

Climate Change and Our Natural Resources:

Regional Impacts of Climate Change



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Partnership for the Delaware Estuary
November 29, 2011



Regional Climate Change Impacts

- Warmer temperatures
 - More frequent /severe precipitation
 - Increased rate of sea level rise
 - More extreme heat days
 - Fewer frost days
- ...these will combine to create stress on natural resources.*

Climate Change and the Delaware Estuary

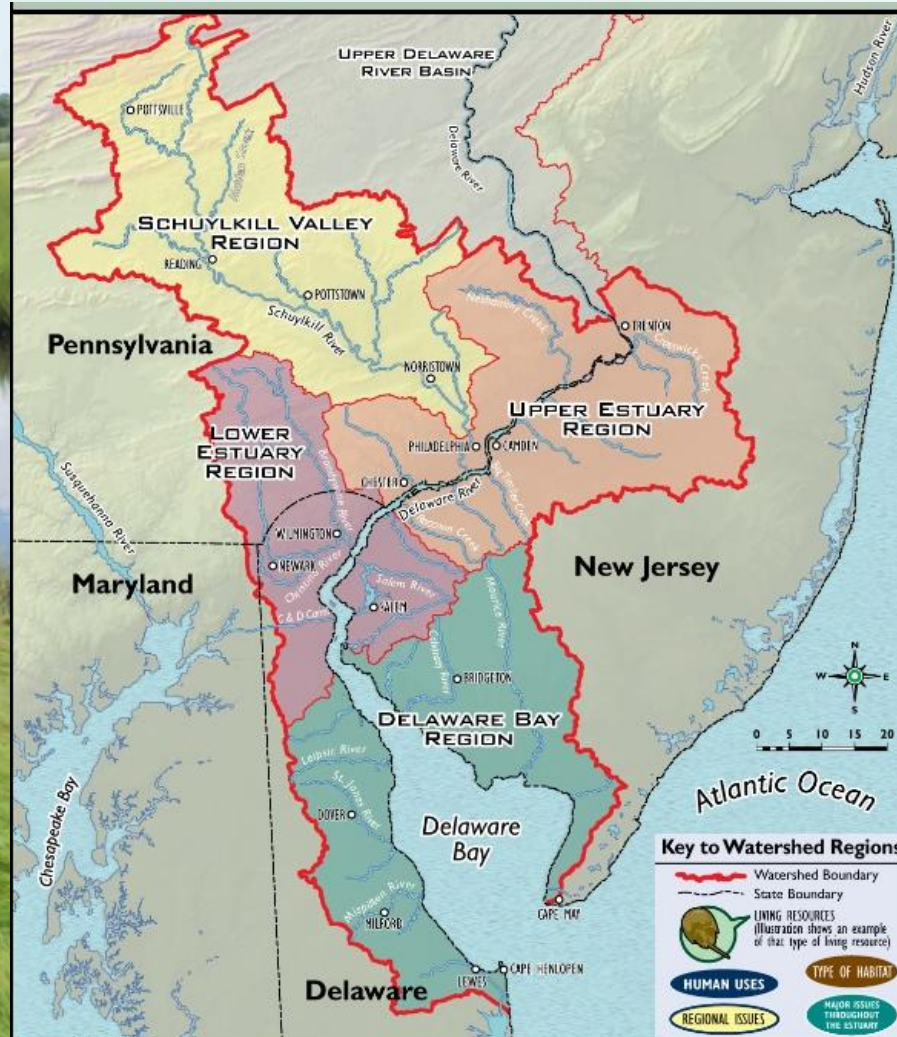
Executive Summary

A Publication of the
Partnership for the Delaware Estuary
A National Estuary Program

June 2010



The Delaware Estuary Watershed





The Delaware Estuary

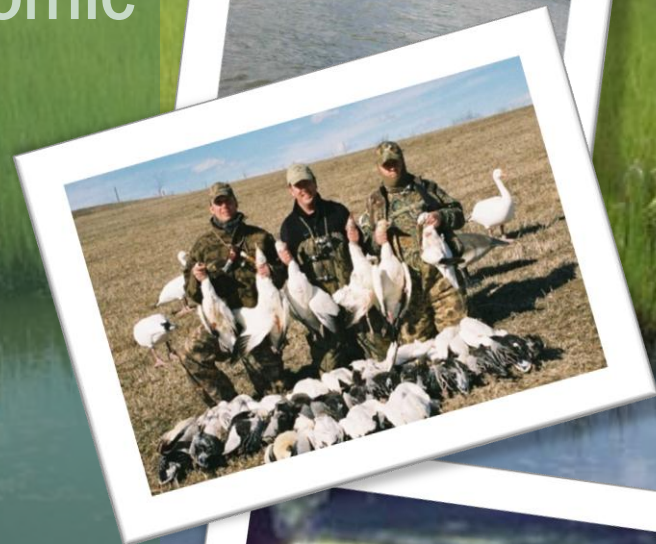
- Over 200 species of fish
- Largest breeding population of horseshoe crabs
- 2nd highest concentration shorebirds





The Delaware Estuary

- > \$10 Billion in economic activity
- > \$10 Billion in jobs
- > \$12 Billion in ecosystem goods and services





The Delaware Estuary

- Drinking Water
- Bivalve Shellfish
- Tidal Wetlands





Drinking Water

The Delaware River, its bay, and tributaries provide a source of drinking water for

17 MILLION PEOPLE

--over 5% of the entire U.S. population.





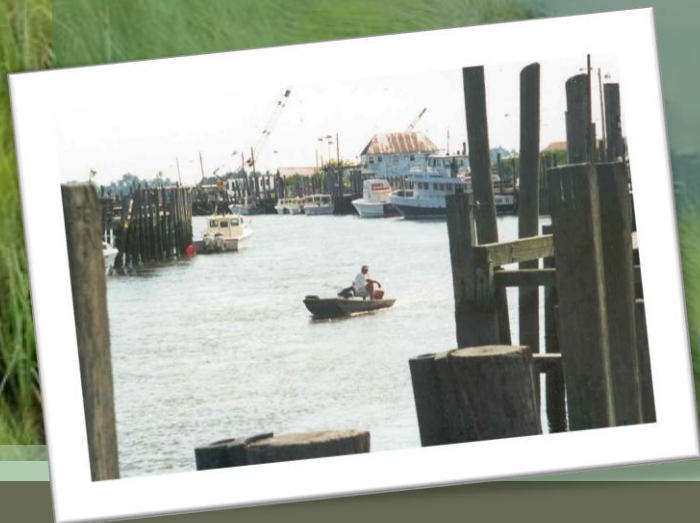
Bivalve Shellfish

Bivalves filter water, stabilize sediment, and recycle nutrients.

New Jersey's shellfish industry is worth

\$790 MILLION*

a year.



http://www.nj.gov/dep/newsrel/2010/10_0053.htm



Tidal Wetlands

Tidal wetlands filter water, grow fish, sequester carbon, and protect coastal communities from floods and storms.

The Delaware Estuary's tidal wetlands provide ecosystem services values of

\$1 BILLION *

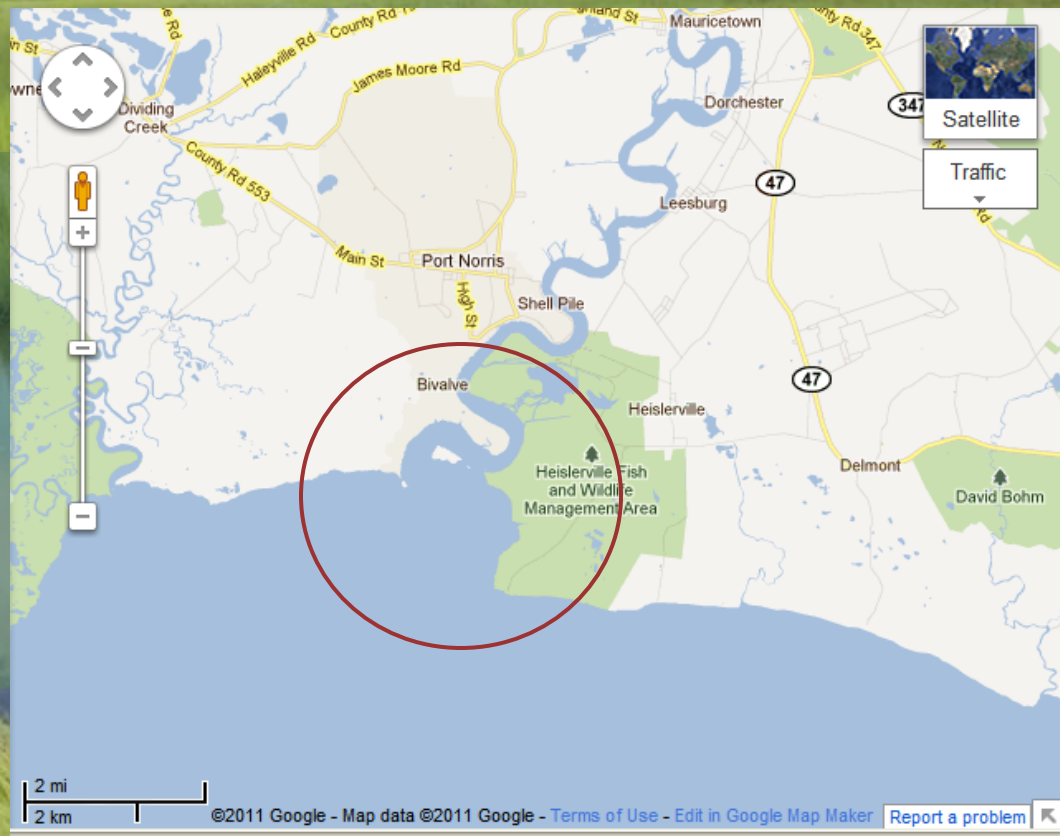
a year.

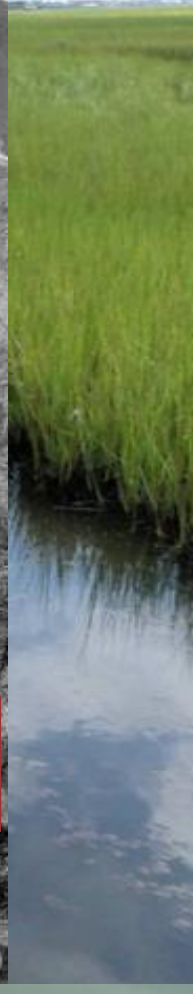




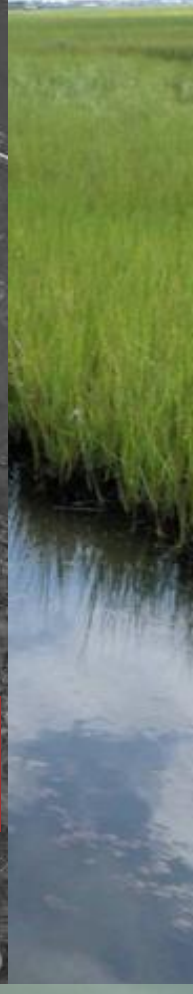
How Will Climate Change Impact Tidal Wetlands?

Erosion due to sea level rise is the biggest threat to salt water tidal wetlands











Bivalve, NJ 08349

Bivalve

8/12/2006

Miller Ave

Shell

2006

Image USDA Farm Service Agency

© 2011 Google

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Imagery Date: 7/15/2006



1991

39°13'31.28" N 75°01'47.17" W elev 3 ft

Eye alt 10450 ft





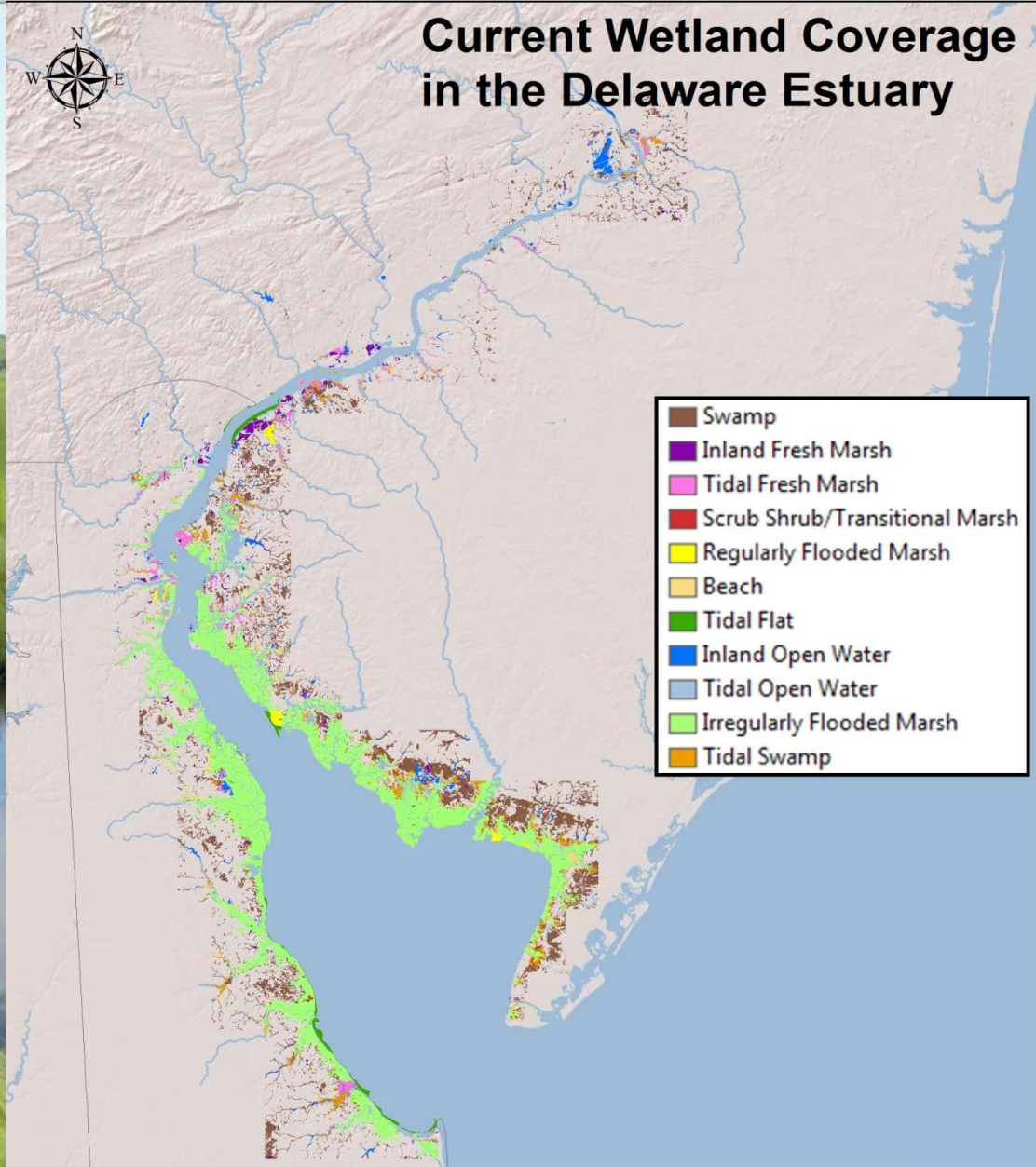
Wetlands

If this much shoreline has eroded since 1991, what can we expect for wetlands 50 or 100 years in the future?



Wetlands

Current conditions.
Light green means
'irregularly flooded
marsh.'



Sources:

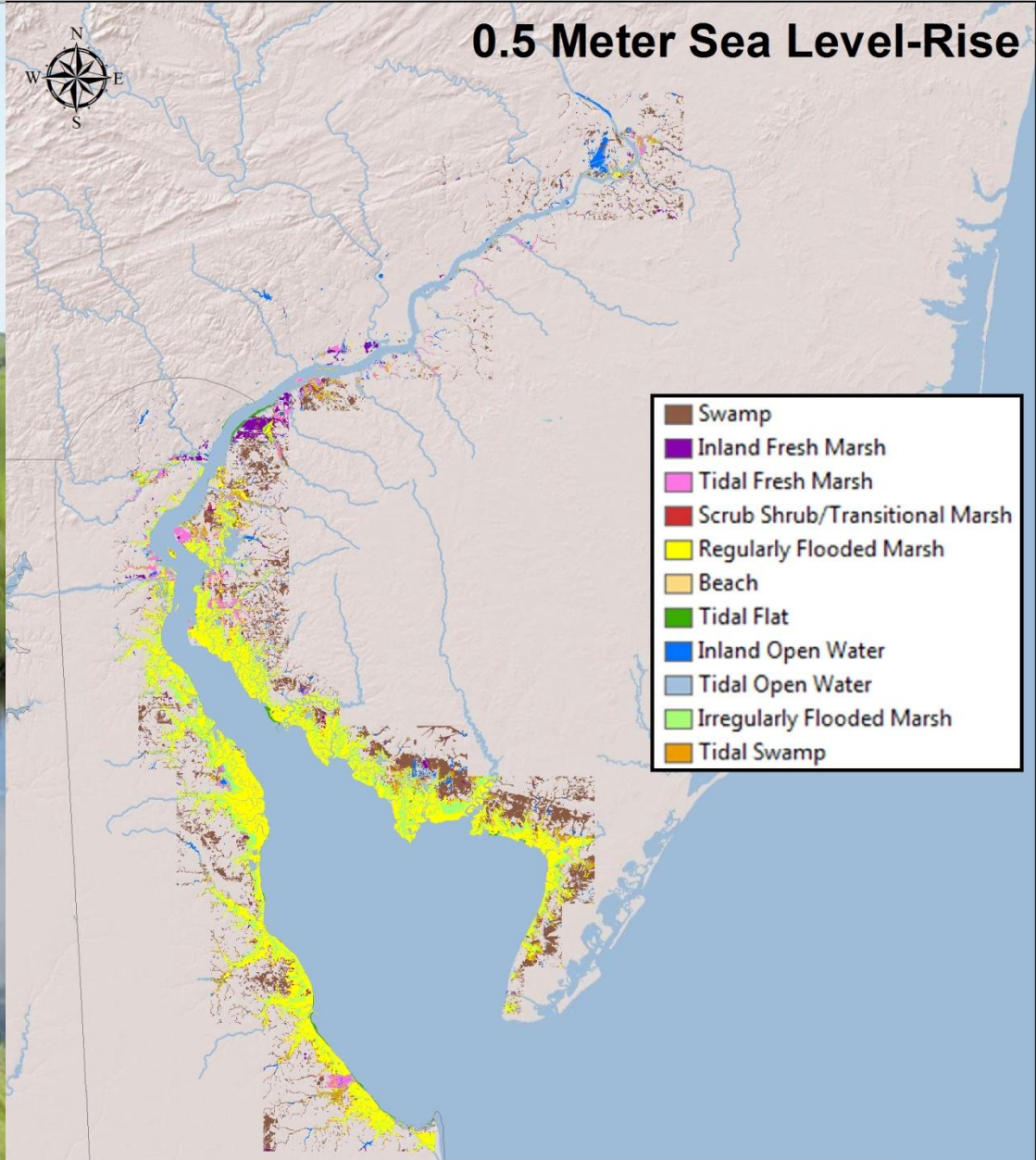
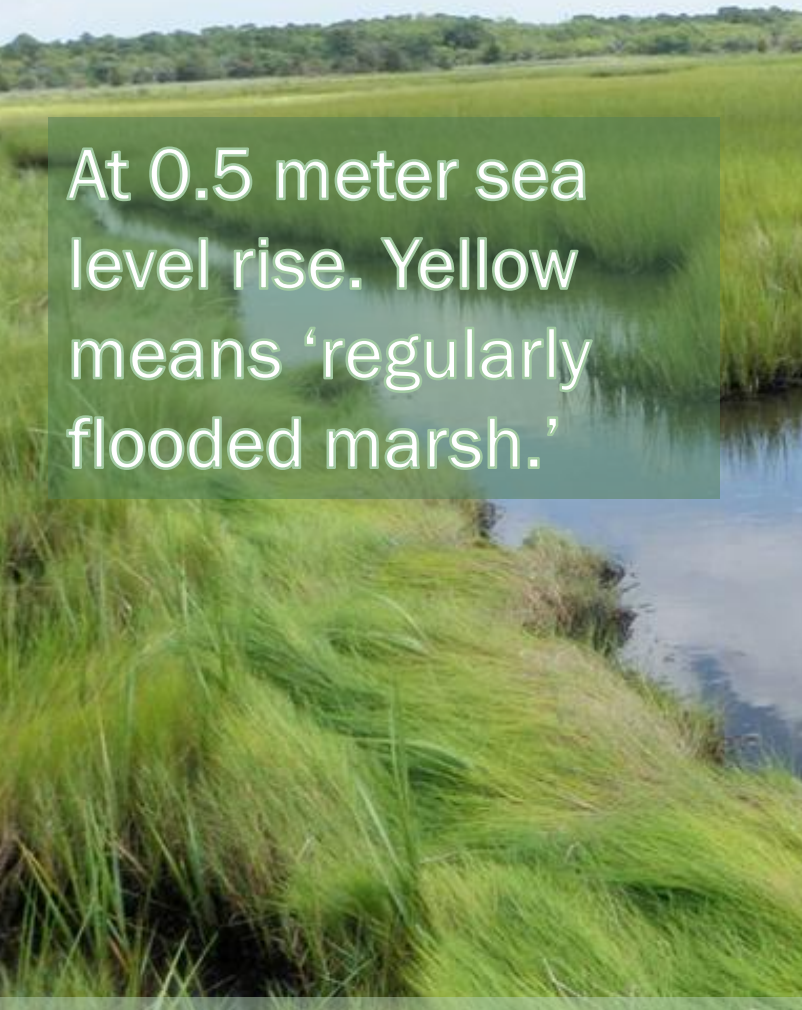
- Industrial Economics (2010). Appendix G: Application of Ecological and Economic Models of the Impacts of Sea-Level Rise to the Delaware Estuary. In Partnership for the Delaware Estuary, Climate Change and the Delaware Estuary: Three Case Studies in Vulnerability Assessment and Adaptation Planning. Wilmington, DE: PDE, Re. No. 10-01.
- National Wetlands Inventory, U.S. Fish & Wildlife Service 1981-1999





Wetlands

At 0.5 meter sea level rise. Yellow means 'regularly flooded marsh.'



Sources:

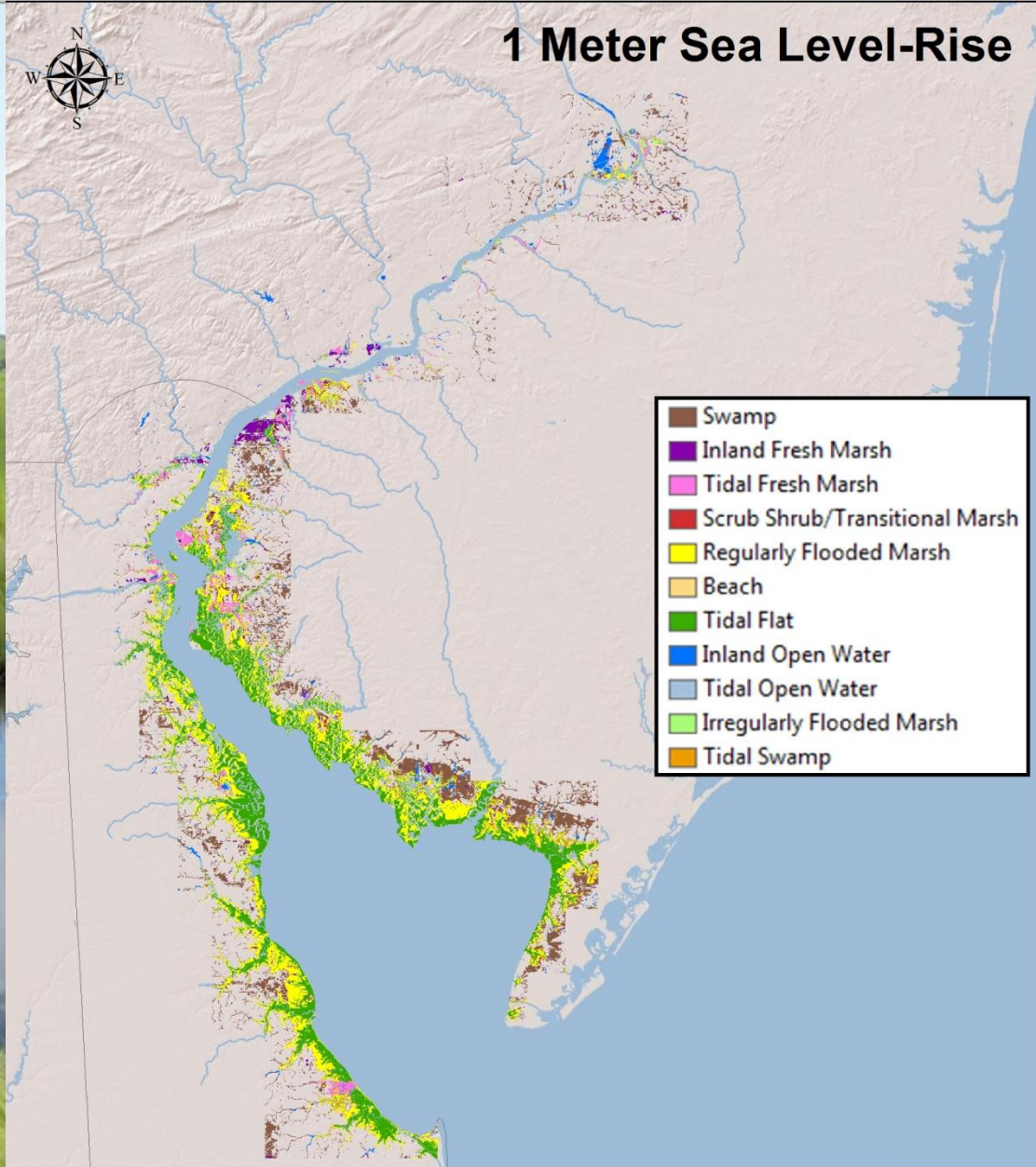
- Industrial Economics (2010). Appendix G: Application of Ecological and Economic Models of the Impacts of Sea-Level Rise to the Delaware Estuary. In Partnership for the Delaware Estuary, Climate Change and the Delaware Estuary: Three Case Studies in Vulnerability Assessment and Adaptation Planning. Wilmington, DE: PDE, Re. No. 10-01.
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Wetlands

At 1 meter sea level rise. Green means 'tidal flat' or mud flat.



Sources:

-Industrial Economics (2010). Appendix G: Application of Ecological and Economic Models of the Impacts of Sea-Level Rise to the Delaware Estuary. In Partnership for the Delaware Estuary, Climate Change and the Delaware Estuary: Three Case Studies in Vulnerability Assessment and Adaptation Planning. Wilmington, DE: PDE, Re. No. 10-01.
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Wetlands

With 1 meter of sea level rise

40,000 acres

of tidal wetlands will be flooded by 2100.



Wetlands

40,000 acres

15 times the size if the Rutgers New Brunswick Campus .



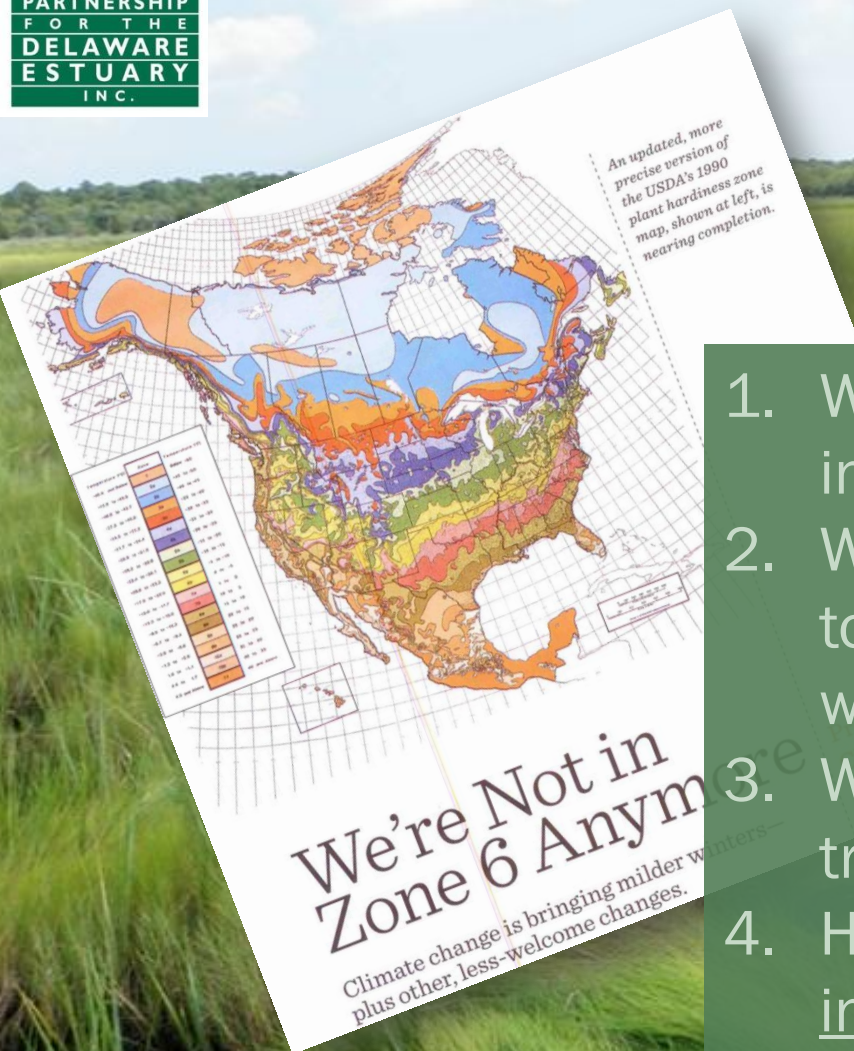
Wetlands

40,000 acres

Almost three times the size of
Manhattan.



Wetlands



We still don't know:

1. Whether/where wetlands can migrate inland.
2. Whether some wetlands will be able to keep pace with sea level rise without our help.
3. Whether freshwater wetlands will transition (or die?) with higher salinity
4. How many acres of wetlands are even in the Delaware Estuary, or how many acres we've already lost.



What can we do to help our natural resources adapt to a changing climate?



Delaware Estuary Living Shoreline Initiative

Using natural materials that slow erosion and attract assemblages of mussels, oysters and plants as intertidal reefs along the marsh edge





Delaware Estuary Living Shoreline Initiative





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Delaware Estuary Living Shoreline Initiative

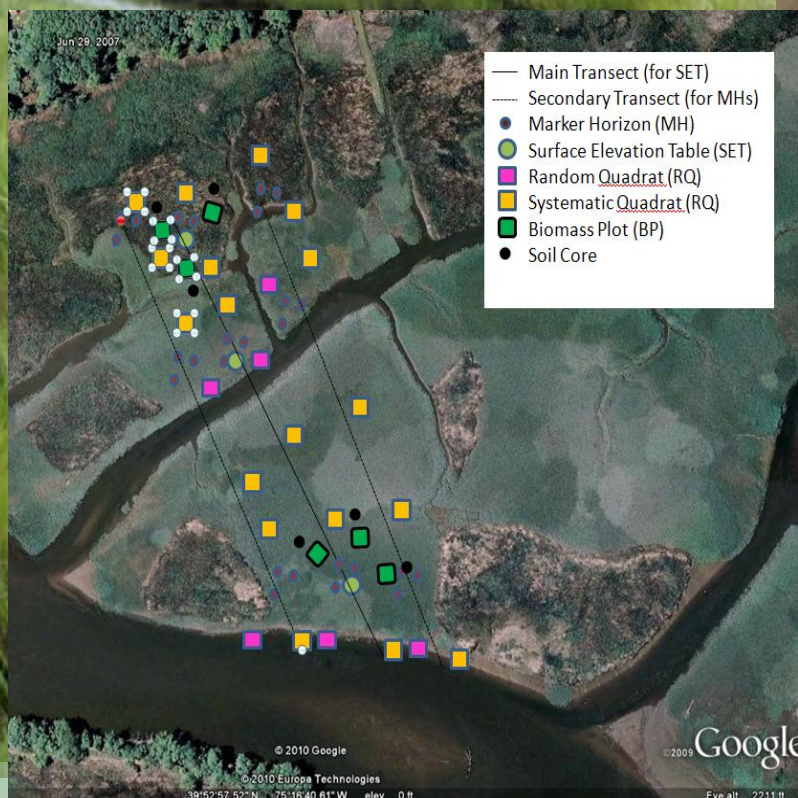




Delaware Estuary Living Shoreline Initiative



Wetland Assessment & Monitoring





Help Communities Weather Change with Green Infrastructure

WEATHERING CHANGE

WORKING WITH NATURE TO PROTECT COMMUNITIES AND CLEAN WATERS

At Risk...

are people, property, and clean water. Local community leaders face tough decisions in planning and control the waters that sustain, and yet the lives and livelihoods of the people in the region can create an onslaught of stormwater floods developed banks, damages streams and

Plan for Change

Ben Franklin once said, "An ounce of prevention is worth a pound of cure"— still true today in planning for water quality and emergency protection in changing times. Planning costs very little, but reactive measures as problems develop can be extremely expensive.

- Look at existing zoning, land use, comprehensive, and hazard/ emergency plans and update them to take increasing temperature, precipitation, and sea level conditions into consideration.
- Work together, across zoning, planning, and public works departments to update codes to accommodate and encourage installation of absorbent green stormwater management practices.
- Keep development away from any land that is expected to erode and/or flood to protect public safety, property and other community assets.
- Protect wetlands, streamside forests, and any natural areas existing between them and developed land – they are the best natural defense against flooding in developed areas.
- Require use of green infrastructure for stormwater control in new and expanding land development.

Work with Neighbors

Municipal leaders, residents, and businesses can work together to meet the challenges of changing weather and water conditions.

- Encourage tree planting and the creation or protection of natural areas (F) on developed properties.
- Encourage people in your community to install rain barrels (G), downspout planters, and rain gardens to reduce excessive runoff from their properties.
- Use your community's existing communications (newsletters, bill mailings, websites, and annual reports) to highlight green projects and talk about community water conservation efforts.
- Stretch your dollars by partnering with your local watershed organization on projects and public outreach efforts.
- Work collaboratively with upstream and downstream towns to implement larger and/or multiple projects to significantly improve stormwater control in your watershed. We all live downstream!

region...

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ver the past 100 years, er 2 to 5 feet during

12

13



**PARTNERSHIP
FOR THE
DELAWARE
ESTUARY
INC.**

Learn more at
www.DelawareEstuary.org

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