US EPA ARCHIVE DOCUMENT

ENHANCING THE NATIONAL WETLAND DATABASE FOR LANDSCAPE-LEVEL WETLAND FUNCTIONAL ASSESSMENT

Ralph Tiner
Wetland Ecologist
U.S. Fish & Wildlife Service
National Wetlands Inventory Program

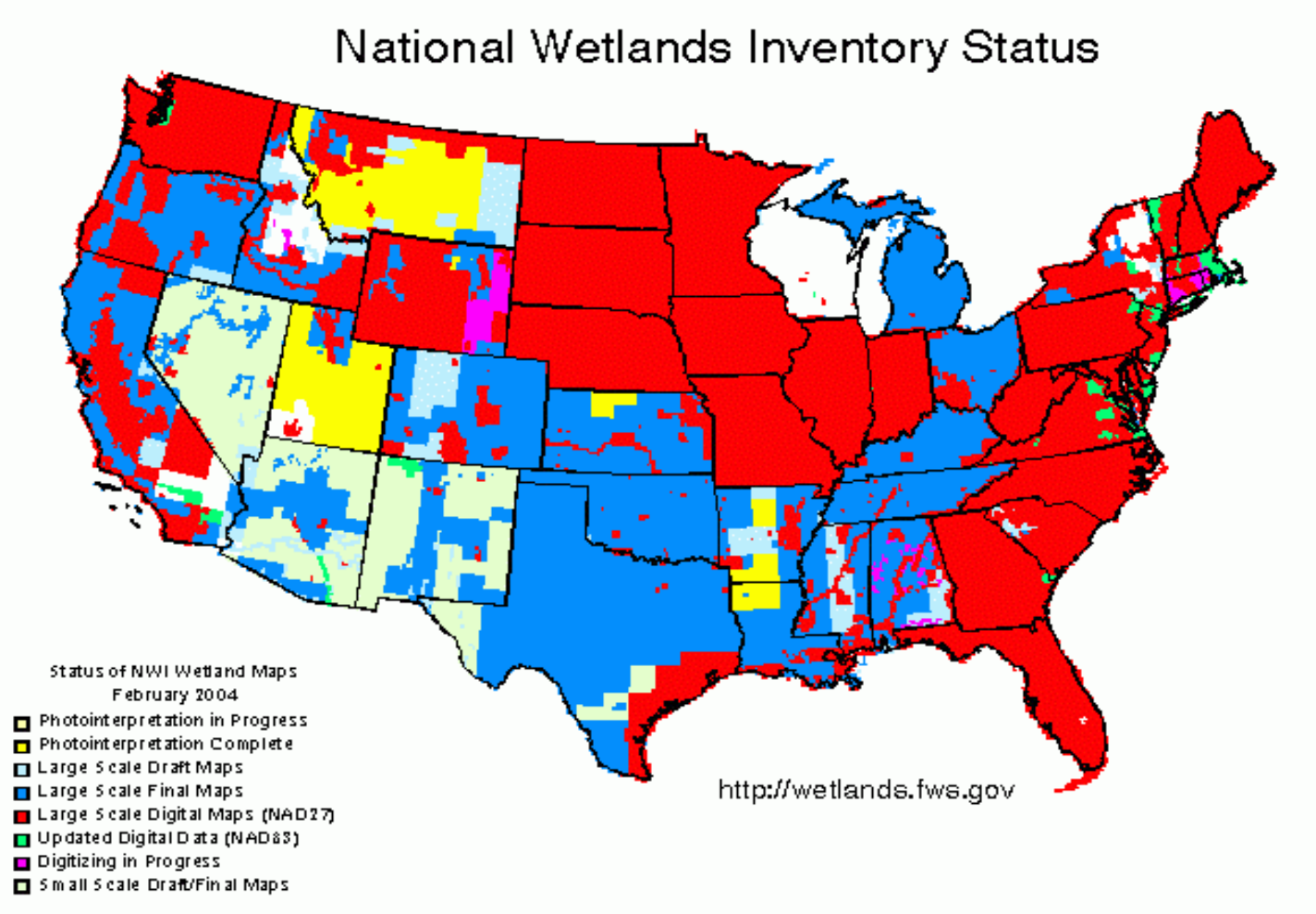
National Wetland Database

- U.S. Department of the Interior
  Fish & Wildlife Service
- National Wetlands Inventory Program (NWI)

NWI Products

- NWI maps
  - 91% of conterminous U.S.
  - 35% of Alaska
- NWI digits (the National Wetland Database)
  - 40% coterminous U.S.
  - 18% of Alaska
  - Access: http://wetlands.fws.gov
- Reports

Status of NWI Maps/Digits



FWS Classification System

- Characteristics Emphasized
  - Vegetation
  - Hydrology
  - Salinity
  - Soils and substrates
  - Human impacts

Conterminous U.S. Wetlands 1997

- 95% of wetlands = Palustrine (100.2M)
  - 51% Forested
  - 25% Emergent
  - 18% Scrub-Shrub
  - 6% Pond
- 5% = Estuarine (4.6M)
  - 74% Emergent
  - 13% Scrub-Shrub
  - 13% Nonvegetated

Some Questions

How many wetlands are there?

How much and how many

- occur along rivers? Along streams? In lake basins?
- are isolated?
- are sources of streams?
- have inflow but no outflow?

FWS Classification Shortcomings

- Shortcomings
  - No landscape position
  - No landform
  - No water flow direction
  - Features important for assessing many functions
- Most of these features can be interpreted from the maps

Needs for Enhancing the NWI Database

- Better characterization of wetlands for national wetland database
- Perform landscape-level functional assessments
- Help assess significance of wetland losses
- Predict functions expected from potential wetland restoration sites

Add New Descriptors to the NWI Database

LLWW Descriptors

- Landscape Position - relationship between a wetland and an adjacent waterbody or not
- Landform - shape or physical form
- Water Flow Path –directional flow of water
- Waterbody Type

Landscape Position

- Marine – along ocean shores
- Estuarine – in an estuary
- Lotic - in or along rivers and streams or on floodplain
- Lentic - in or along lakes
- Terrene – completely surrounded by upland or nearly so; not flooded by rivers or streams

Marine

Estuarine

Lentic

Lotic

RIVER

STREAM

Terrene

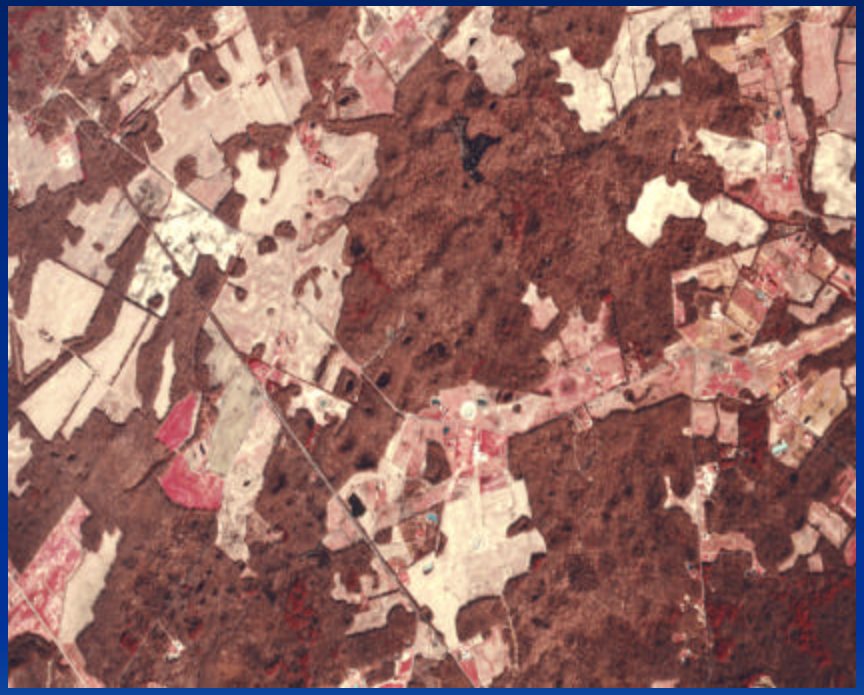
Landforms

- Slope
- Island
- Fringe
- Floodplain (basin, flat)
- Interfluve (basin, flat)
- Basin
- Flat

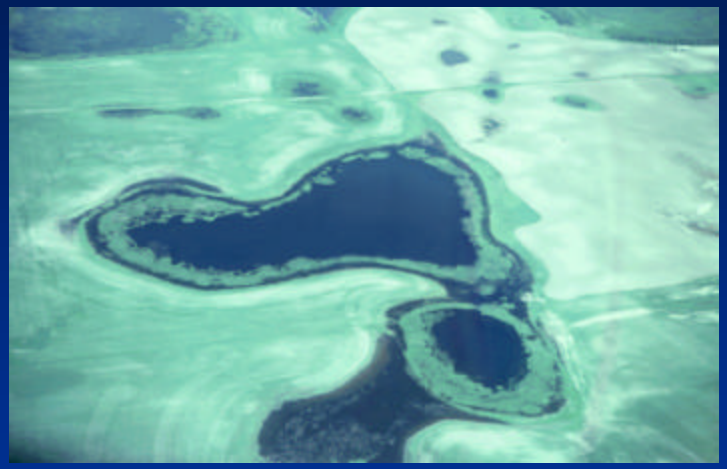
Fringe

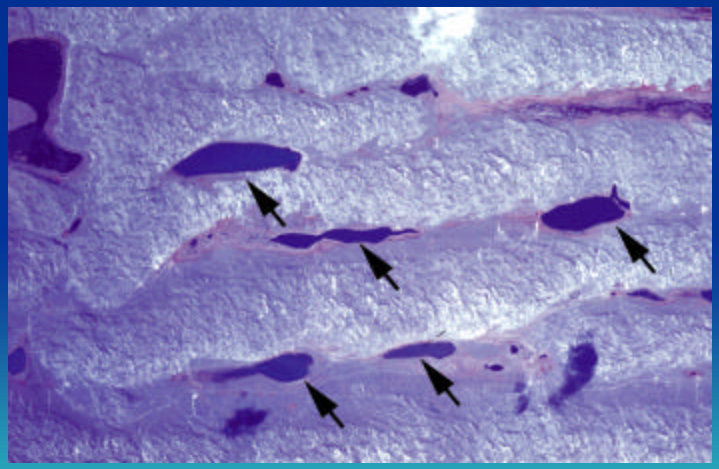
Floodplain

Interfluve Flat



Basin





Water Flow Path

- Bidirectional Tidal
- Bidirectional Nontidal
- Throughflow (intermittent, entrenched, artificial)
- Outflow (artificial)
- Inflow
- Isolated
- Paludified

Mostly Map Interpretation

Waterbody Types

- River and Stream Gradients (tidal, dammed, intermittent, high, middle, and low)
- Lakes (e.g., natural, dammed river valley-reservoir, other dammed, excavated)
- Ponds (e.g., natural, artificial, beaver, sinkhole, farm, golf, prairie pothole, vernal)
- Estuary (e.g., drowned river valley, bar-built)
- Ocean (e.g., open, reef-protected, atoll, fjord)

Preliminary Functional Assessment

- Possible Functions
  - Surface Water Detention
  - Streamflow Maintenance
  - Shoreline Stabilization
  - Nutrient Transformation
  - Coastal Storm Surge Detention
  - Sediment Retention
  - Fish and Wildlife Habitat

Developing Functional Correlations

- Correlate Functions with Characteristics
  - Some emphasize LLWW descriptors
    - Surface Water Detention
    - Streamflow Maintenance
  - Some only use NWI
    - Nutrient Transformation
    - Habitat for Other Wildlife
  - Others rely on NWI + LLWW
    - Shoreline Stabilization
    - Sediment Retention
    - Habitat for Fish and Shellfish
    - Habitat for Waterfowl and Waterbirds

Coordinated Effort To Develop Correlations

- Reviewed literature
- Worked with wetland specialists in the Northeast
  - Maine Wetland Advisory Group
  - NYCDEP
  - Nanticoke Wetlands Study Group
  - FWS biologists
  - Others

Data for Watershed-based Wetland Assessments

- Primary Source Data
  - NWI Digital Data
  - USGS Digital Hydro Data (1:24K)
- Other Sources
  - USDA Digital Soil Survey Data
  - State Wetland Digital Data
  - More Detailed Hydro Data
  - Aerial Photos

Steps

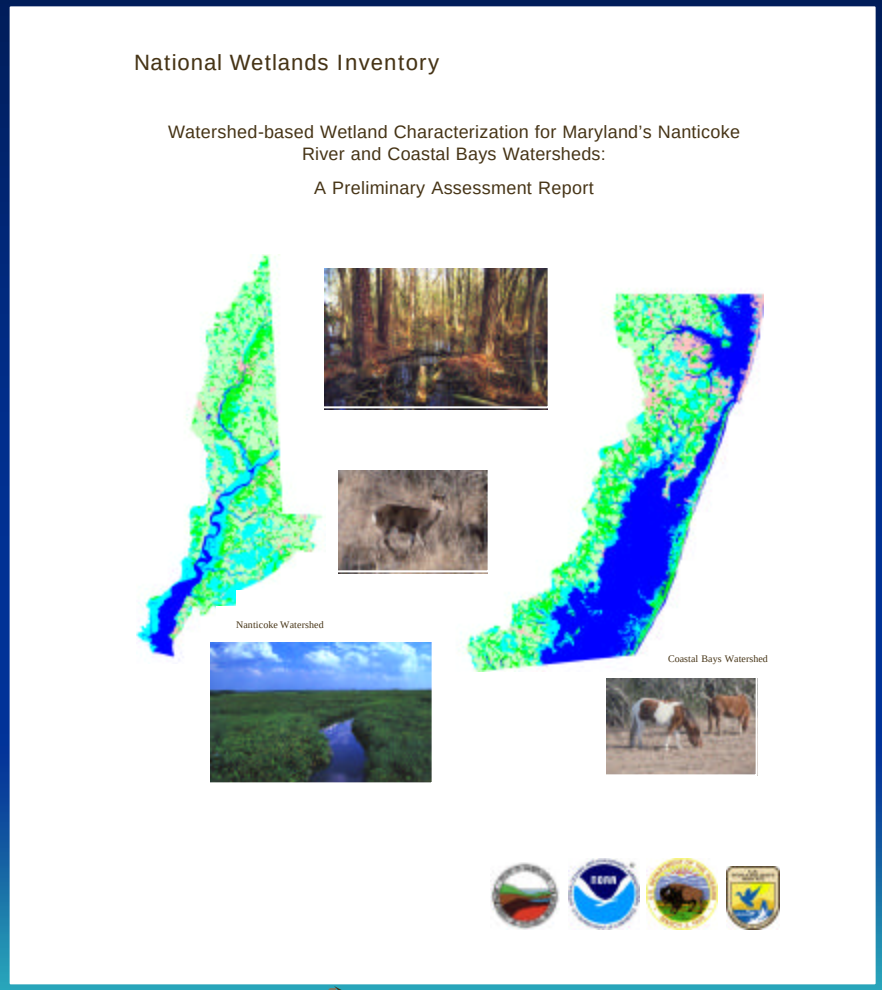
1. Update NWI digits (improve the data)
2. Build wetland database for study watershed
3. Classify LLWW (expand the data)
4. Review and edit LLWW classifications
5. Apply functional correlations to database (interpret the data)
6. Review stats/working maps
7. Produce draft report/maps (CD format) (generate new data)
8. Peer review
9. Produce final report/maps (CD format)

Study Areas

- Casco Bay Watershed (ME)
- New York City Water Supply Watershed
- Small watersheds (NY)
- Coastal Bays Watershed (MD)
- Nanticoke River Watershed (MD/DE)
  - 1998 and Pre-settlement analyses
- Pennsylvania Coastal Zone

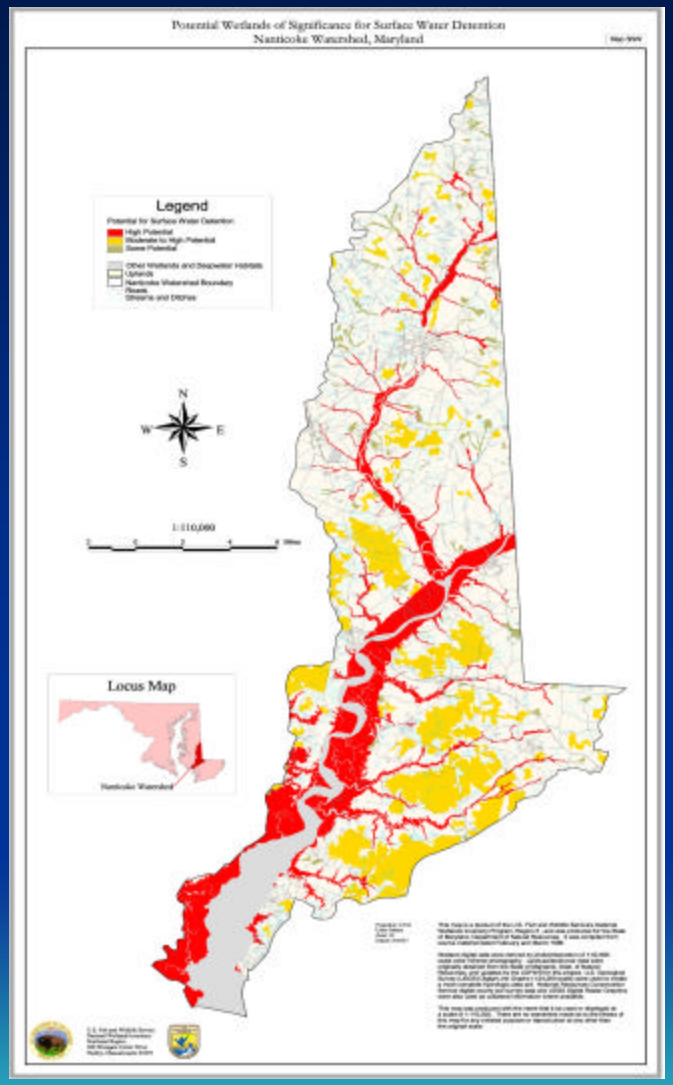
Web-based Watershed Report

- CD Version
- View on Internet at: wetlands.fws.gov



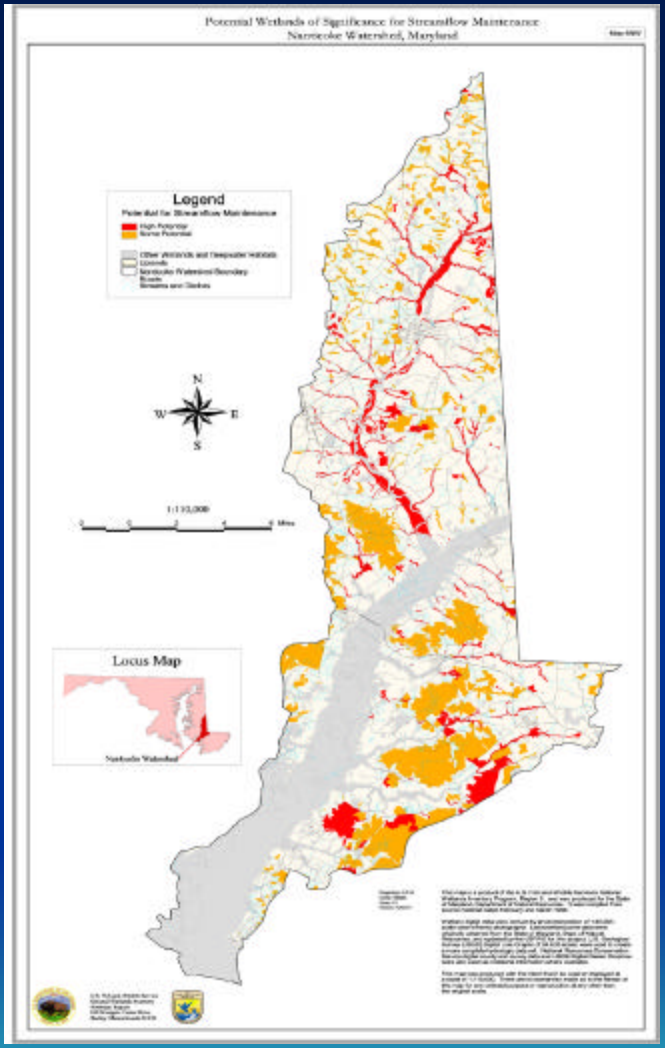
Nanticoke Watershed - Surface Water

28% High
69% Moderate
(97% of all wetlands)



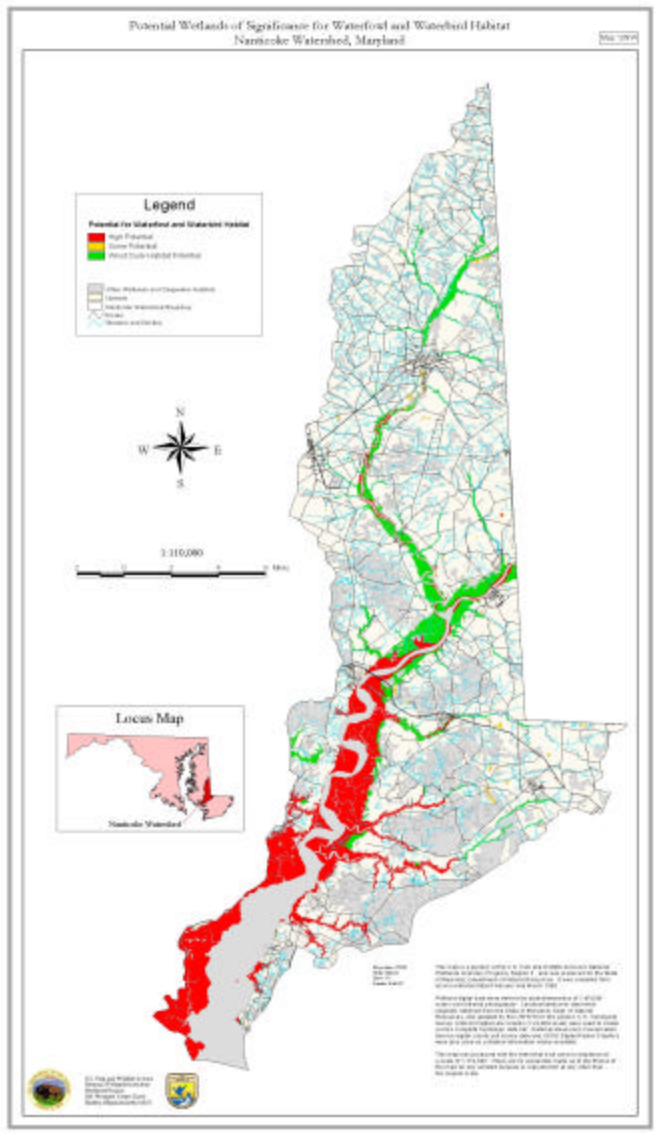
Nanticoke Watershed - Streamflow Maintenance

17% H
58% M
(75%)



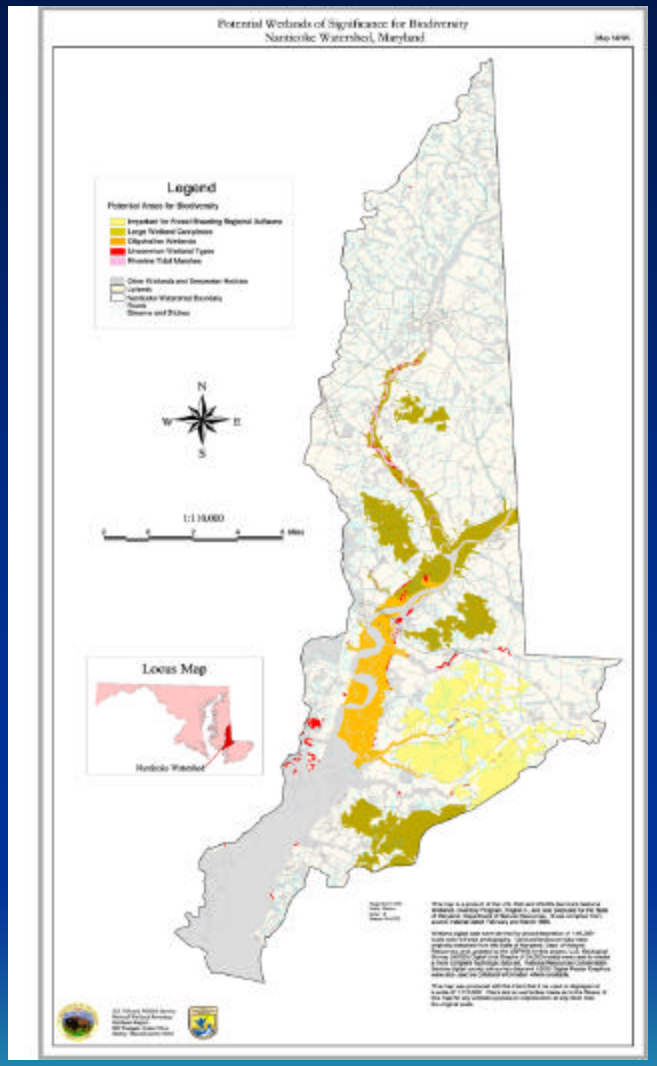
Nanticoke Watershed – Waterfowl & Waterbird Habitat

13% H
7% M
(20%)



Nanticoke Watershed - Biodiversity

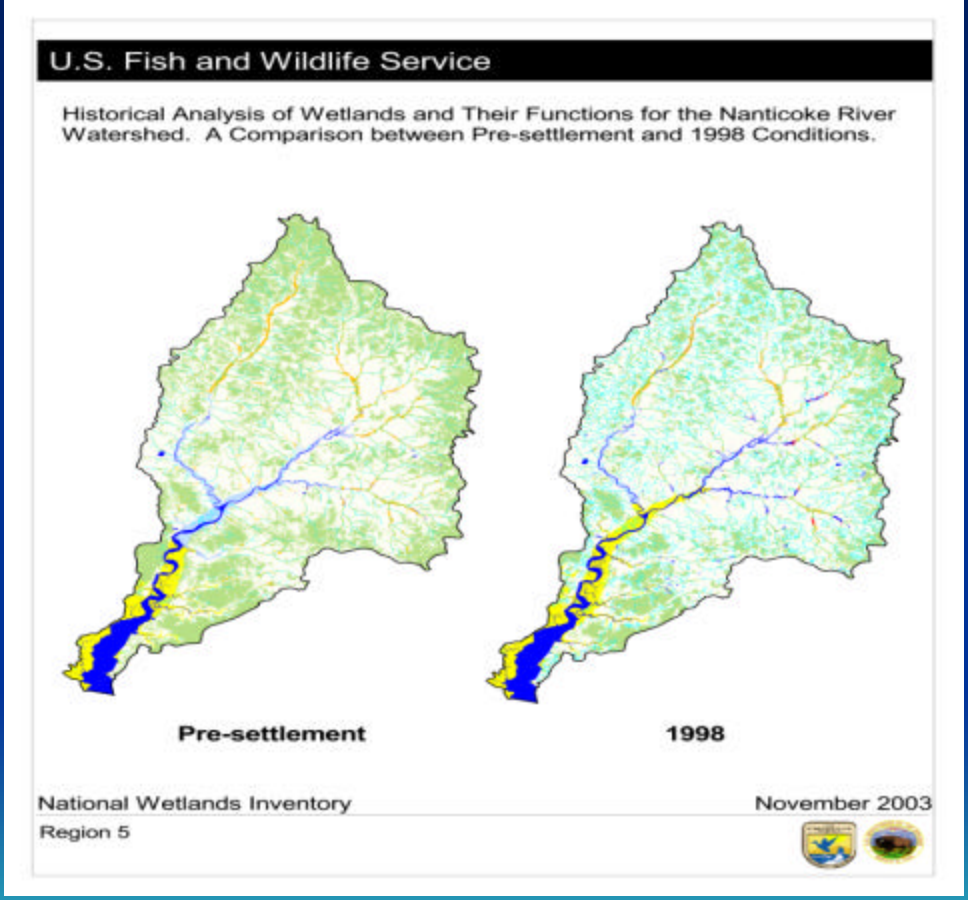
25%



Limitations of Landscape-level Assessment

- First approximation
- Source data limitations
  - All wetlands not shown
  - Possible upland inclusions
  - All streams not shown
  - Age of data
- LLWW wetland classifications based largely on map interpretation (field review variable)
- Correlations between functions and characteristics = work in progress (report available for Northeast US)

Historical Analysis – Cumulative Impacts



Pre-settlement vs. 1998 Nanticoke River Watershed

Pre-settlement

- 230,000 acres
- 2,809 wetlands
- 72% = interfluve outflow wetlands
  - Aver. Size = 433 a

1998

- 142,000 acres (=62%)
- 5,810 wetlands
- 43% decrease in interfluve outflow type
  - Aver. Size = 44 a
- Palustrine -40%
- Estuarine -28%

Functional Losses for Nanticoke

- Surface Water Detention -36%
- Streamflow Maintenance -64%
- Nutrient Transformation -47%
- Sediment Retention -46%
- Coastal Storm Surge Detention -23%
- Fish/Shellfish Habitat -28%
- Waterfowl/Waterbird Habitat -30%
- Other Wildlife Habitat -41%

Uses of Enhanced NWI Data

- Watershed characterization of wetlands
- Landscape-level wetland functional assessments
- Functional loss assessments as part of wetland trend studies
- Restoration planning

Bottomline

- By adding LLWW descriptors to wetland data you gain a powerful tool to begin reporting status and trends of wetland functions for large geographic areas.

For Additional Information

To view sample watershed report:

http://wetlands.fws.gov

For most recent information:

ralph_tiner@fws.gov