

Wetland Management Along A Changing Coast: A Manager's Dilemma

PRIME HOOK NATIONAL WILDLIFE REFUGE

*Wednesday, February 29, 2012
Delaware Wetlands Conference
Dover, Delaware*



A Refuge's Dilemma

Freshwater marsh vs. Salt marsh vs. Open water



History of Prime Hook's Marshes

- About 1911 a storm closed the outlets of Prime Hook Creek and Slaughter Creek to the bay.
- Around this time Slaughter Canal was also extended into Unit II.
- In the 1930s grid ditching for mosquito control took place.
- Mosquito control managed the water levels until the 1950s.
- Landowners further altered the marsh depending on their objectives (grazing, haying, muskrat trapping, hunting, etc.)
- From 1963-1980 no management occurred by the Service due to public concerns.
- In 1980 the Service proposed the establishment of freshwater impoundments for waterfowl and to control *Phragmites*. By 1988 the installation of 3 water control structures basically eliminated all tidal flow to 4,000 acres of marsh.

History of Prime Hook's Marshes continued

- As a condition in the state's wetland permit for the installation of the Unit II water control structure in 1988 the dune was to be restored. The 1986 Environmental Assessment acknowledged there would be some saltwater intrusion from the Bay.
- The dunes have been restored several times since 1988:
 - 1992 storms
 - 1998 storm
 - 2006 Hurricane Ernesto
 - 2008 Mother's Day Storm
- This was done in an effort to provide freshwater impoundments for waterfowl and to control *Phragmites*.



History of Prime Hook's Marshes continued

The end result was – IT WORKED



History of Prime Hook's Marshes continued

- Waterfowl numbers increased

Chamberlain (1951) – Prime Hook Marshes had a peak of 2,700 birds in the fall of 1950.

1975-1984 No Wetland Management Era
Peak Waterfowl Numbers - 5,795

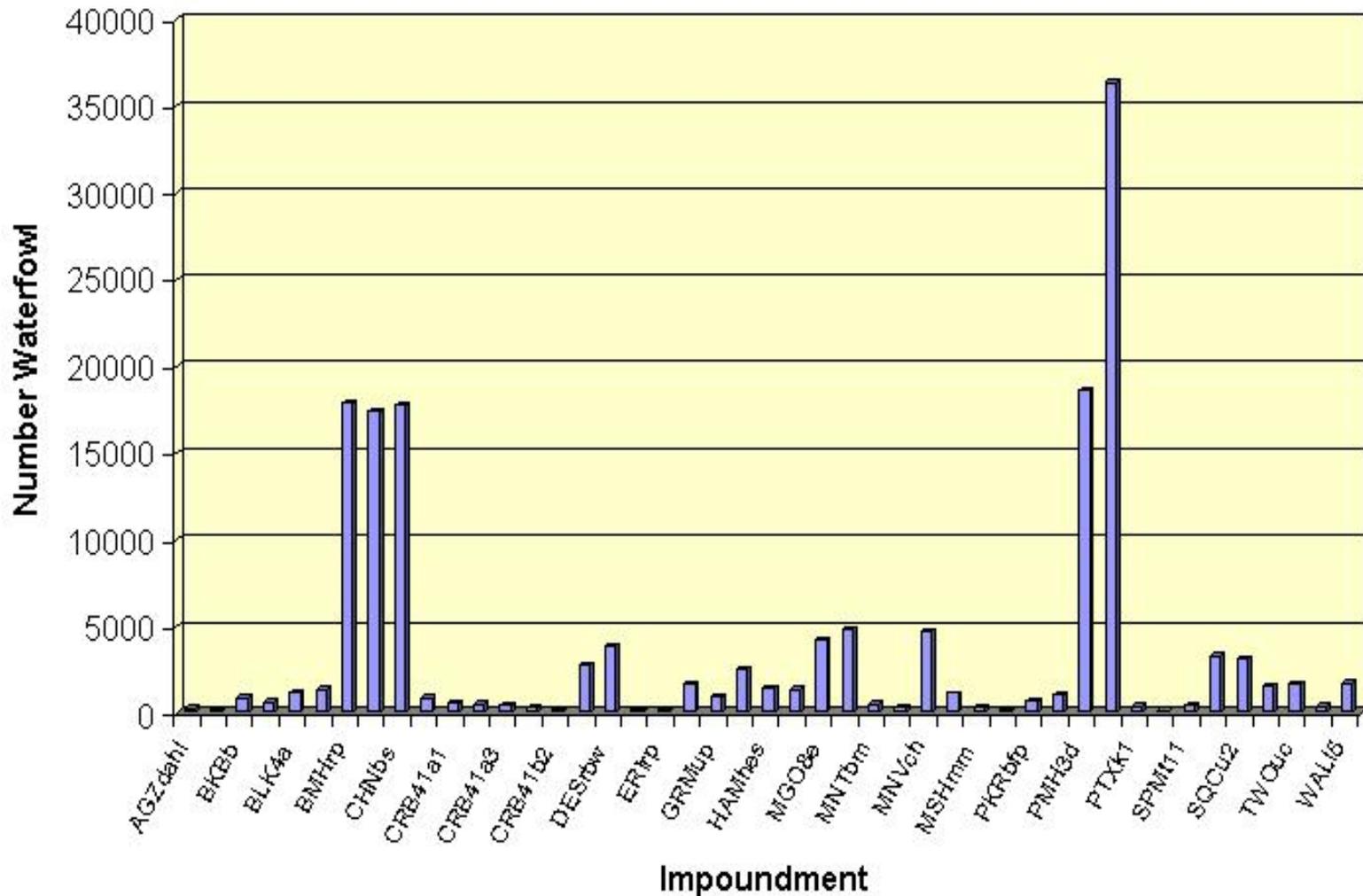
1986-1995 Marsh Rehabilitation Era
Peak Waterfowl Numbers – 54,606

1996-2005 Integrative Wetland Management Era
Peak Waterfowl Numbers - 80,261



Photo:USFWS/Erwin & Peggy Bauer

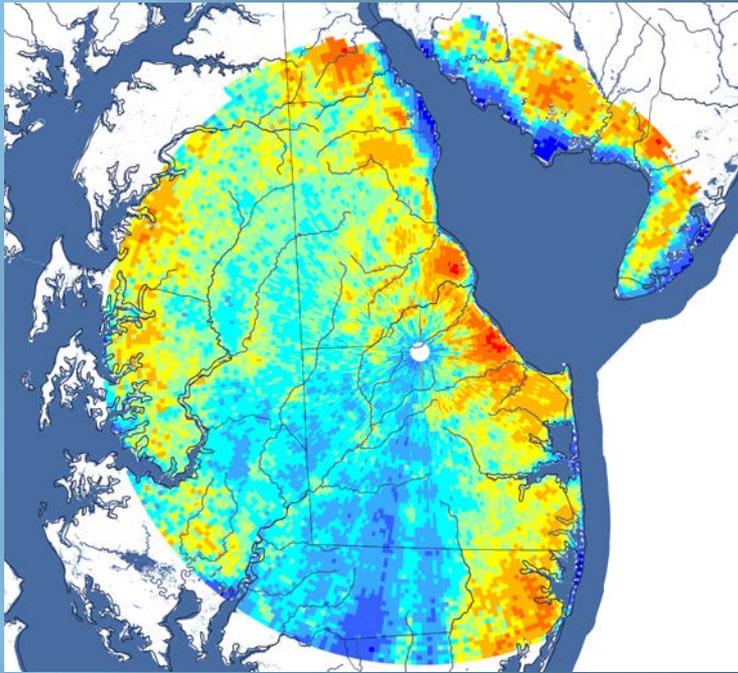
USFWS Region 3/5 Multi-refuge Impoundment Study



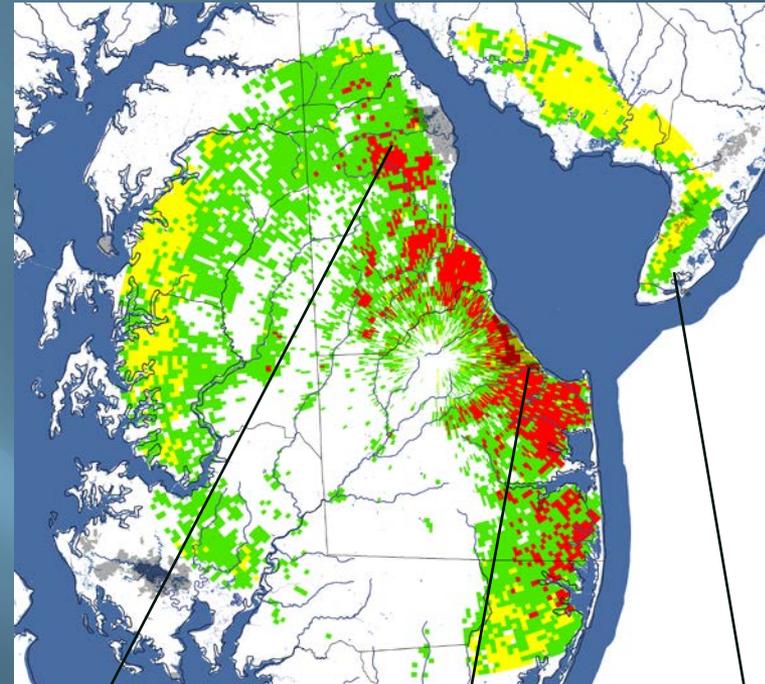
- Radar research done in 2010 clearly showed how important Prime Hook's forests are to landbirds during the migration.
- The Refuge has approximately 125 to 150 acres dead, dying or stressed trees due to the saltwater intrusion. We are losing this critical habitat.



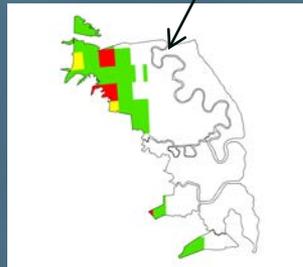
Radar study



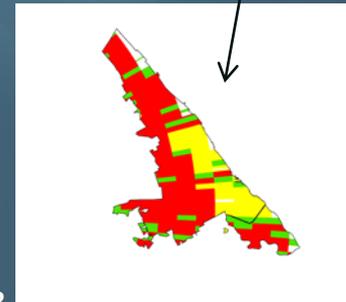
KDOX, Dover, DE (30 nights)



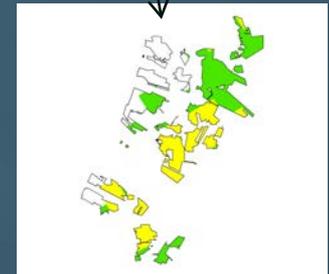
- "Hotel" - consistently high bird density (>75th % of reflectivity & <25th % of variability)
- "Fire escape" - high bird density and high daily variability (>75th % of reflectivity & >75th % of variability)
- "Convenience store" - above median bird density (>50th % of reflectivity)



Bombay Hook NWR



Prime Hook NWR



Cape May NWR

A Refuge's Dilemma cont'd

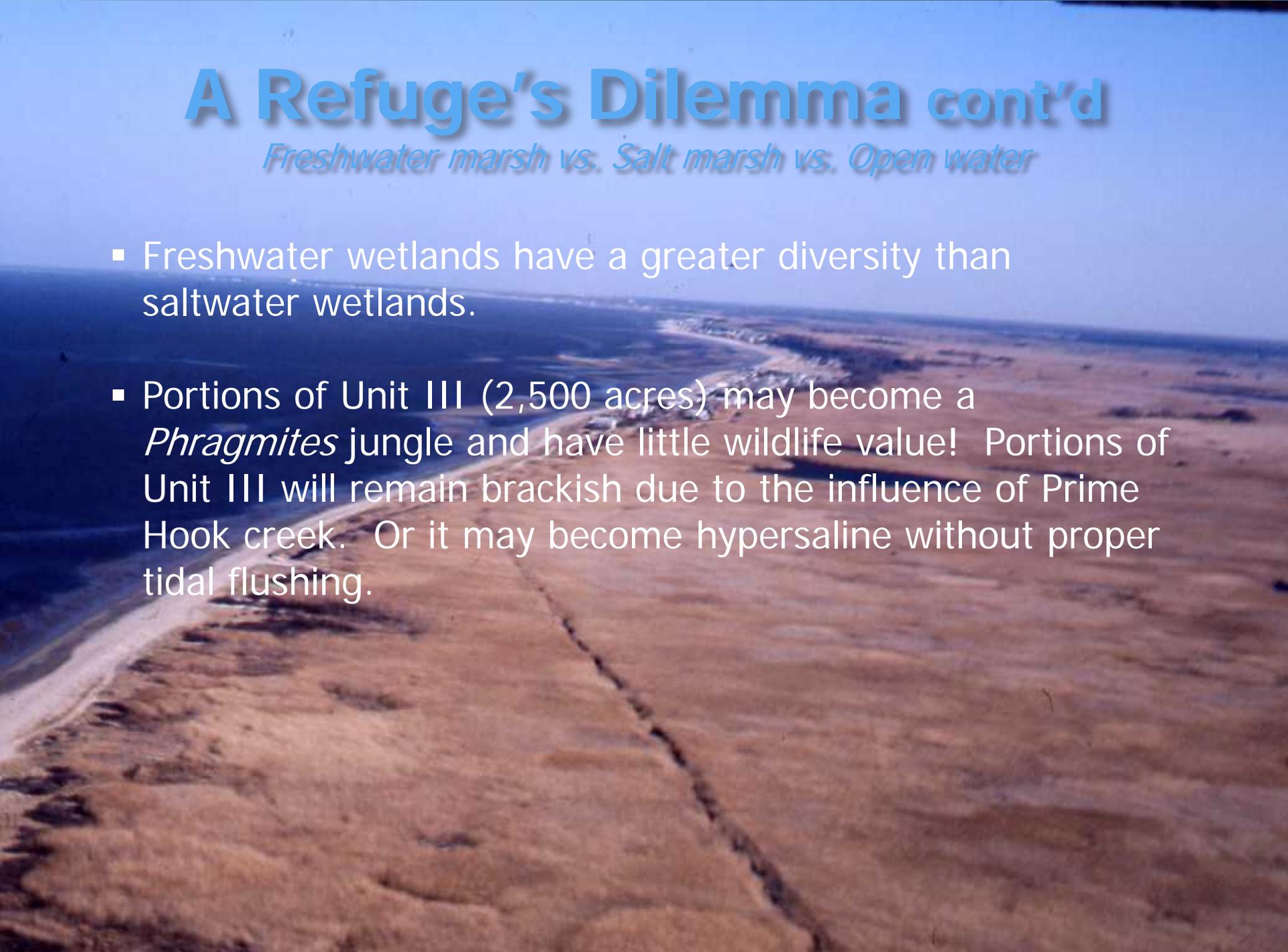
Freshwater marsh vs. Salt marsh vs. Open water

- Prime Hook's 4,000 acres of impoundments represents 40% of the total 10,000 acres of impoundments in Delaware.
- Potential for **significant reduction in waterfowl numbers** at Prime Hook. The impoundments were built for a reason and were very successful.
- **A loss of 50% to 85% or more of the Refuge's shorebird habitat.** The water management in our impoundments provided the mudflats utilized by the shorebirds.
- The shoreline is eroding and exposing the peat. The loss of sand means the loss of horseshoe crab spawning habitat. The reduction in HSC spawning means the reduction of shorebird numbers such as red knots.

A Refuge's Dilemma cont'd

Freshwater marsh vs. Salt marsh vs. Open water

- Freshwater wetlands have a greater diversity than saltwater wetlands.
- Portions of Unit III (2,500 acres) may become a *Phragmites* jungle and have little wildlife value! Portions of Unit III will remain brackish due to the influence of Prime Hook creek. Or it may become hypersaline without proper tidal flushing.



A Refuge's Dilemma cont'd

Freshwater marsh vs. Salt marsh vs. Open water

- Invasive species such as Japanese stilt grass and *Hydrilla* have been either eliminated or severely set back due to the saltwater intrusion. *Phragmites* has been set back in the higher salinity areas.
- Saltmarsh may be able to keep up with sea level rise or it may slow the landward migration.
- Saltmarsh specialist birds are declining and are a resource of concern.
- Saltmarsh is relatively easy to maintain and is cost-effective.
- Anadromous fish will benefit with increased habitat.
- If the overwash habitats remain unvegetated, they may provide critical bird nesting habitat.
- Vegetated marsh provides storm surge and flood protection.
- Sequesters Carbon more effectively than freshwater marsh

A Refuge's Dilemma cont'd

Freshwater marsh vs. Salt marsh vs. Open water

- Open water and/or *Phragmites* provide little to no wildlife value (especially migratory birds). The reductions in waterfowl populations and /or habitat from freshwater to salt marsh are expected to be even worse if the Unit or Units go to open water and/or *Phragmites*.
- No vegetation means no spawning/nursery habitat for fish.
- Wave action and saltwater intrusion continue to march landward further impacting forests and early successional habitats on the refuge, not to mention neighboring farmland.
- The potential for increase flooding and damage to facilities (roads).

Unit I



Unit II



What are the alternatives?

Maintaining Freshwater impoundments

- Requires beach replenishment
 - \$7+ million initial price tag with recurring costs every five to 10 years. The recent Lewes project had a \$1.45 million mobilize/demobilization cost with a \$13/cu yd cost for sand
 - Does this mean the refuge will be in direct competition with the Bay Beach communities for funding and sand?

- The refuge is losing water management control at the water control structures.

- By maintaining the impoundments we maintain biological diversity at the local scale but maybe sacrificing biological integrity.

What are the alternatives? cont'd

Marsh Restoration

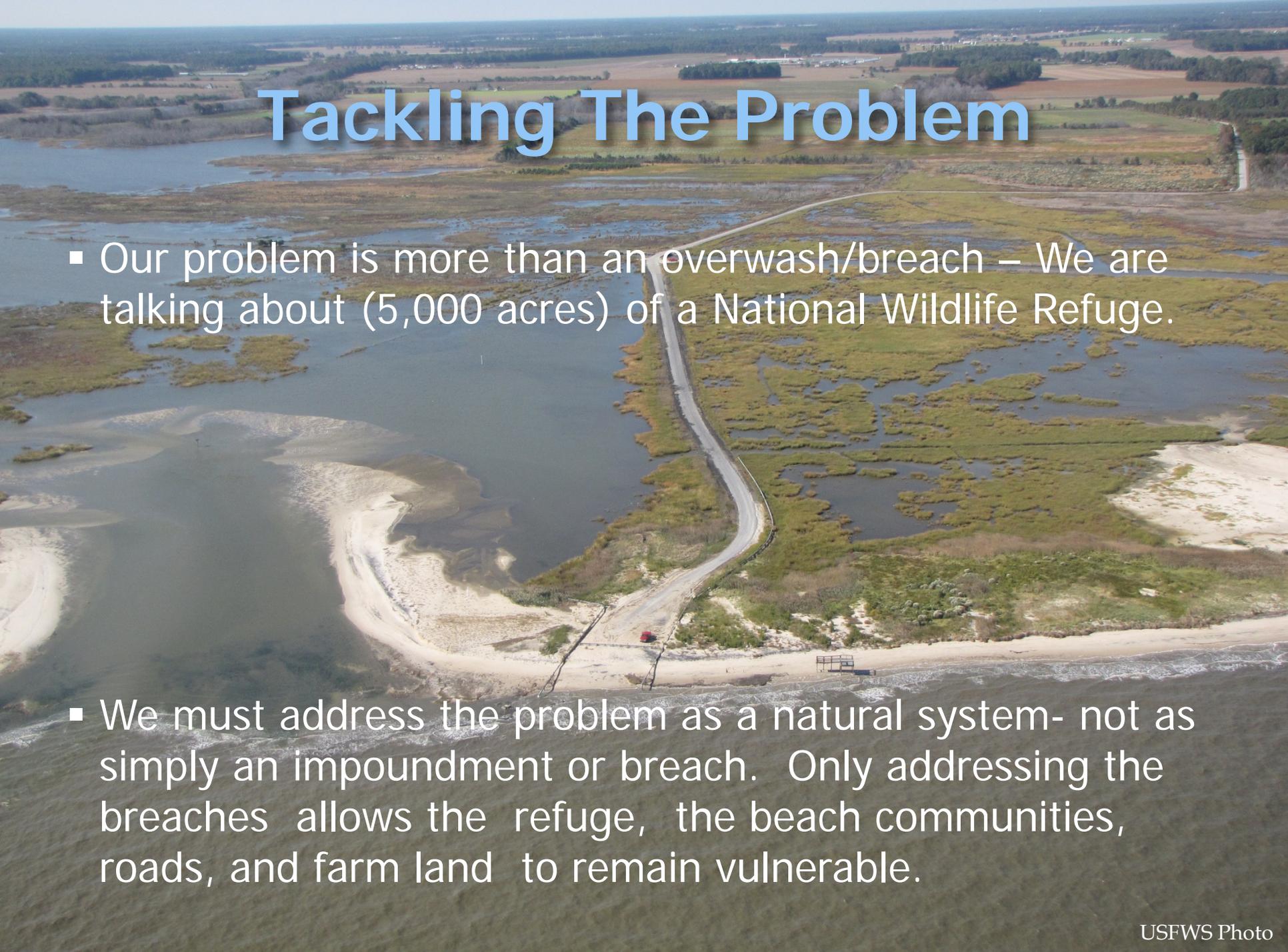
- ❑ Requires dredge material – 7" to 10" across unit II and III.
- ❑ Hydrological restoration
 - Need to allow the marsh to drain
 - Need to establish tidal channels
 - The units remain tidally restricted
 - Hypersalinity issues
- ❑ Costs are unknown
 - Initial cost will be high but should be self-sustaining
- ❑ Restores ecosystem services
 - Storm surge and flood protection
 - Sequesters Carbon
 - Habitat
- ❑ By restoring saltmarsh we may be sacrificing biological diversity at the local scale for biological diversity and integrity at the landscape level.

What are the alternatives? cont'd

Passive Management

- ❑ “Let Mother Nature run its course”
- ❑ Conversion to open water could lead to loss of up to 5,000 acres of wetlands (does not include loss of uplands)
- ❑ Loss of Ecosystem Services with value totaling \$53 million
 - ❑ Value of ecosystem services for wetlands = \$10,600 / acre / year (Southwick Associates 2011 report)
 - ❑ Does not include economic benefit of outdoor recreation
- ❑ Value of ecosystem services for Uplands is an additional \$1,675/acre/year.
- ❑ Natural wetland recovery not impossible, but could take decades or hundreds of years (if sea level rise doesn't preclude completely)

Tackling The Problem

An aerial photograph showing a coastal wetland area. A road runs through the center, separating a large body of water on the left from a marshy area on the right. The water appears to be overflowing or breaching the road. The landscape is a mix of green marshes, brownish water, and sandy areas. In the background, there are fields and some buildings, suggesting a rural or agricultural setting. The sky is clear and blue.

- Our problem is more than an overwash/breach – We are talking about (5,000 acres) of a National Wildlife Refuge.
- We must address the problem as a natural system- not as simply an impoundment or breach. Only addressing the breaches allows the refuge, the beach communities, roads, and farm land to remain vulnerable.

In Conclusion

- Can we afford to maintain the status quo?*
- Can we afford to restore these systems?*
- Can we afford to walk away?*

Prime Hook's situation gives us a glimpse into the future what we will be facing as a result of climate change and sea level rise.

ANY QUESTIONS?

