



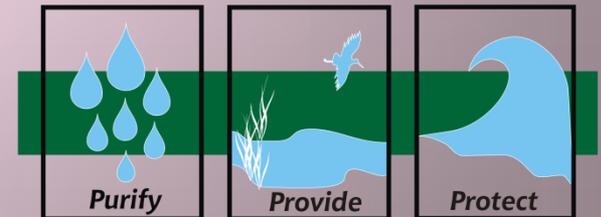
Delaware Wetlands:

Status and Changes from 1992 to 2007



**Delaware Wetlands
Conference**
February 29, 2012

Delaware Wetlands



www.dnrec.delaware.gov/admin/delawarewetlands

Delaware Wetlands:

Status and Changes from 1992 to 2007



NWI



 VirginiaTech



- A 3-year project
- Used most recent “leaf off” aerial photography (2007)

Wetland Mapping Info

A 'landscape-level' statewide analysis

Mapping techniques constantly improve -- although no map is 100% correct, but is a valuable tool for assessment at the statewide scale

Uses the most current and accurate data including Elevation data, USDA soil maps, National Hydrologic data, and past wetland maps.

Does not replace site specific, on-the-ground info (plans to do follow up ground-level QA/QC)

ZAP!



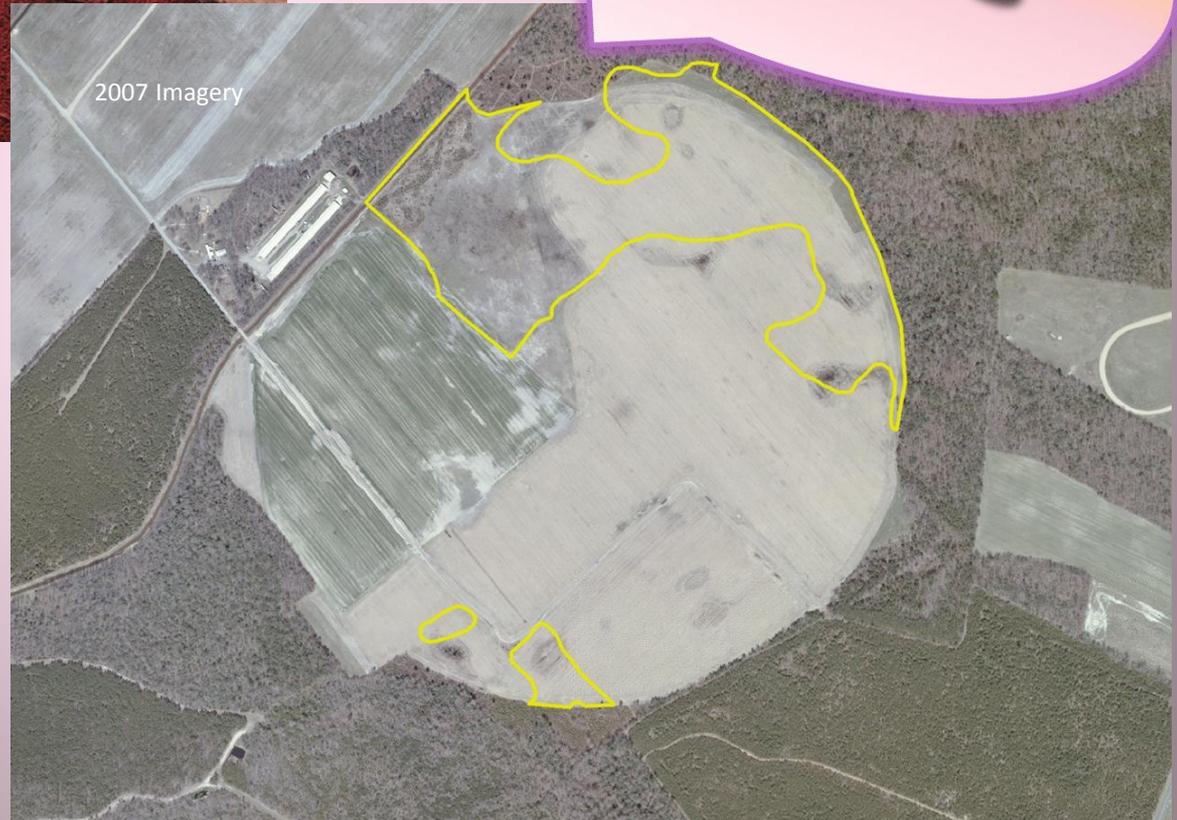
Early into the mapping, there are significant changes to the landscape...

1992 Imagery



POW!

2007 Imagery



...even large changes from agriculture like this center pivot irrigation...



...and also the housing boom which occurred during this time period.

Mapping Comparison (SWMP)

1992 Color Infrared
aerials (DOQQ)

Stereoscopic photo-
interpretation at
1:12,000

MMU at .25 acre
accuracy (some
polygons smaller)



Mapping Comparison (SWMP2007)

2007 true color and
infrared aerial photo

Heads up delineation
at 1:5,000 (some
larger)

MMU at 0.1 acre
accuracy

Using FGDC Wetland
Mapping Standard



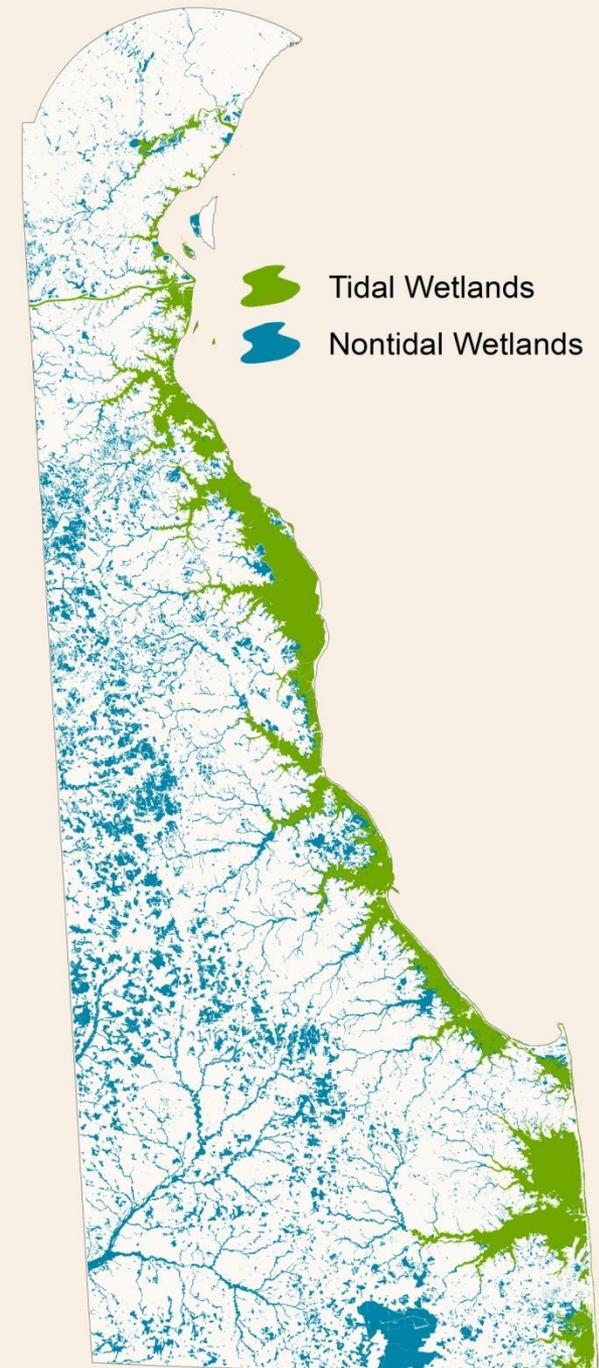
How Many Wetlands Do We Have?

25% of Delaware's land area is covered by wetlands

> 350,000 acres inventoried
(including large open water – the Inland Bays and the mouths of rivers along the coast)

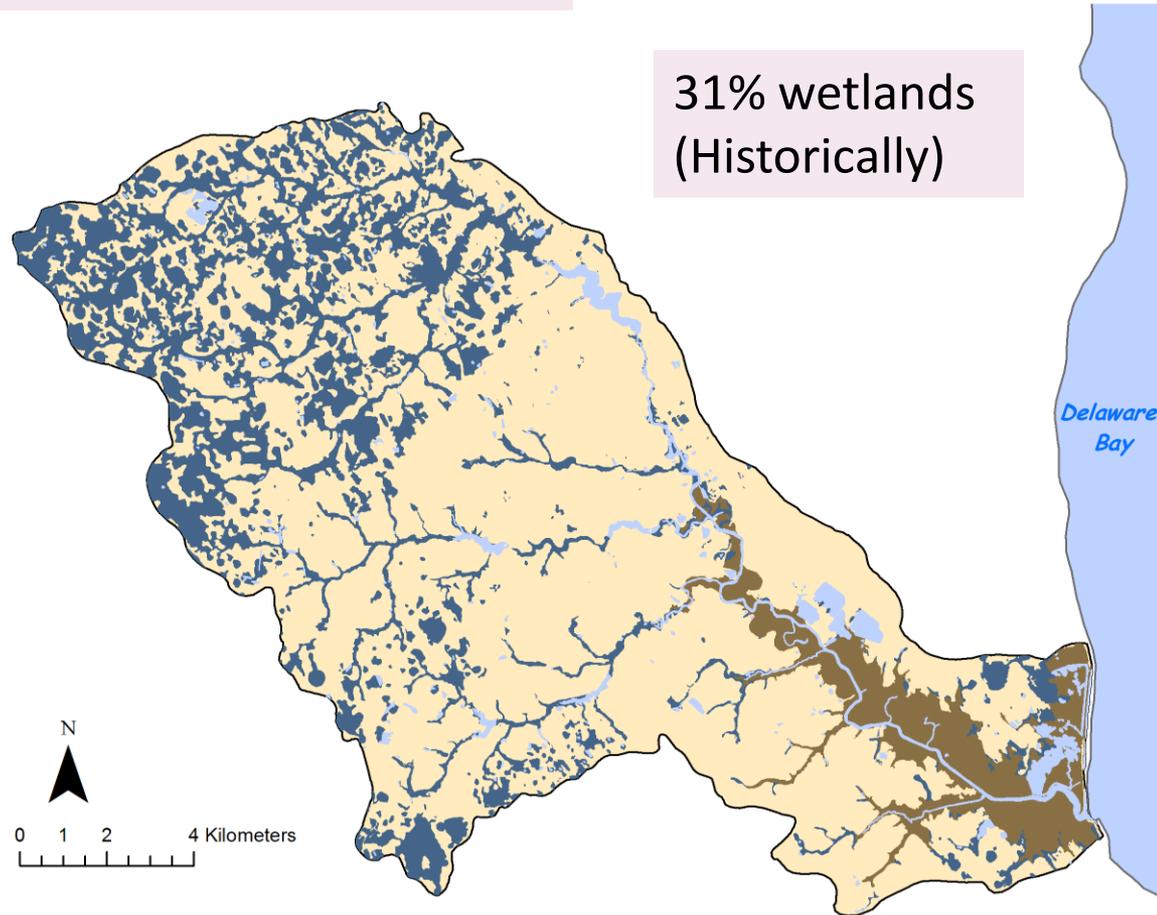
Non-tidal wetlands comprise 2/3 of the State's wetlands

54% of original wetland acreage has been lost statewide



St. Jones Watershed

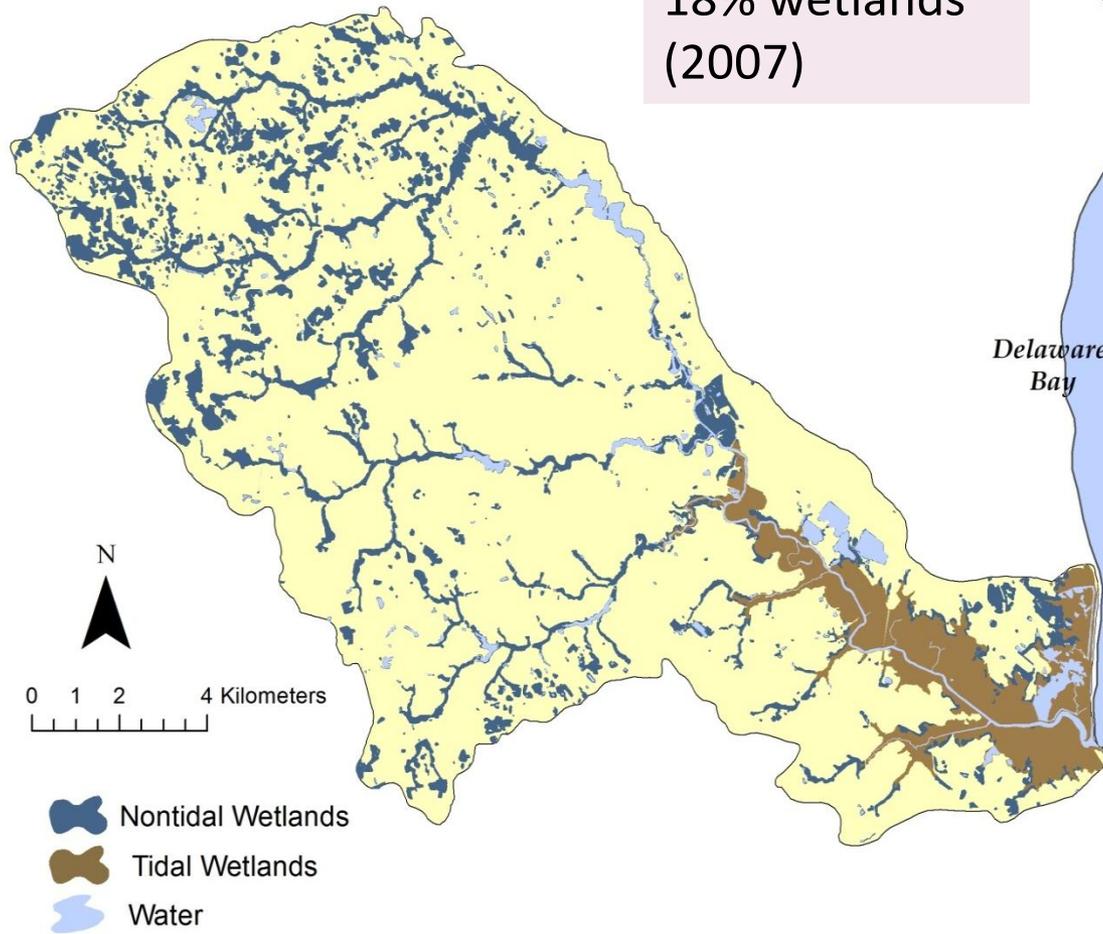
31% wetlands
(Historically)



-  Nontidal Wetlands
-  Tidal Wetlands
-  Water

St. Jones Watershed

18% wetlands
(2007)



Delaware Wetlands Act (1973)

Reaction to
widespread tidal
wetland loss

Has significantly
reduced tidal
wetland losses



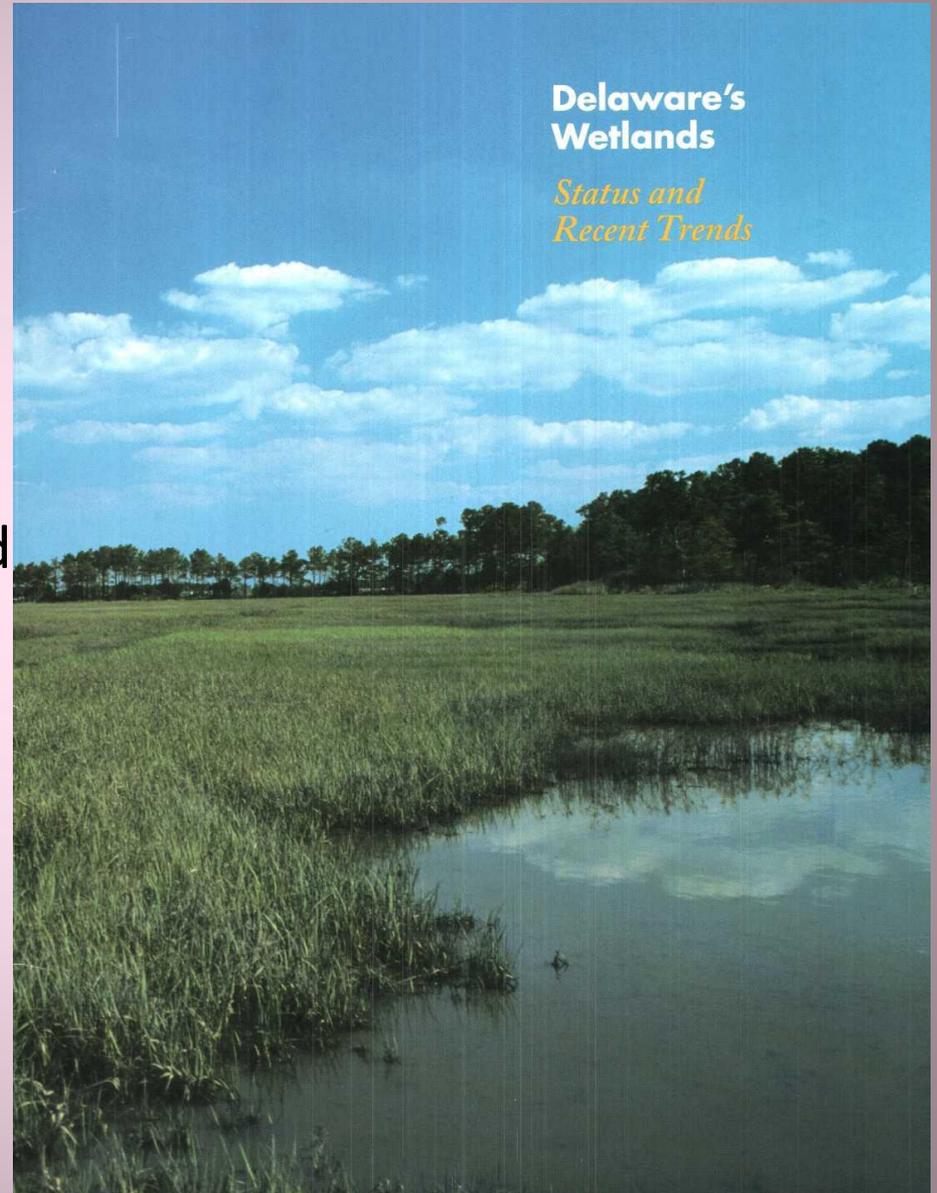
Previous status and trends report 2001

First effort to track wetland losses and gains statewide

Based on period of 1982 NWI to 1992 Delaware **State Wetland Mapping Project (SWMP)**

Reported losses of 1900 acres over 10-year period

Used for comparison to the 2011 status report



'82-'92 Wetland Loss

The losses were primarily non-tidal forested wetlands

Losses were due to agriculture activities and increasing residential development



Wet areas being filled for home construction

Changes to Wetlands

Human activities:

Filling

Draining

Dredging

Pond Construction

Channelization

Conversion to

Pollutant discharge

other uses

Natural processes:

Droughts

Sea level rise

Floods

Hurricanes

Fire

Animal activity

Invasive Species

Climate Changes

Gauging Wetland Changes in Acreage and Function

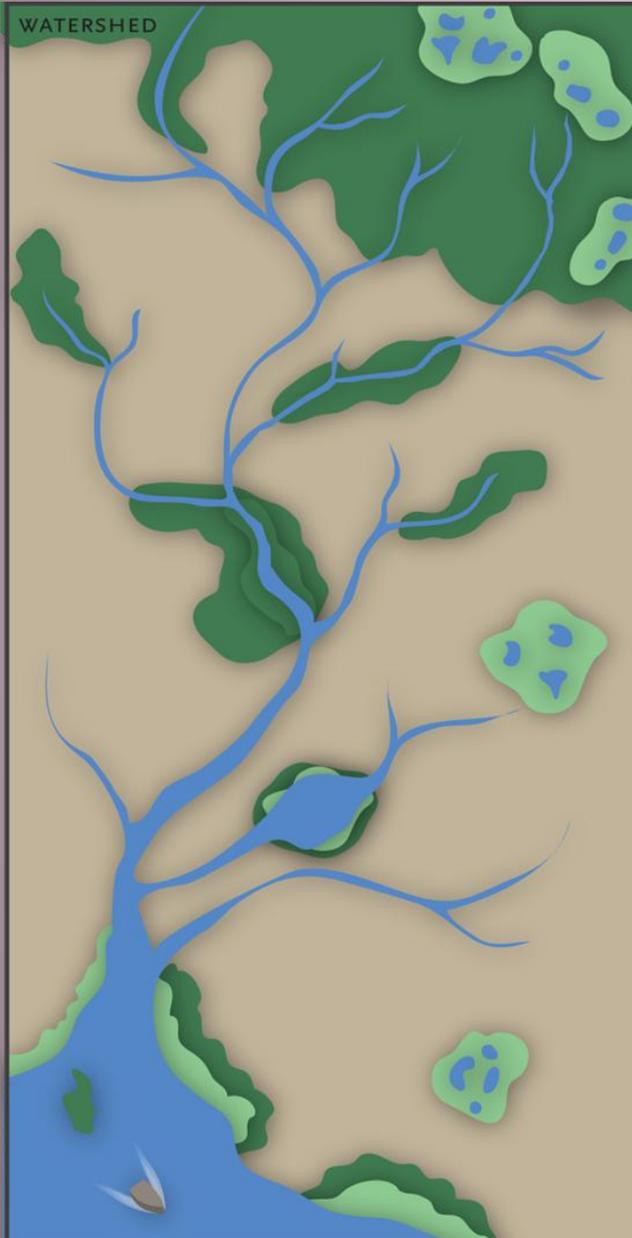
Past status report only tracked acreage

Need to measure wetland functional capacity--the services wetlands provide (e.g. flood protection)

Ability to track direct impacts *and* secondary impacts to existing wetlands due to surrounding land use (@ landscape and local level)



New Mapping Project



Combined National Wetland Inventory and Delaware effort – now are same maps

Mapped wetlands by ecological (Cowardin) and abiotic properties (LLWW; landscape position, landform, water flow path, water body type)

Associated data layers:

Trends, Potential Restoration, Historic, Cowardin, LLWW, H-wetlands, Urbanized hydric soils, special DE modifiers

Landscape Scale Functional Assessment

--As part of this mapping, we also assessed wetlands on their ability to provide these 11 functions

Functions predicted:

Surface water detention

Streamflow maintenance

Carbon sequestration

Bank and shoreline stabilization

Provision of waterfowl and waterbird habitat

Provision of unique, uncommon or highly diverse wetland plant communities

Coastal storm surge detention

Nutrient transformation

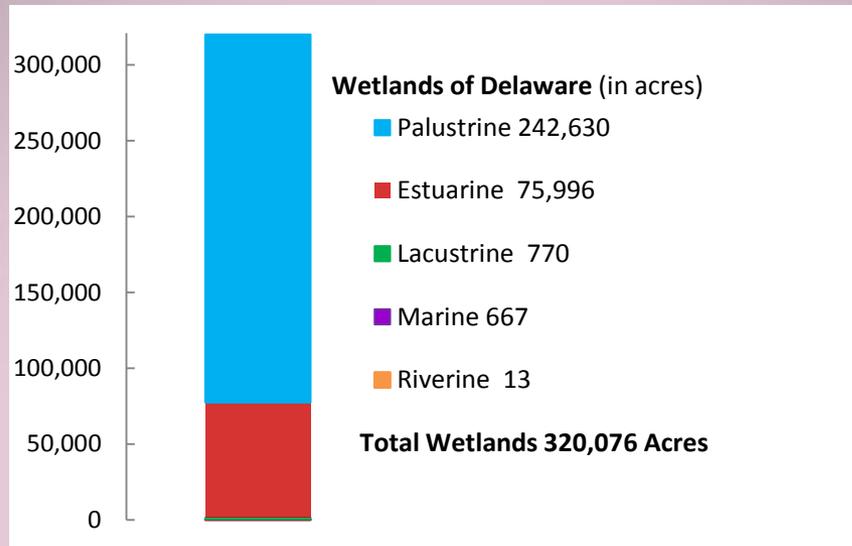
Sediment and other particulates retention

Provision of habitat for other wildlife

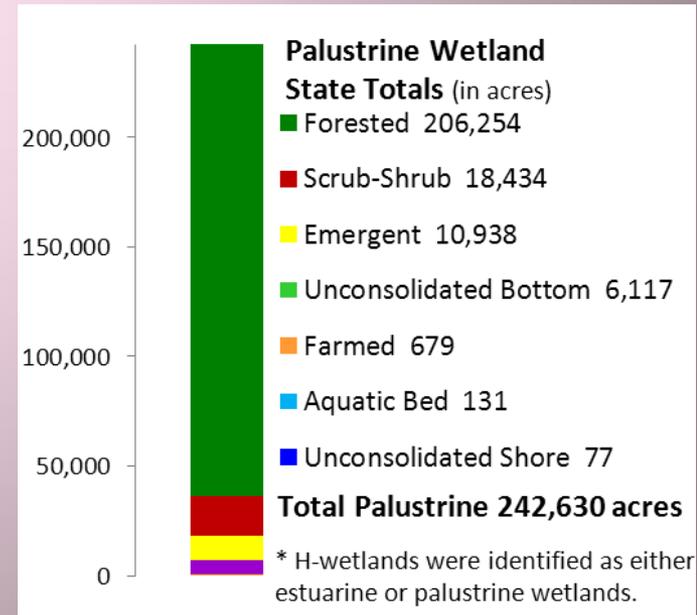
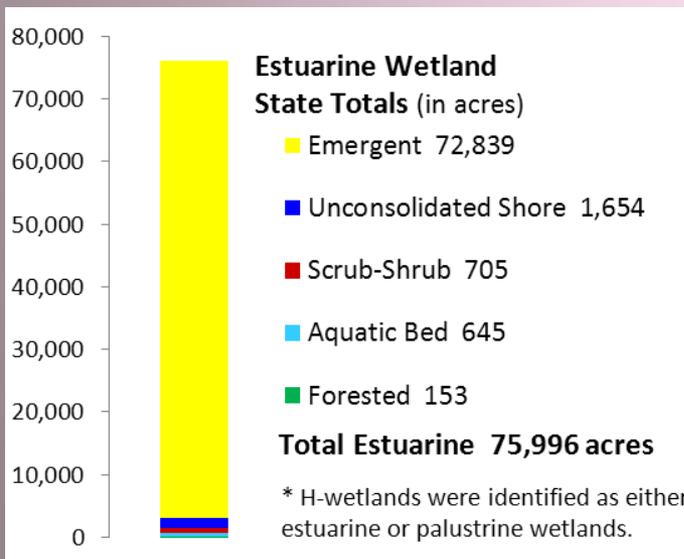
Provision of fish and aquatic invertebrate habitat

2007 Delaware Wetlands- Status (by ecological classification)

Composition
of all
wetlands



← salt and
freshwater
wetlands →



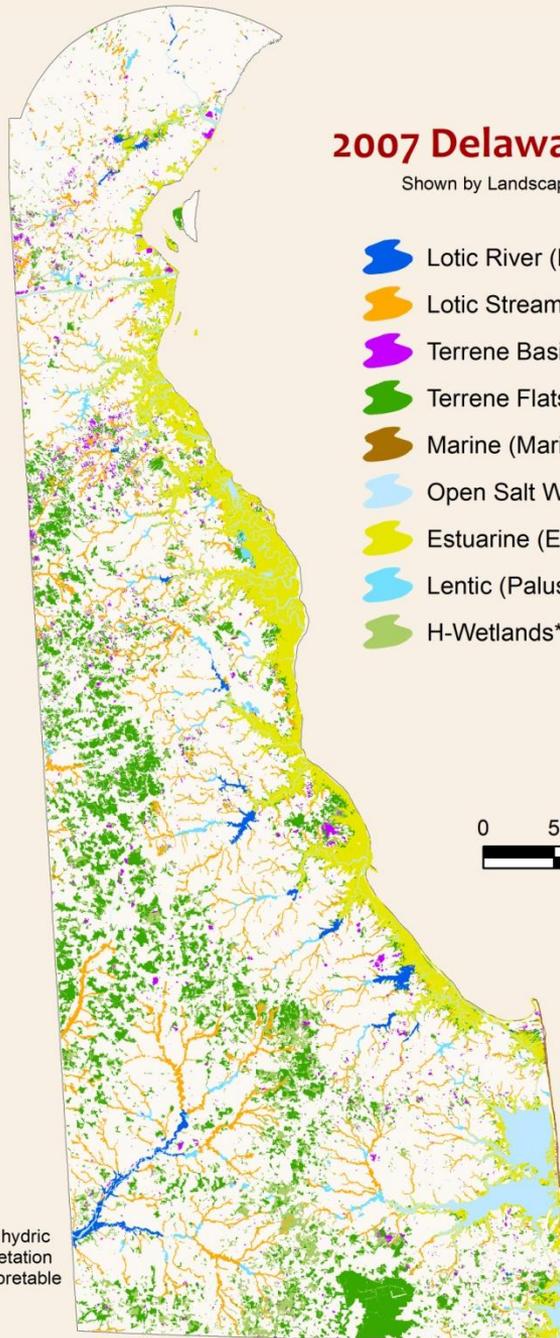
2007 Delaware Wetlands

Shown by Landscape Position (Cowardin)

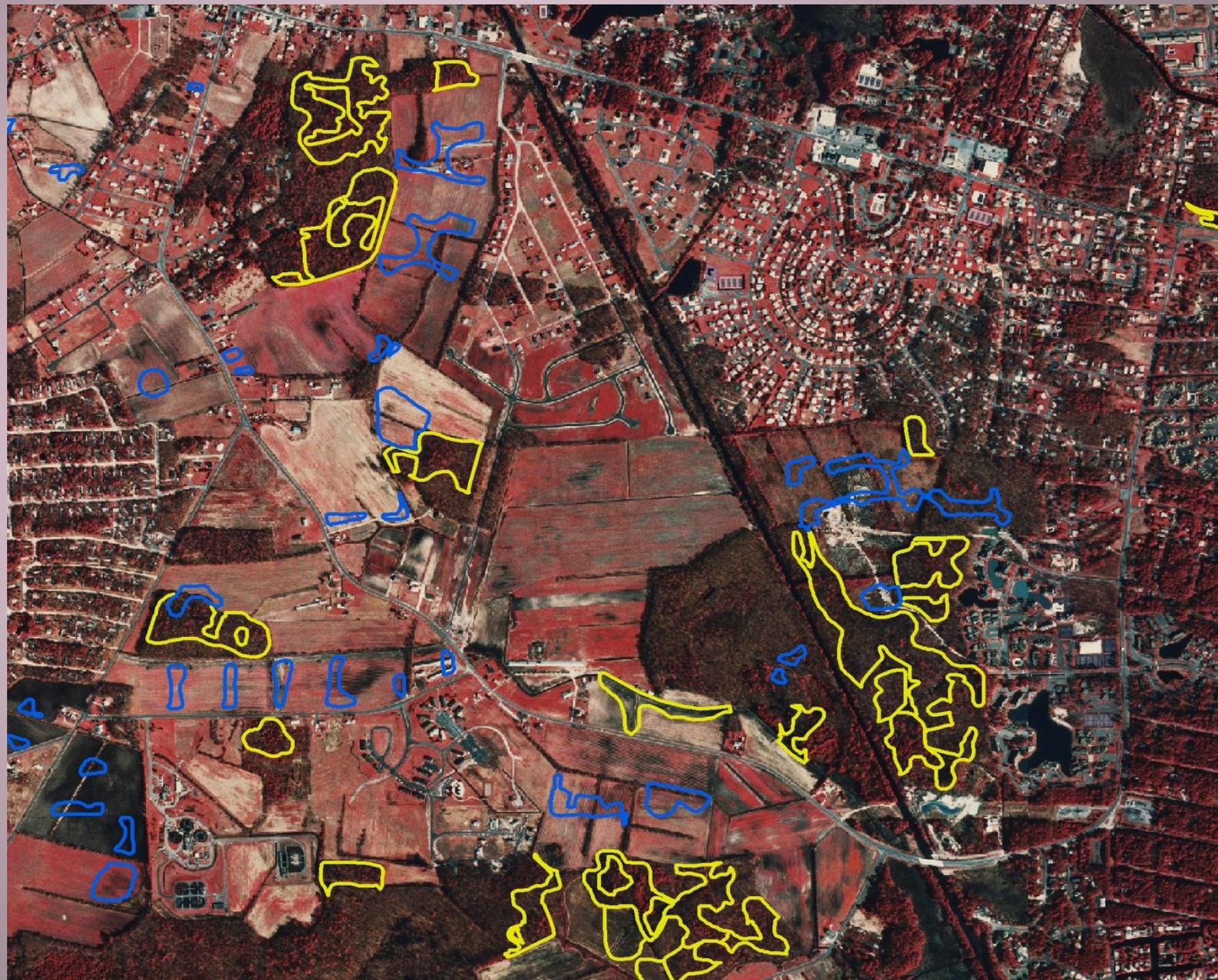
-  Lotic River (Palustrine)
-  Lotic Stream (Palustrine)
-  Terrene Basin (Palustrine Depression)
-  Terrene Flats (Palustrine)
-  Marine (Marine)
-  Open Salt Water
-  Estuarine (Estuarine Tidal)
-  Lentic (Palustrine)
-  H-Wetlands*



* H-Wetlands consist of hydric soils having natural vegetation but lacking a photointerpretable wet signature.



West Bethany 1992



Loss



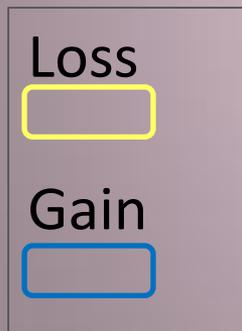
Gain



West Bethany 2007

93 acres
forested
& emergent
lost

37 acres
Ponds
gained



Middletown 1992



Loss



Gain



Middletown 2007

66 acres

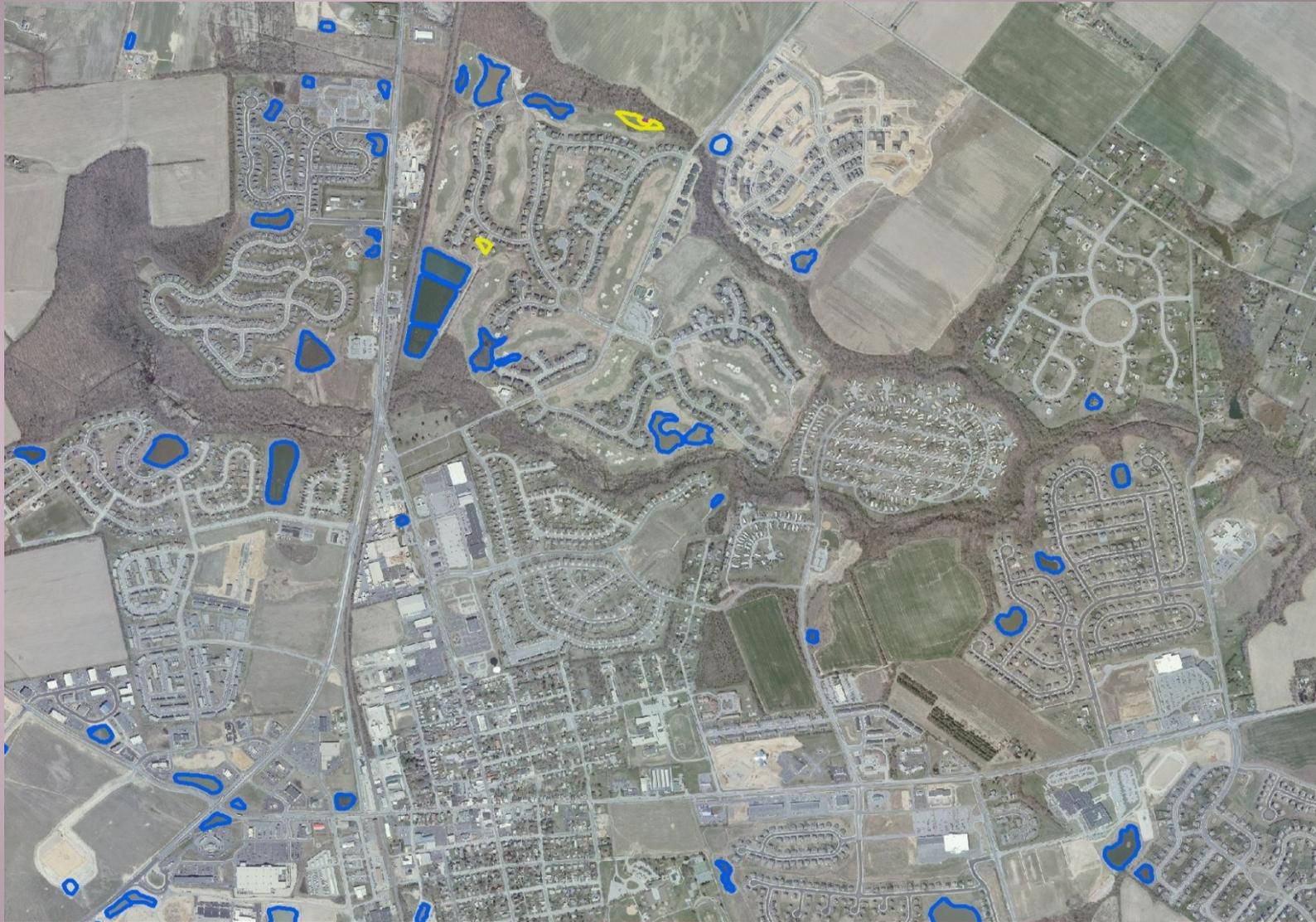
Ponds
gained

2 acres
lost

Loss



Gain



**The gain in stormwater ponds, while important for surface water detention, are no substitute for the multitude of functions provided by natural wetlands.

West Georgetown 1992



Loss



Gain



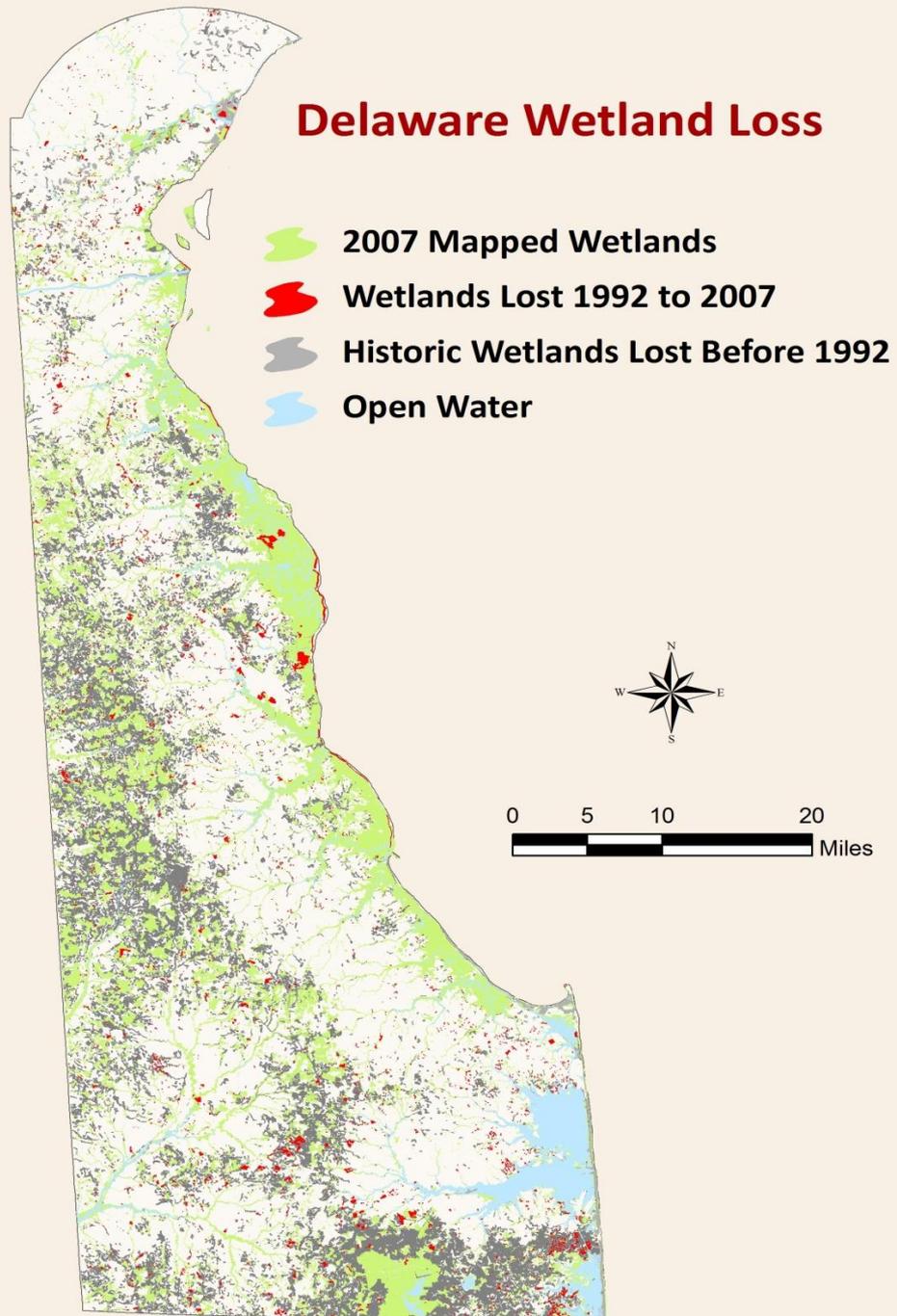
West Georgetown 2007

330 acres
Forested
Wetlands
lost

43 acres
ponds or
borrow pits
gained

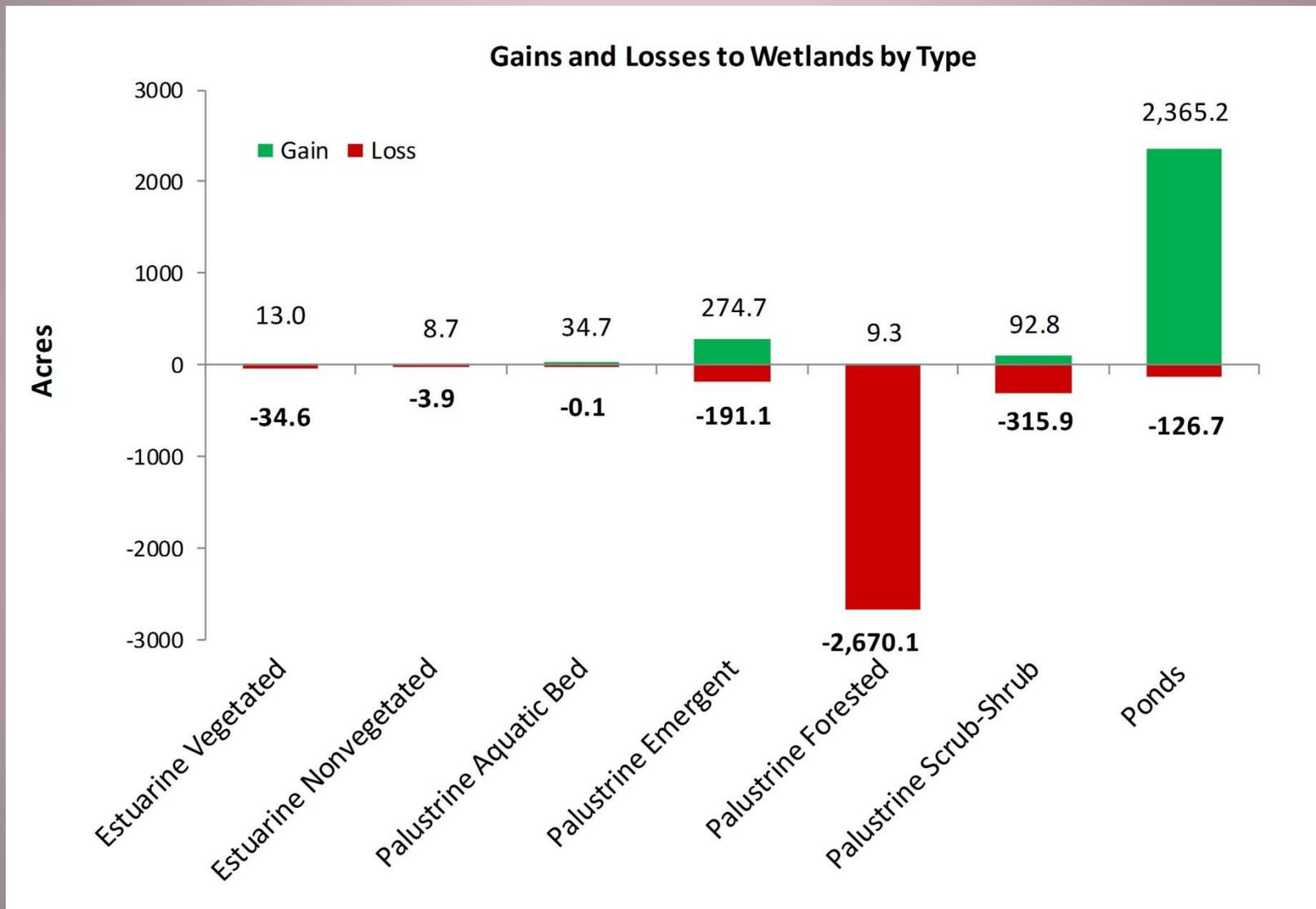


Delaware Wetland Loss



Statewide losses
(3,894 acres) equal to
the size of Smyrna
(3,807 acres)

Delaware Wetlands – 1992 to 2007



Delaware Wetlands – 1992 to 2007

Gross loss 3,894 acres *vegetated wetlands*

Gross gain 768 acres

Net loss of 3,126 acres

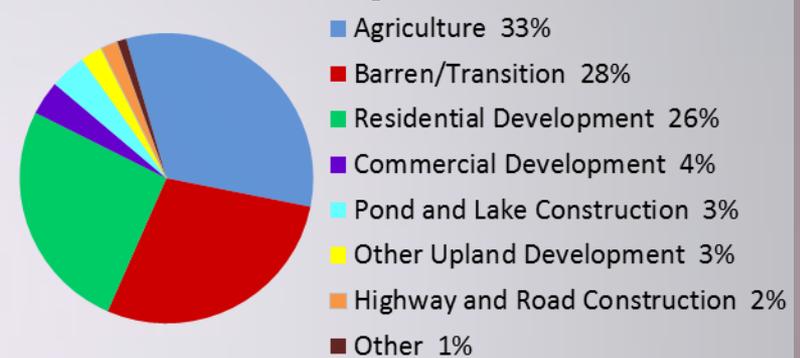
92% of all lost were non-tidal wetlands
(mostly forested headwaters)

Tidal wetland net loss of 238 acres
(gross loss of 580 acres due to
submergence of marshes and gains
were open water)

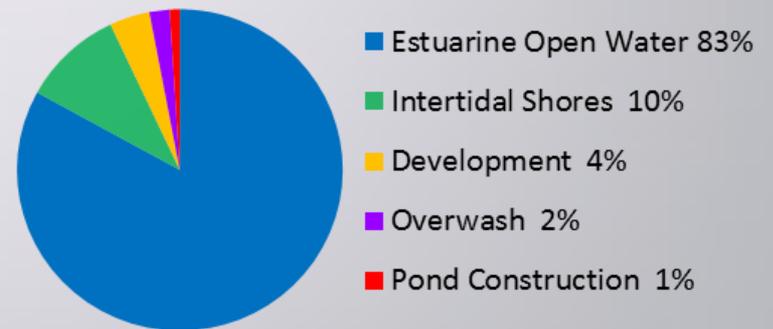
Pond gain of 2,285 acres

65% of created ponds came from ag
land being converted to development

Sources of Palustrine Vegetated Wetland Losses



Sources of Estuarine Vegetated Wetland Losses

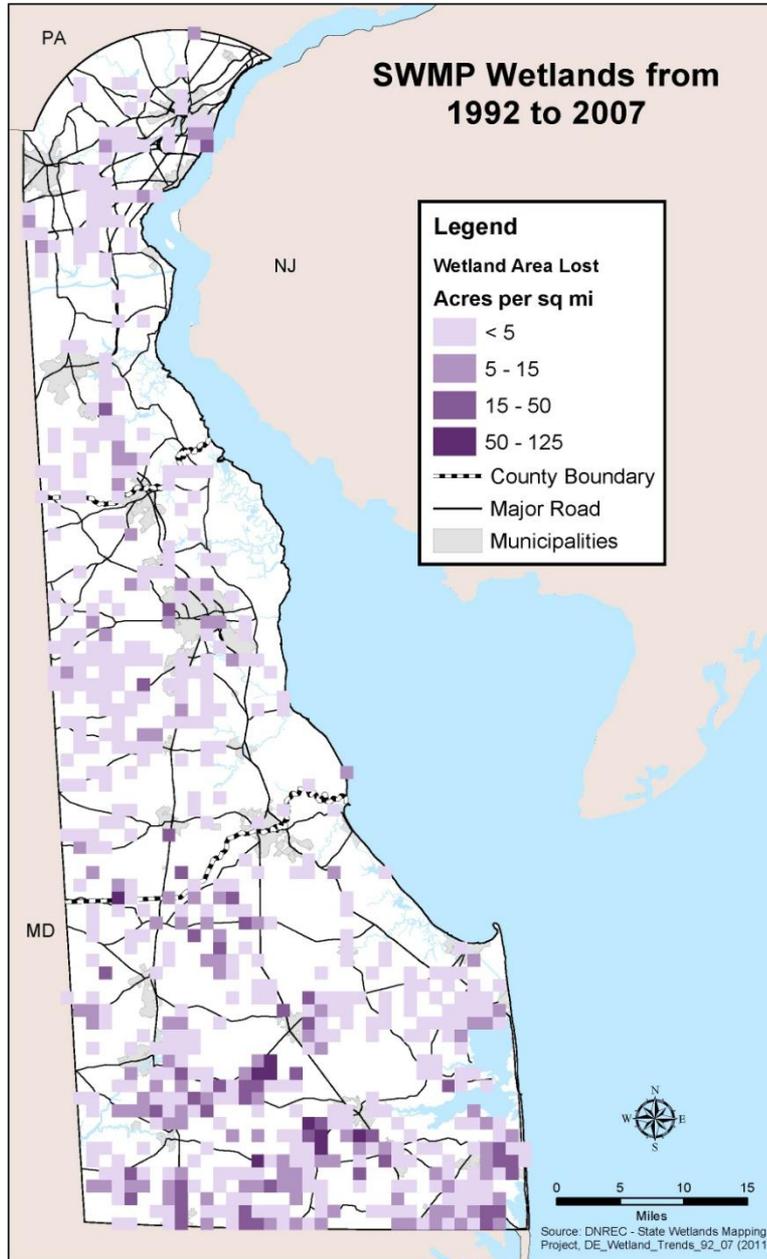


Analysis by County and Drainage Basin

Of the 3,126 acres of net vegetated wetland loss, > 80% was in Sussex County (larger than the size of Georgetown)

The Chesapeake Bay (1,767ac) and Inland Bays (1,012ac) basins accounted for the highest net vegetated wetland loss

The Delaware Bay basin and Sussex County had the highest gain in pond acreage



Wetland Loss per Square Mile

Rate of loss by **County**:

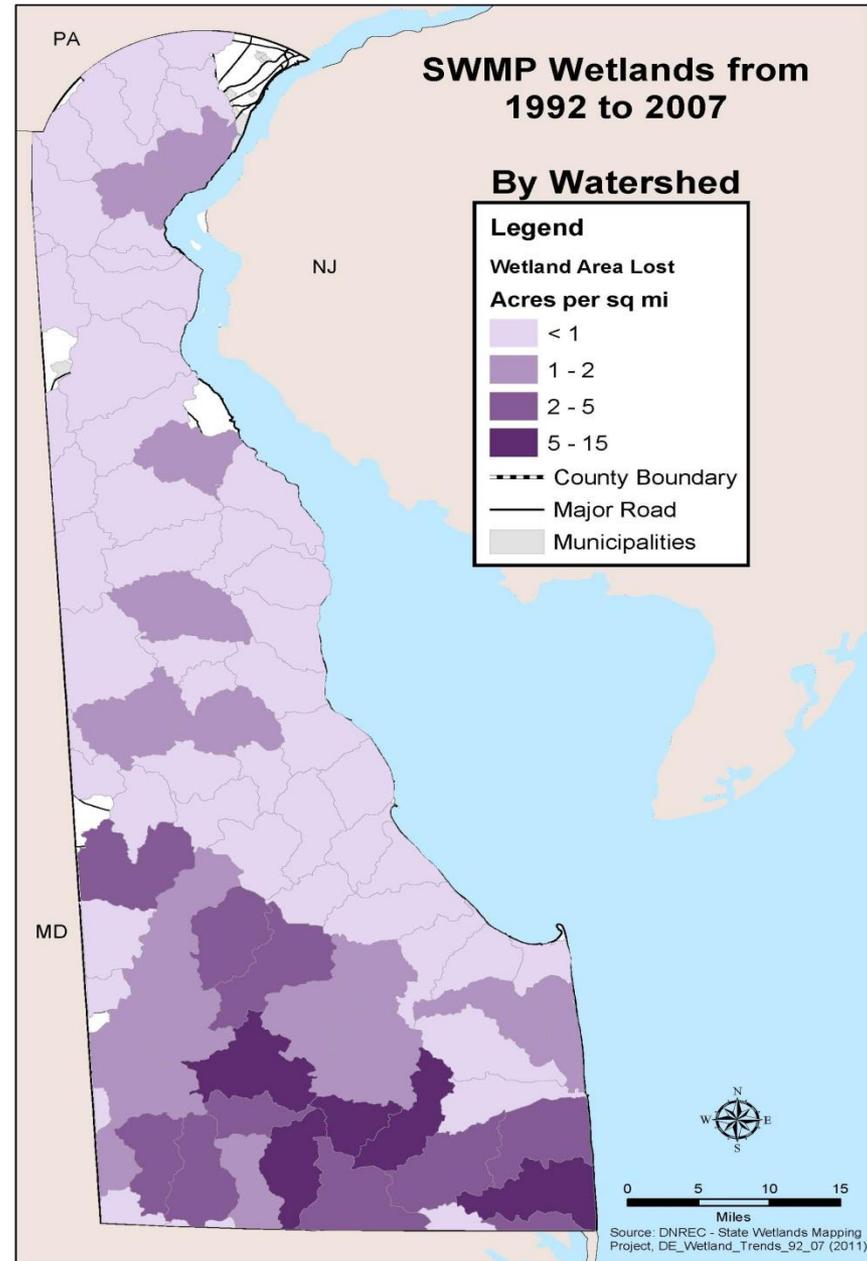
New Castle	0.51 ac/mi ²
Kent	0.60 ac/mi ²
Sussex	2.81 ac/mi ²

Rate of loss by **Basin**:

Piedmont	0.12 ac/mi ²
Delaware Bay	0.54 ac/mi ²
Inland Bays	3.42 ac/mi ²
Chesapeake Bay	2.29 ac/mi ²

Wetland Loss by Watershed

- south of and headwaters of the **Inland Bays**
- the **Nanticoke River** headwaters



What's next...

Work with USACE, EPA, NRCS, WSLS to zero in and clarify why these impacts happened

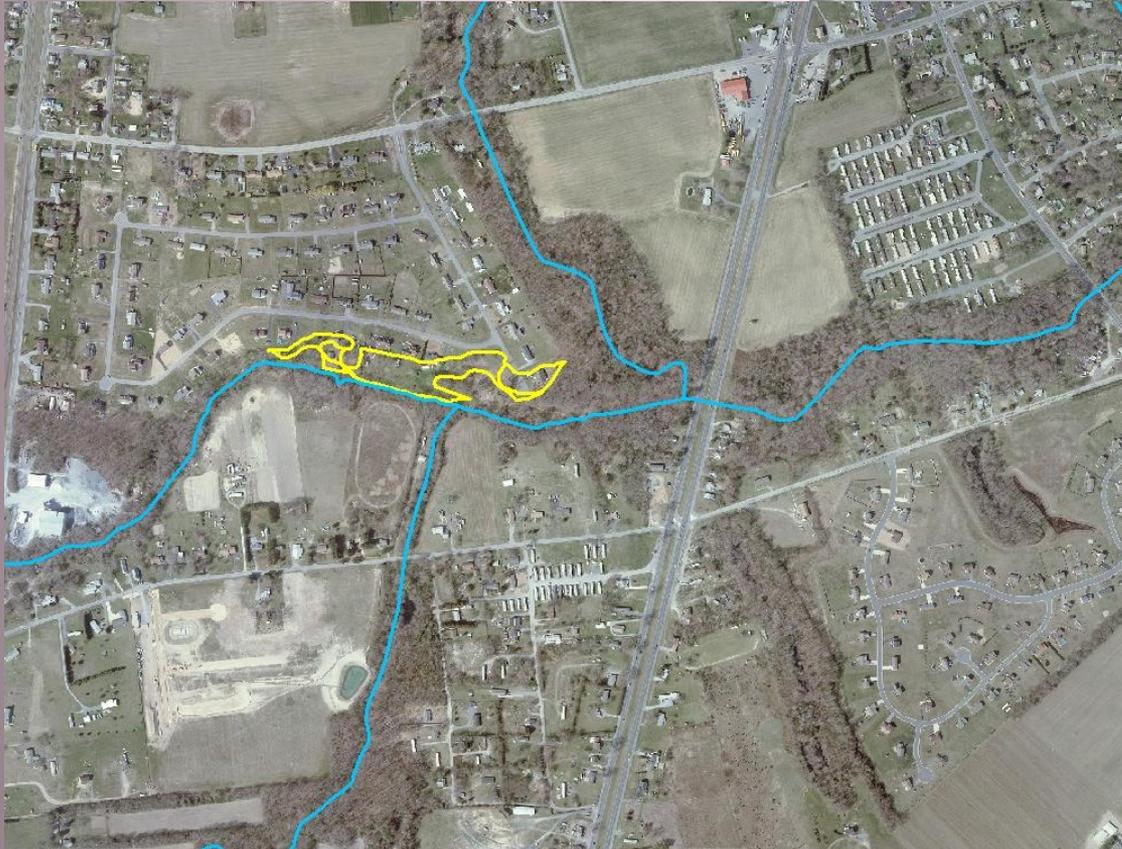
More clearly define how the Nationwide permit program is affecting wetlands in Delaware

Maximize existing programs and leverage funding and other mechanisms to protect wetlands

Work to incorporate wetland functional analysis into regulatory decision making

More clearly define and value individual wetland functions beginning with flood protection

Wetland Services: Effects on downstream flooding of property...



...when wetlands
are lost upstream

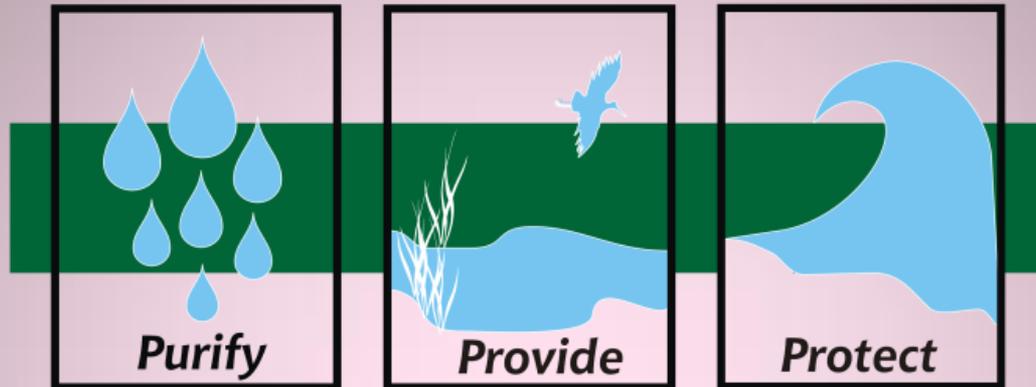
Wetland Services:

Cumulative Effects of Wetland Loss



How has this loss affected an area such as Dover?

Delaware Wetlands



www.dnrec.delaware.gov/admin/delawarewetlands

Delaware Wetlands Social Media

www.facebook.com/delawarewetlands

twitter.com/de_wetlands

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