Delaware's Inland Bays History of Protection Efforts Water Quality Status & Trends

Inland Bays Foundation Public Forum

August 9, 2012

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Division of Watershed Stewardship

Some Sussex County History

1609 – Henry Hudson and his crew aboard the Half Moon enter the mouth of what will become known as Delaware Bay.

1631 – Dutch established a trading post in what is present-day Lewes, calling the colony Zwaanendael, or "Valley of the Swans".

1776 to 1783 – Revolutionary War.

1787 – Delaware becomes the first state to ratify the U.S. Constitution.

1830s to 1840s – Canning industry begins.

1859 – Railroad reaches Delmar. Farmers are now able to ship perishable goods outside of Delaware to cities such as Wilmington, Philadelphia and Baltimore.

Some More Sussex County History

1871 – Strawberries first planted near Selbyville.

1872 – Rehoboth Beach founded as a tent revival meeting grounds.

1878 – Rail line reaches Rehoboth Beach; popularity of beaches spreads south.

1923 – Cecile Steele of Ocean View orders 50 chicks for her egg-laying business, but instead receives 500 birds thanks to a clerical error. The foul-up gives birth to the modern broiler industry, and will make Sussex County not only the birthplace, but the leading county of broiler production in the United States.

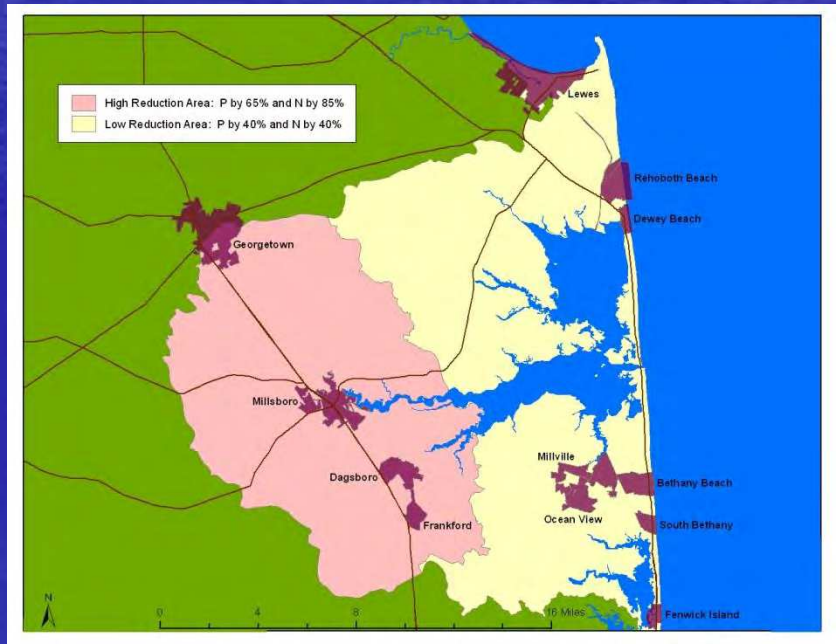
1924 – du Pont Highway opens, connecting Sussex County to points northward.

Inland Bays Timeline

- 1969 – Governor Peterson Commissions Study
- 1982 – Inland Bays Study Group
- 1983 – Inland Bays Task Force
- 1983 – Decisions for Delaware
- 1984 – Inland Bays Monitoring Committee
- 1988 – Inland Bays Estuary Program
- 1988-90 – Intensive Monitoring Program
- 1995 – Comprehensive Conservation & Management Plan
- 1995 – Center for the Inland Bays Created
- 1998/2004 – TMDLs developed

TMDL - 1998
Total Maximum Daily Load

- Systematic elimination of all point sources of nutrient loading
- Remove 40-85% Nonpoint Nitrogen
- Remove 40-65% Nonpoint Phosphorus
- 20% reduction in atmospheric deposition of N via Clean Air Act
- Implementation through a Pollution Control Strategy



Nutrients (Nitrogen and Phosphorous)

Although nutrients are essential elements for plants and animals, their presence in excessive amounts cause undesirable conditions and negatively impact fish and other aquatic life.

Potential Consequences of Nutrient Overenrichment

- Low Dissolved Oxygen
- Nuisance Algal Growth
- Harmful Algal Blooms
- Fish & Shellfish Kills
- Human Health Effects

Algal Production and Respiration Equations

Photosynthesis (Day):

Oxygen Produced

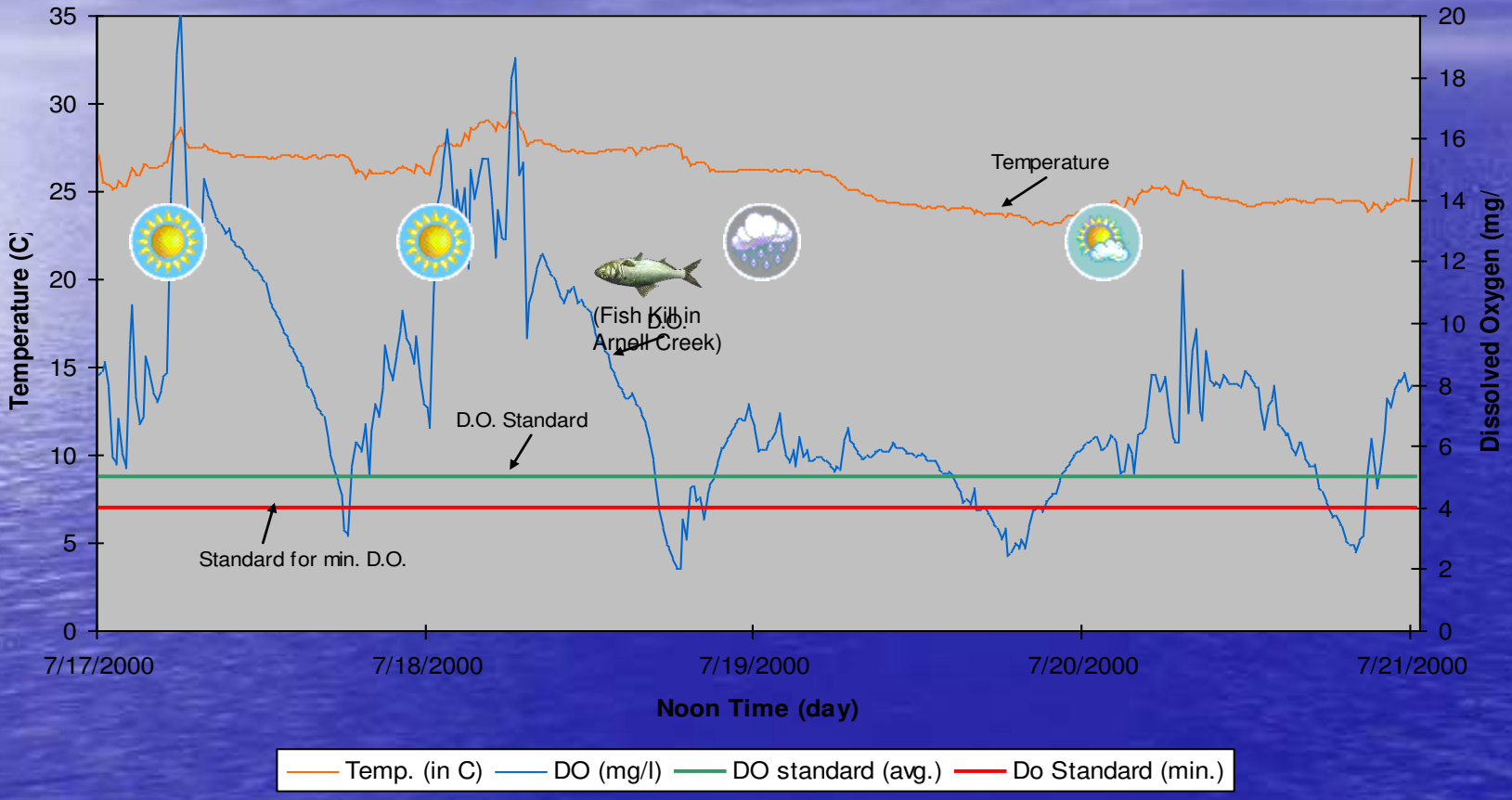
$CO_2 + H_2O + N + P$ -----> Organic Matter + O_2

Respiration (Night):

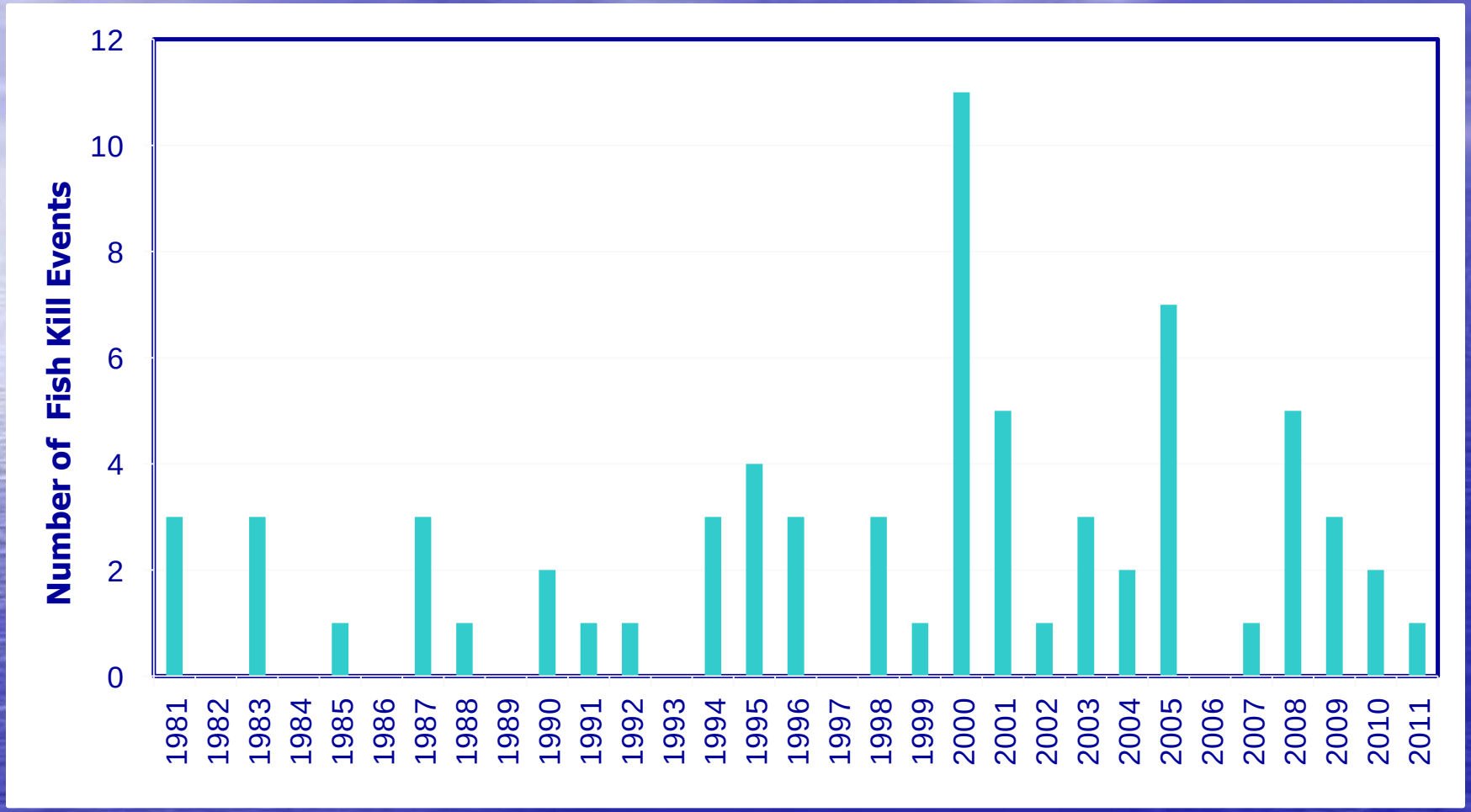
Organic Matter + O_2 -----> $CO_2 + H_2O + N + P$

Oxygen Consumed

Day/ Night Dissolved Oxygen Pattern In Waters With Excessive Nutrients

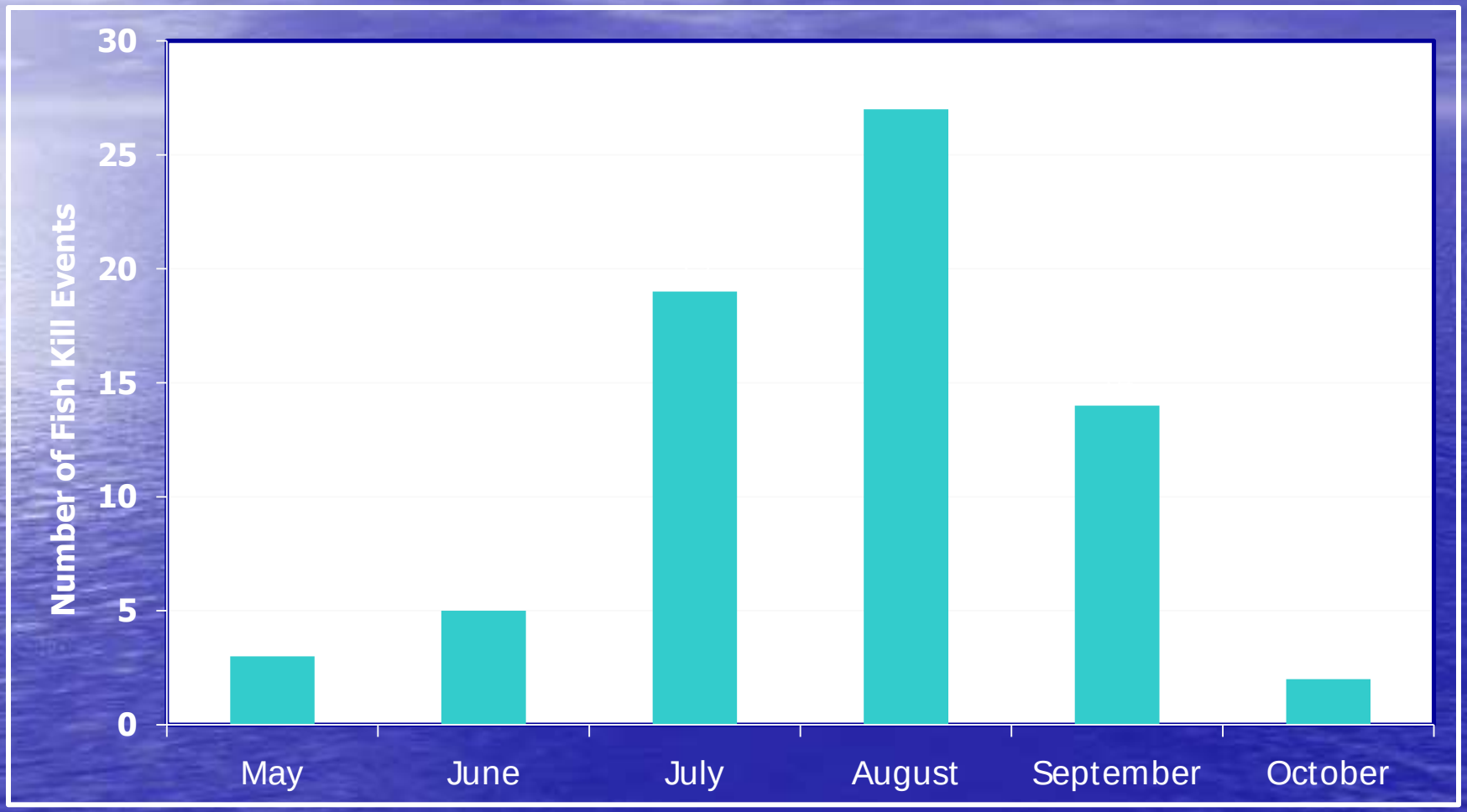


Number of Fish Kill Events by Year in the Delaware Inland Bays, 1981-2011



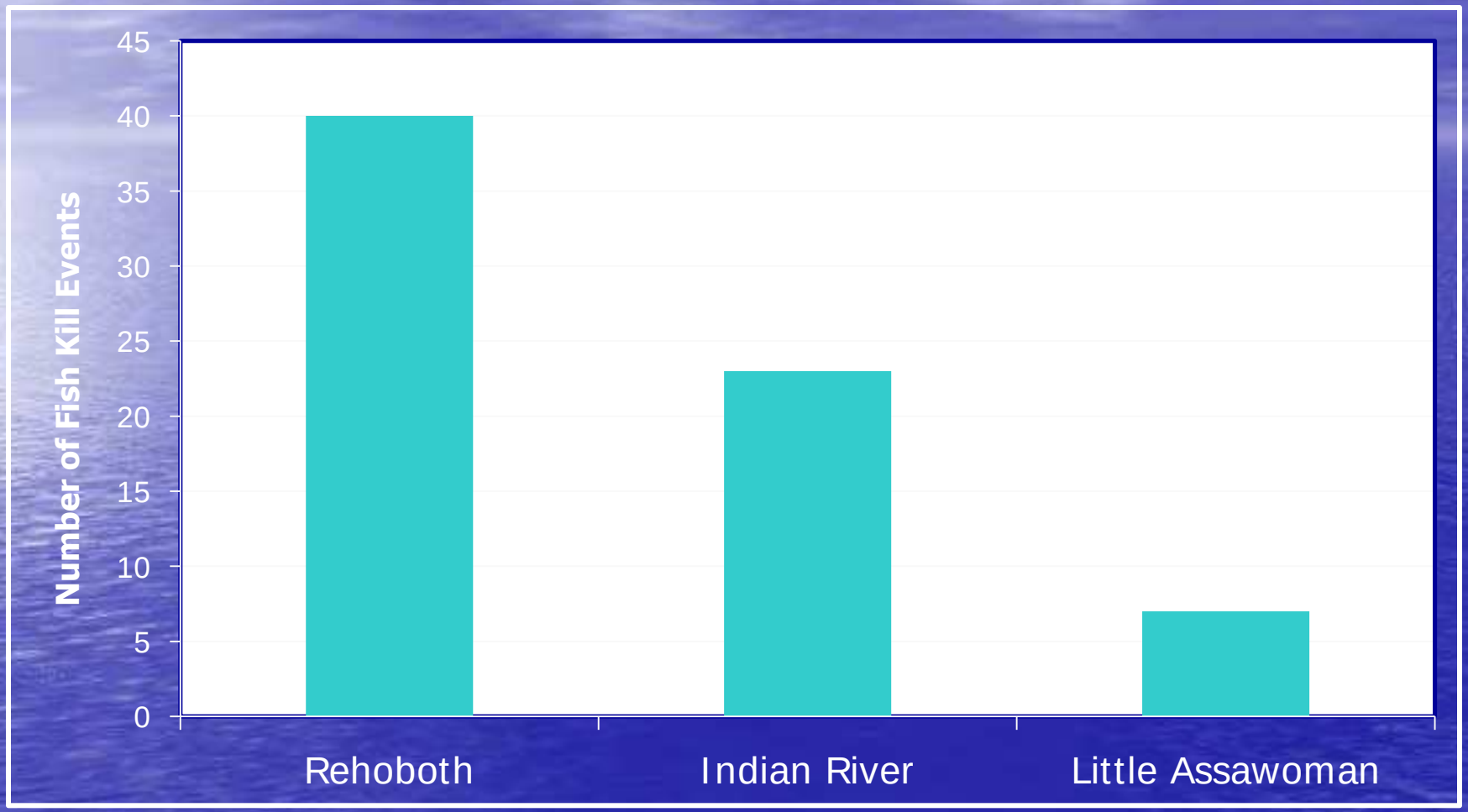
Source: DNREC, Division of Fish and Wildlife, Fisheries Section.

Number of Fish Kill Events by Month in the Delaware Inland Bays, 1981-2011



Source: DNREC, Division of Fish and Wildlife, Fisheries Section.

Number of Fish Kill Events by Bay in the Delaware Inland Bays, 1981-2011



Source: DNREC, Division of Fish and Wildlife, Fisheries Section.

POCOMOKE
RIVER, MD


The waters of the Inland Bays may contain organisms that could be harmful to your health. Swimming could result in an increased risk of rashes, infections or gastrointestinal distress, especially during and after rainfall.
For your health and safety, please swim at beaches with lifeguards where the water quality is tested weekly. For information on beach water quality or to report illnesses resulting from contact with these waters, please call 1-800-922-WAVE or visit www.dnrec.state.de.us

History of Inland Bays Pollution Control Strategy Development

- 1998 – Inland Bays Tributary Action Team (TAT)
  - Convened by Center for the Inland Bays
- 2000 – Tributary Action Team Public Outreach
  - Held 7 public forums
  - Distributed thousands of issue books
- 2000, 2001, 2002 – Team sent three sets of recommendations for the PCS to DNREC
  - Addressed wastewater, development, stormwater
  - Silent on agriculture

More Pollution Control Strategy History

- 2002-2004 – Agriculture PCS workgroup
- 2004 - 2006
  - December ‘04: IB elected officials briefed
  - January & February ‘05: 1st draft taken to workshop
  - March – May ‘05: Several organizations briefed, changes made
  - May ‘05: 2nd draft taken to workshop; House Natural Resource Committee briefed
  - June ‘05: Senate Concurrent Resolution passed, Secretary committed to meeting with “The Coalition”
  - August ‘05 – July ‘06: Department meets with “The Coalition”

POLLUTION CONTROL STRATEGY

- Guiding Principles
- Point Sources
- Nonpoint Sources
  - Agriculture
  - Urban/Suburban
  - Wastewater
  - Stormwater
  - Concurrence

More Pollution Control Strategy History

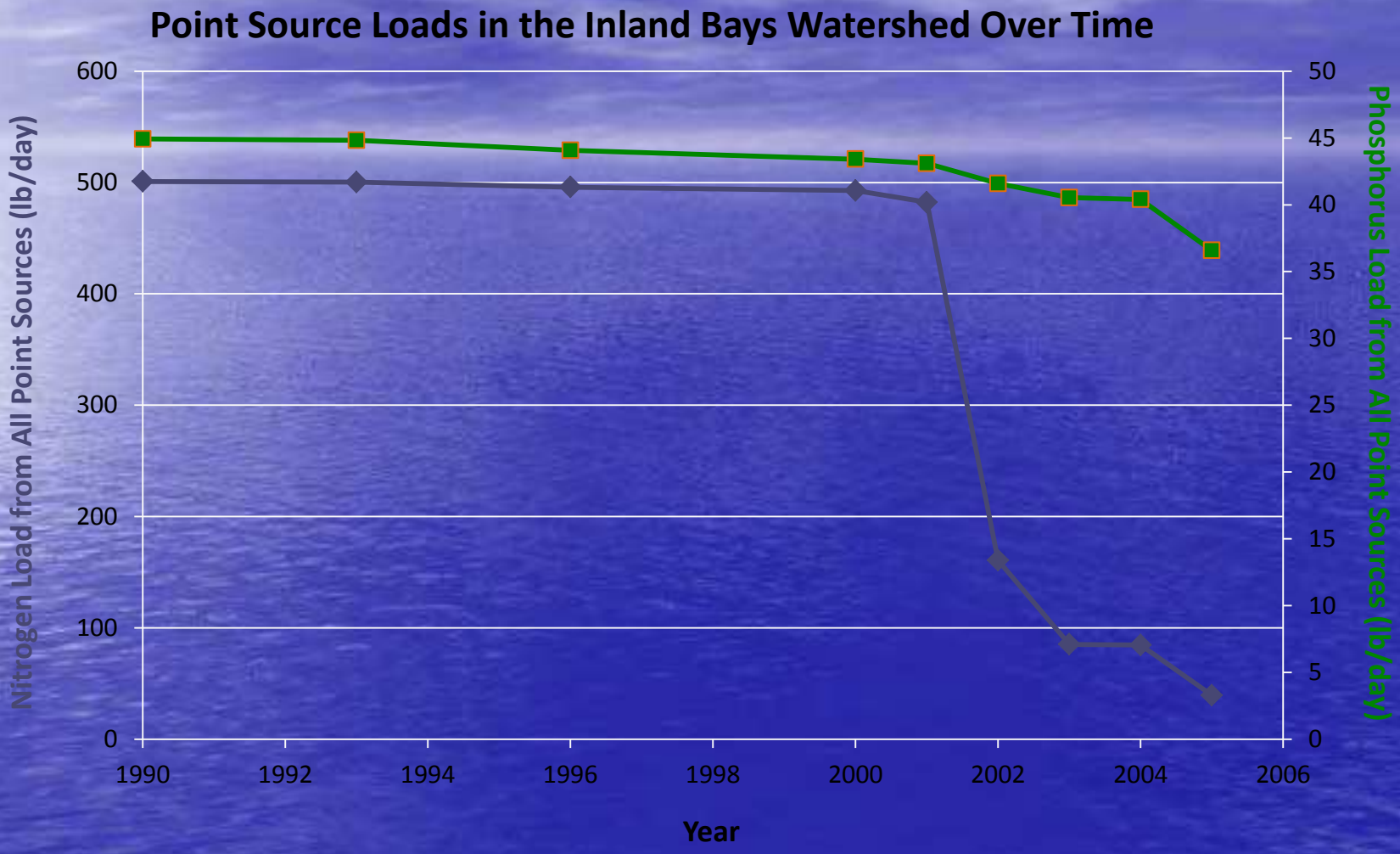
- 11/1/2008 – PCS Regulation Promulgated
- 11/25/2008 – Sussex County challenges regulation in Superior Court
- 11/26/2008 – White Farm, LLC challenges regulation in Superior Court
- 2/25/2011 - Superior Court declares the buffer portions of the PCS void and unenforceable

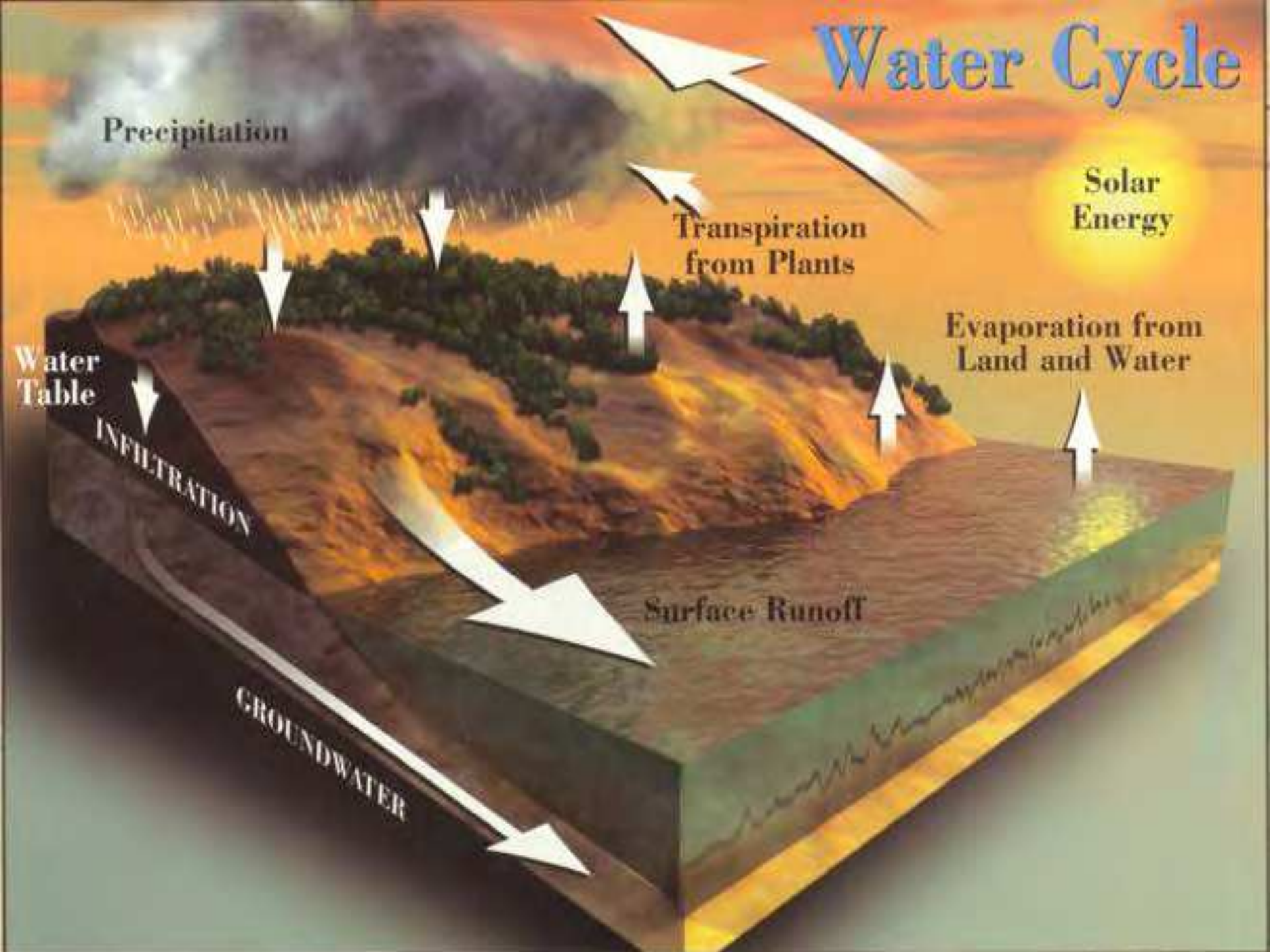
Even More Pollution Control Strategy History

- 11/1/2011 – DNREC appeals Superior Court decision to the Delaware Supreme Court
- 12/29/2011 – Supreme Court affirms Superior Court decision

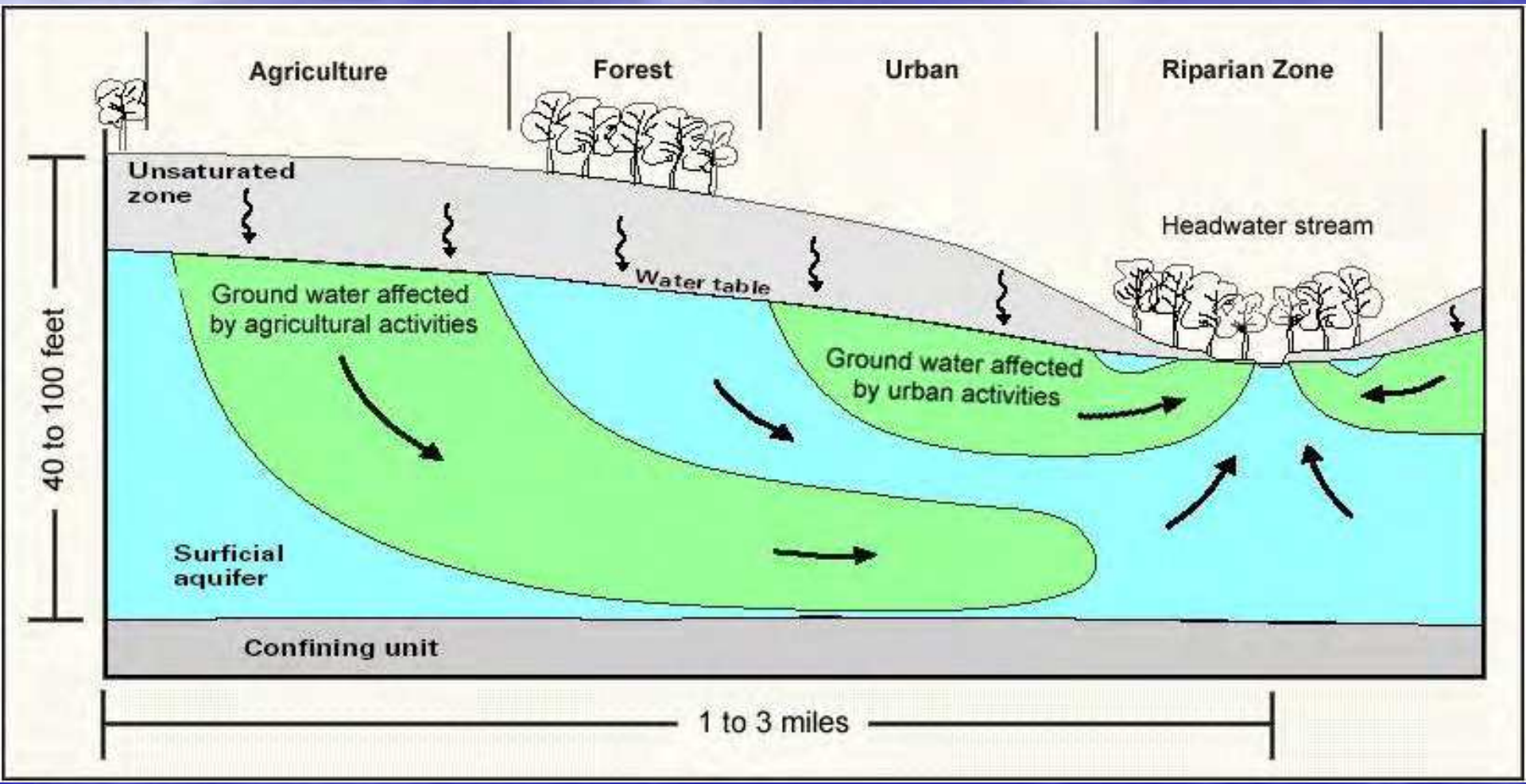
Ten Point Source Discharges Removed Since 2000

Center for the Inland Bays 2011 State of the Bays Report

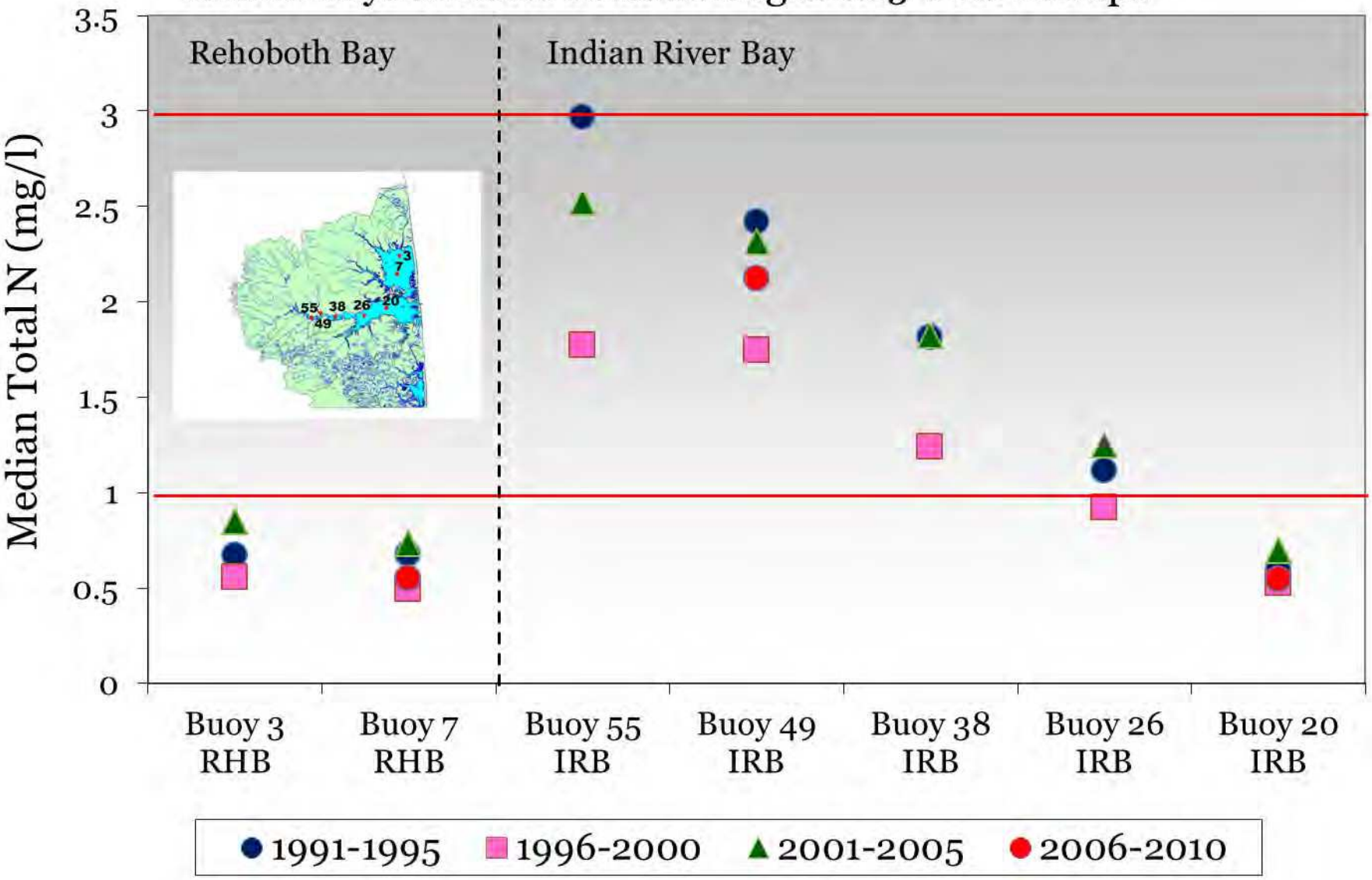

Point Source Loads in the Inland Bays Watershed Over Time
Nitrogen Load from All Point Sources (lb/day)
Phosphorus Load from All Point Sources (lb/day)
600
500
400
300
200
100
0
50
45
40
35
30
25
20
15
10
5
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
Year


Water Cycle
Precipitation
Solar Energy
Transpiration from Plants
Evaporation from Land and Water
Water Table
INFILTRATION
Surface Runoff
GROUNDWATER

Nutrient Pathways



Inland Bays Median Total Nitrogen in 5 Year Groups



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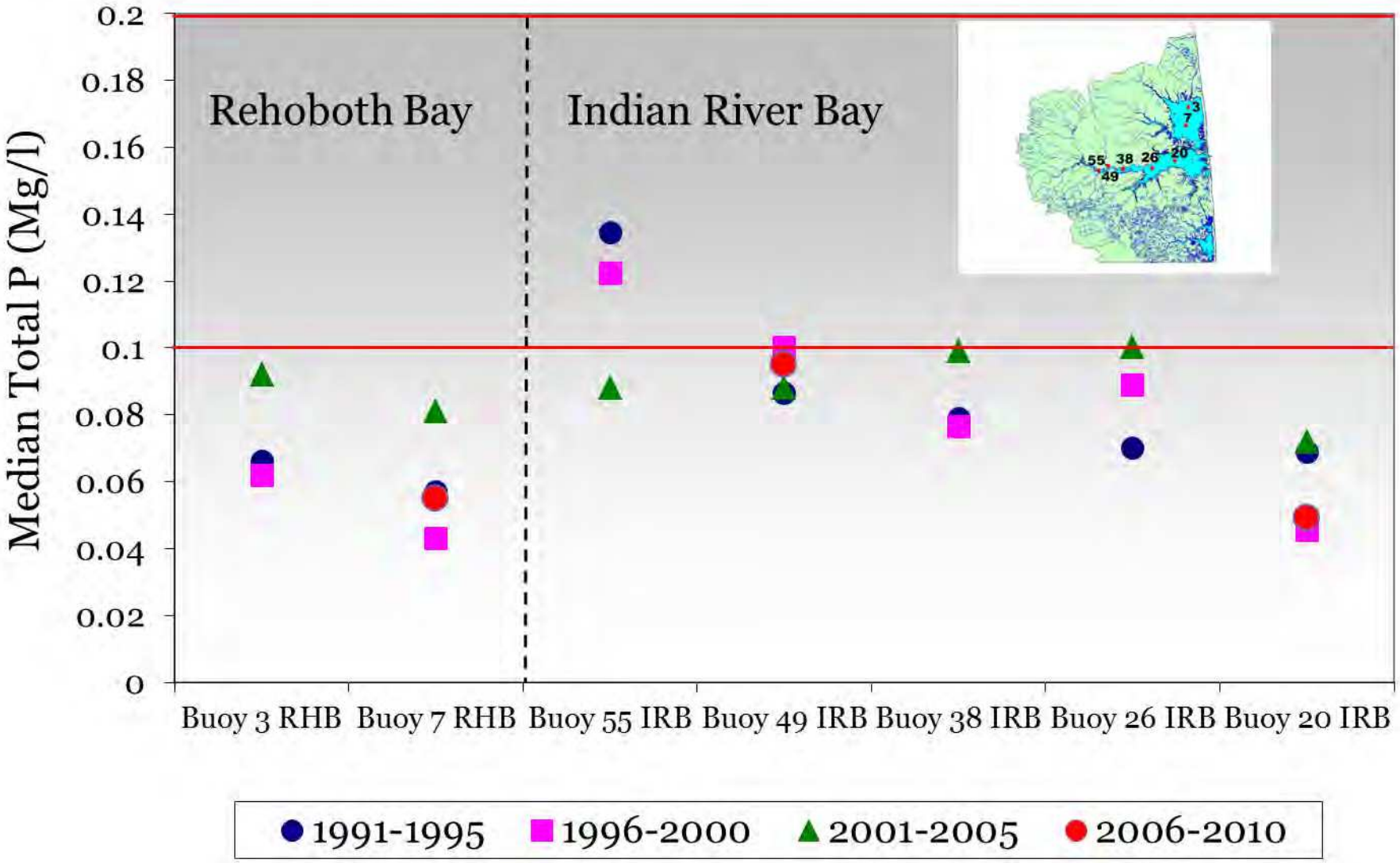
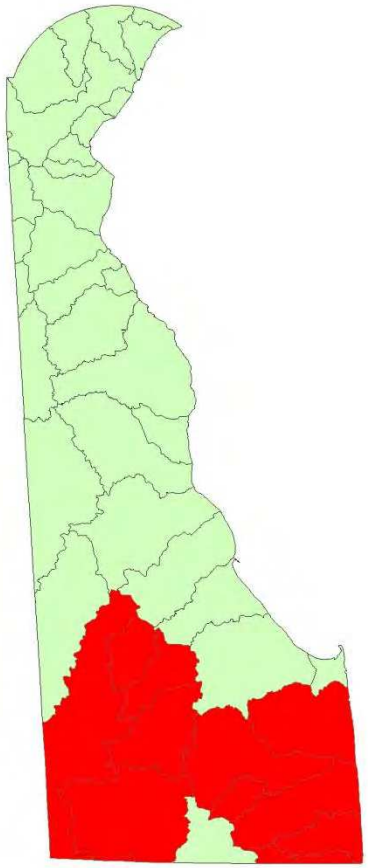
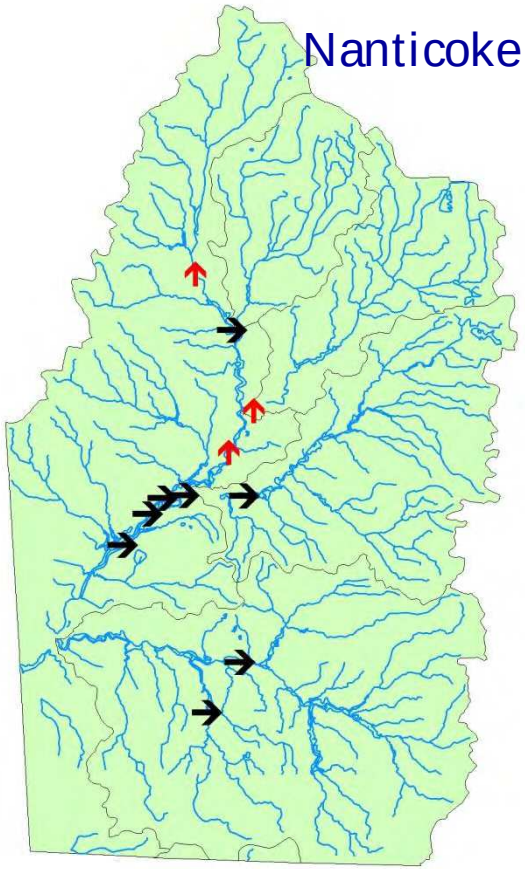
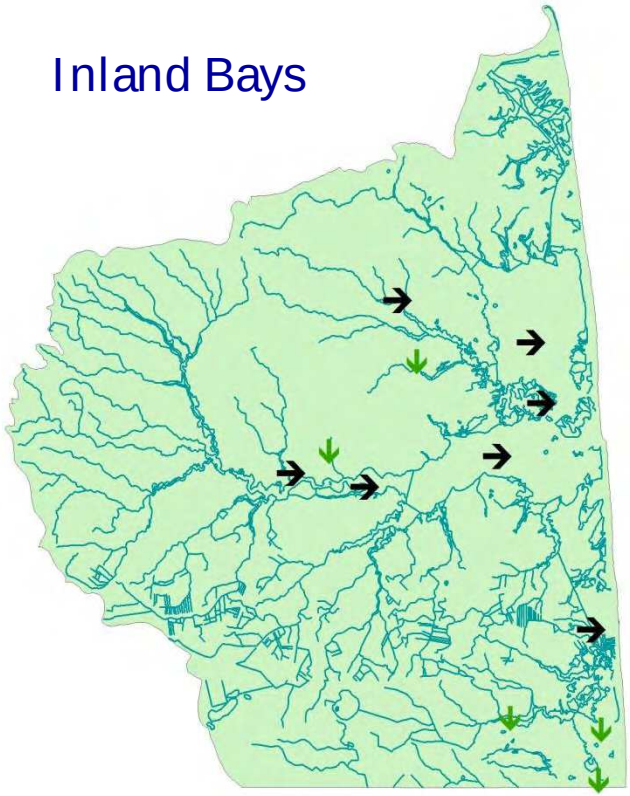


Total Nitrogen Trends in the Nanticoke River & Inland Bays 1995 - 2011







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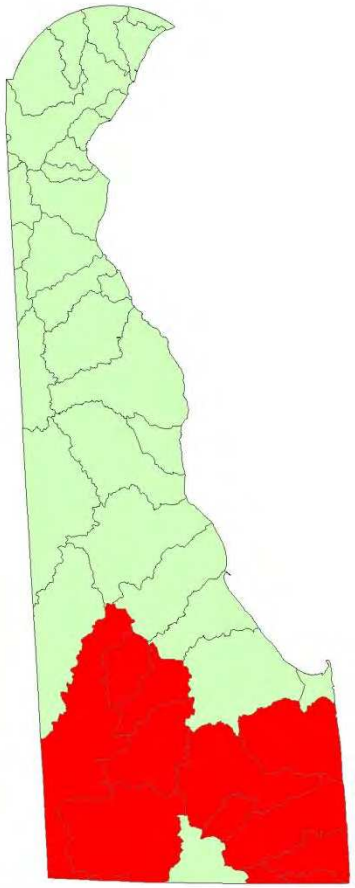
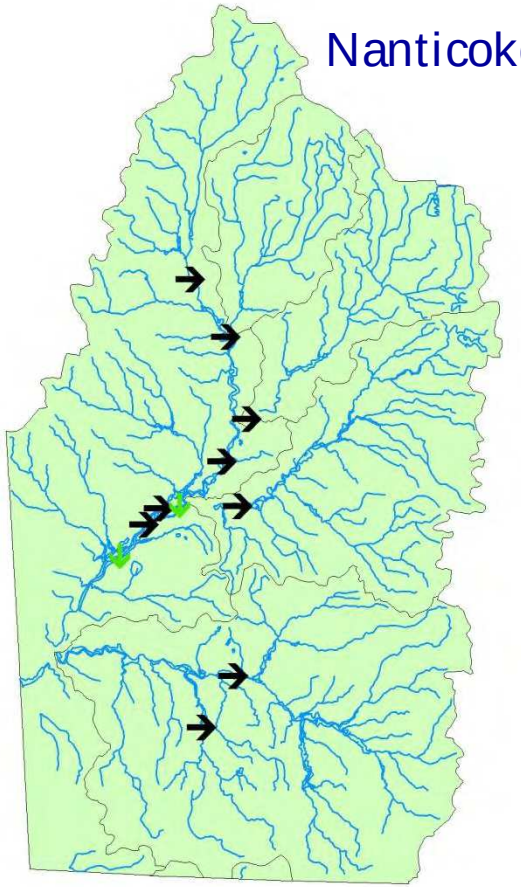
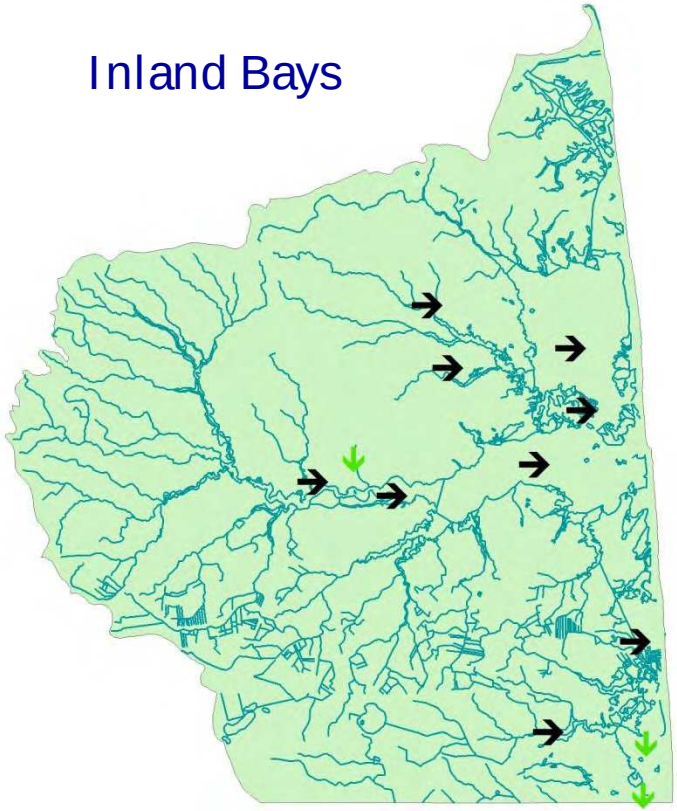
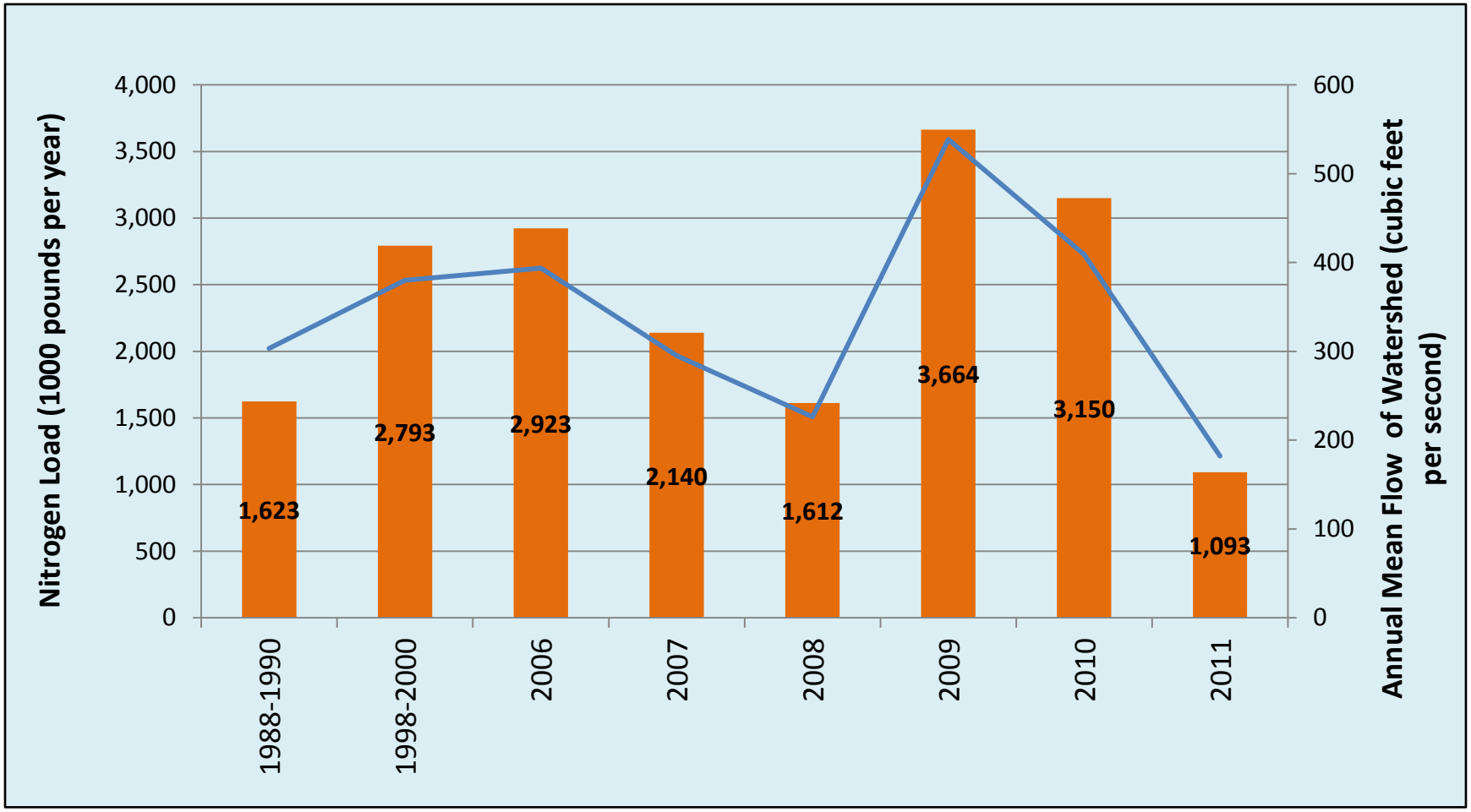






Annual Nitrogen Loads for the Inland Bays



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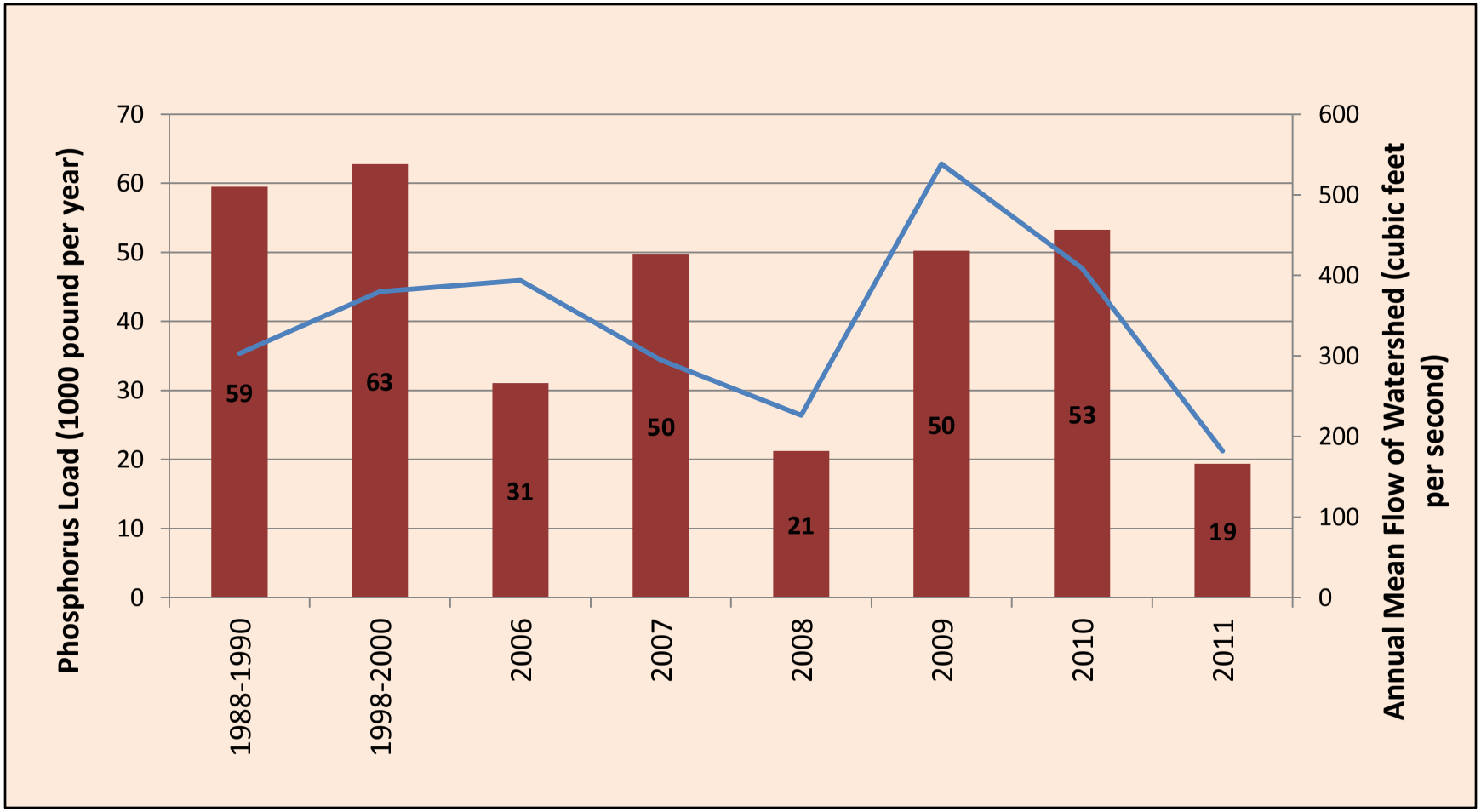
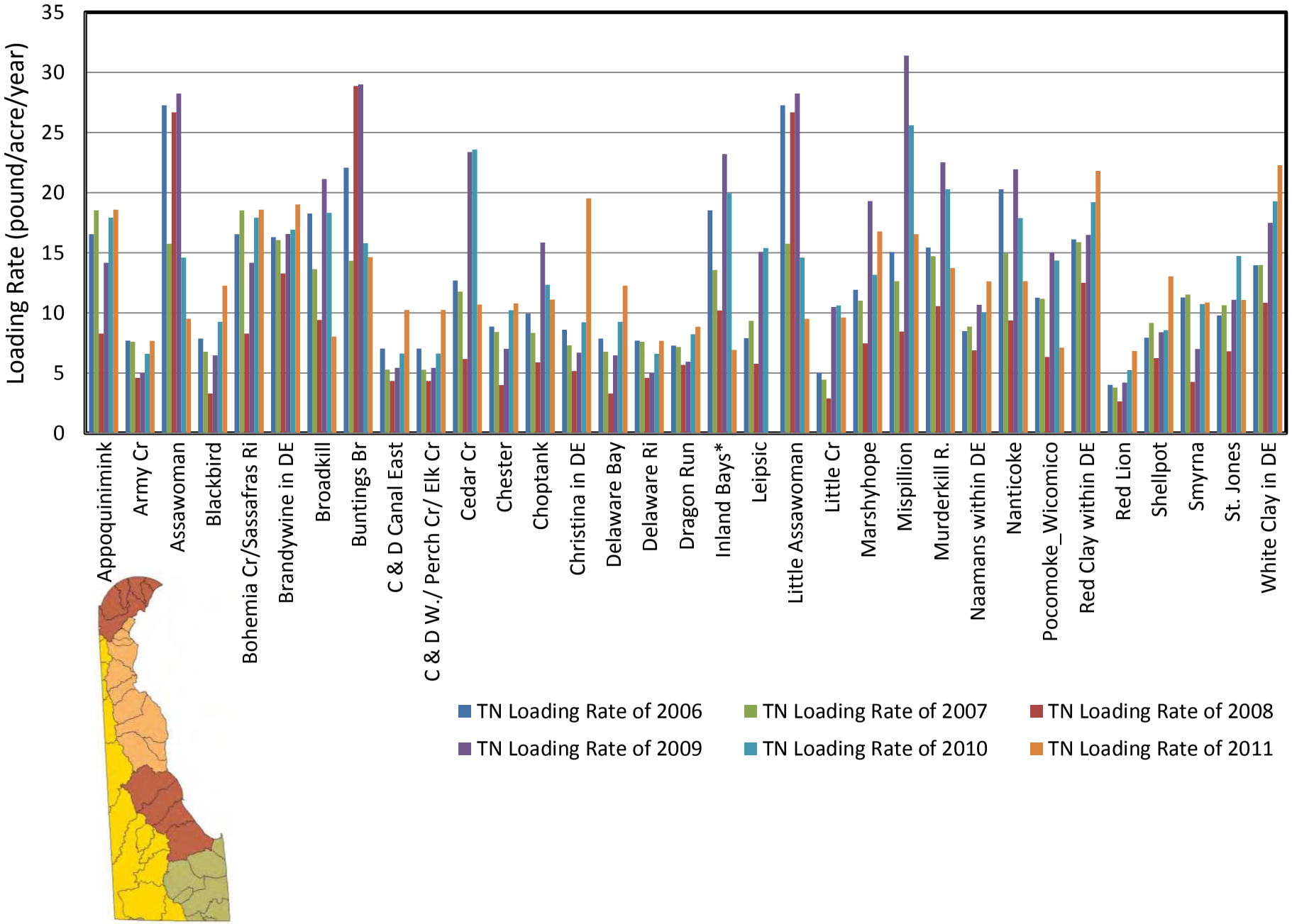


Total Nitrogen Loading Rates



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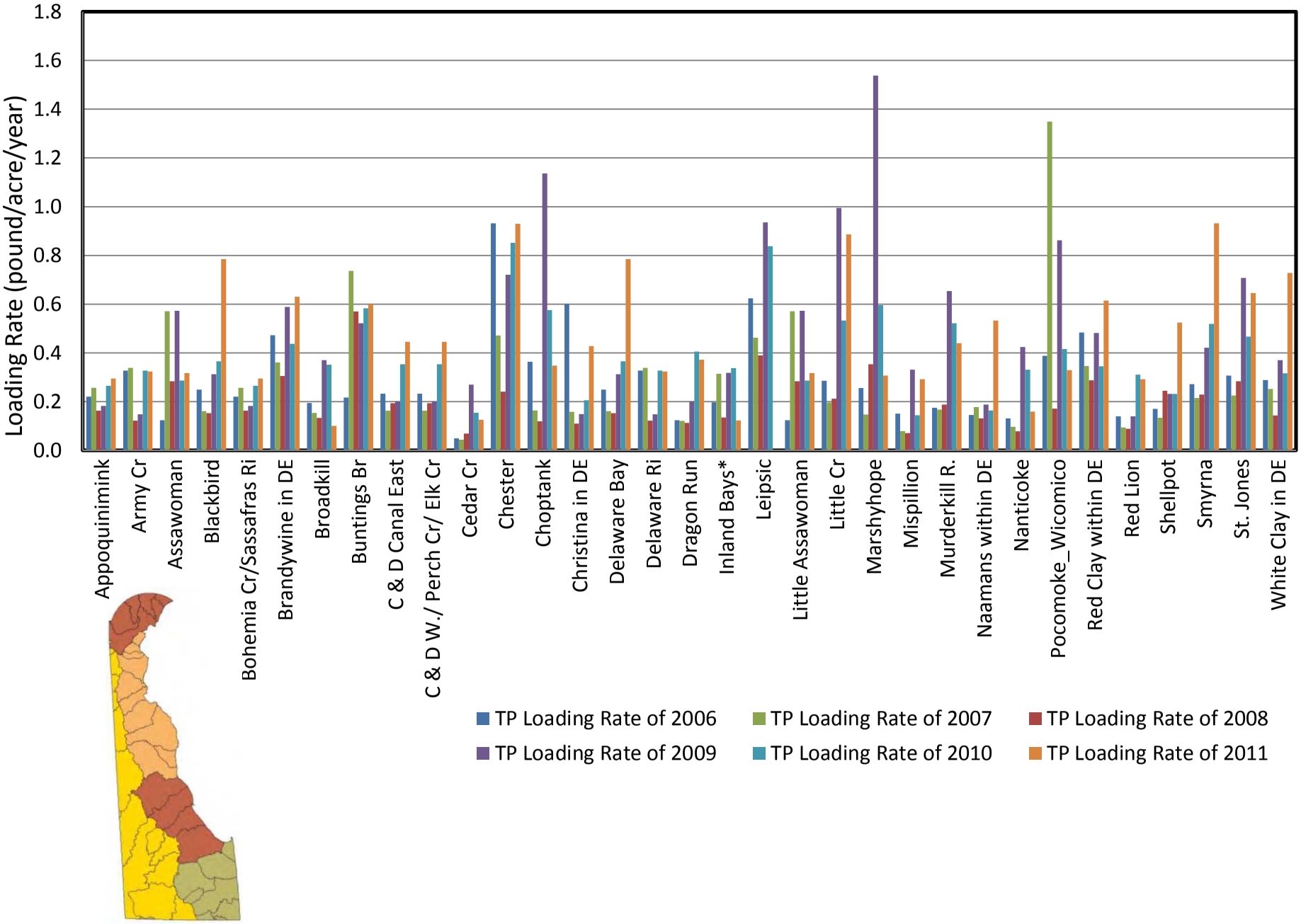
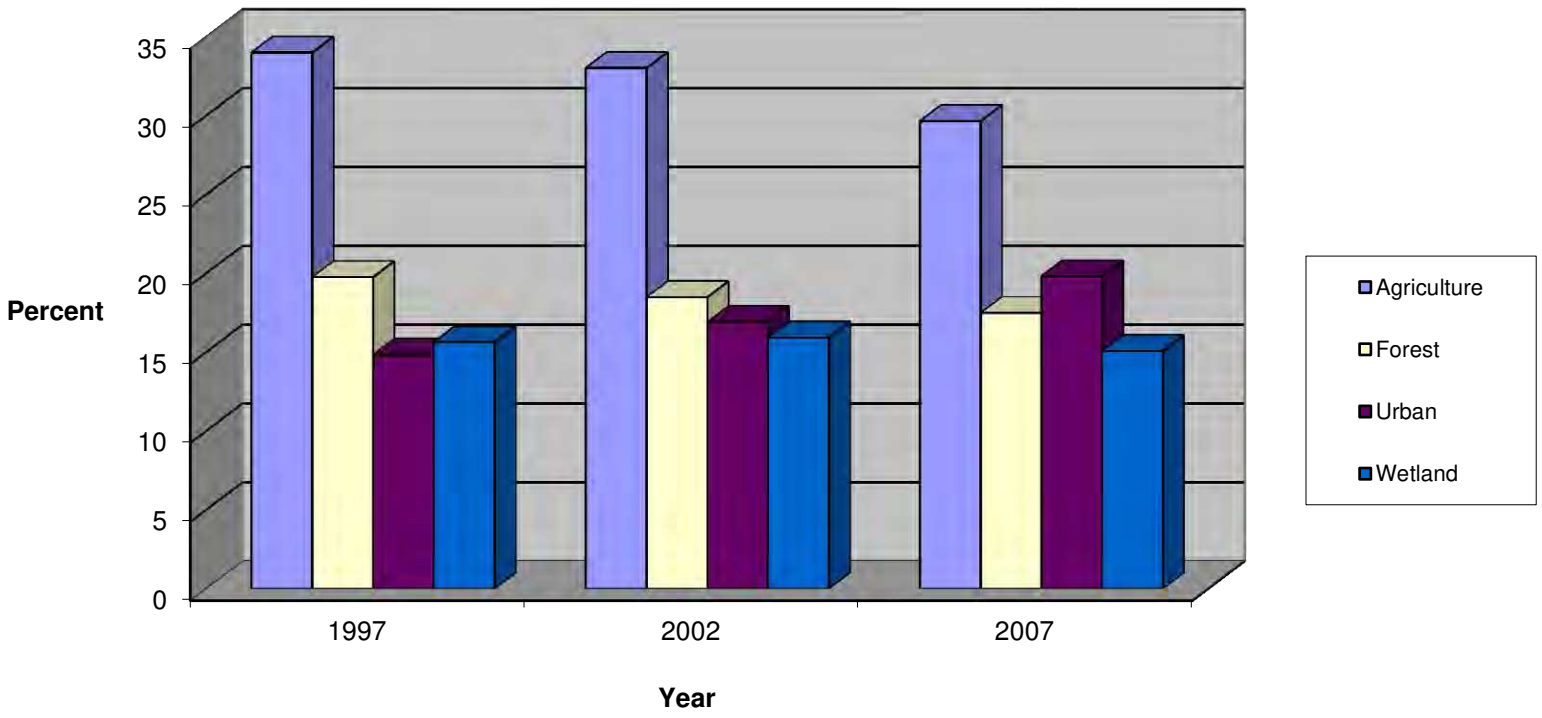
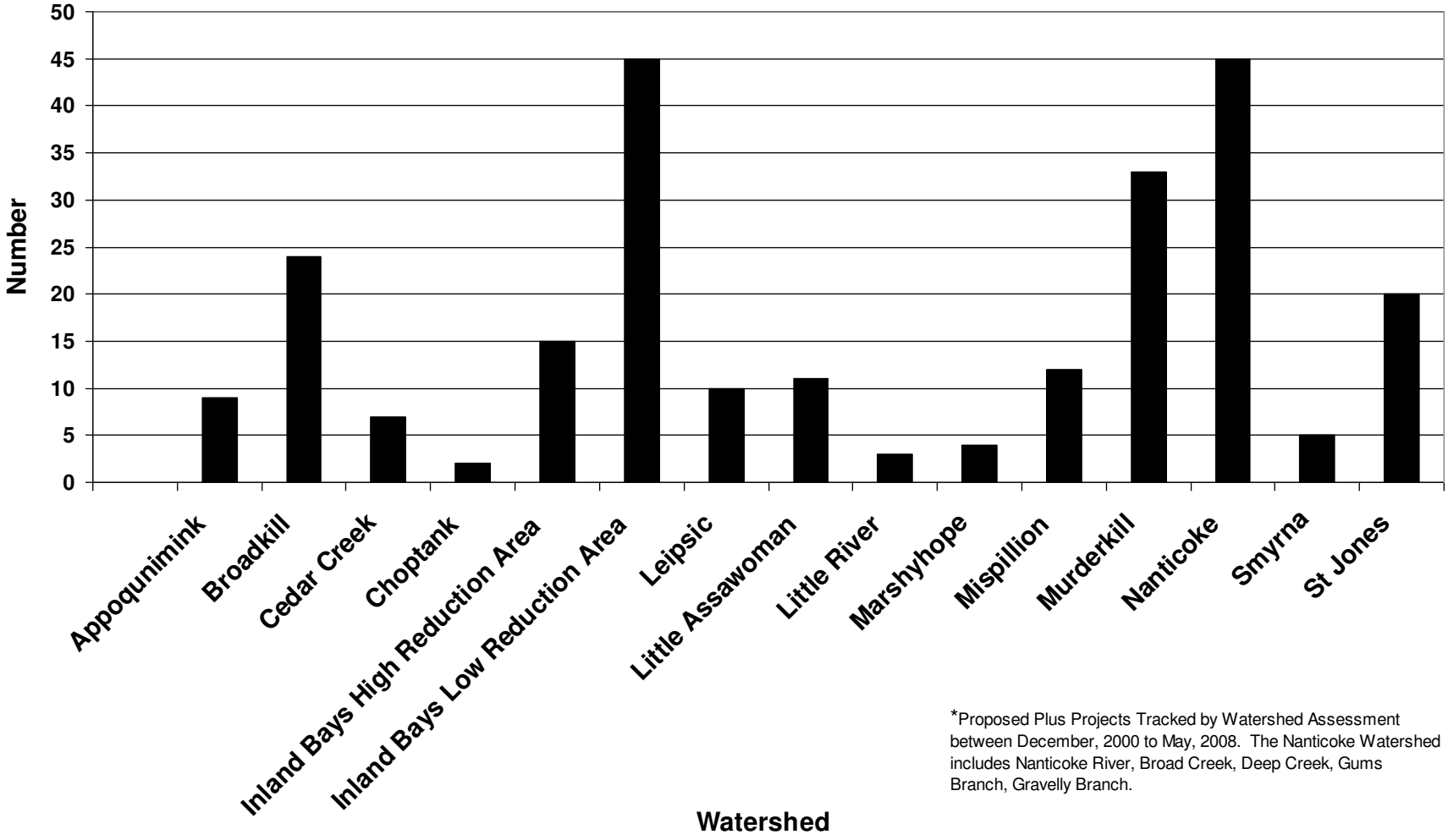


Change in landuse In The Inland Bays Watershed from 1997 to 2007

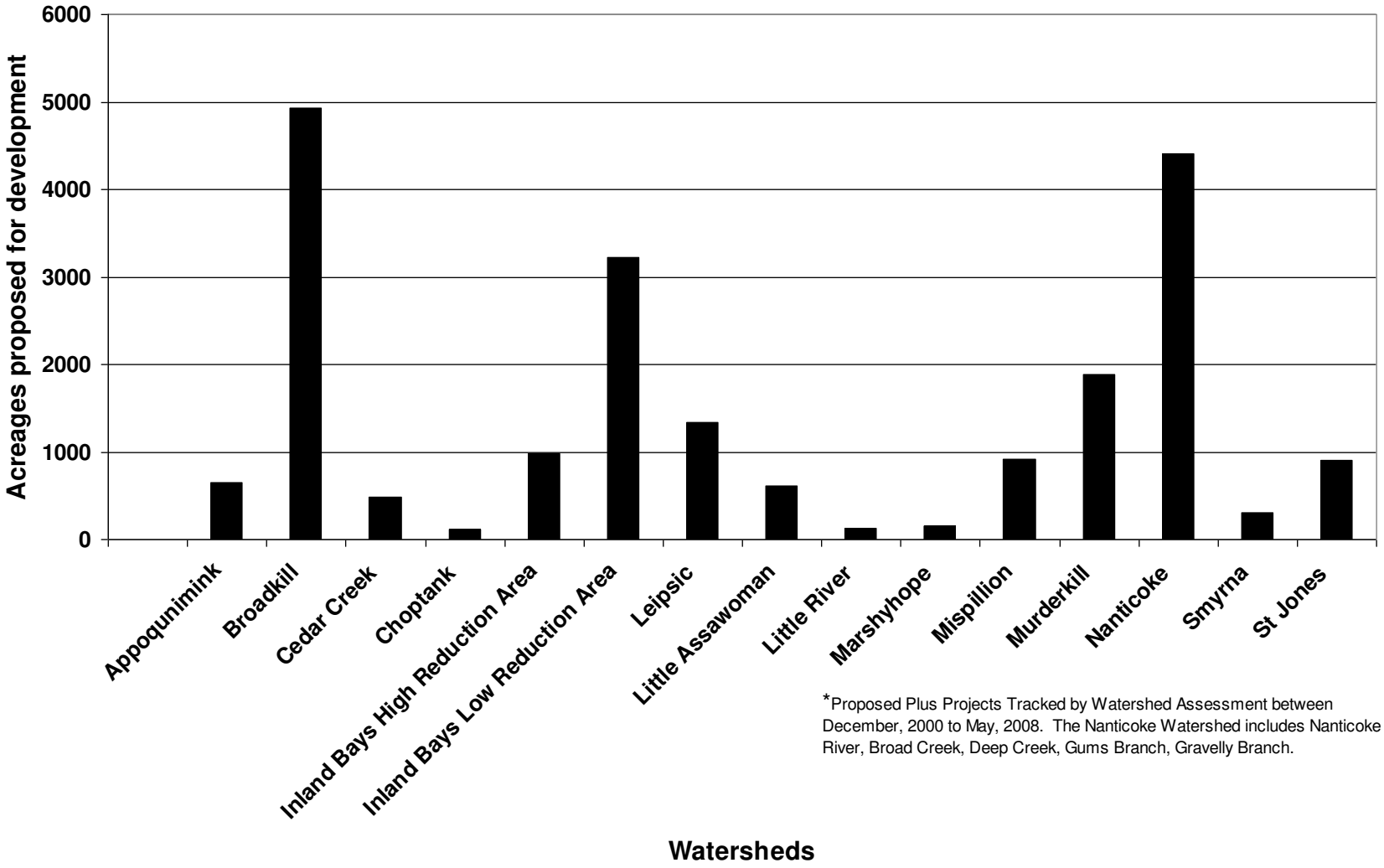


Number of PLUS Projects Proposed between 2004 to 2008*



*Proposed Plus Projects Tracked by Watershed Assessment between December, 2000 to May, 2008. The Nanticoke Watershed includes Nanticoke River, Broad Creek, Deep Creek, Gums Branch, Gravelly Branch.

Total Acreage of proposed Plus Projects*



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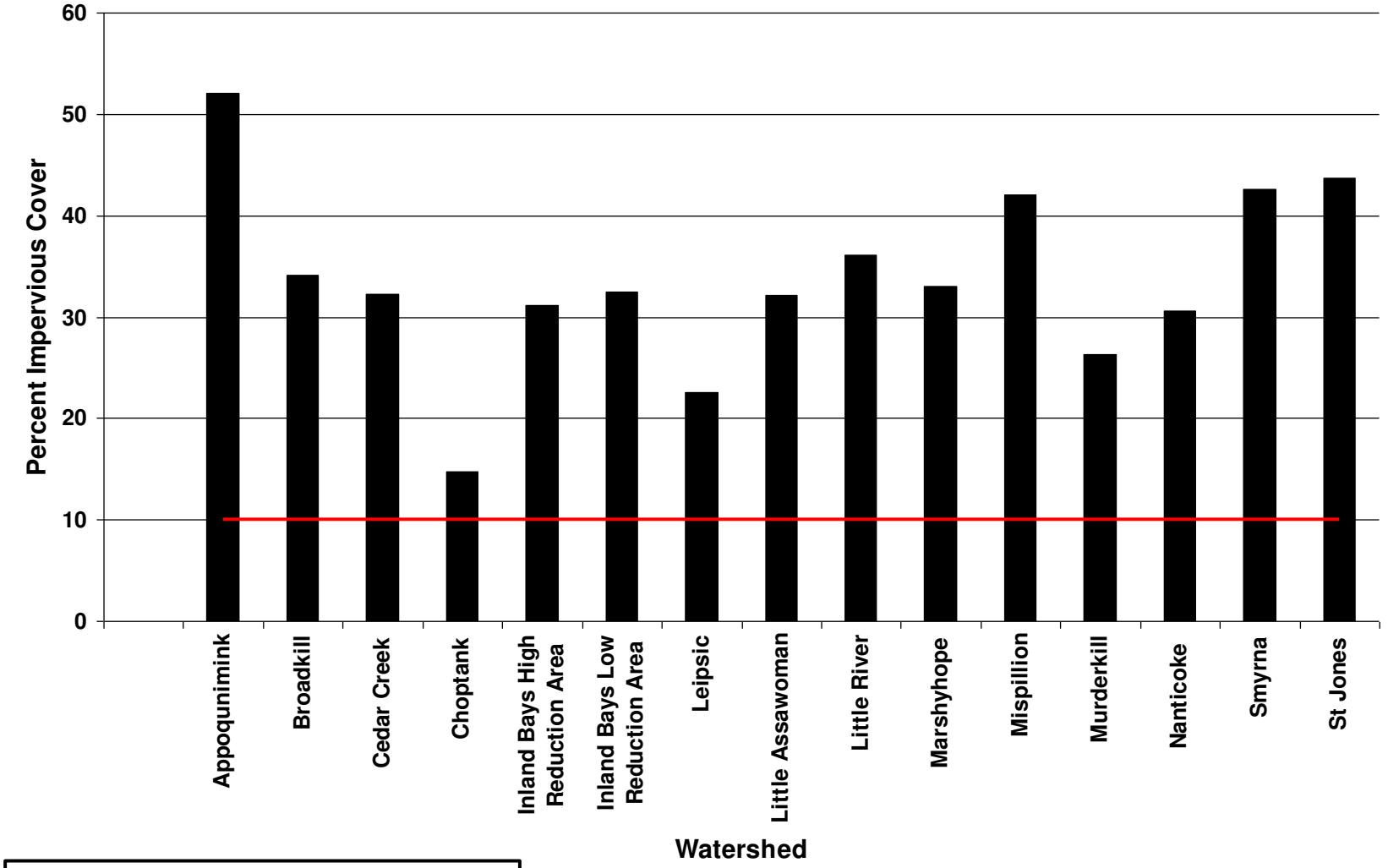
Average percent of impervious cover of Proposed



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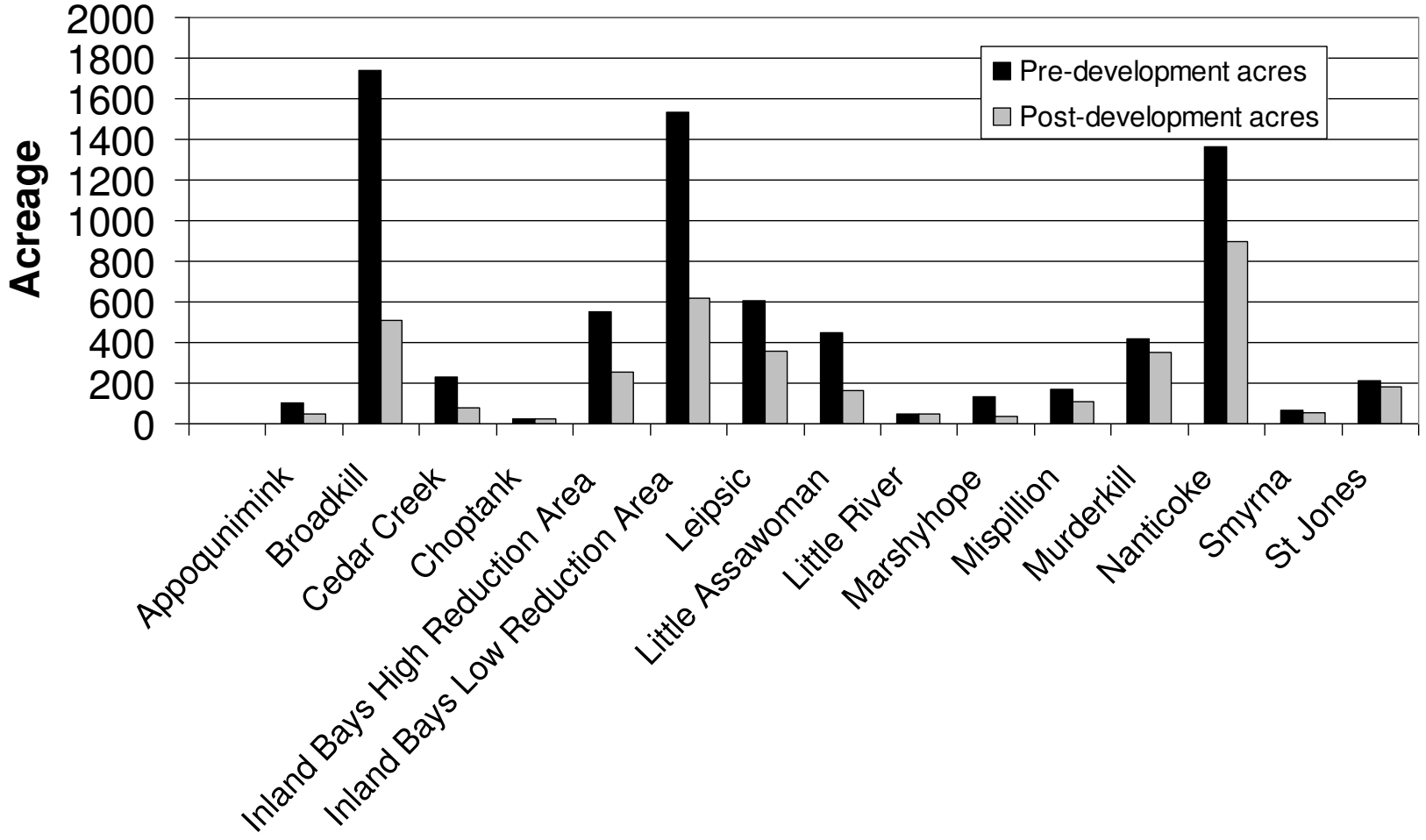
Forest acres retained



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