Condition of Tidal and Non-Tidal Wetlands in Southern Delaware's Coastal Watersheds

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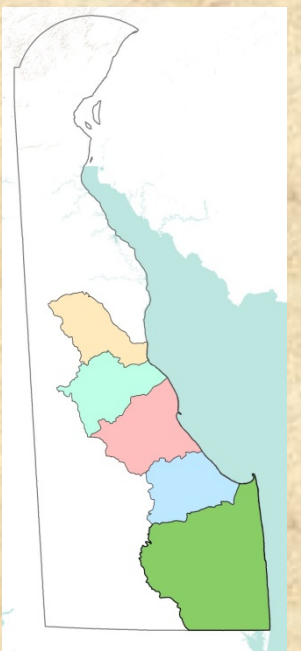
Wetland Monitoring and Assessment Program

Delaware Wetlands
Purify Provide Protect

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

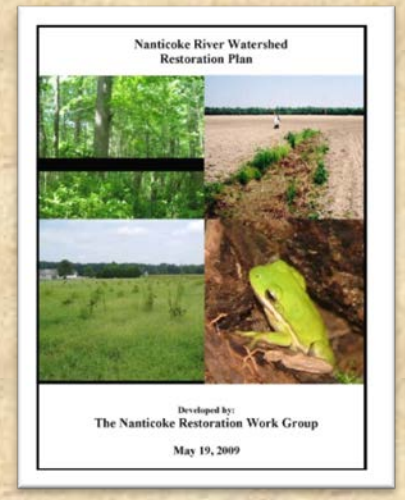
Outline

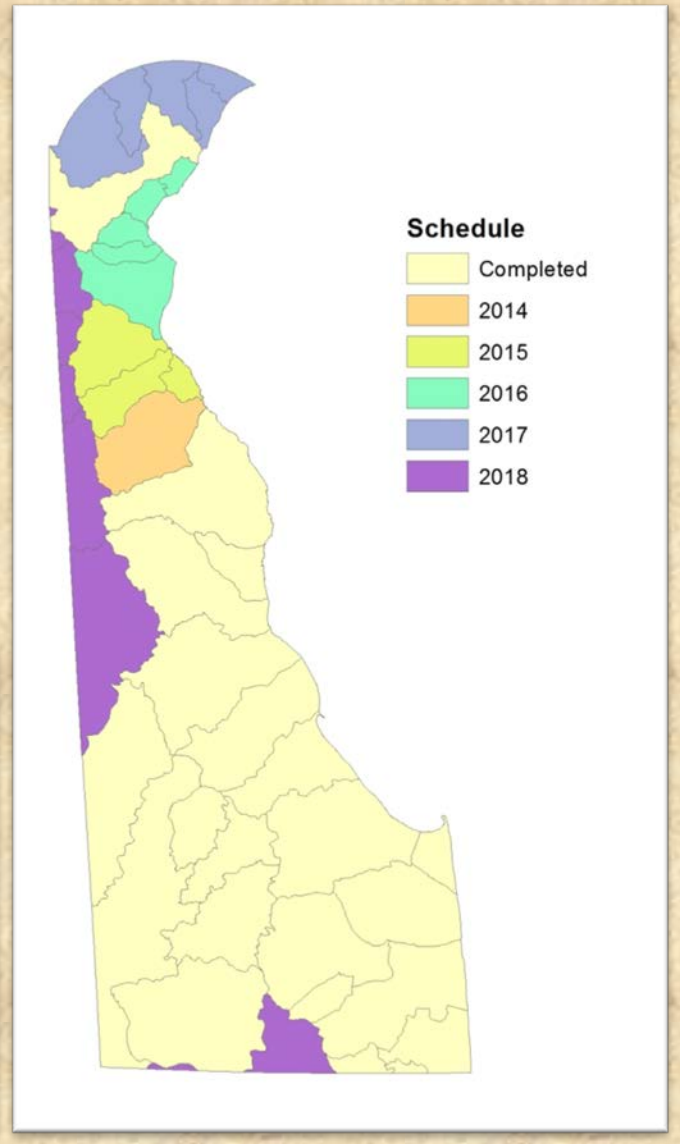
- DE Wetland Monitoring and Assessment Program
- Info on watersheds included in this study
- Condition of salt marshes, non-tidal flats, and non-tidal riverine wetlands
- Implications and recommendations



Why Monitor Wetland Condition?

- What ecosystem services are wetlands providing and at what level?
- Determine stressors
- Gain information to guide restoration and enhancement
- HGM based approach





Delaware Wetland Monitoring and Assessment Strategy

- 3-tiered assessment design

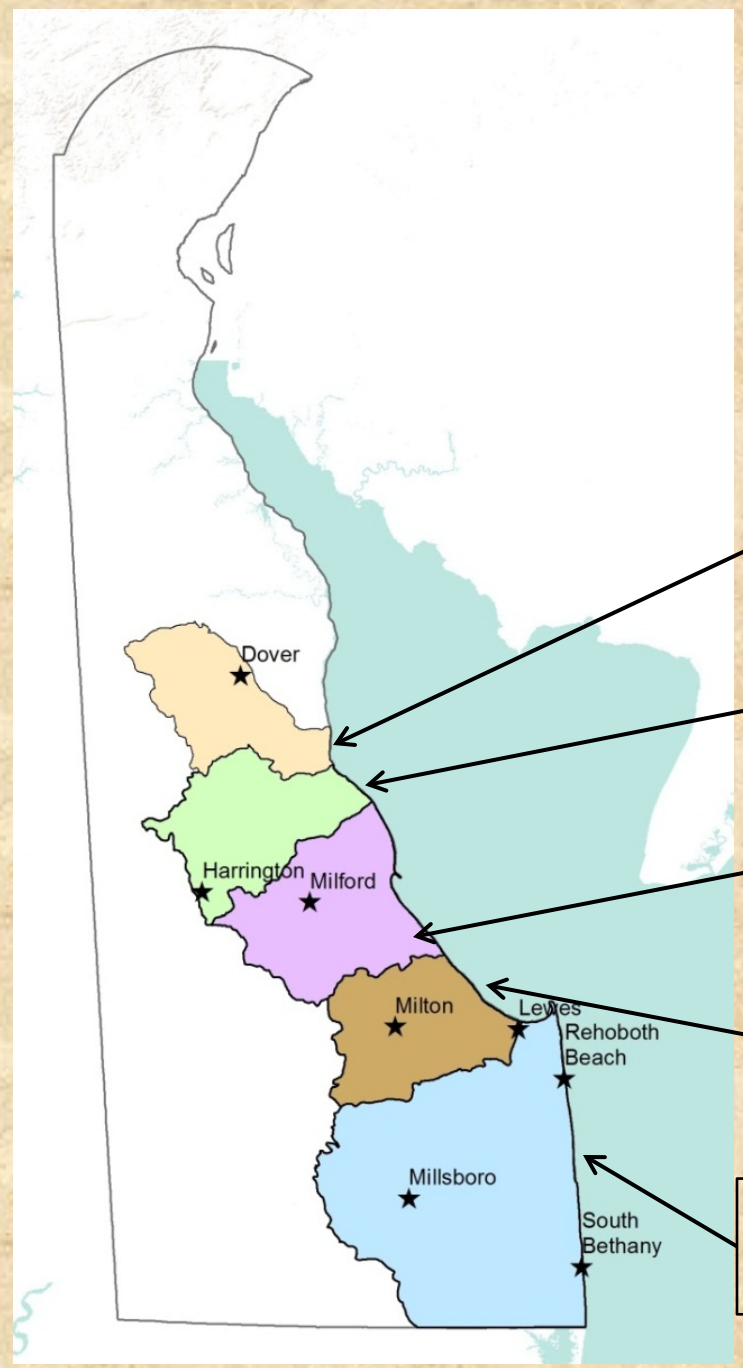
Level 1 – Landscape

Level 2 – Rapid

Level 3 – Intensive

Study Area

5 watersheds on lower Delaware Bay/Atlantic Ocean



St. Jones (2007-2008)
N = 111

Murderkill (2007-2008)
N = 111

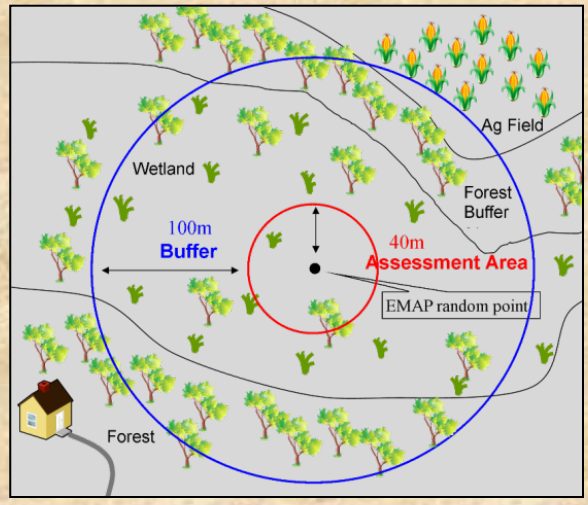
Mispillion (2012)
N = 112

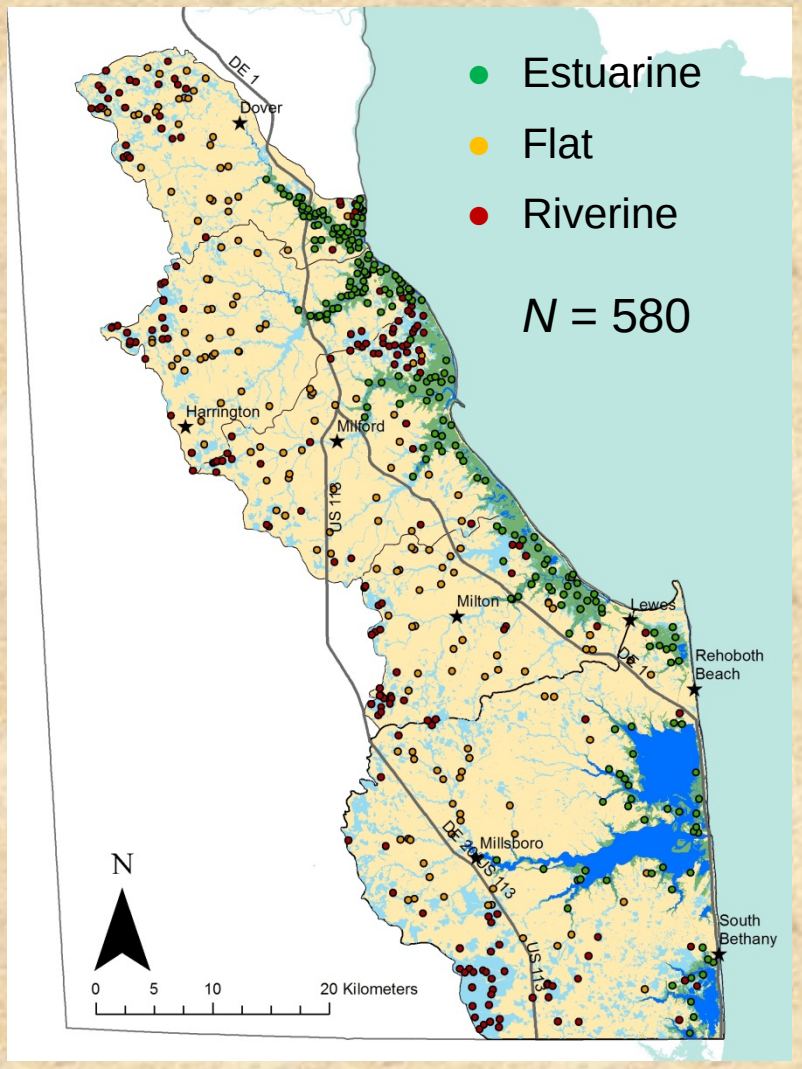
Broadkill (2011)
N = 91

Inland Bays (2005-06, 2008)
N = 149

Study Design

- Level 1: Landscape Analysis
  - LULC, wetland acreage
- Level 2: Condition Assessments
  - Assess functional capacity of a wetland based on stressor intensity
  - Mid-Atlantic Tidal Wetland Rapid Assessment Method
  - Delaware Rapid Assessment Procedure (non-tidal)

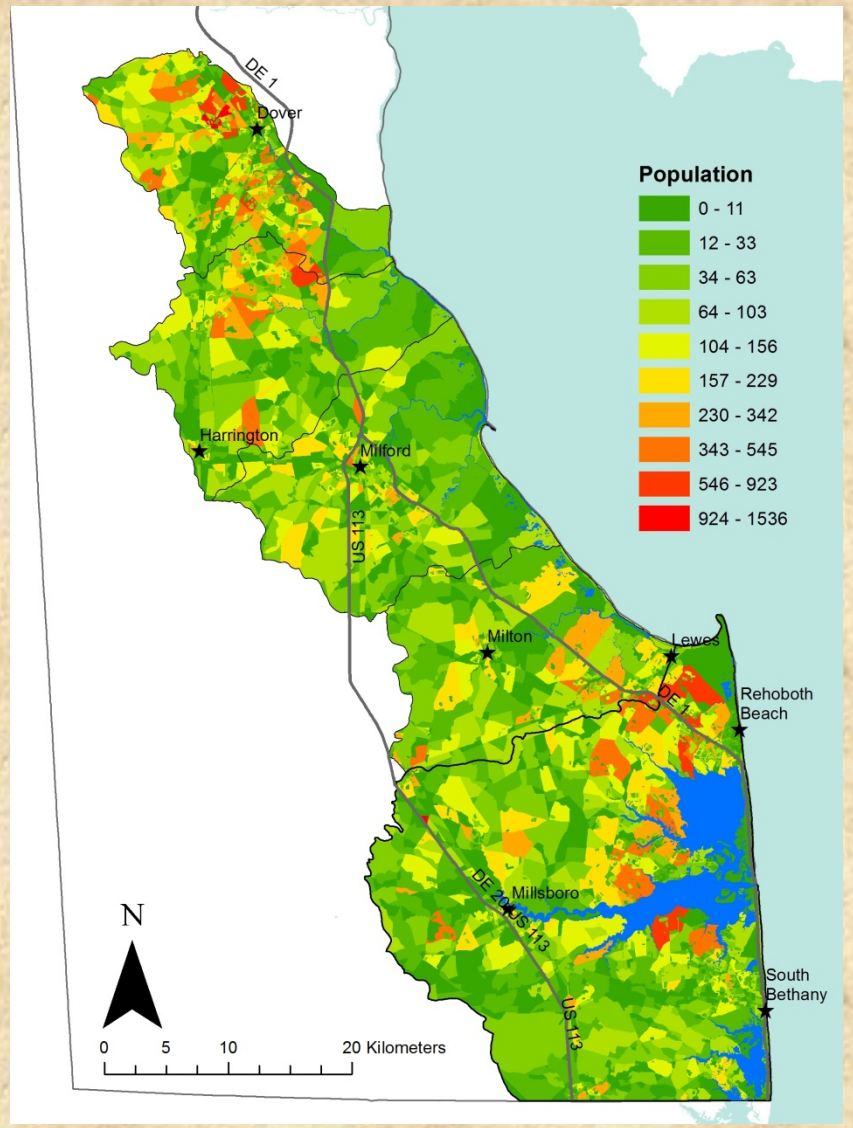




2010 Census Data

- Population: est. 254,251
  - Inland Bays (90k) and St. Jones (75k)
  - Inland Bays population in coastal communities

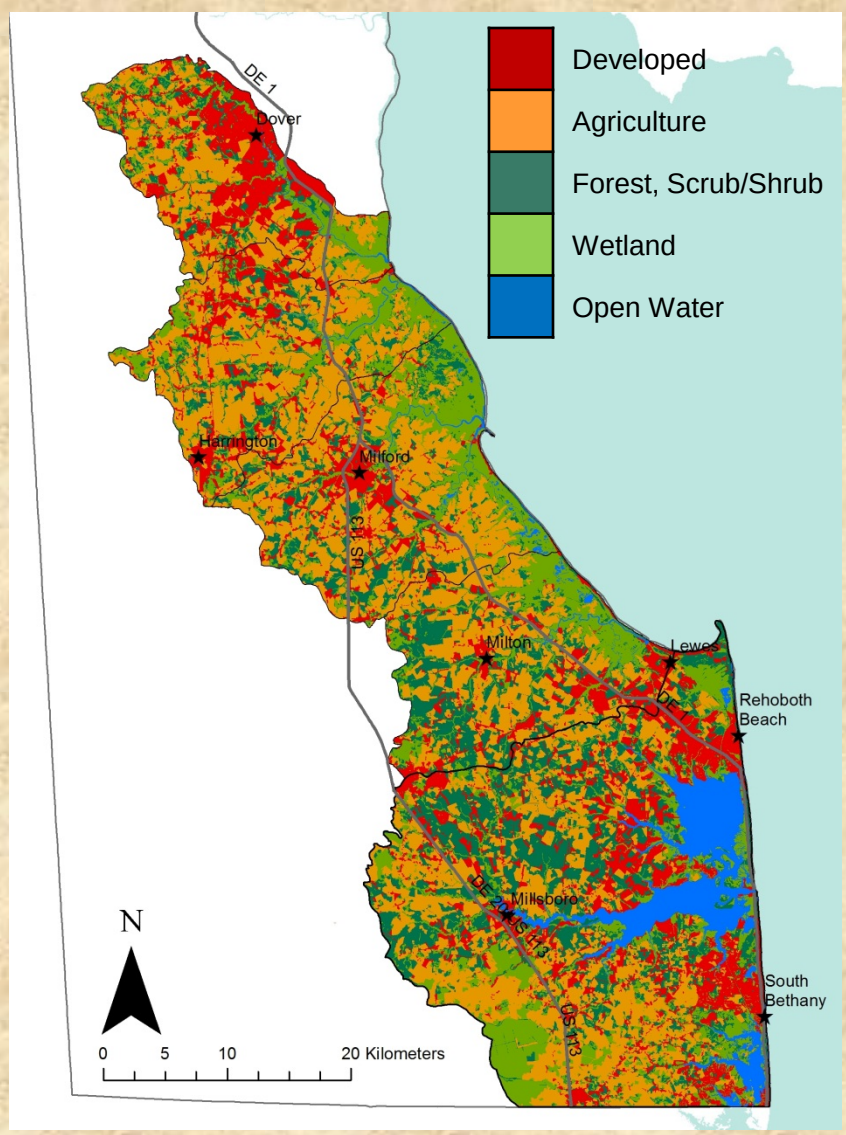
Watershed	People per ha
St. Jones	3.82
Murderkill	1.27
Mispillion	1.05
Broadkill	1.29
Inland Bays	1.43



Coastal DE Land-Use

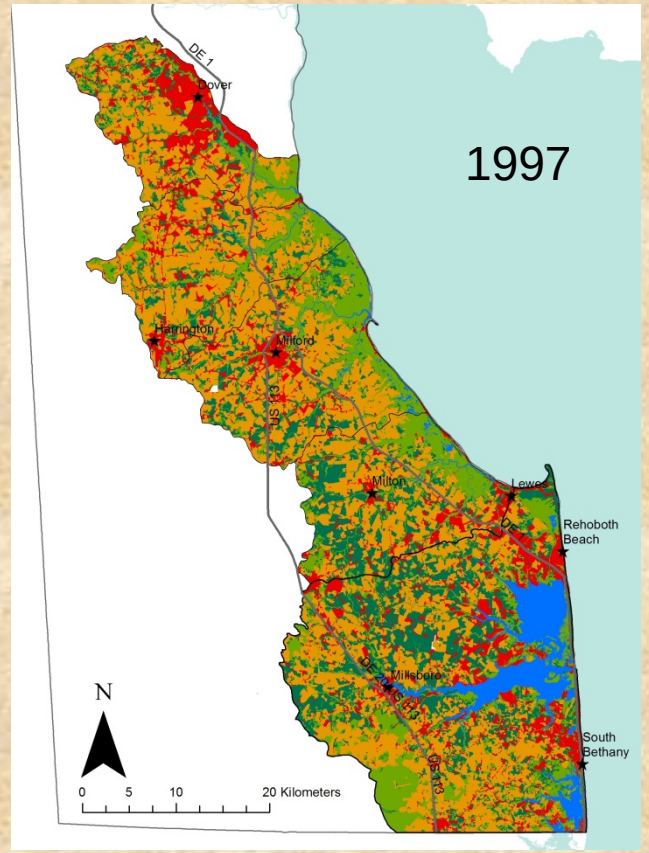
- Dominated by agriculture
  - 52% of Murderkill
  - 30% of Inland Bays
- Areas of urban and suburban development
  - 32% of St. Jones
  - 13% of Mispillion
- Large forest tracts in Broadkill and Inland Bays

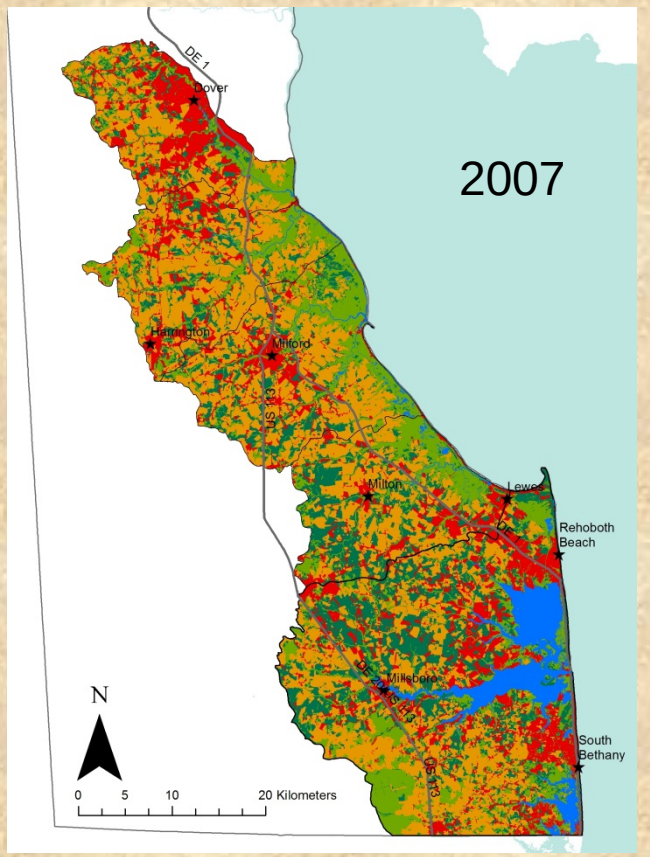
Based on 2007 LULC



Land-Use Change

- 1997 to 2007 Land-use/Land-cover data
  - 4-6% increase in development in all watersheds
  - 3-10% decrease in agricultural land in all watersheds



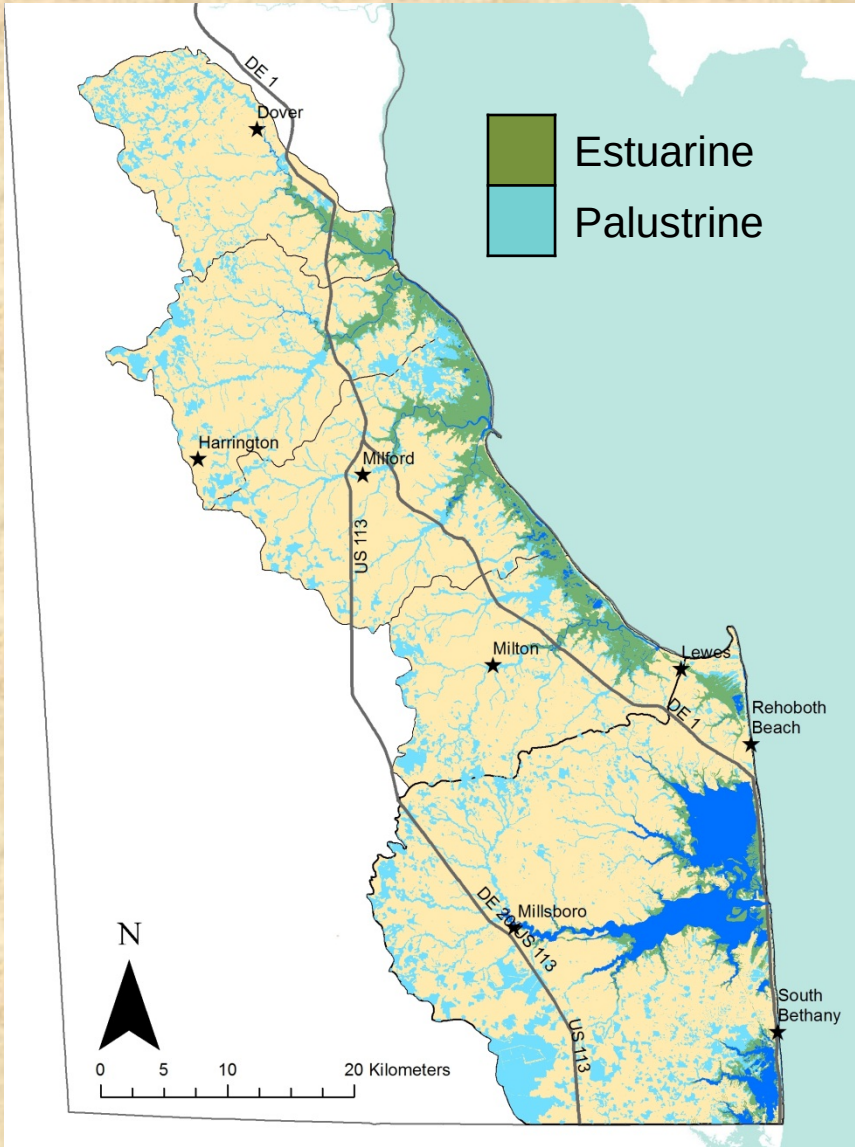


Wetland Acreage

- 43,000 ha of wetlands
  - 15,000 ha estuarine
  - 28,000 ha palustrine

	Estuarine	Palustrine
St. Jones	1513 ha (39%)	2398 ha (61%)
Murderkill	1718 ha (34%)	3336 ha (66%)
Mispillion	4934 ha (51%)	4753 ha (49%)
Broadkill	2657 ha (49%)	2773 ha (51%)
Inland Bays	4440 ha (24%)	14150 ha (76%)

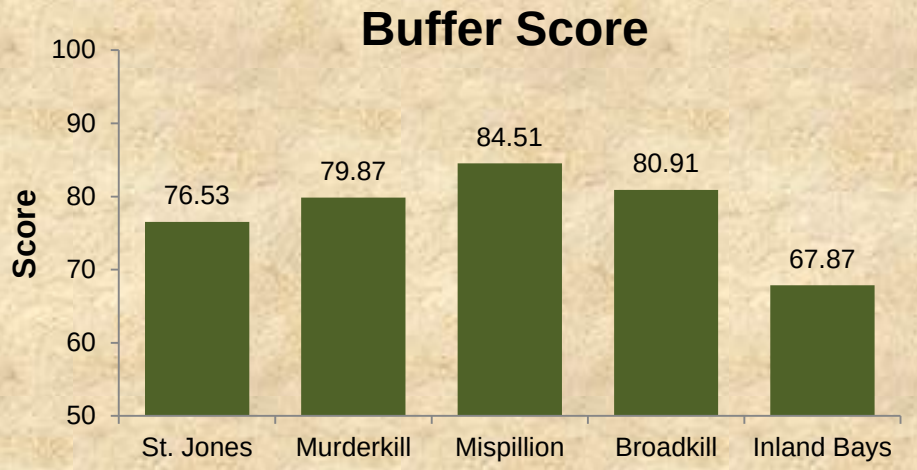
2007 SWMP



Estuarine Wetlands

Estuarine Wetland Condition

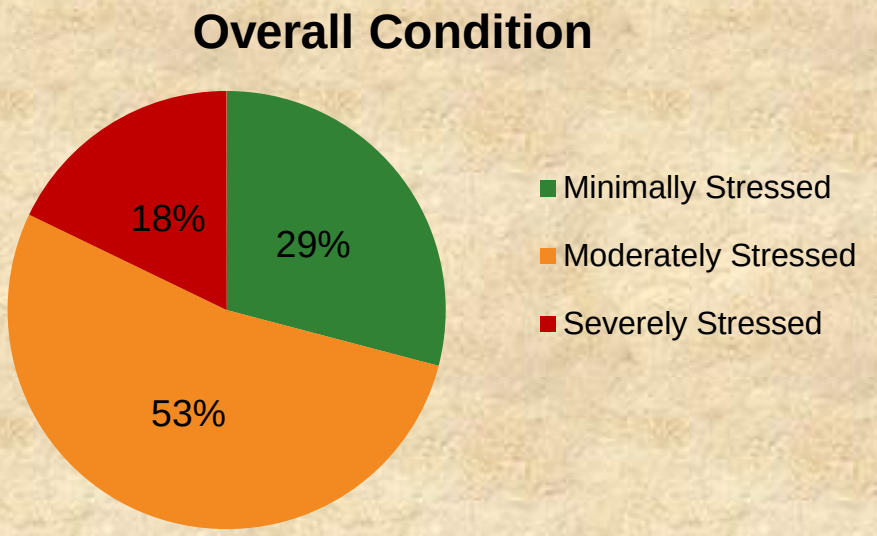
- <u>Impacts to Surrounding Landscape</u>
  - 96% of wetlands have degraded buffers
    - Development, agriculture, roads, ditches, invasive plants
  - Inland Bays- wetland buffers most impacted
    - Low proportion of natural cover
    - Highest occurrence of development in buffers (94%)
    - Hardened shorelines

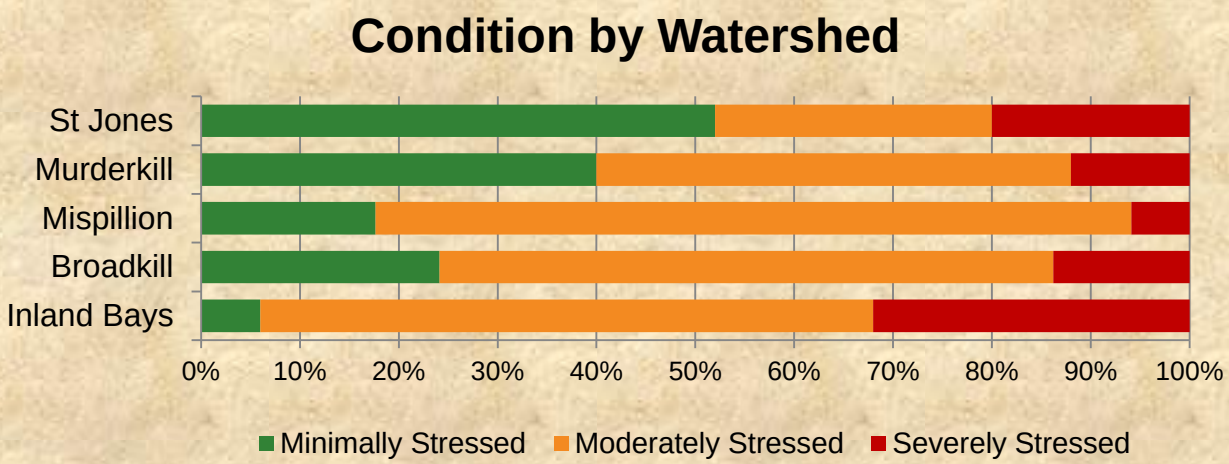


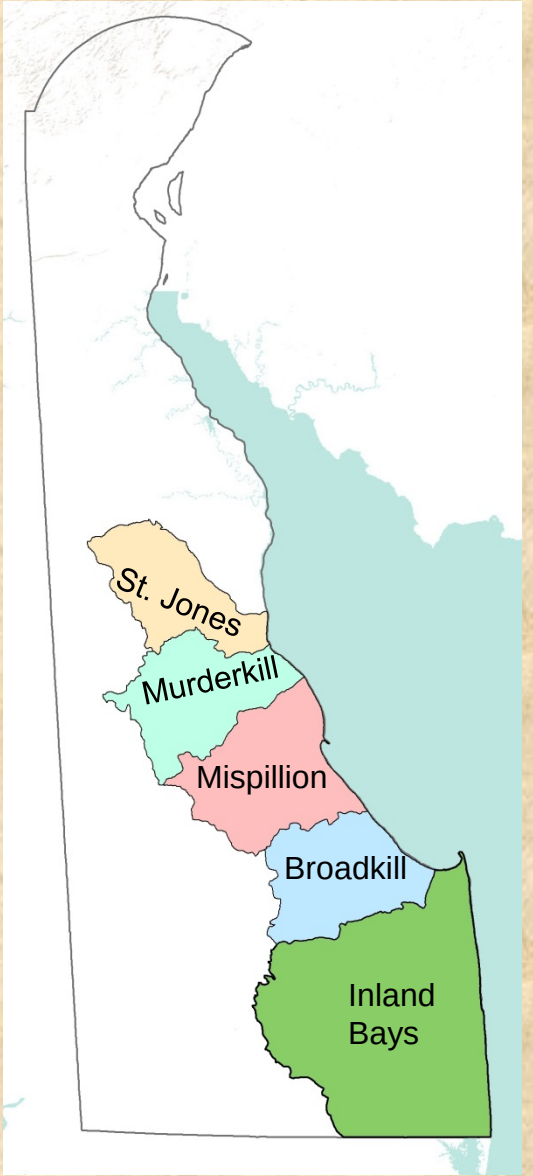
Estuarine Wetland Condition

- <u>Wetland Hydrology</u>:
  - 60% are ditched
    - Spoil piles associated with ditching
  - Other hydrology stressors uncommon
- <u>Wetland Habitat Quality</u>:
  - Most sites dominated by 1-3 *sp*.
  - 56% contained *Phragmites*
    - 10% were dominated by *Phragmites*
    - Most abundant in Broadkill, (*Phrag* covered est. 22% of wetland acreage)

Estuarine Wetland Condition



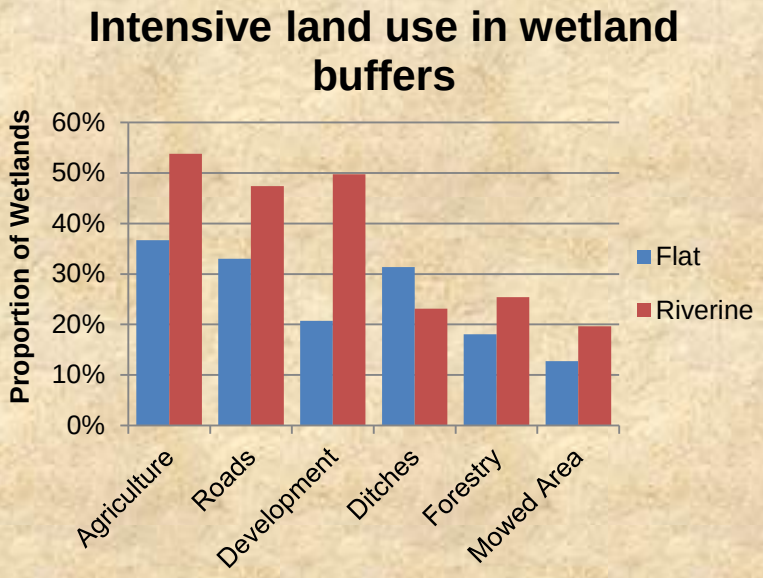




Palustrine Wetlands

Non-tidal Wetland Condition

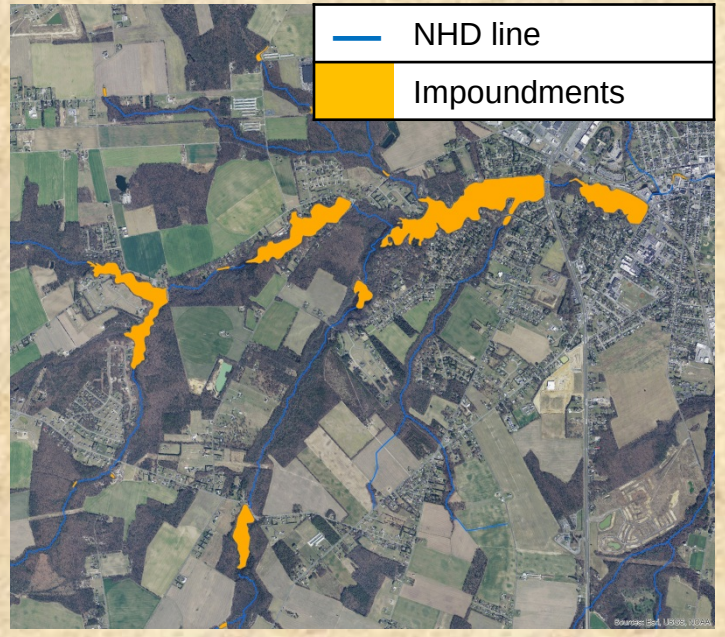
- Not all wetlands are the same!
- Riverine wetlands have narrow buffers = edge effects
  - Invasive species found in 79% of riverine wetlands vs. 36% of flats



Riverine Wetland Condition

- <u>Stream hydrology</u>
  - 30% were channelized or incised
  - 16% were impounded
    - 52% of Mispillion wetlands

Impoundments (Mispillion)



Stream incision

Stream channelization

Riverine Wetland Condition

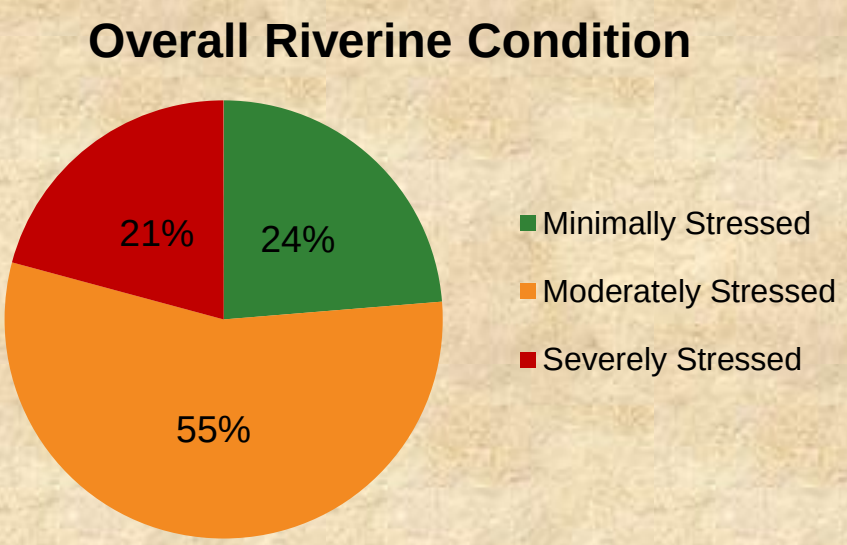
- <u>Habitat Quality</u>
  - 79% of wetlands had invasive species
    - 9% were dominated by invasives
  - 34% of wetlands have fill/spoil
    - Stream channelization, yard waste, or filling
  - 3% were clear-cut
    - 22% selectively cut

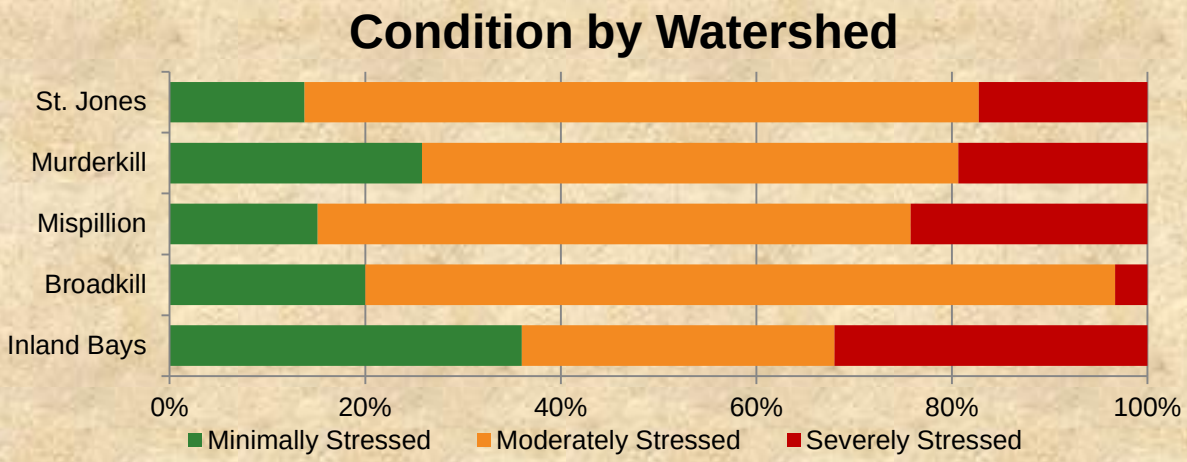
Phragmites

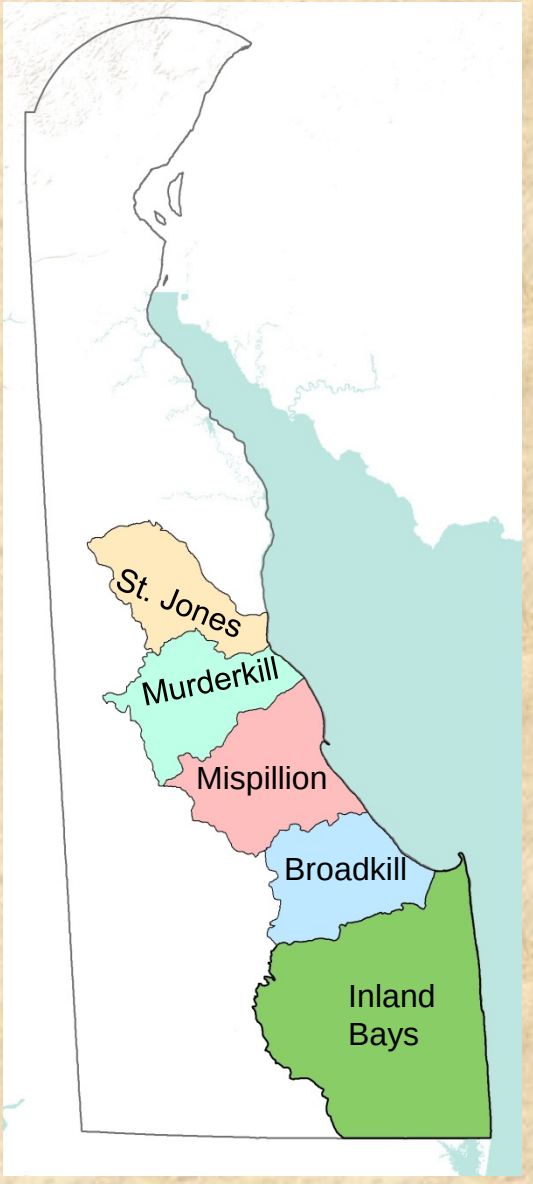
Spoil piles

Selective cutting

Riverine Wetland Condition







Flat Wetland Condition

- <u>Forestry</u>
  - Recent forestry in 48% of wetlands
    - 10% of flats clear-cut, 38% selective harvesting
  - 33% with skidder tracks
  - Conversion to pine plantations in Inland Bays and Broadkill
  - Loss of wildlife habitat and ecosystem services

Skidder tracks

Clear-cutting

Clear-cutting

Flat Wetland Condition

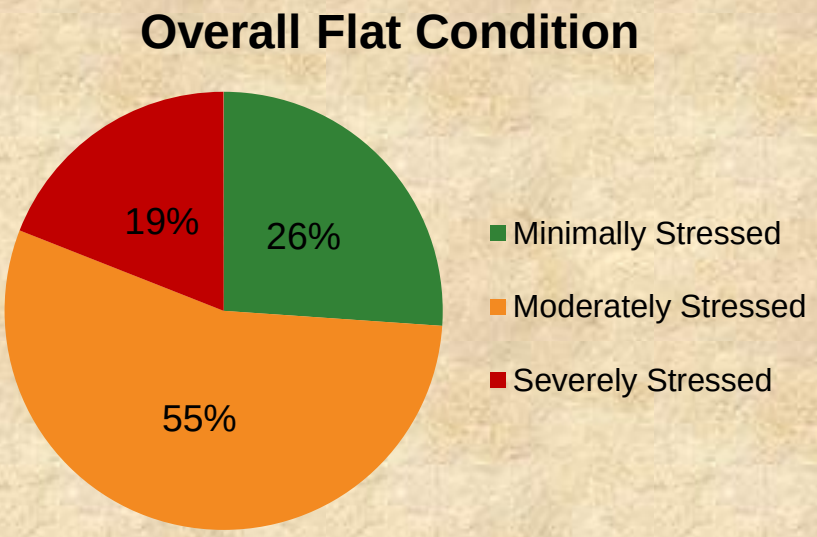
- <u>Hydrology impacts</u>
  - 48% with fill/spoil material
  - 39% of wetlands were ditched
  - Roads/paths through 30% of flats

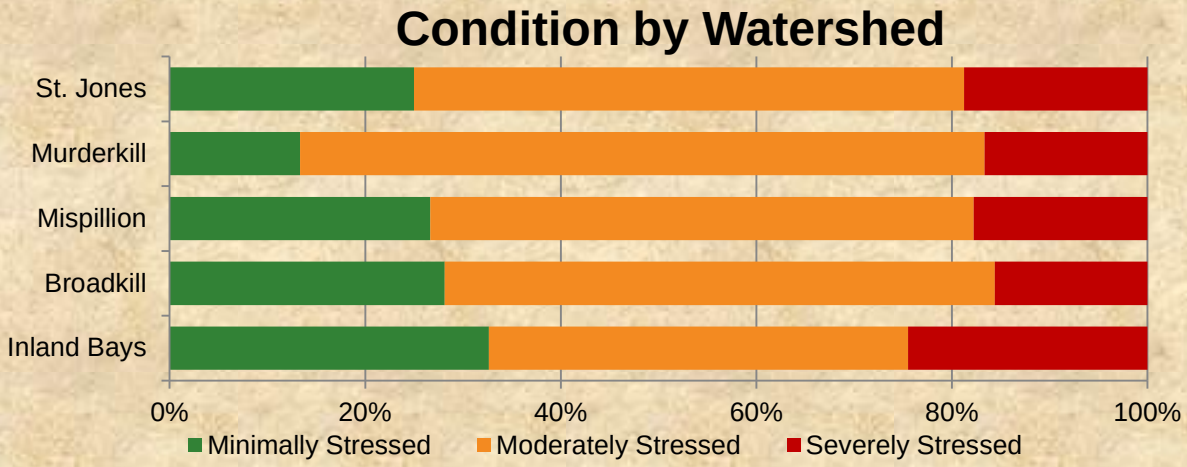
Fill material

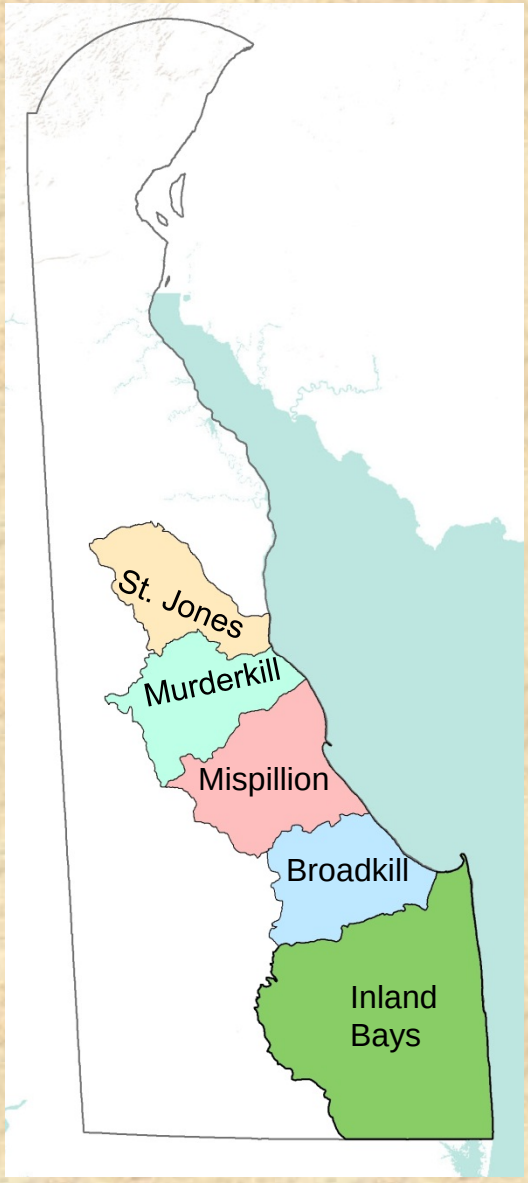
Ditches

Elevated trail/fill

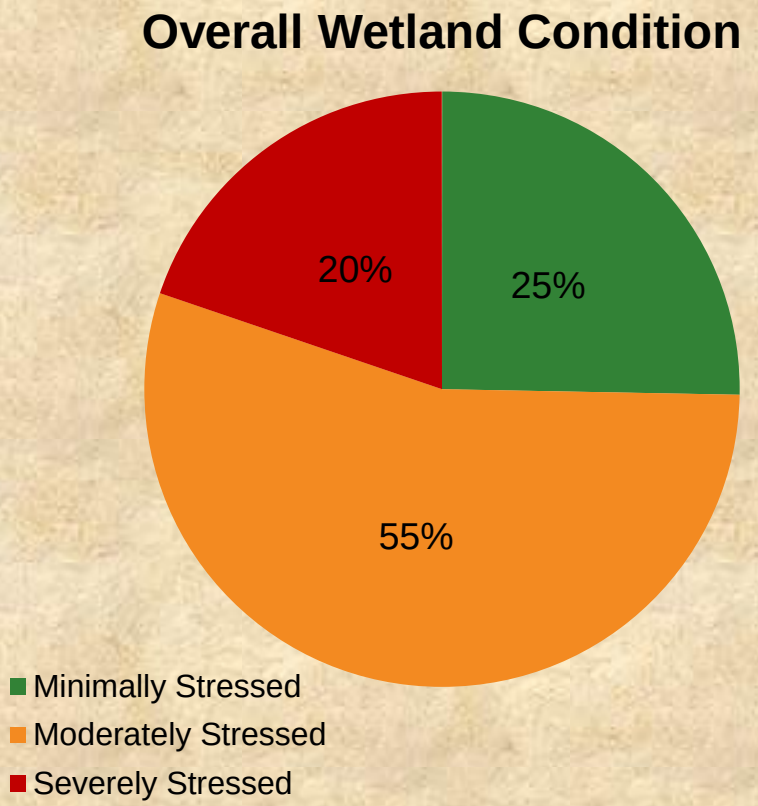
Flats Wetland Condition

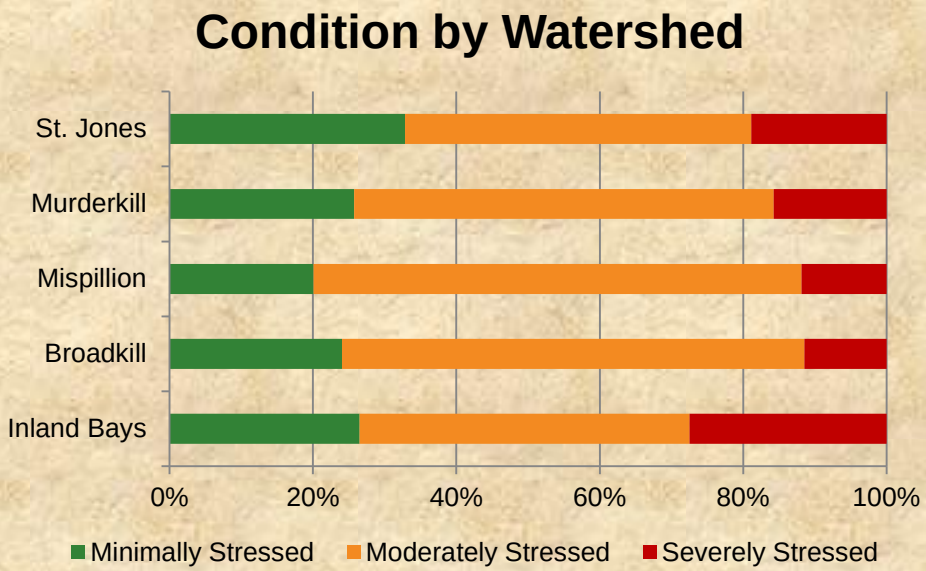






Southern DE Coastal Wetland Condition





Conclusions

- A majority of wetlands in these watersheds are functioning below reference condition
  - Overall condition “scores” were not significantly different among watersheds
- Some stressors are common to all watersheds
  - Ditching, stream alteration, invasive plants, filling
- Some stressors vary by watershed, wetland type

Recommendations

- Preserve minimally stressed wetlands
- Encourage landowners and developers to preserve and restore wetland buffers
- Restore hydrology to freshwater flats
- Increase stewardship for wetlands

Acknowledgements

- EPA EMAP and Region III

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Questions?