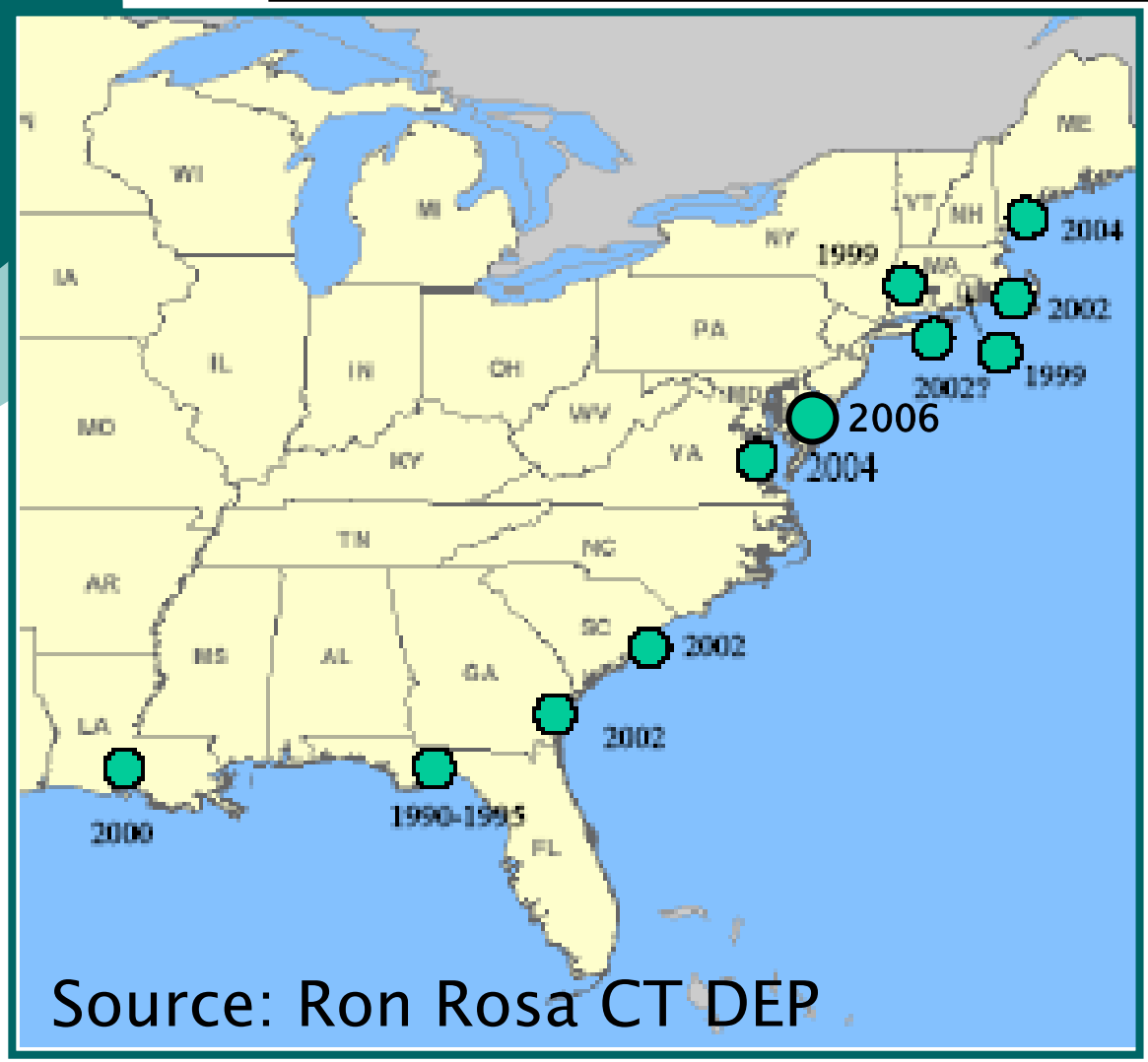
Uncertain Threats to Saltmarshes of the Delaware Inland Bays

Chris Bason, Delaware Center for the Inland Bays

Revised: December 13, 2006

Center for the Inland Bays

Sudden Wetland Dieback on Atlantic and Gulf Coasts



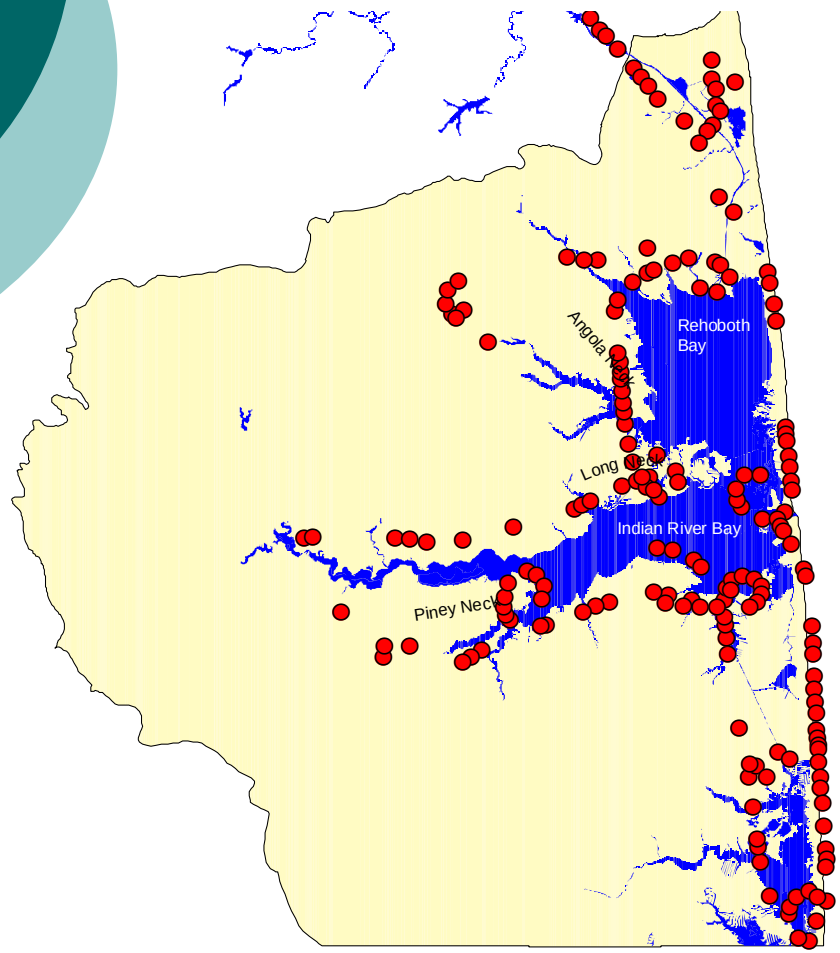
- Widespread, sudden vegetation death
- Mostly *Spartina alterniflora* (low marsh)
- 1st noted ’68 in Louisiana
- Recent occurrences unprecedented
- Rate of recovery variable

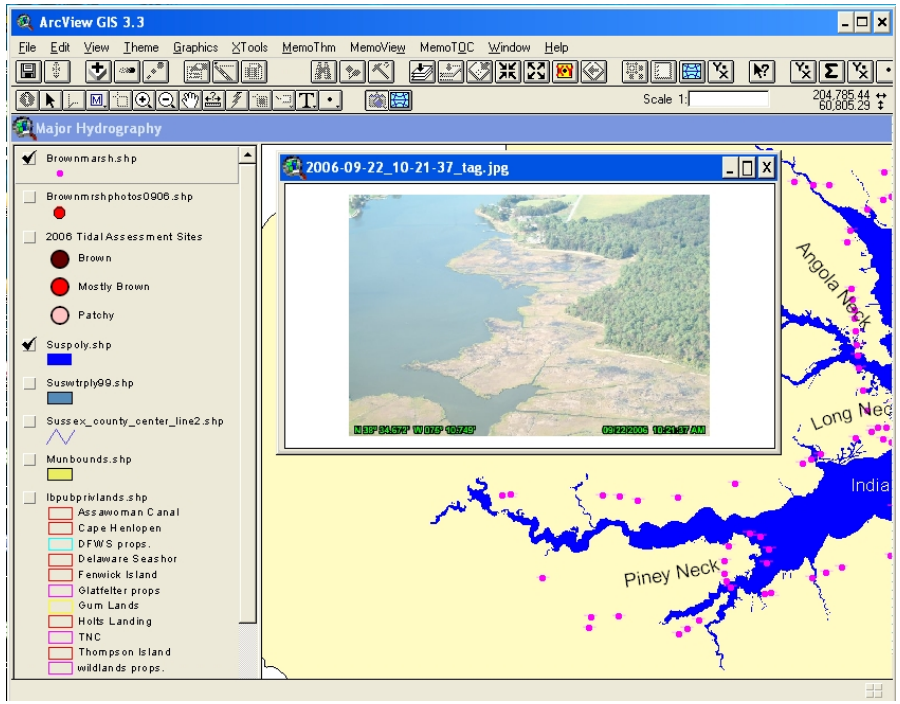
Piney Neck Brown Marsh – Sudden Wetland Dieback

Possible Causes

- Fungal Pathogens
- Herbivore Fronts
- Trophic Changes (decreased predator populations)
- Eutrophication
- Toxicity
- Hydrologic Alteration
  - Changes in tidal cycles, amplitudes
  - Alteration through intense ditching
- Climate Change
  - Increased variability in precipitation (deluge & drought)
  - Change in rate of sea level rise

September 22, 2006 Aerial Survey Path





GPS Photo-Link Software Assigns Lat and Long to image file


Green Marsh –
Rehoboth Bay Back
Barrier


Piney Neck –
I. R. Bay

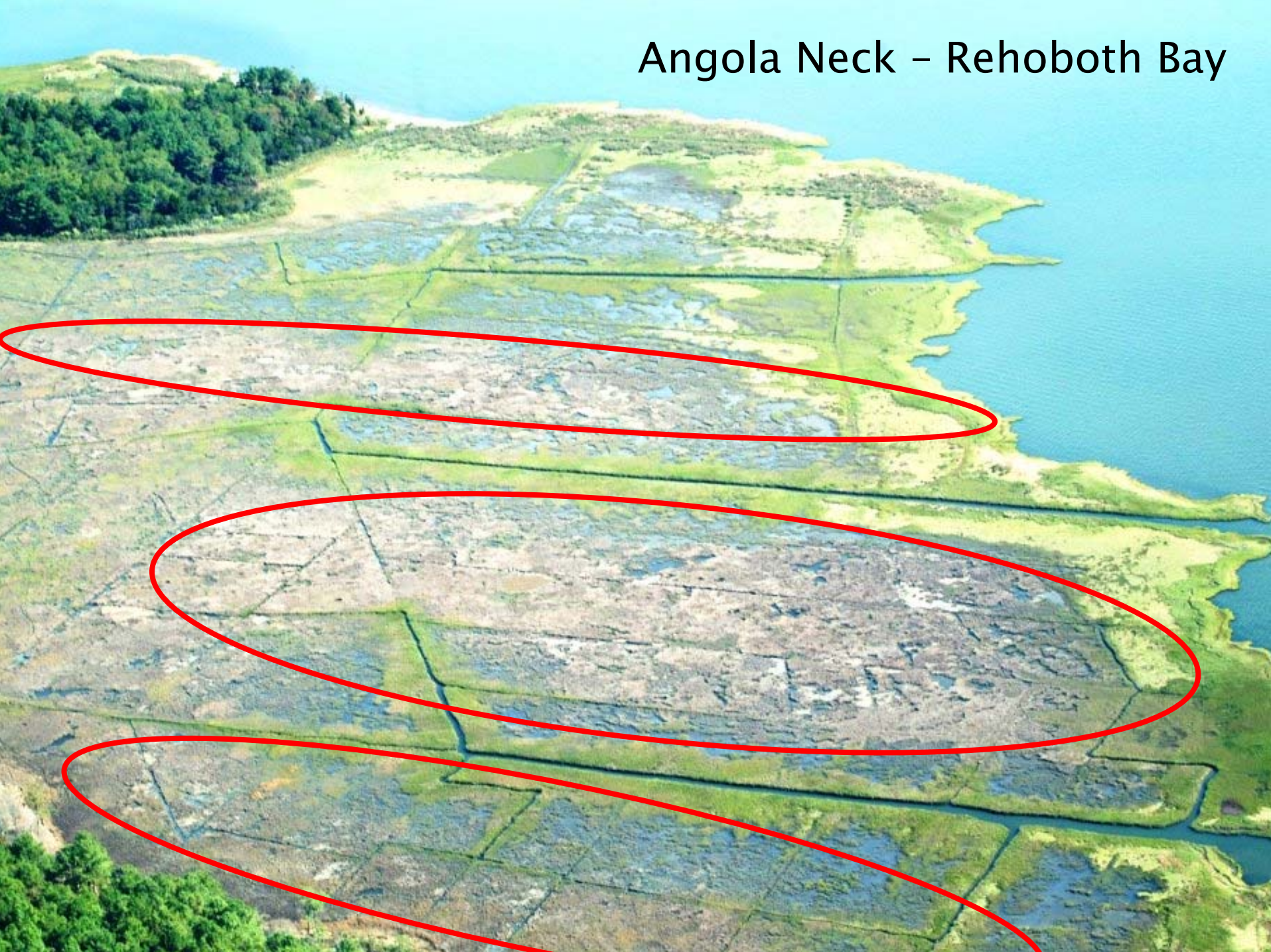
Sudden Dieback Survey Results

- Present in all 3 Bays
- Varies greatly in intensity
  - Maybe present at low levels in the majority of marshes
  - Severe in a few different marshes
  - Natural autumn senescence partly obscuring definition
- Upland and in-site disturbance not apparently influential of presence

White's Creek Area Marsh Browning Comparison – Indian River Bay

September 2002

September 2006


Angola Neck – Rehoboth Bay

Back Barrier Marsh South of Indian River Inlet

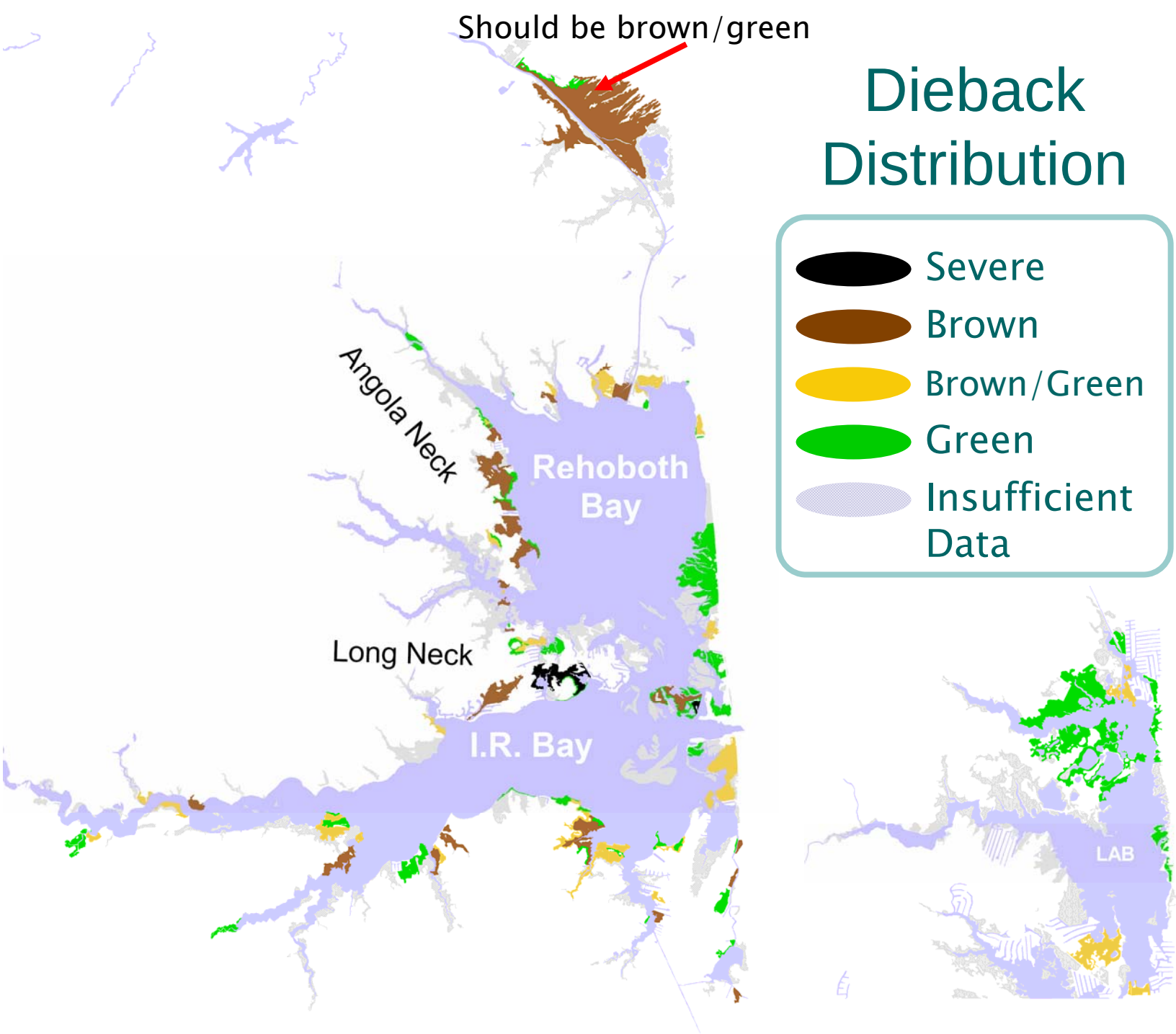

Burton’s Island


Cotton Patch Hills
Marsh, IRB
DELDOT Mitigation
Site


Indian River Marsh – No Ditching

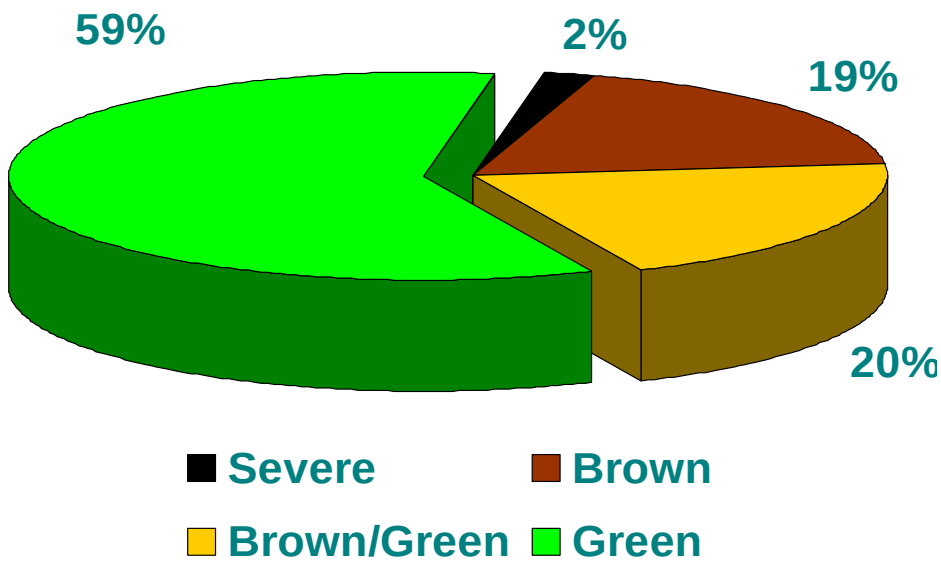
Sally Cove Marsh, Angola Neck – Rehoboth Bay

Dieback Distribution



Frequency of Dieback by Tidal Wetland Polygon

- Oblique photos did not allow area calculation
- 929 wetland polygons total
- 205 sufficiently observed (22%)
- Frequency by dieback intensity



Established Permanent Monitoring Sites

- 4 sites
- Photographs
- Measuring % live cover, dead cover
- Analyzing plant and soil samples for fungal pathogens and nematodes

Initial Laboratory Results

- No nematodes in roots
- Some fungal leaf spots, nothing pathogenic
- No teliospore pustules from *Puccinia*
- Disease probably not a cause
- Now testing for presence of heavy metals

Die Back in Other Regions

Virginia LTER -- Delmarva

Louisiana

Cape Cod, Massachusetts

2002

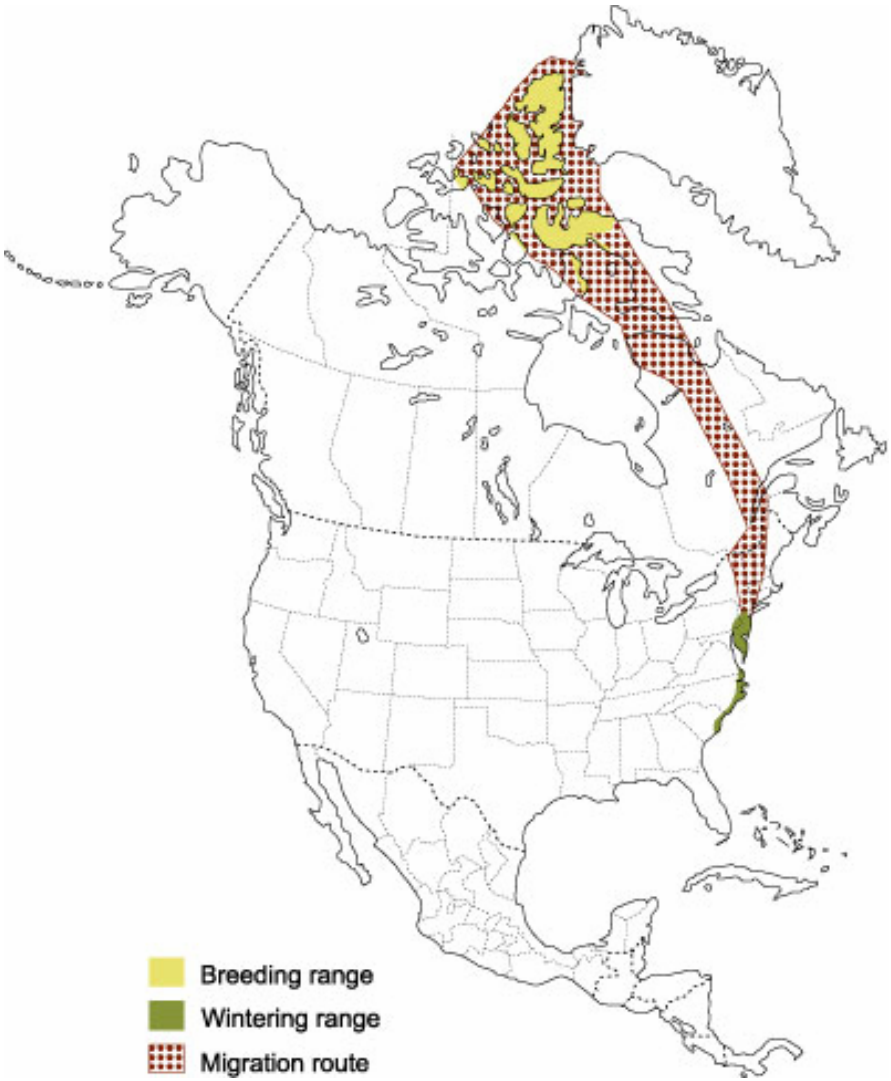
2004

Outcomes of the October 19th Meeting on Dieback in Delaware

- Summarize dieback literature
- Summarize climate, sea-level, and tidal prism data
- Document change in grass cover in plots in 2007, add plots
- Develop state-wide reporting protocol
- Collect remote sensing data
- Contact other researchers, managers involved in wetland loss, dieback
- Next Meeting: Dec 4th, St. Jones Reserve

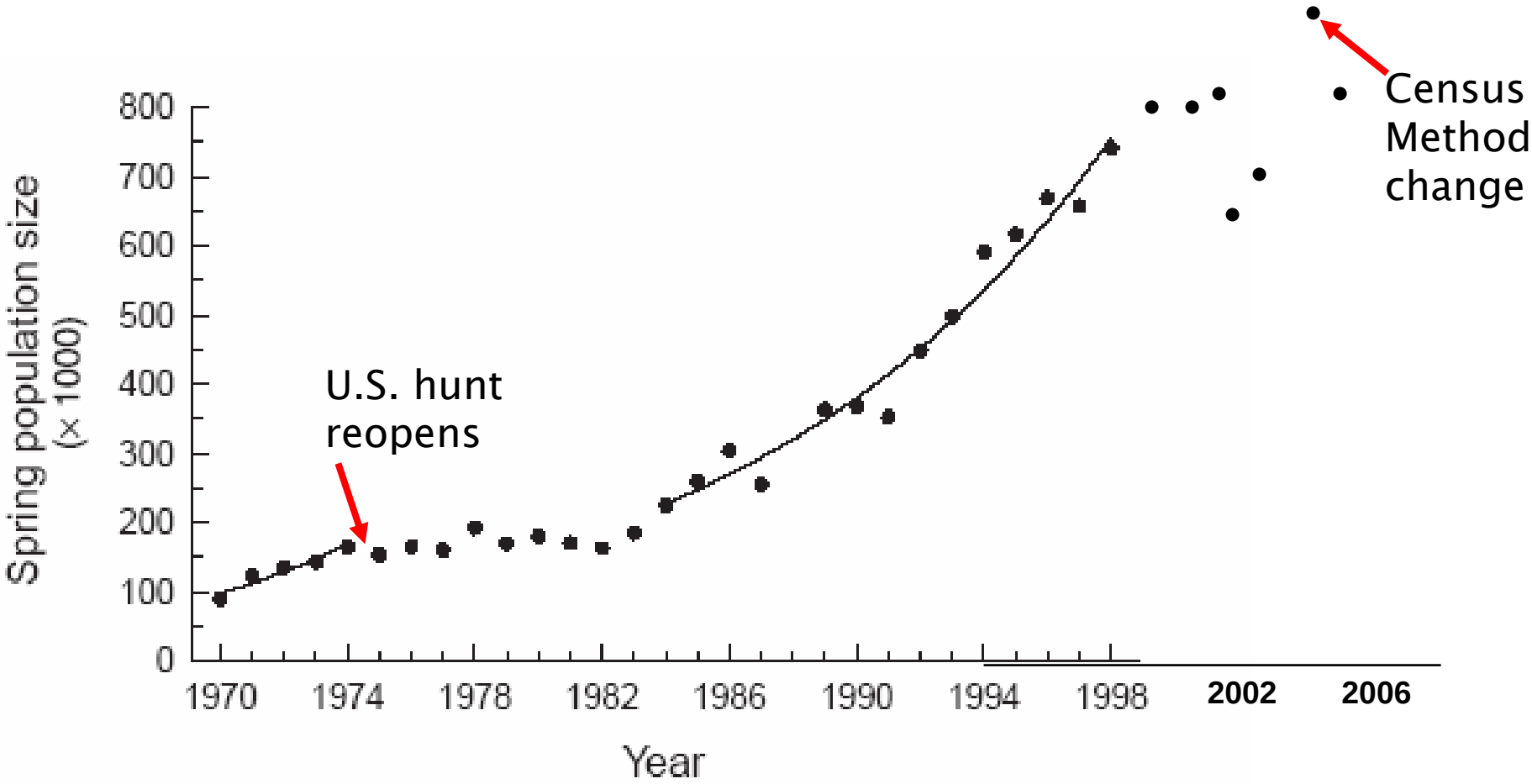
Additional Marsh Stressors

Greater Snow Goose



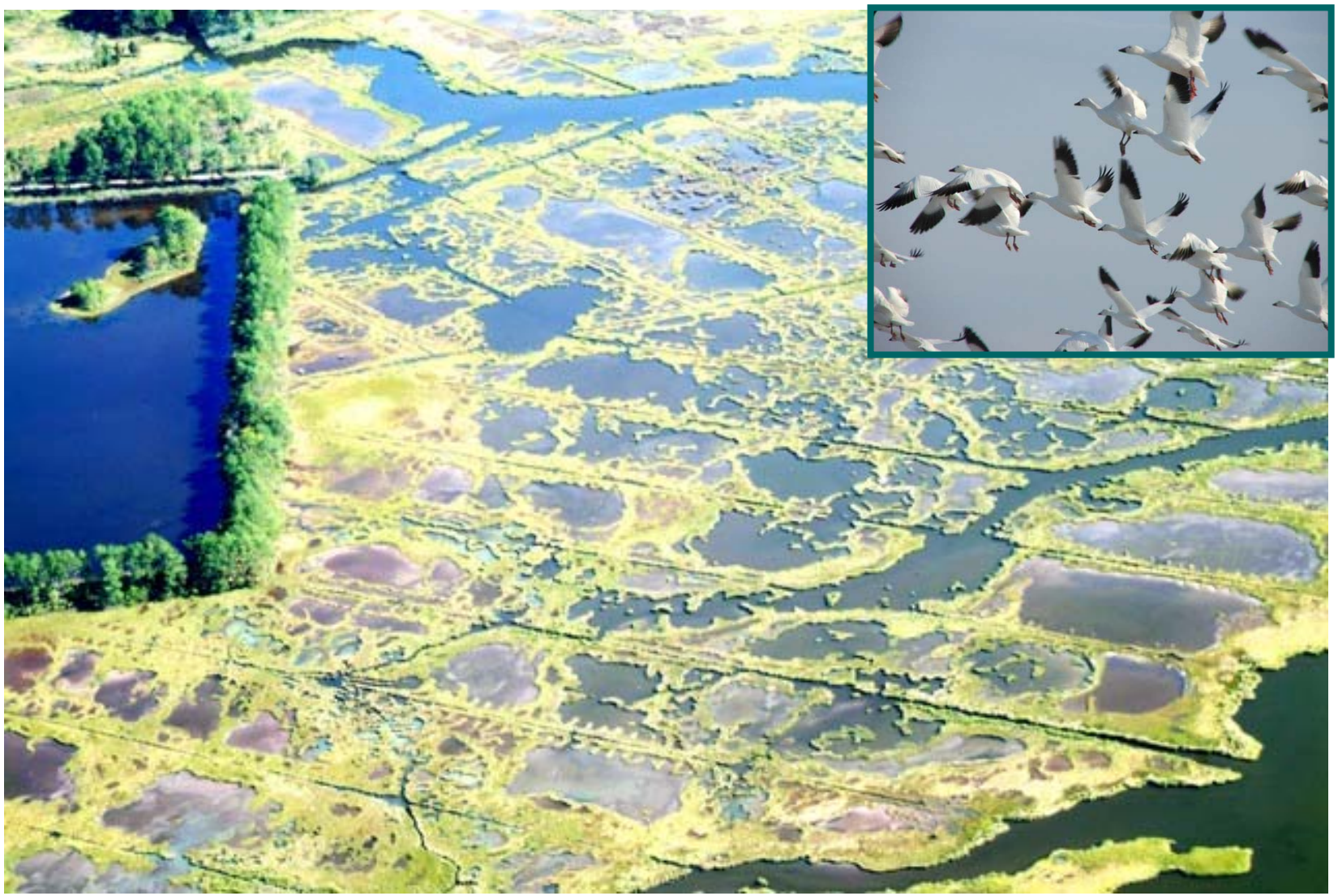
- Long range migrant
- Winter's in coastal mid-Atlantic & SE
- Forages in AG fields and marshes

Greater Snow Goose Population



From Menu et al. J. App. Ecol. 2002 and Environment Canada

Snow Geese Overgrazing: Assawoman Wildlife Area – Little Assawoman Bay



September 2006


Assawoman
Wildlife Area
Geese
Damage
2002


Small
Watercraft


Cape Henlopen SP
Marshes near
Lewes-Rehoboth
Canal
Gordon's
Pond

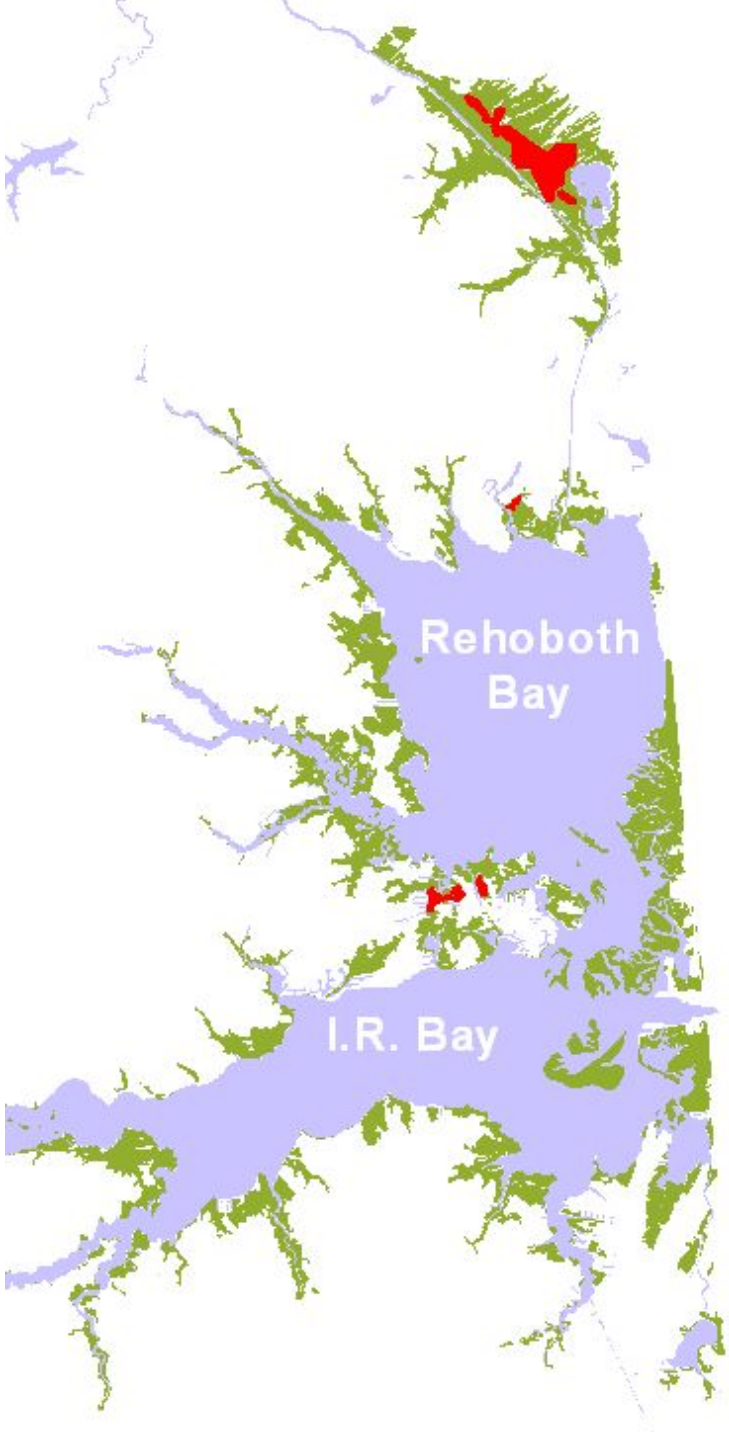
Seal Island – Little Assawoman Bay

September 2002

September 2006

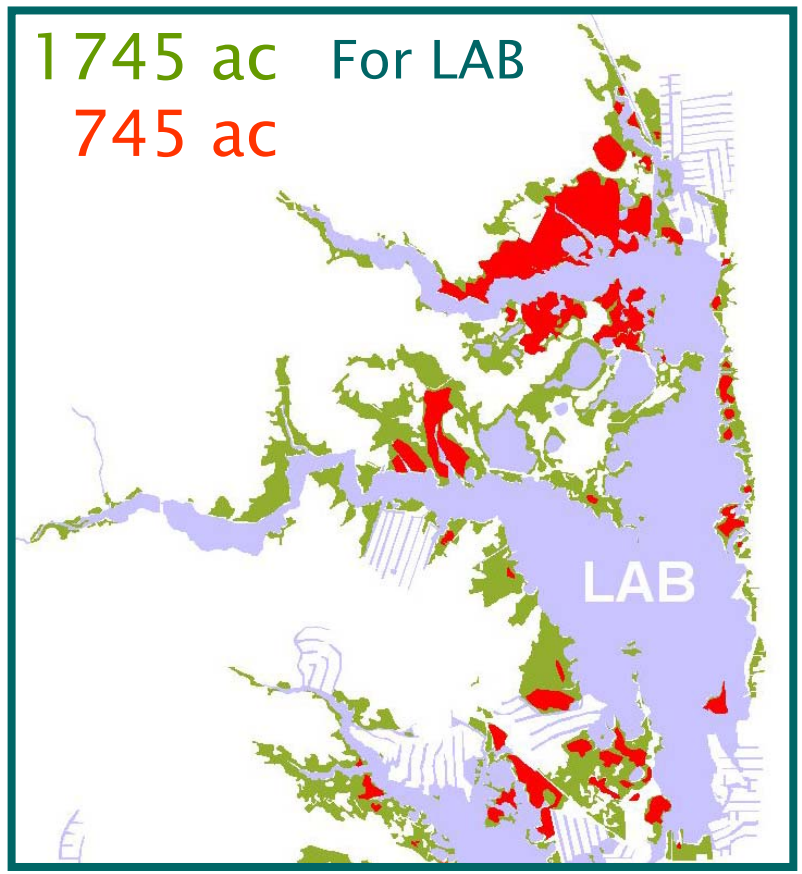
- Snow Geese Devegetated
- Future CIB Estuary Habitat Restoration Act Project
  - Stabilization, Goose Exclusion, Planting

Areas of Likely Snow Geese Damage



Tidal Wetlands

Damage



Management Implications

- Need to manage goose populations for sustainable ecosystems (set target population)
- Increase harvest should occur in DE, NJ, PA (Calvert et al. J. Wildl. Manage. 2005)
- Legalize electronic calls
- Consider providing incentives for hunters

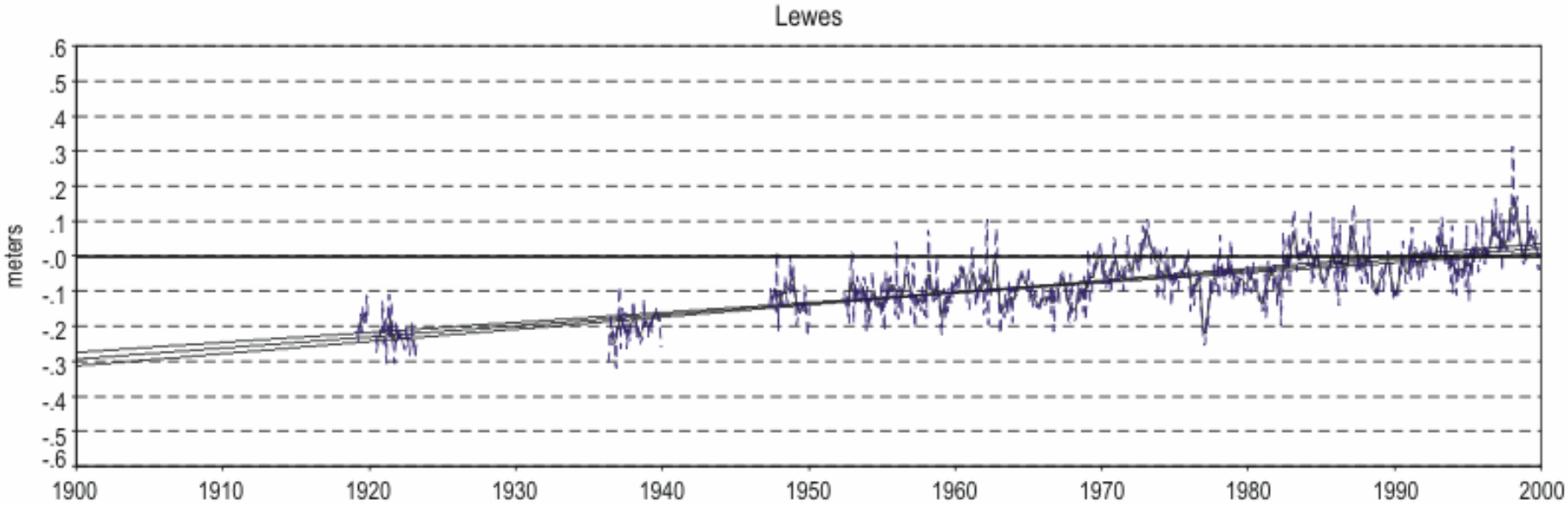
Marsh Collapse?

Locations Experiencing Well Documented Rapid Salt Marsh Loss

- Jamaica Bay, New York *(Hartig et al., Wetlands 2002)*
- Blackwater National Wildlife Refuge, MD
- Louisiana Gulf Coast
- Venice Lagoon, Italy *(Day et al., J.Coastl.Rsrch. 1998)*
- Elkhorn Slough, CA *(Van Dyke & Wasson, Estuaries 2005)*

Mean Sea Level Rise

Current: 3.16 millimeters/year (1.04 feet/century)
1250-2000: 0.9 mm/year *(Nikitina et al. 2000)*



http://www.tidesandcurrents.noaa.gov/sltrends/sltrends.html

Questions

- What are the rates of saltmarsh gain/loss?
- What are the most important factors contributing to gain/loss?
- Will saltmarshes keep pace with accelerated rates of sea-level rise in the future?
- What management strategies are feasible given rapid loss?

Recommendations to the STAC

- Advise the Board on the nature of Sudden Dieback and recommend that they request that DNREC consider seeking additional funding to study the issue in the short term (1 – 2 years).
- The STAC should consider the sustainability of the Inland Bays' salt marshes under a changing climate and hydrologic regime and discuss potential for research.

Acknowledgments

- Amy Jacobs, DNREC
- Bob Mulrooney & Nancy Gregory, UDCE
- Bill Moyer, Duffield Assc.
- EJ Chalabala & Josh Thompson CIB

Website: http://www.inlandbays.org/cib_pm/projects.php