
NWI+ Data and Wetlands One-Stop Web Mapper – New Information to Aid Wetland Conservation and Restoration in Delaware

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- Brief Overview of the Delaware Wetland Mapping Project
 - Delivery of Geospatial Data via the Wetlands One-Stop Web Mapper
 - What's on the Mapper
 - Possible Applications of the New Data
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Delaware Wetlands Project

- By 2007, Delaware wetlands data were 15 years old
 - state wetland data from 1992
 - FWS data from the 1980s
 - The FWS did a trends analysis from 1981/2-1992 (analysis covered ~60% of the state)
 - In 2008, Virginia Tech's Conservation Management Institute began working on an update of the NWI data for Delaware (FWS-Sussex County; DNREC – other counties)
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Project Objectives

- Produce 2007 wetlands inventory (more detailed than prior surveys)
 - Identify other areas that may support wetlands based on prior soil surveys
 - Generate landscape-level functional assessment of wetlands statewide
 - Assess wetland trends from 1992-2007
 - Produce a statewide inventory of potential wetland restoration sites
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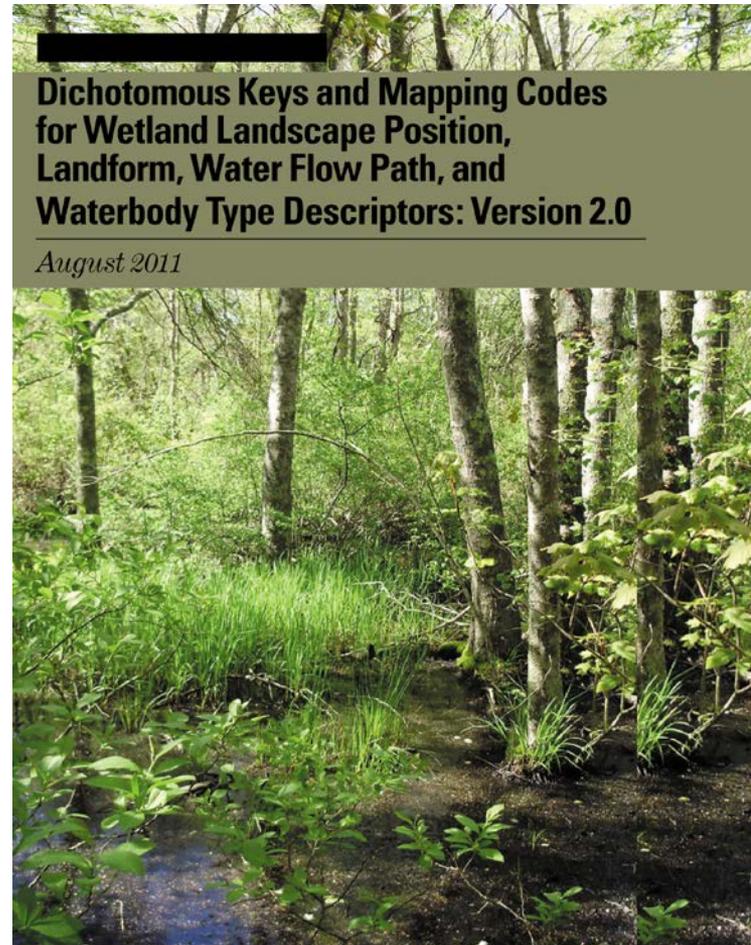
Sources for the Update/Enhancement

- 1980s NWI Data
 - 1992 State Wetlands Data
 - March 1992 CIR imagery
 - 2007 digital imagery
 - USGS topographic data (DRGs)
 - USDA soils data
 - USGS National Hydrography Data (NHD)
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Produce a More Detailed Inventory

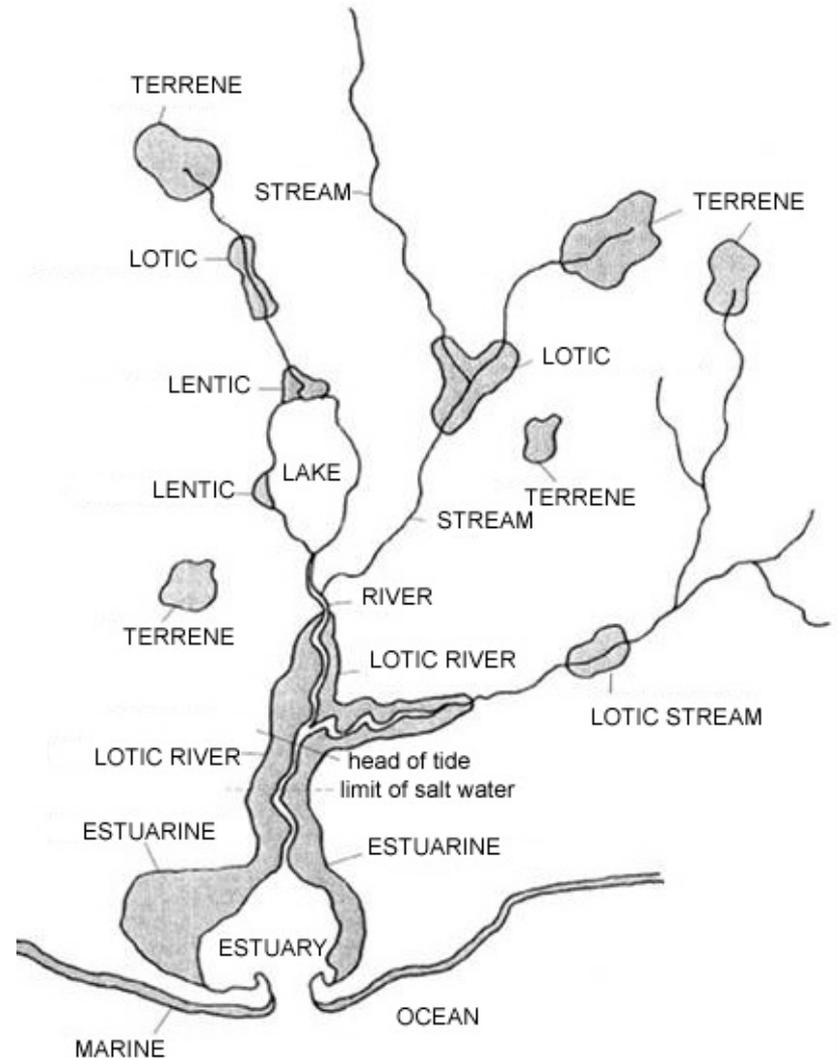
Updated and Enhanced NWI = NWI+

- Classify wetlands by Cowardin et al. (1979)
- Enhance classification
 - Add hydrogeomorphic (LLWW) descriptors
 - Landscape Position
 - Landform
 - Water Flow Path
 - Waterbody Type
 - Other Attributes



Landscape Position

- Relationship between a Wetland and a Waterbody
 - MARINE
 - ESTUARINE
 - LOTIC
 - LENTIC
 - TERRENE



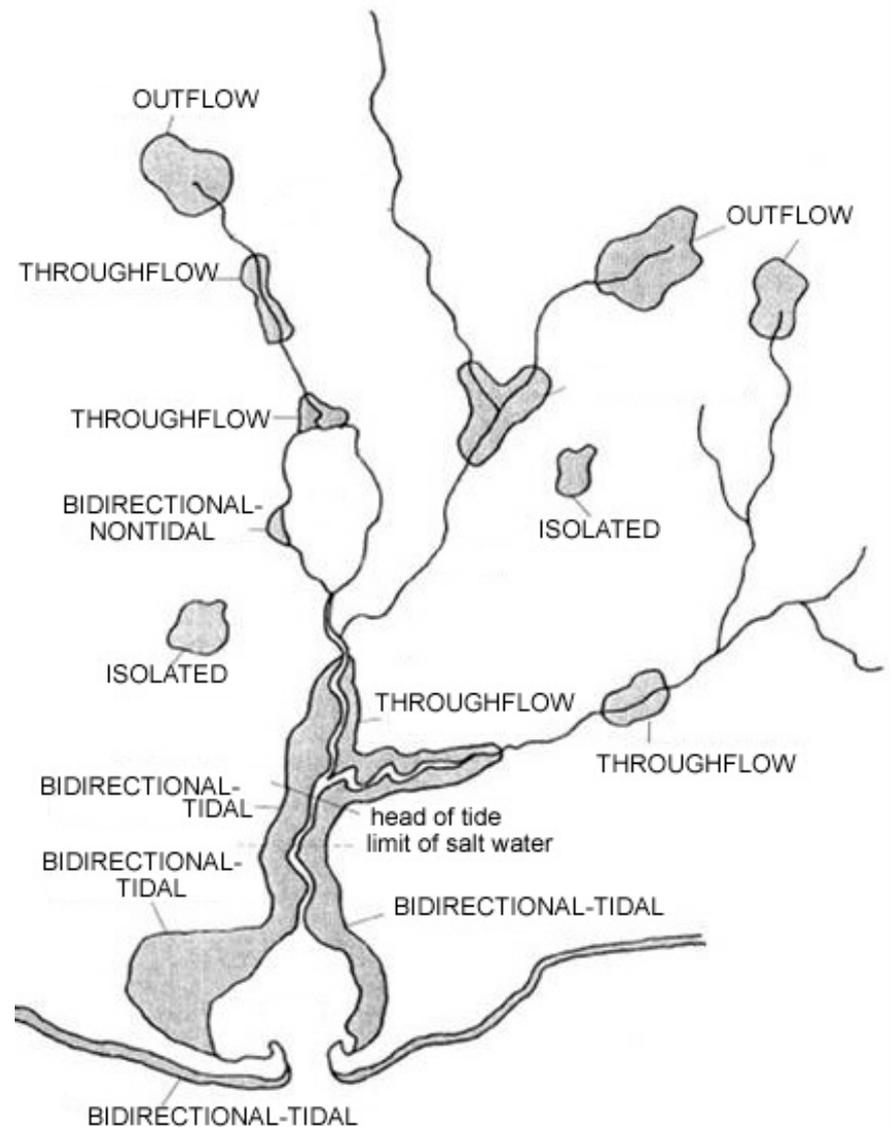
Landforms

- Slope (>2%)
- Island
- Fringe
- Floodplain
- Basin
- Flat



Water Flow Path

- Bidirectional-tidal
- Bidirectional-nontidal
- Throughflow
- Outflow
- Inflow
- Isolated



Waterbody Types – More Specificity

- Estuary: Drowned River Valley, Bar-built;
 - Macrotidal, Mesotidal (6-12 ft tides), Microtidal
 - Circulation patterns – salt-wedge, homogenous, partially mixed
 - Rivers/Streams: tidal, perennial, intermittent, dammed
 - Lakes: natural, dammed (reservoir)
 - Ponds: natural (woodland-wetland, woodland-dryland, sinkhole-woodland, sinkhole-prairie, Carolina bay, cypress dome, interdunal, floodplain, grady, other), dammed/impounded (aquaculture, agriculture, industrial, golf, stormwater, etc.), excavated (etc.), beaver
 - Note: Can add other types of interest – list is a first cut.
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Other Descriptors - Examples

- Headwater*
- Floating mat
- Drainage divide
- Partly drained
- Coastal island
- Freshwater wetland discharging directly into an estuary*
- Overwash
- Tidally restricted (road or railroad)*
- Fragmented

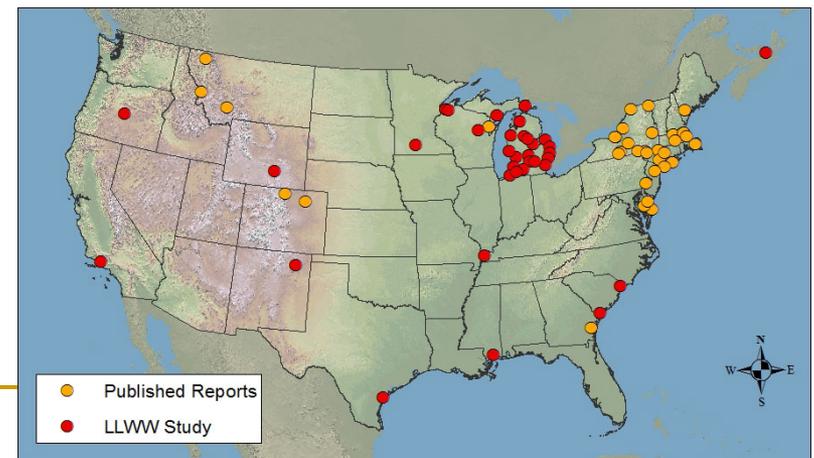
*Applied to all NWI+ projects

Produce Other Wetland Data Layers

- P-wet Areas
 - Undeveloped hydric soil map units that were not mapped as NWI wetlands
 - Formerly called “H-wetlands” (DE report)
 - Potential Wetland Restoration Sites
 - Former wetland areas (based on soils)
 - Impacted existing wetlands (e.g., impounded, partly drained, farmed, tidally restricted)
 - Landscape-level Functional Assessment
 - Wetlands of Significance
-

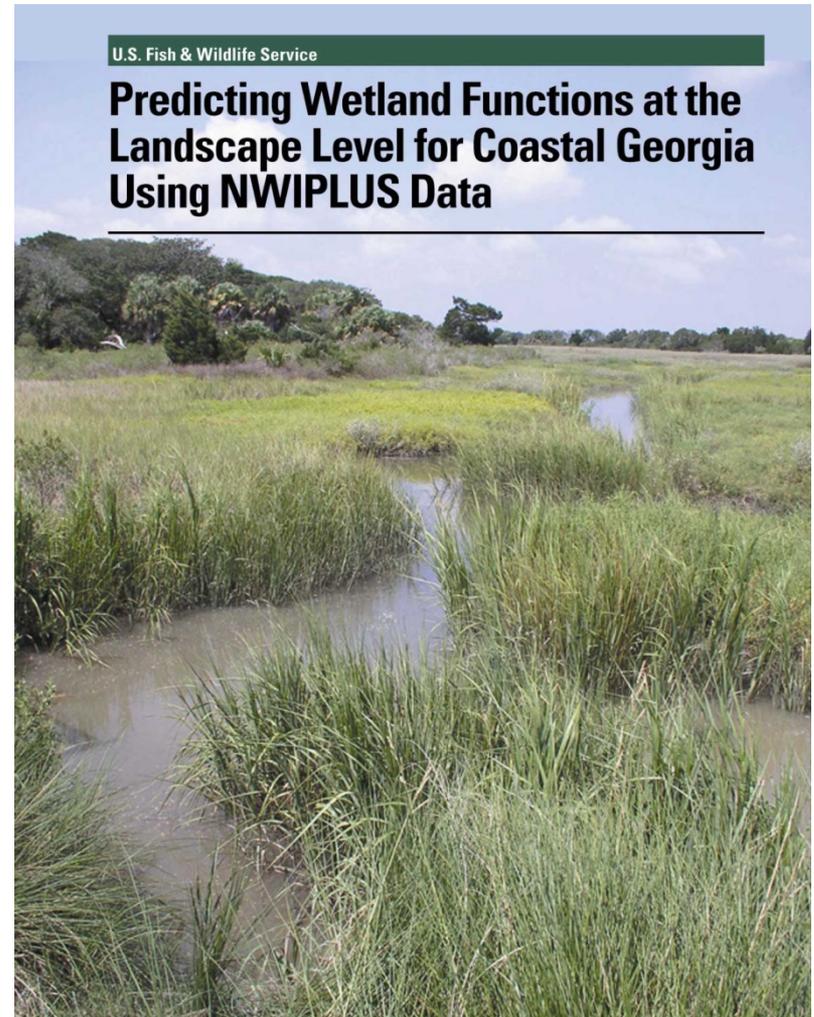
Functional Assessment

- Use NWI and LLWW types to predict wetland functions
 - Correlate properties in database with functions
- Preliminary Landscape-level Assessment
 - Based on geospatial data
- Apply to watershed, coastal zone, county, or entire state



Coordinated Effort To Develop Correlations

- Reviewed literature
- Worked with wetland specialists in the Northeast
 - Maine Wetland Advisory Group
 - NYCDEP
 - Nanticoke Wetlands Study Group
 - DNREC biologists
 - FWS biologists
 - Others
- Correlation Report (2003) and Tables (2013)
- Should review prior to use in other geographic regions
 - Reviewed/ revised for coastal Georgia, Wisconsin, and New Mexico
- User Adaptable (can modify functions of interest)



Preliminary Functional Assessment

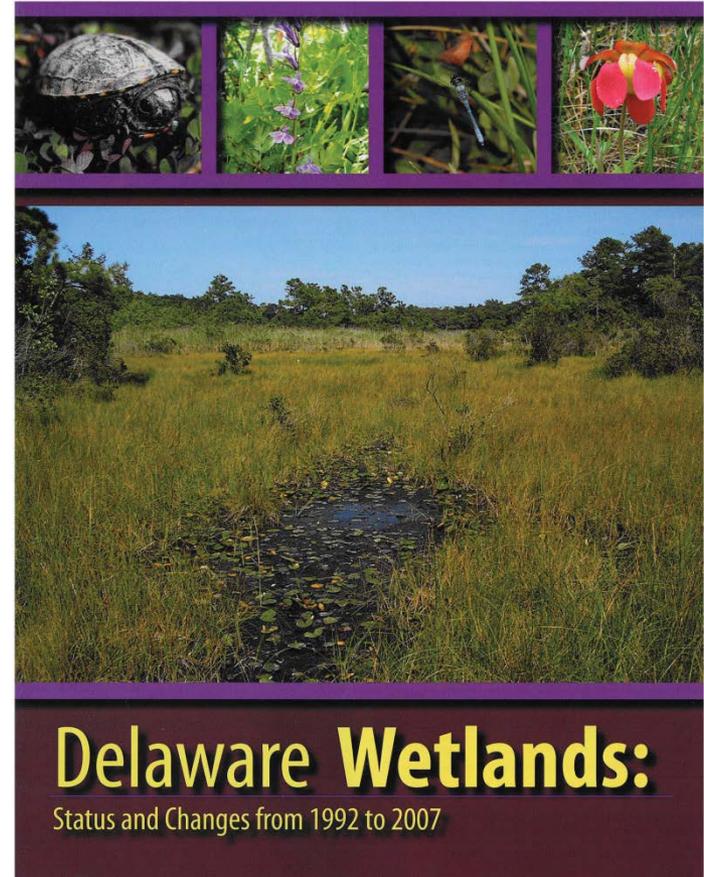
- Surface Water Detention (inland wetlands)
 - Coastal Storm Surge Detention
 - Streamflow Maintenance
 - Bank and Shoreline Stabilization
 - Nutrient Transformation
 - Carbon Sequestration
 - Sediment and Other Particulate Retention
 - Provision of Fish and Wildlife Habitat
 - Fish and Aquatic Invertebrates
 - Waterfowl and Waterbirds
 - Other Wildlife
 - Provision of Habitat for Unique, Uncommon, or Highly Diverse Wetland Plant Communities (formerly Conservation of Biodiversity; *based on mapped types not through field surveys*)
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Limitations of Landscape-level Assessment

- Preliminary assessment
 - Based on image/GIS analysis; not field checked
 - Source data limitations
 - All wetlands not shown
 - Possible upland inclusions
 - All streams not shown
 - Accuracy of wetland classification
 - Age of data
 - Enhanced wetland classifications based largely on photo and map interpretation plus merging with other databases (e.g., streams)
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NWI+ Data and Reports Posted Online

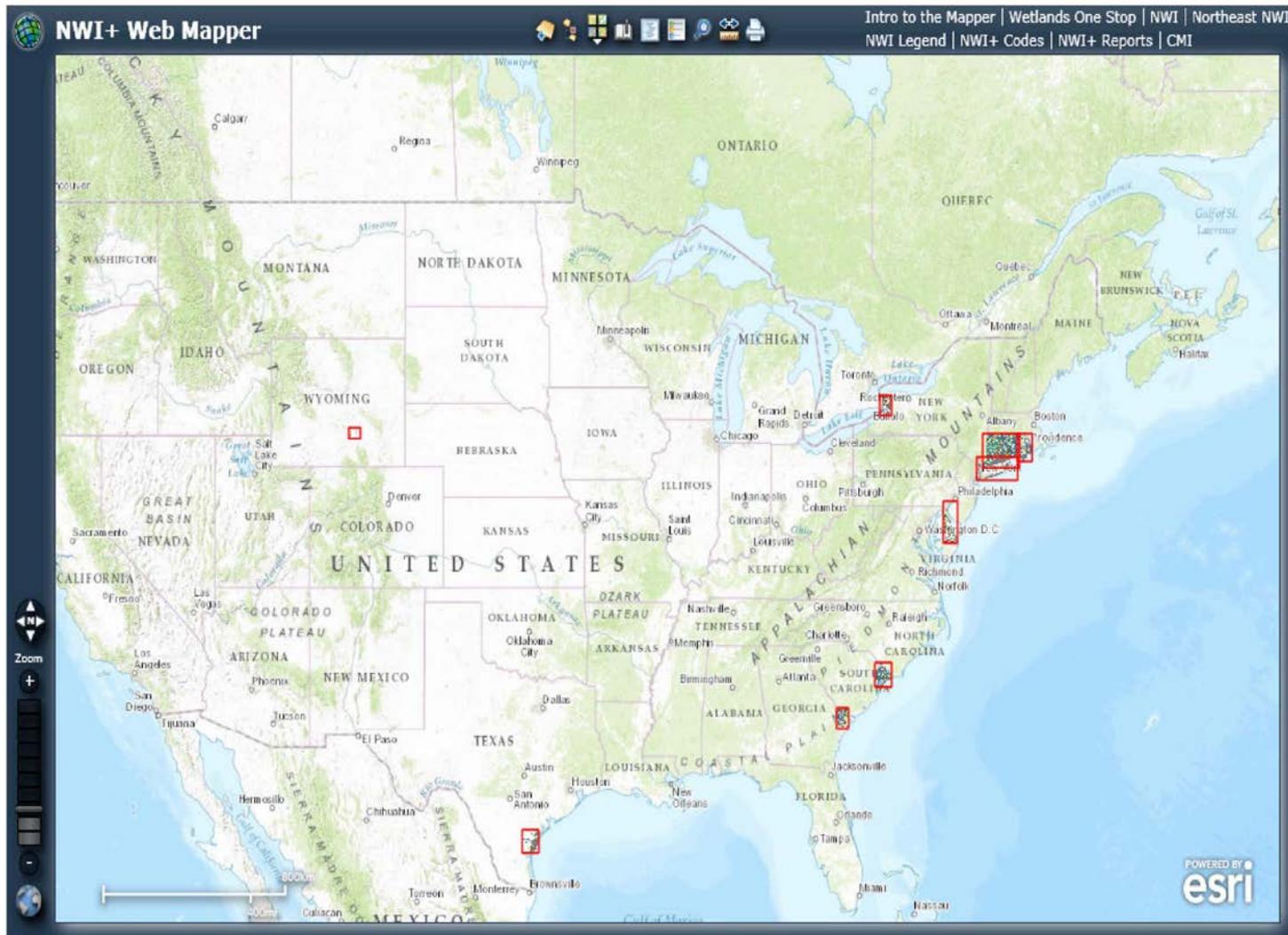
- ASWM's Wetlands One-Stop Mapping
- <http://aswm.org/wetland-science/wetlands-one-stop-mapping>
- Look under:
 - **NWI+ Mapper** for display of results
 - **NWI+ Reports** for copies of summary reports



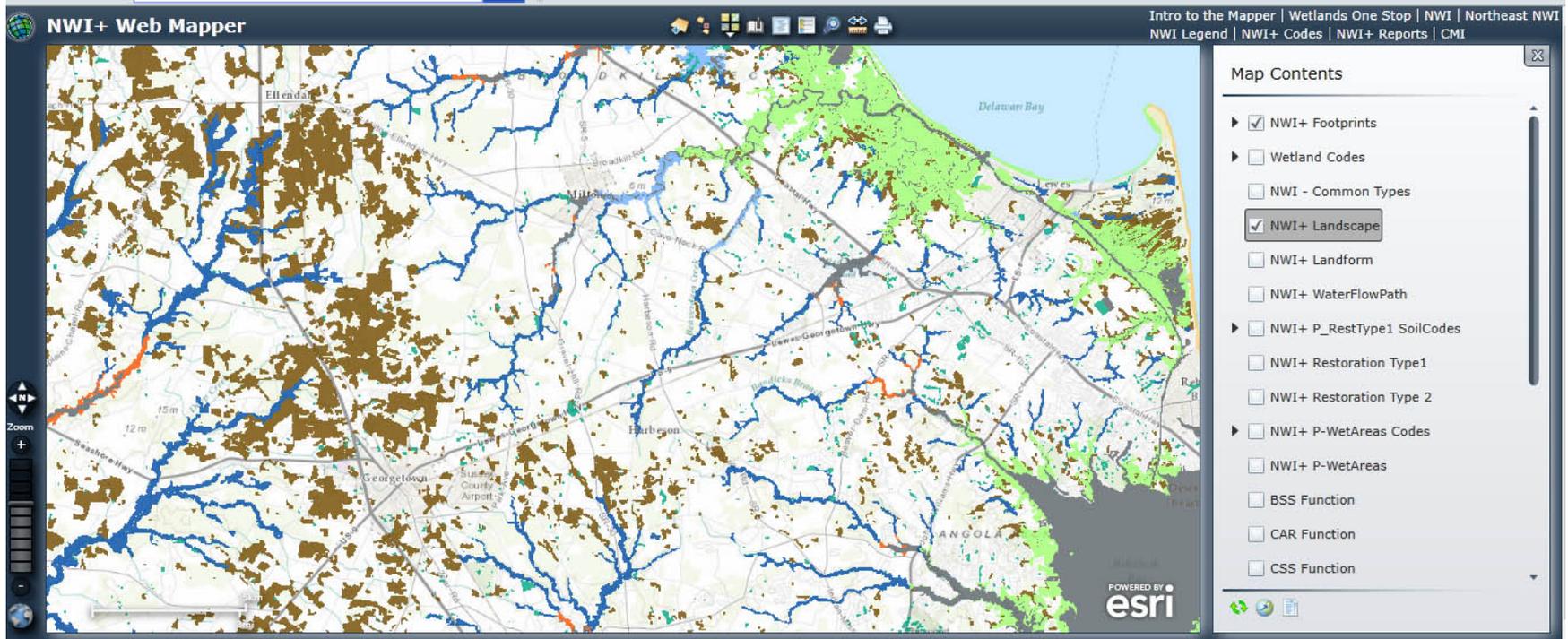
Wetlands One-Stop Mapper - Views

Examples

Opening Page -Footprints of Projects



Landscape Position (Default) with Map Contents Opened



Landscape Position with Map Options

The screenshot displays the NWI+ Web Mapper interface. The main map area shows a landscape with a network of blue water features (streams and rivers) overlaid on a brown and tan terrain. The map is titled "NWI+ Web Mapper" in the top left corner. In the top right corner, there are navigation links: "Intro to the Mapper | Wetlands One Stop | NWI | Northeast NWI | NWI Legend | NWI+ Codes | NWI+ Reports | CMI".

On the left side of the map, there is a vertical toolbar with a "Zoom" control and a "Home" button. The map content is displayed in a grid of nine map styles, with "Topographic" selected and highlighted in blue. The other styles are:

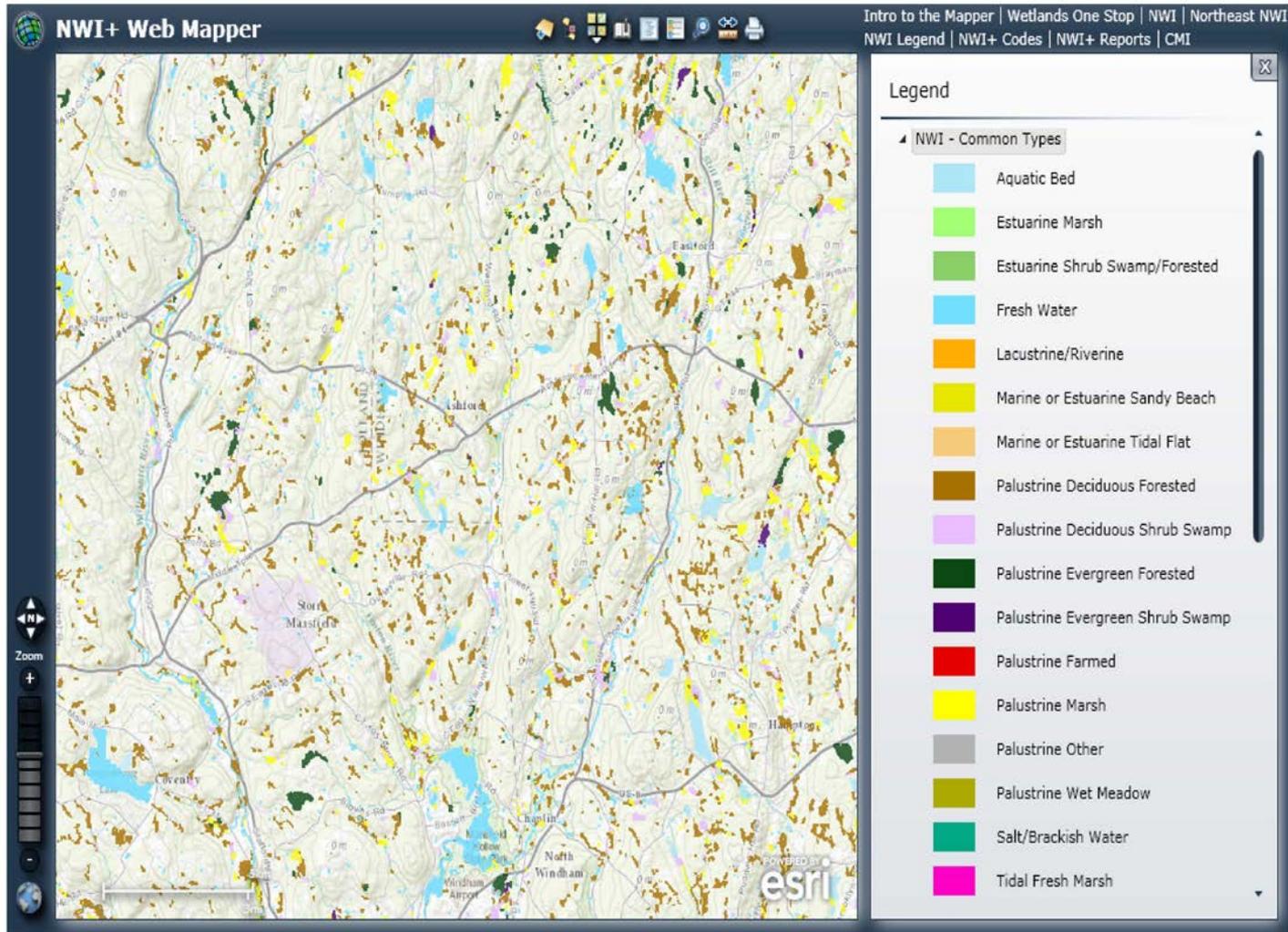
- Streets
- Imagery
- USA Topo Maps
- Ocean
- Light Gray Canvas
- Terrain
- Shaded Relief
- OpenStreetMap

On the right side, there is a "Map Contents" panel with a list of layers and their visibility status:

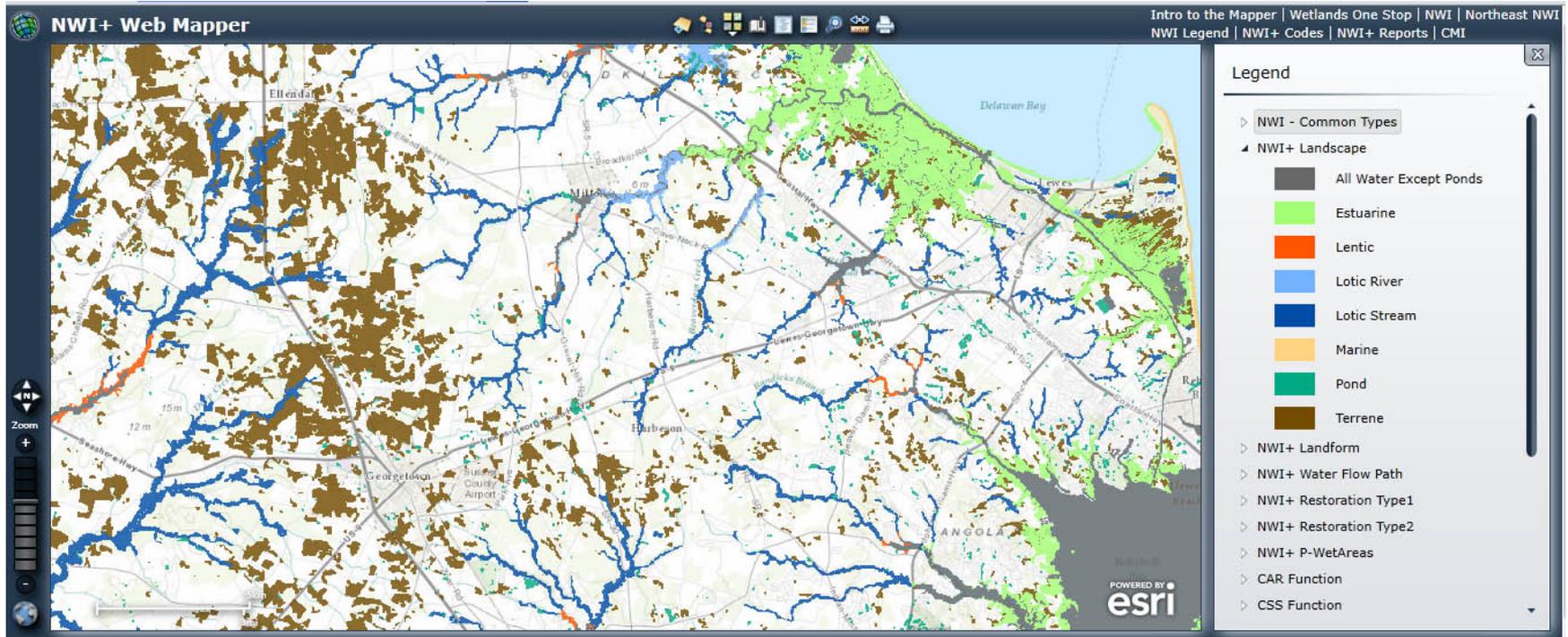
- NWI+ Footprints
- Wetland Codes
 - NWI - Common Types
 - NWI+ Landscape
 - NWI+ Landform
 - NWI+ WaterFlowPath
- NWI+ P_RestType1 SoilCodes
 - NWI+ Restoration Type1
 - NWI+ Restoration Type 2
- NWI+ P-WetAreas Codes
 - NWI+ P-WetAreas
- BSS Function
- CAR Function
- CSS Function

At the bottom of the Map Contents panel, there are icons for a globe, a refresh button, and a help button.

NWI Types with Legend



Landscape Position with Legend



Landscape and “Wetland Code” Table

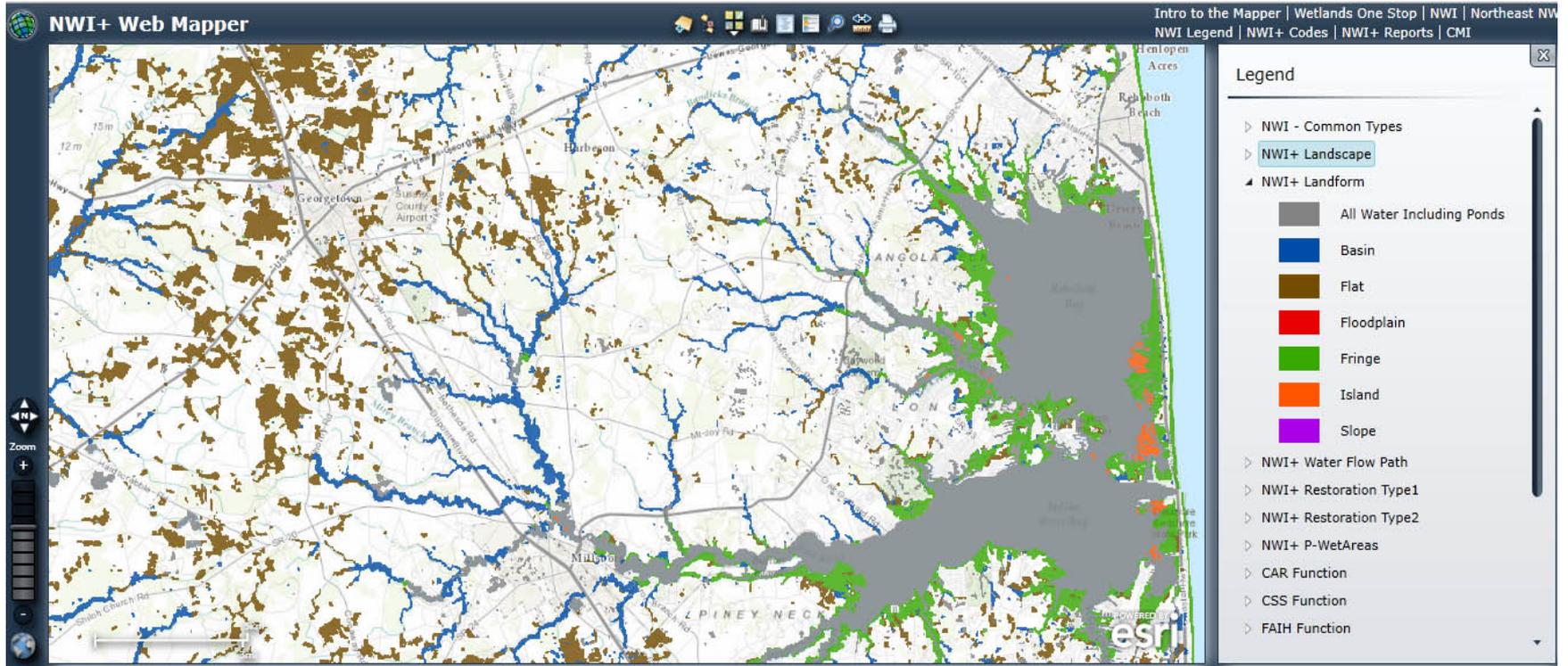
The screenshot displays the NWI+ Web Mapper interface. The main map area shows a landscape with various wetland codes represented by different colors. A pop-up window titled "PFO1E" is open, displaying the following data:

PFO1E	
NWI Attribute Code	PFO1E
LLWW Code	LS1BApdTHhw
Acres	51.7781901365653

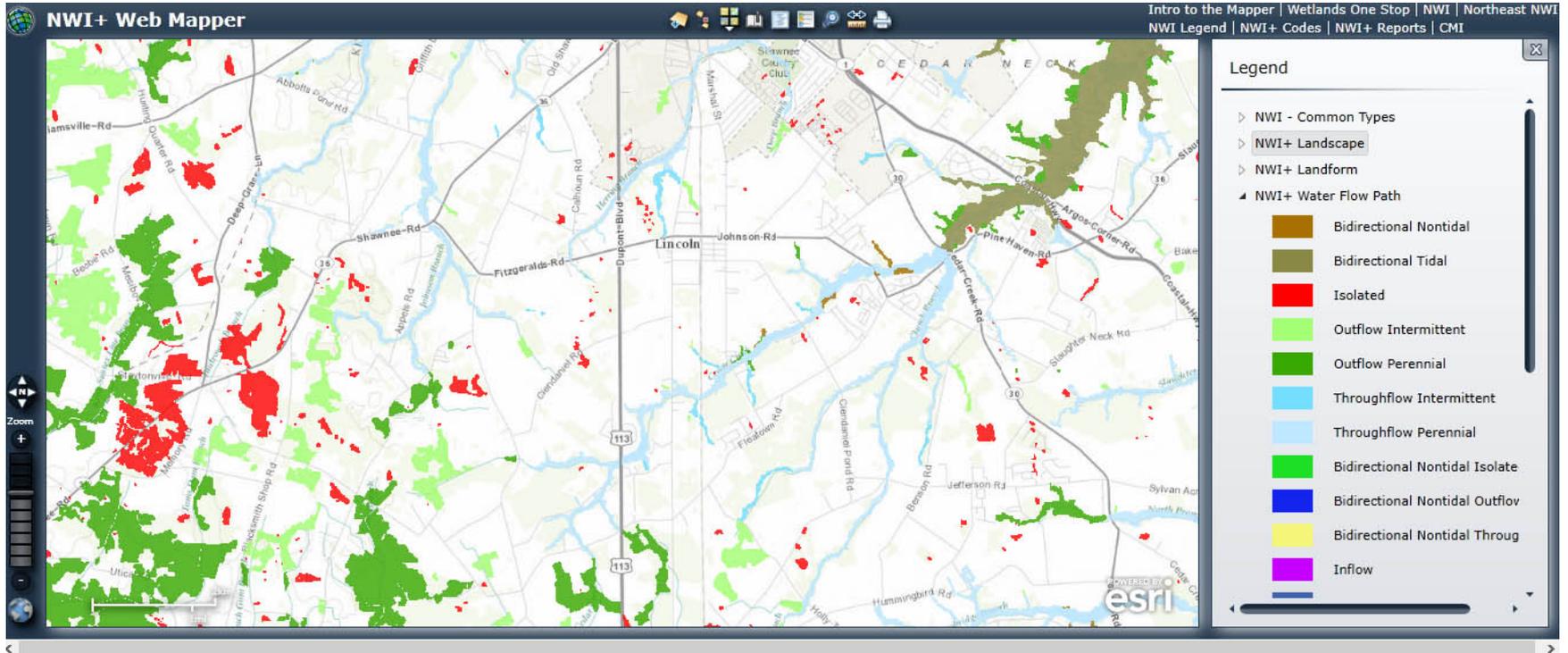
The Map Contents panel on the right lists the following layers:

- NWI+ Footprints
- Wetland Codes
 - NWI - Common Types
 - NWI+ Landscape
 - NWI+ Landform
 - NWI+ WaterFlowPath
 - NWI+ P_RestType1 SoilCodes
 - NWI+ Restoration Type1
 - NWI+ Restoration Type 2
- NWI+ P-WetAreas Codes
- NWI+ P-WetAreas
- BSS Function
- CAR Function
- CSS Function

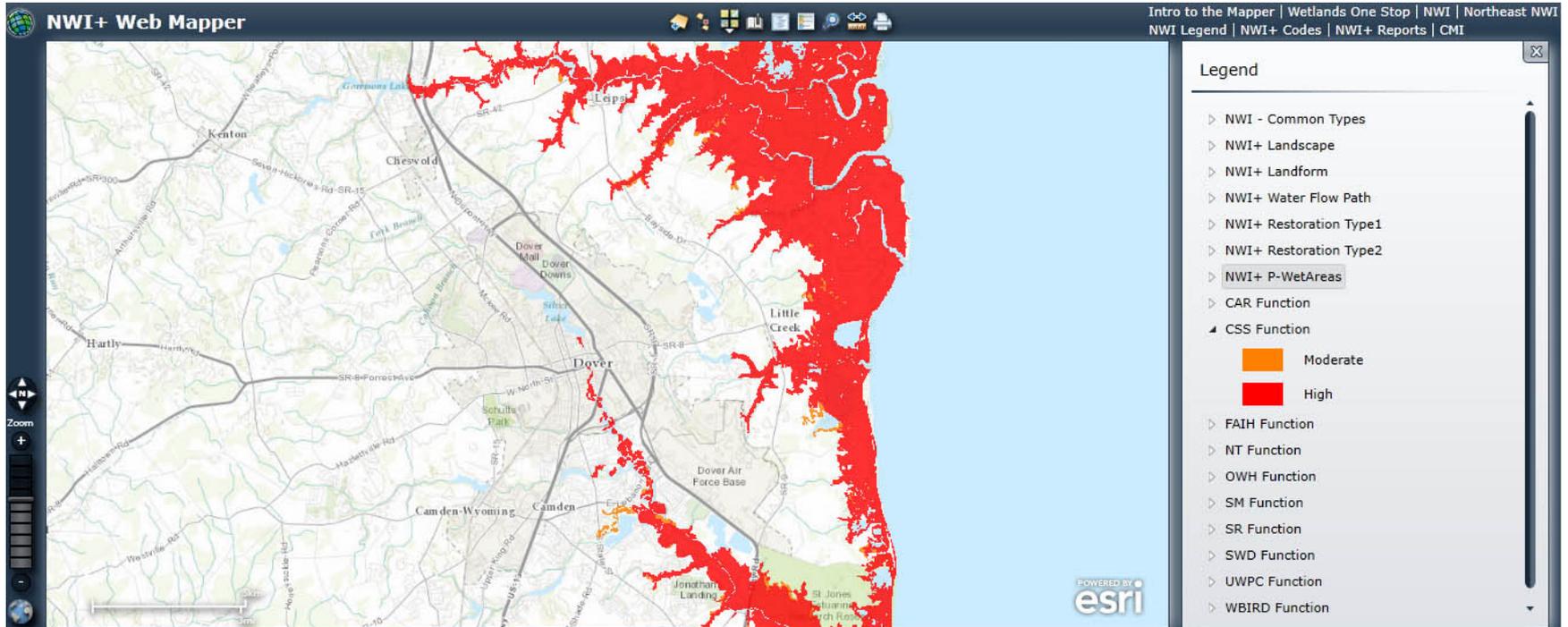
Landform with Legend



Water Flow Path with Legend



Function Map – Coastal Storm Surge Detention



Restoration Type 1 Site w Code Table

NWI+ Web Mapper

Intro to the Mapper | Wetlands One Stop | NWI | Northeast NWI
NWI Legend | NWI+ Codes | NWI+ Reports | CMI

Othello silt loam, 0 to 2...

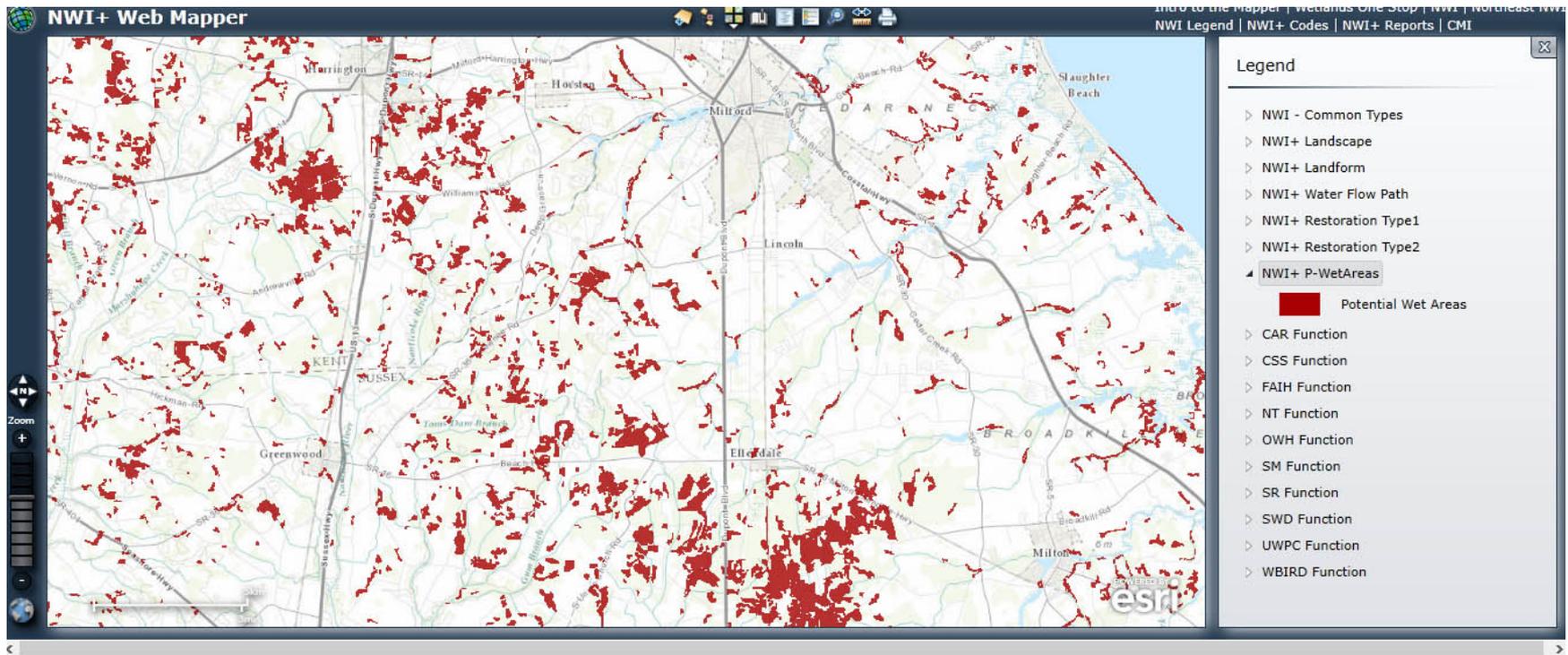
MUSYM	OtA
muname	Othello silt loam, 0 to 2 percent slopes

Map Contents

- NWI+ Footprints
- Wetland Codes
 - NWI - Common Types
 - NWI+ Landscape
 - NWI+ Landform
 - NWI+ WaterFlowPath
- NWI+ P_RestType1 SoilCodes
 - NWI+ Restoration Type1
 - NWI+ Restoration Type 2
- NWI+ P-WetAreas Codes
 - NWI+ P-WetAreas
 - BSS Function
 - CAR Function
 - CSS Function

POWERED BY **esri**

Potential Wet Areas (P-wet areas based on soil mapping; “H-wetlands”)



P-Wet Area with Soil Code and Potential Type 1 Restoration Layer also Open (CT)

The screenshot shows the NWI+ Web Mapper interface. The map displays several layers, including Cropland (green), Filled Land (brown), and Other Agriculture (orange). A pop-up window titled "Raypol silt loam" is open, showing the following details:

MUSYM	12
muname	Raypol silt loam

The legend on the right side of the interface lists the following layers:

- NWI - Common Types
- NWI+ Landscape
- NWI+ Landform
- NWI+ Water Flow Path
- NWI+ Restoration Type1
 - Cropland
 - Filled Land
 - Other Agriculture
- NWI+ Restoration Type2
- NWI+ P-WetAreas
- BSS Function
- CAR Function
- CSS Function
- FAIH Function
- NT Function
- OWH Function
- SM Function
- SR Function
- SWD Function
- UWPC Function
- WBIRD Function

Print Map – NWI Types (example)

NWI + Data - US Fish & Wildlife Service/Virginia Tech

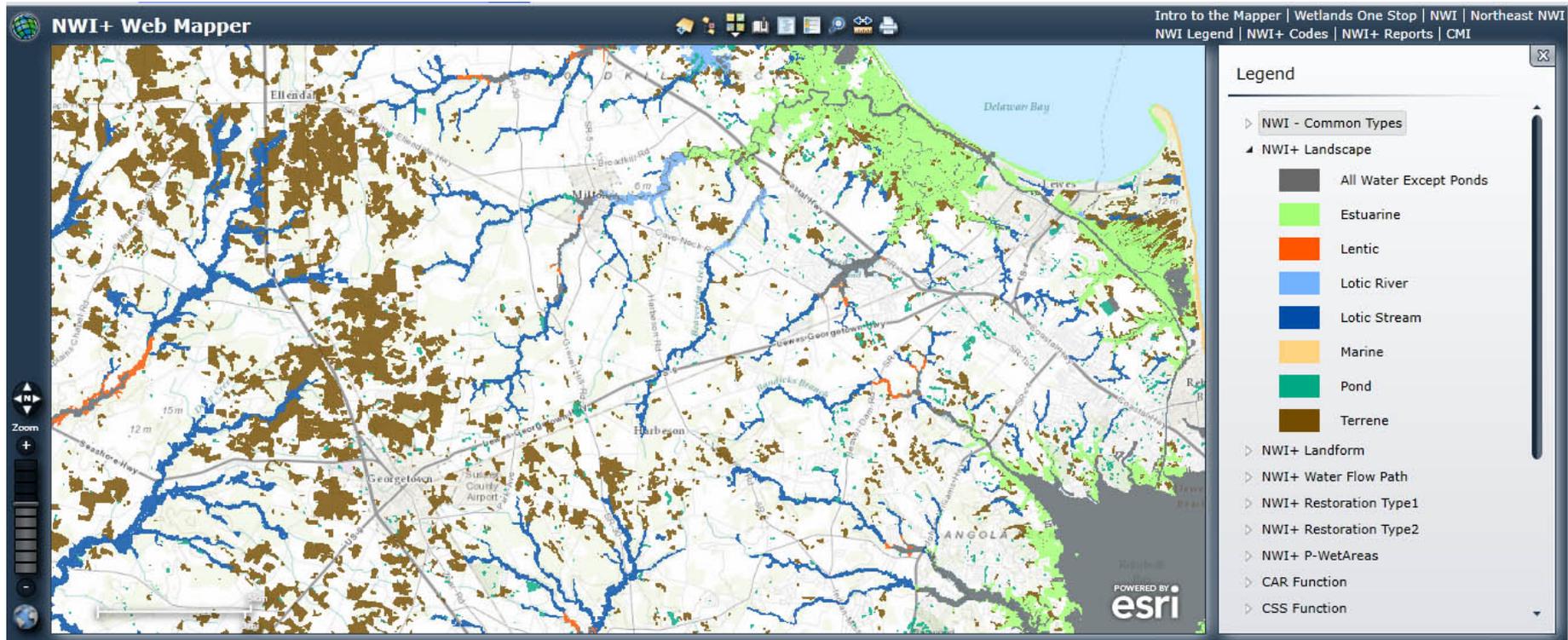
NWI+ Mapper



Sources: USGS, FAO, NPS, EPA, ESRI, DeLorme, TANA, and other suppliers

Import Other Data Layers for Viewing

- NHD Data
- Presence of Hydric Soil Data



Summary

- Created the most comprehensive statewide wetland database in the country
 - Wetland Inventory and Characterization
 - Areas that May Support Wetlands based on Soil Mapping
 - Potential Restoration Sites
 - Statewide Landscape-level Functional Assessment
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■ Better Characterization of Wetlands

- Can use for describing wetland types in the area of interest and as aid in selecting sites for monitoring and research

■ P-Wet Areas

- Identify where wetlands may be located that were not recognized through photointerpretation

■ Opportunities for Restoration

- Type 1 – former wetlands
 - Type 2 – existing wetlands with some impairment
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- **Landscape-level Assessment of Wetland Functions**
 - Preliminary
 - Current capacity of “area of interest” to provide functions
 - Can use to assess possible effect of cumulative losses on wetland functions since “settlement” (e.g., Nanticoke)
 - Can use to assess significance of wetland changes on wetland functions between time periods (e.g., DE report)
 - Increase in some types while other types decline will alter performance of certain wetland functions
 - When applied to **potential wetland restoration sites** (former hydric soils with restoration potential), provides perspective on likely functions to be improved
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Conclusion

- The Delaware wetland database provides a wealth of data to aid efforts to manage, conserve, restore, and monitor wetlands
 - Given the extensive nature of the data, it should be relative cost-effective to update
 - To track wetland changes over time
 - To assess the impact of those changes on wetland functions
 - While NWI+ data and the mapper are useful tools for wetland managers, it is important to remember that it is not intended to replace the need for site-specific assessments and investigations.
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Questions?



Check out NWI+ Data on the web at “Wetlands One-Stop Mapping”
<http://aswm.org/wetland-science/wetlands-one-stop-mapping>