZONE SOIL SURVEY

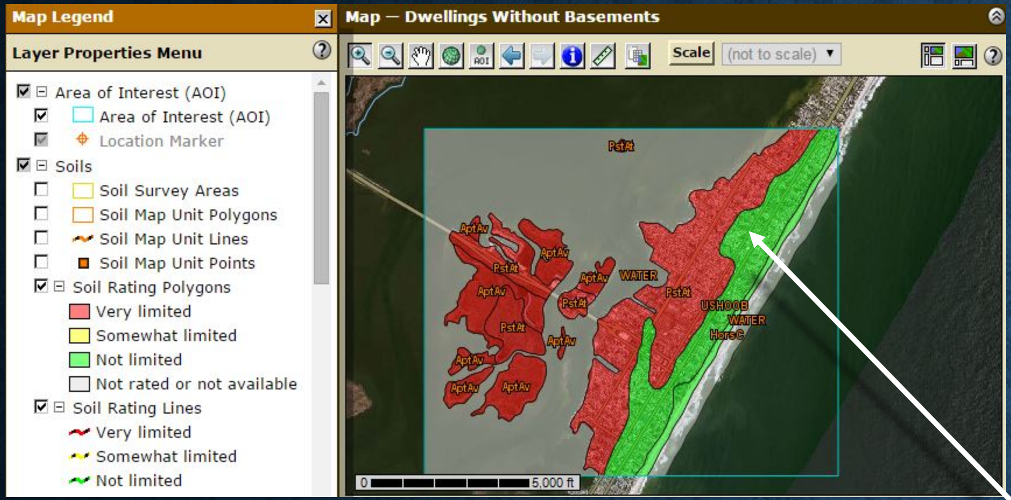


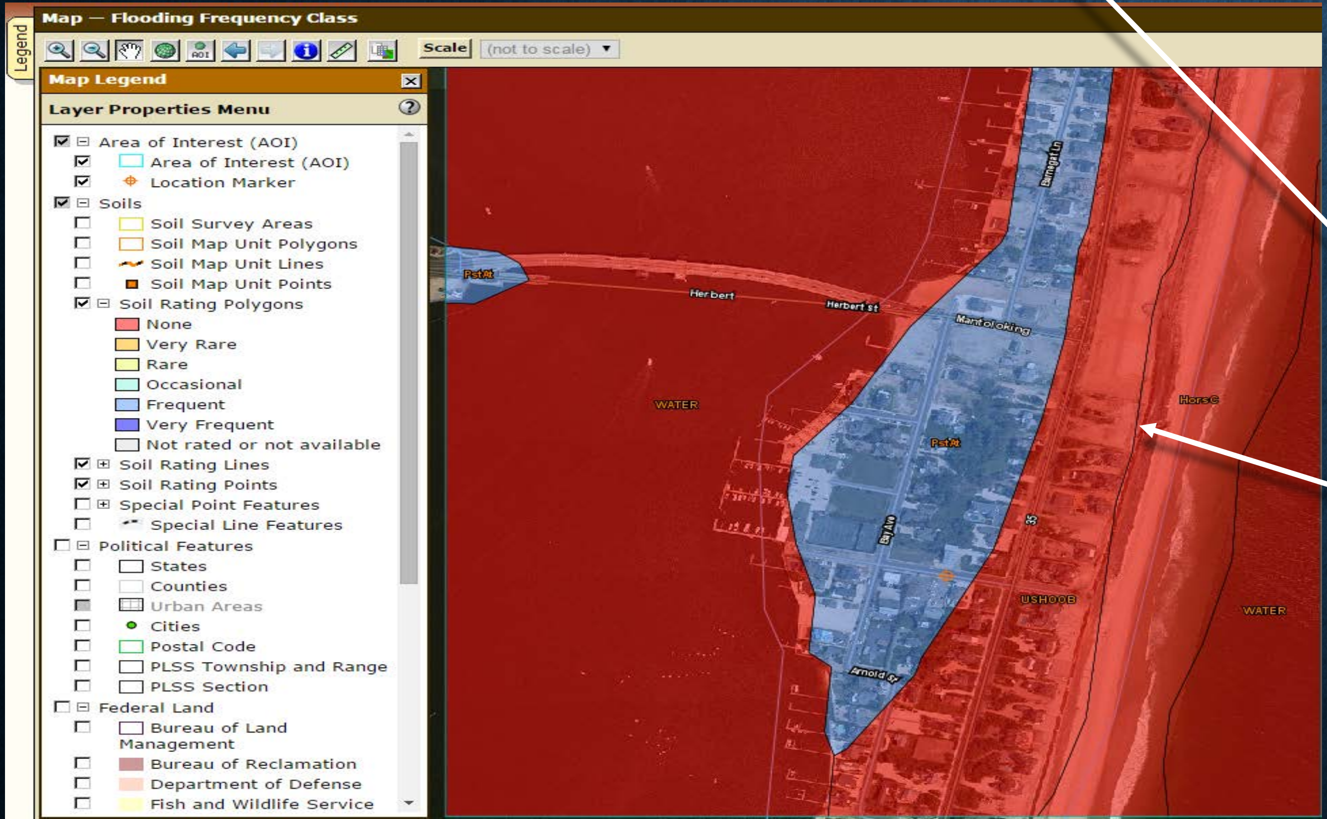
# COASTAL ZONE SOIL SURVEY – SHORELINE CHANGE ANALYSIS (NOAA NATIONAL SHORELINE)

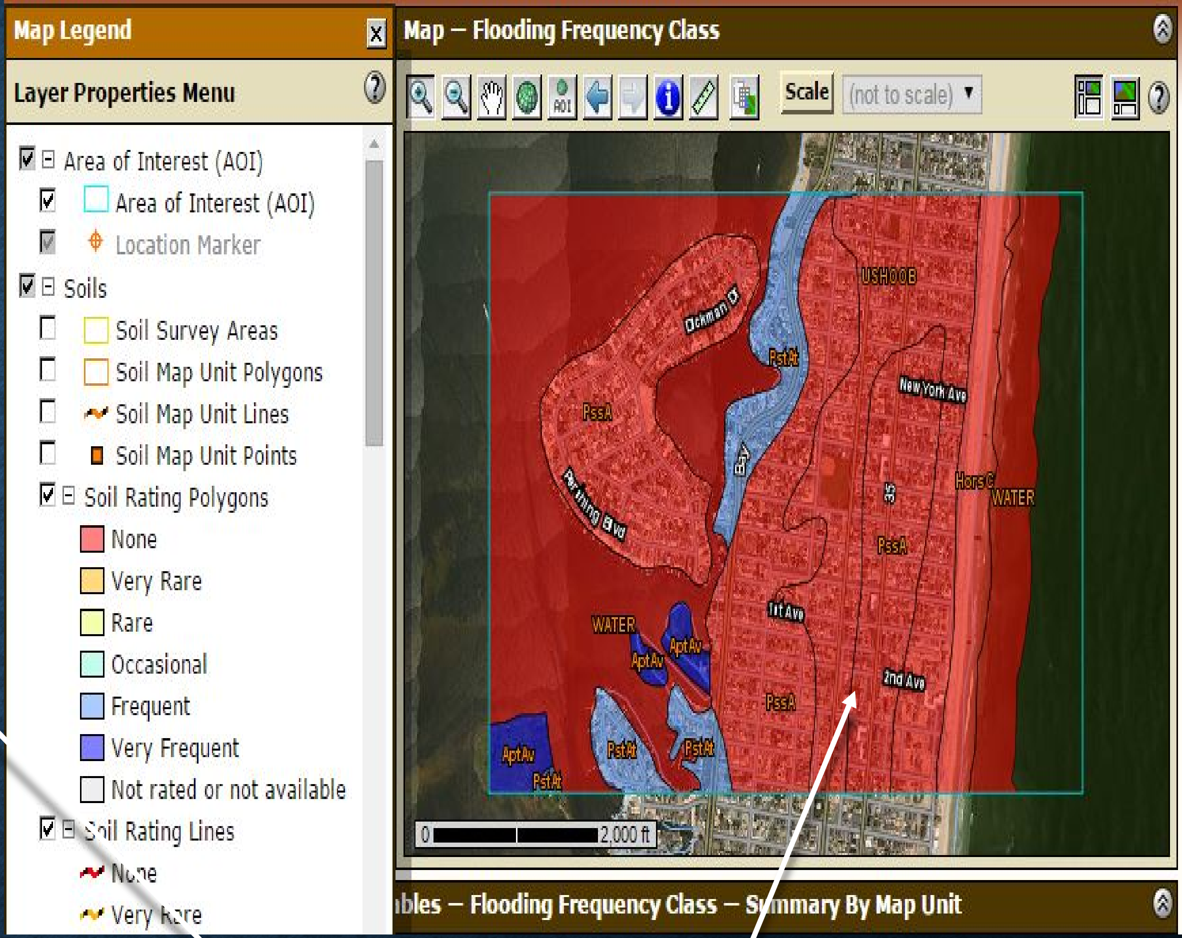

# WEB SOIL SURVEY (SEASIDE HEIGHTS)



# WEB SOIL SURVEY (LBI, MANTOLOKING & SEASIDE HEIGHTS)



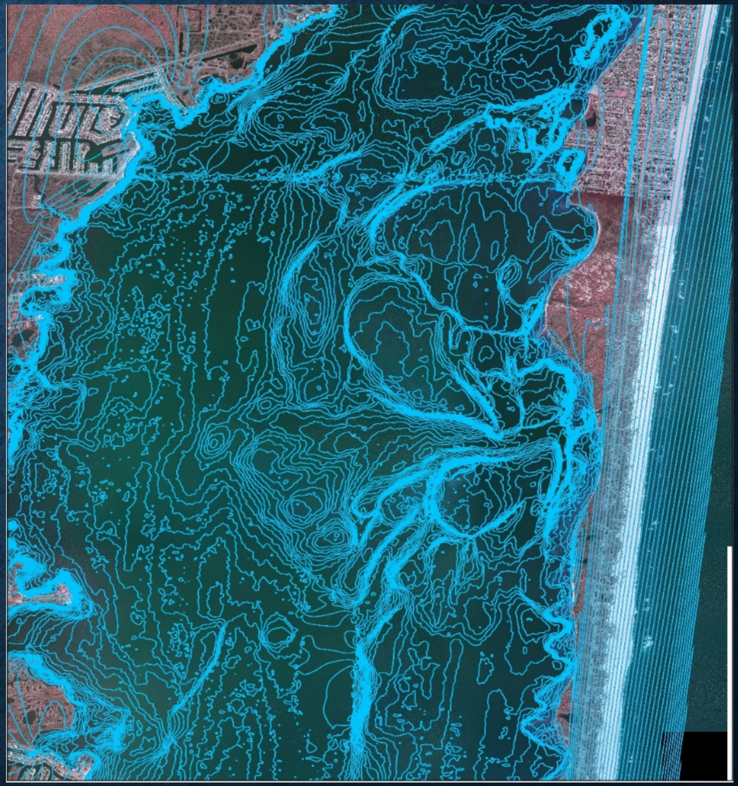




We definitely can do better!!!

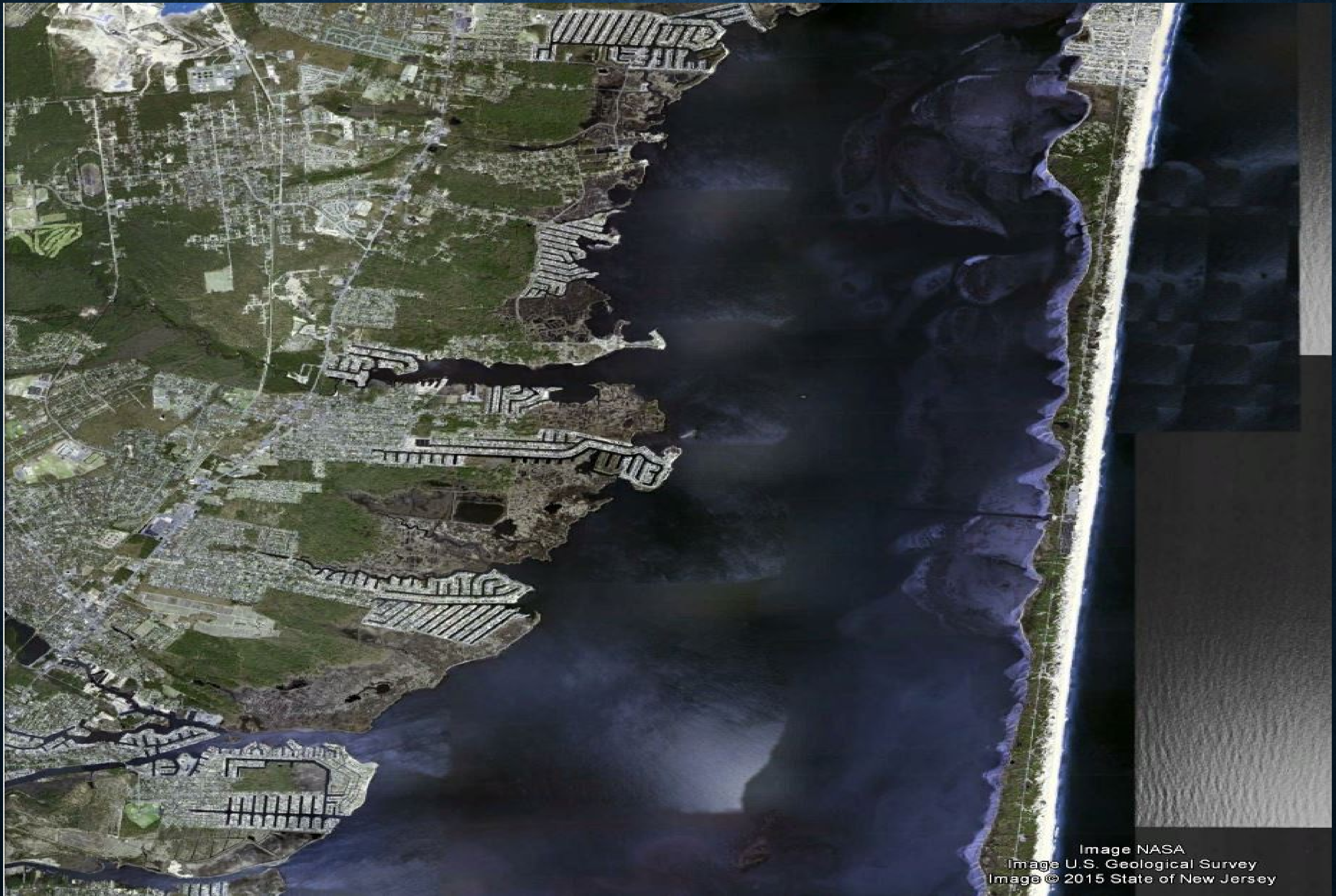
# COASTAL ZONE SOIL SURVEY – WHEN?

- **Year 1 (2012) – Acquire bathymetry and determine / generate basic soils and landform map (reimbursable for product) Mostly Complete!!**
- **Year 2 (2013) – Map, sample, transect, progressively correlate, and begin NASIS build for entire bay (build on current data)**
- **Year 3 (2014 / 2015) – Complete NASIS, final correlation, and publish / commit soil survey to the Soil Data Mart (SDM) / Web Soil Survey (WSS), begin CZSS (acquire all remote sensing data)**
- **Year 4 (2016 / 2017 and beyond) – Continue and complete CZSS with coastal zone interpretations data and publish to Web Soil Survey (Google Soil Web app and GE)**



Pre-Sandy USGS EAARL-B Lidar 2015 (ds885)

# COASTAL ZONE SOIL SURVEY

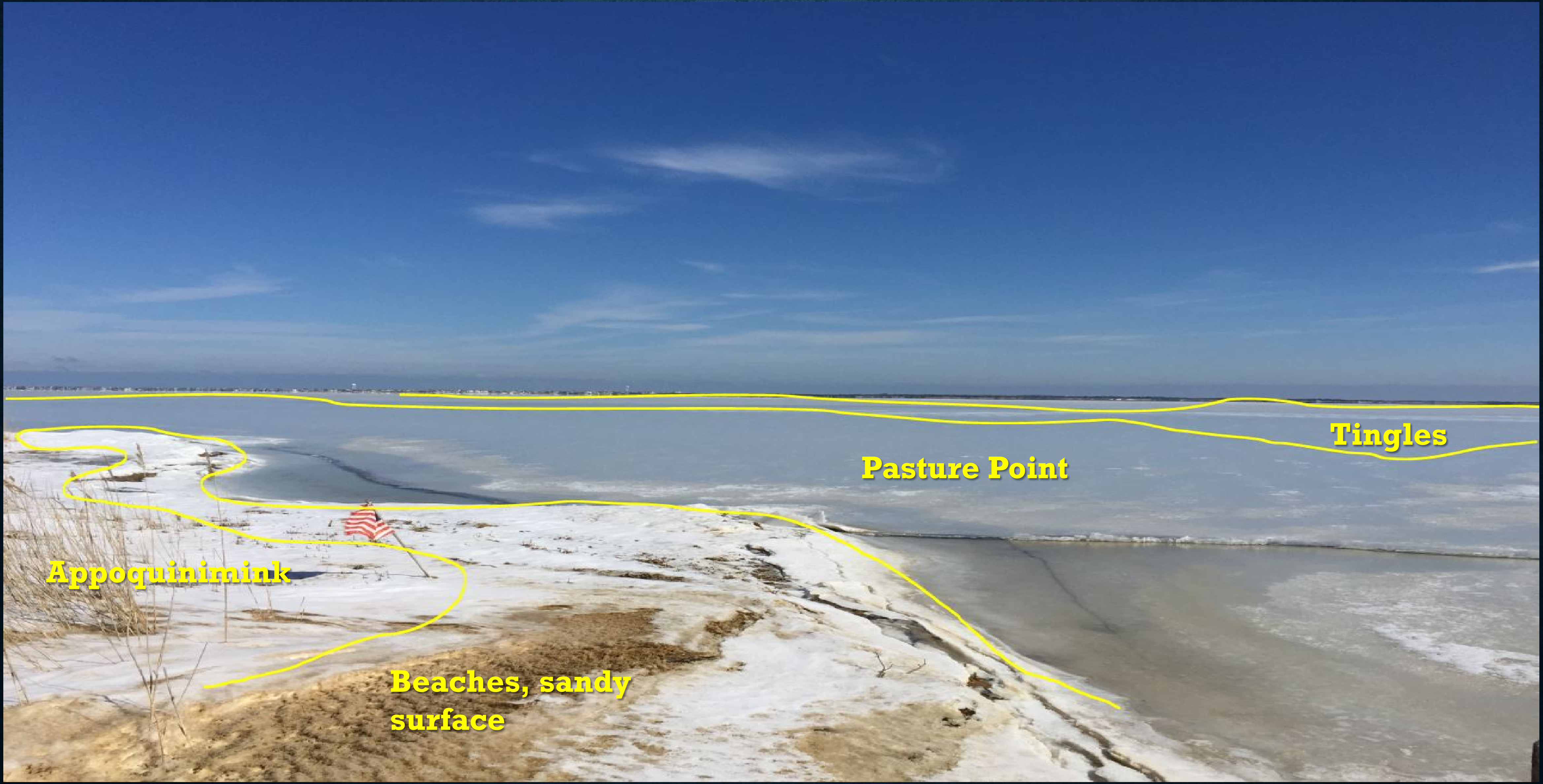


# LIVING SHORELINE / COASTAL RESTORATION PROJECTS – THE 5 DO'S

1. Do your soils office work. Understand the potential soils you may have on your project site and those just offshore.
2. Do question your soils information and dig deeper literally and figuratively into your project site.
3. Perform an onsite specific soils investigation (unfortunately this must be required) to accurately determine your dominant soil characteristics (nutrient rich materials / sulfidic materials / load bearing capacity – fluidity - n value).
4. Know what soil series your project site most closely compares to or fits (subaerial and subaqueous). Can soil types correlate directly to project success / failure?
5. Now you may be shovel ready or you may need to re-locate your shoreline project.

# Questions?

2015 = International Year of Soils



# THANK YOU PARTNERS!

- The Barnegat Bay Partnership (BBP)
- USEPA
- Ocean County College
- NJ – DEP
- US Geological Survey
- US Fish & Wildlife Service
- NOAA
- ReClam the Bay (RCTB)
- Ocean County Health Dpt.
- Ocean County Soil District
- Rutgers University
- Stockton College
- American Littoral Society
- US Army Corp of Engineers
- Monmouth University
- NJ Pinelands Commission
- Rider University
- Ocean County Parks Department
- Save Barnegat Bay (SBB)

# THANK YOU!

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