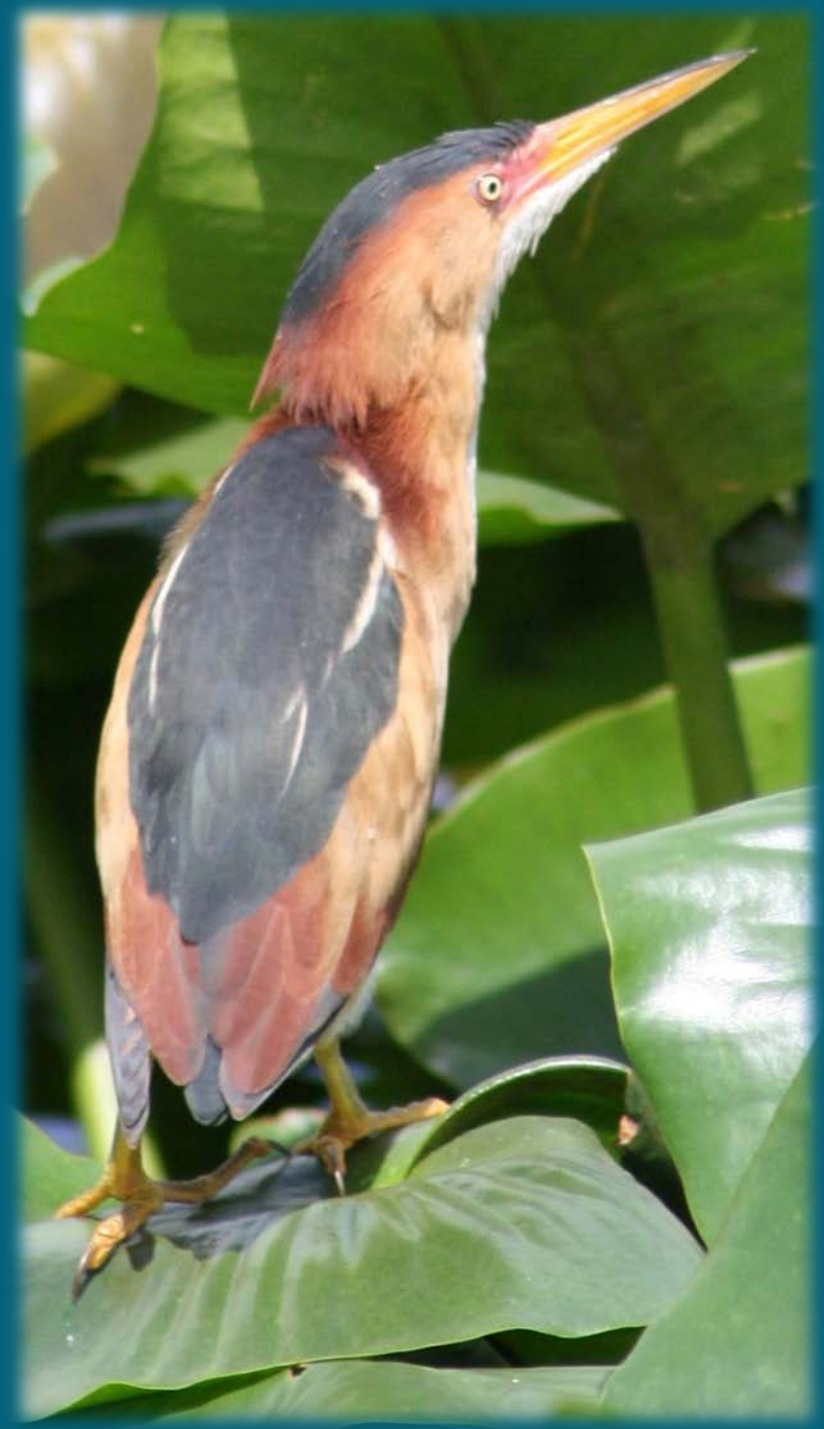


Climate-Smart Coastal Impoundments: Replacing Lost Functions and Values

Austin Kane, NWF
Karen Bennett, Delaware DFW
Robert Hossler, Delaware DFW

Coastal Impoundments History

Rice production

Salt hay farming

Mosquito control

Waterfowl habitat

Today…Multiple Functions for Wildlife:

- Breeding habitat for shorebirds, rails, bitterns, waterfowl
- Feeding habitat for migrating shorebirds and waterfowl, post-breeding wading birds.
- Roosting habitat for shorebirds, waterfowl
- Fish nursery habitat
- Muskrat habitat

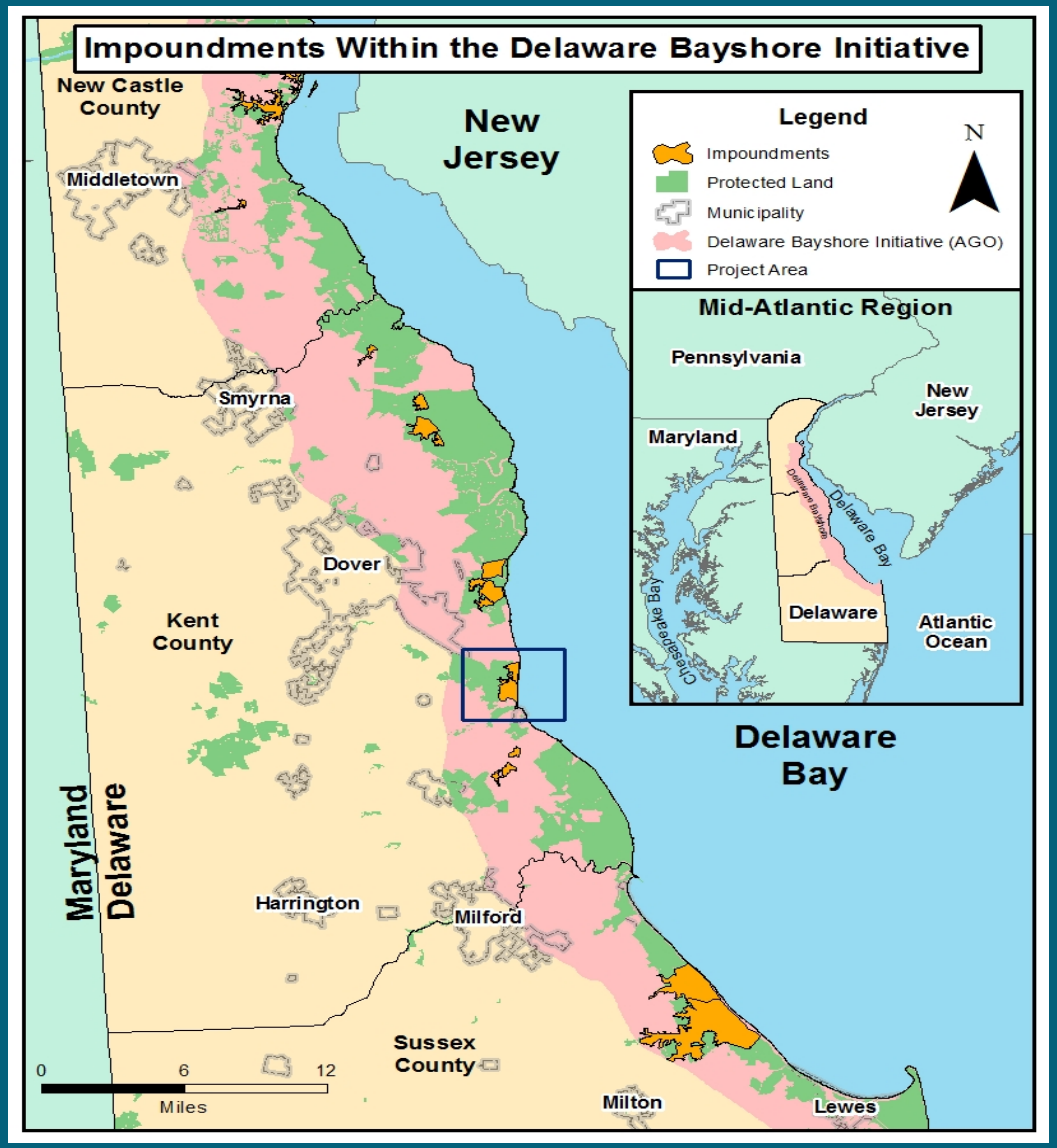
Today…Multiple Socioeconomic Functions:

- Waterfowl hunting
- Birding, wildlife viewing and photography
- Furbearer trapping
- Flood-hazard reduction
- Mosquito control

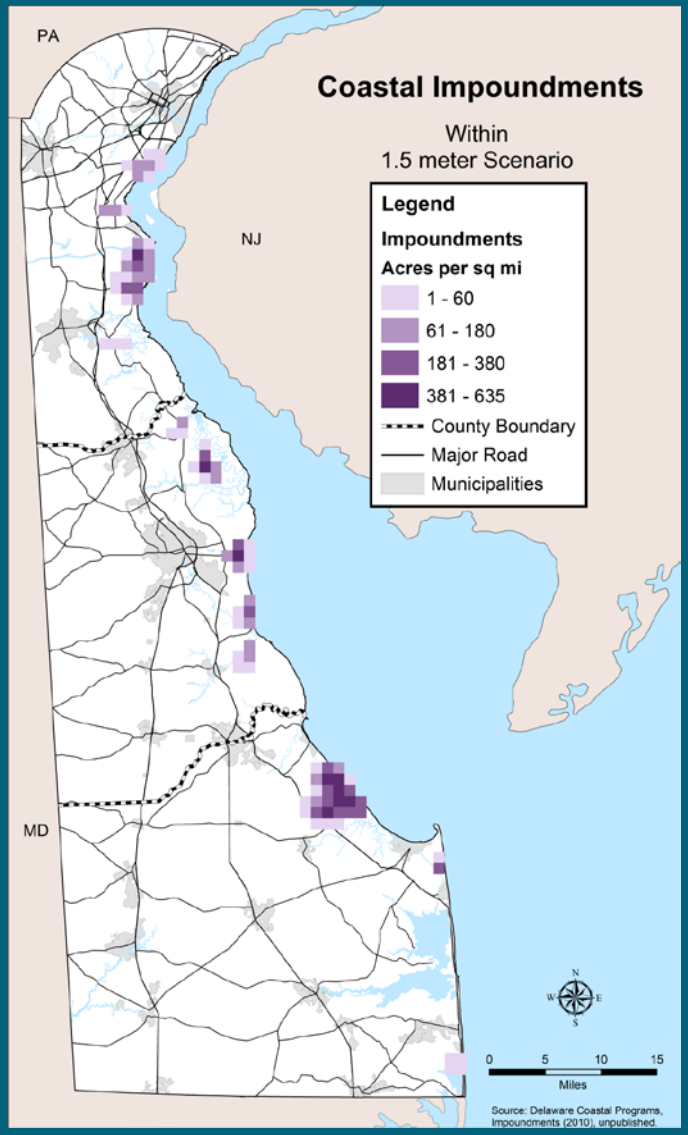
Delaware's Goal

- Maintain a coordinated system of coastal impoundments to meet wildlife, fish and human objectives and ***incorporate cost constraints and uncertainty associated with sea-level rise impacts into long-term management decisions.***

Impoundments within Delaware



Impoundments Threatened by Sea-Level Rise

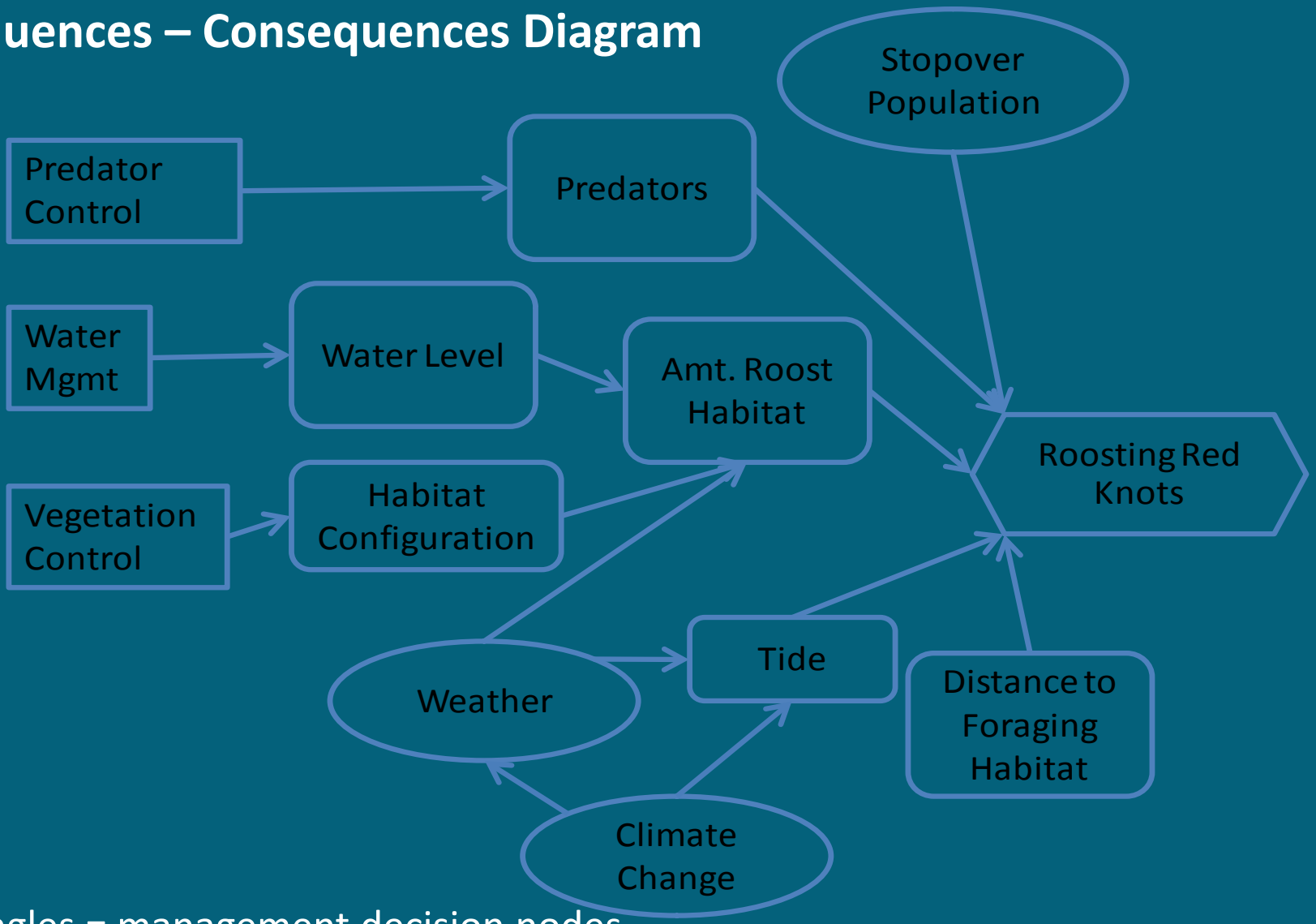


Approach: Structured Decision Making

- **SDM is an explicit, organized way to deal with multiple, competing objectives and uncertainty.**
- **Developed a prototype decision model for 4 impoundments looking 30 years out.**
- **Small team of experts identified key management objectives and predicted outcomes of different actions under different SLR scenarios.**

- **Flexible**
- **Transparent**
- **Adaptive**
- **Incorporates cost constraints**
- **Provides a suite of actions that maximizes benefit**

Influences – Consequences Diagram



Rectangles = management decision nodes
Ovals = stochastic process nodes
Rounded rectangles = intermediate calculations
Hexagons = outcomes (e.g., objectives).

How Do We Decide?

- Each action has an expected benefit.
- Benefit is determined by:
  - Species response
  - Uncertainty
  - Species weighting
- Each action has a cost.

Climate-Smart Options

Water Control Structure Options

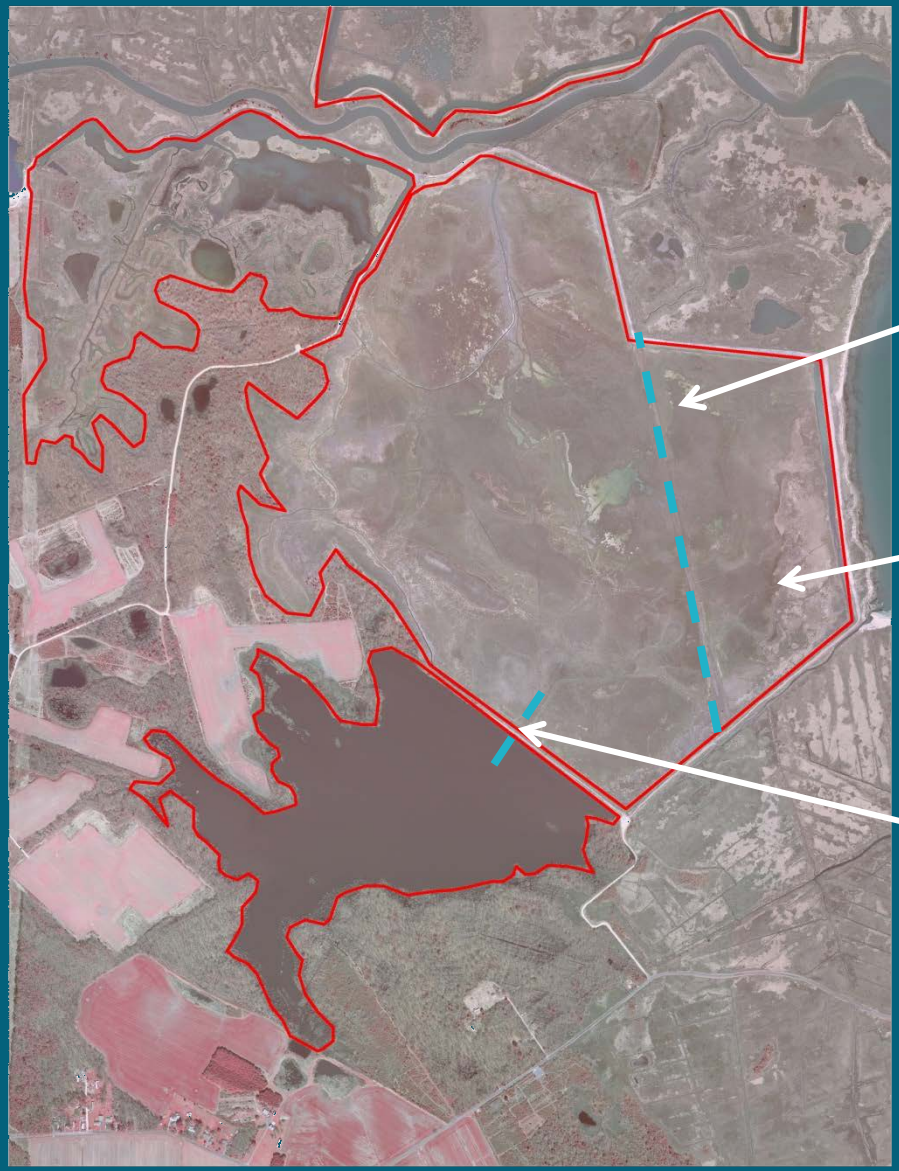
- Modify water control structures
- Add additional water control structures
- Dike alterations
- Stabilize dikes by restoring buffer areas

Climate-Smart Options

Additional Options

- Add more sediment to wetland
- Create an upland impoundment
- Create new brackish impoundment in place of current freshwater impoundment.
- Allow impoundment to convert to brackish/ salt water habitat.

Option: Protect Existing Impoundment

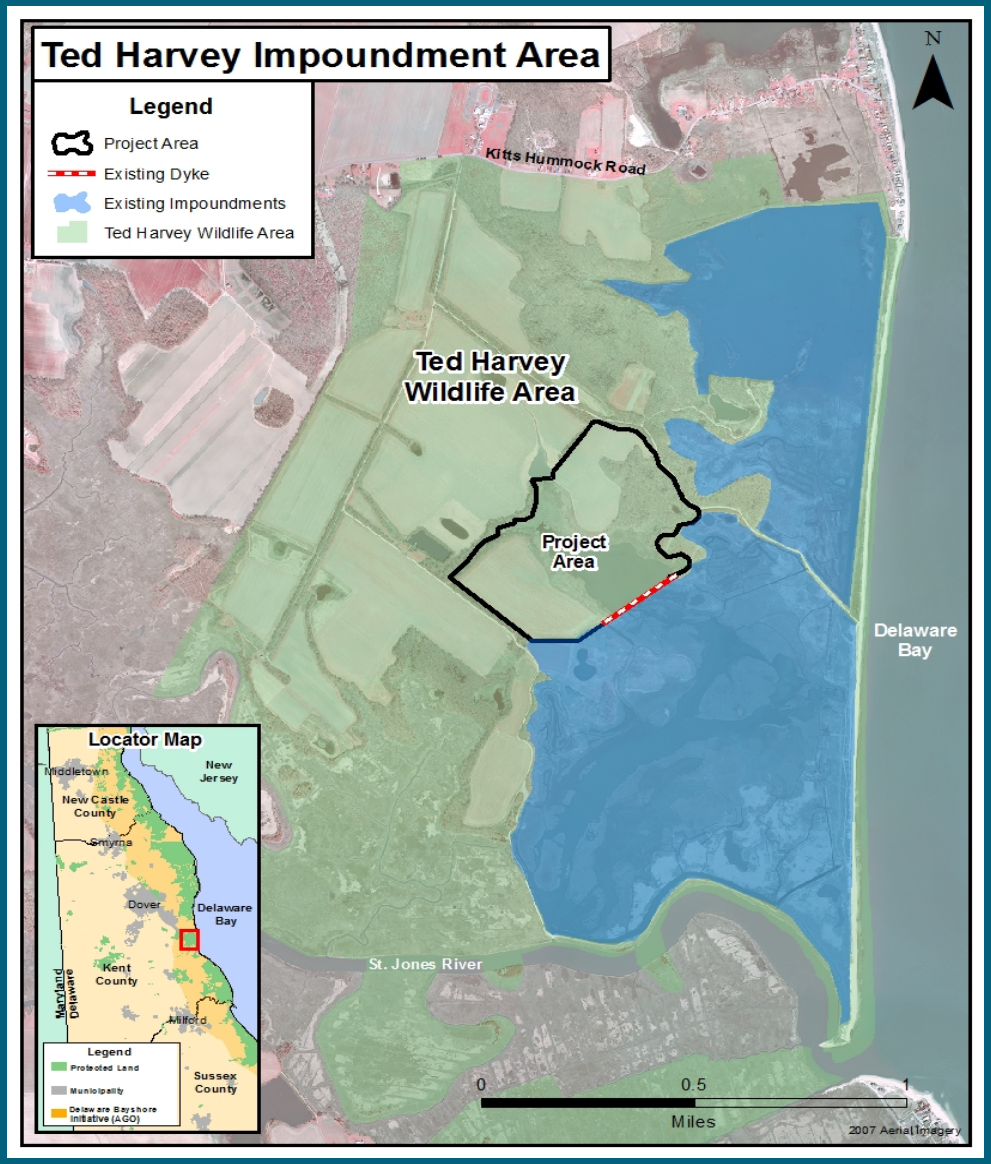


Repair old levee

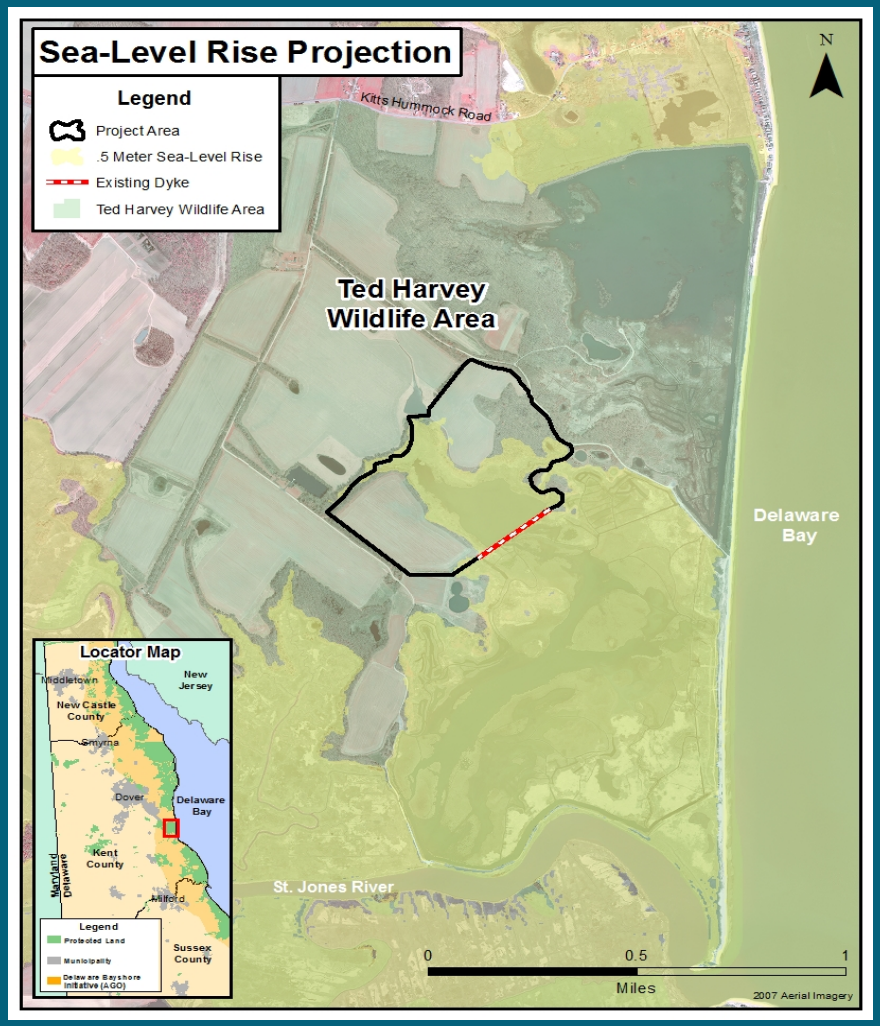
Restore tidal flow, add thin-layer dredge material?

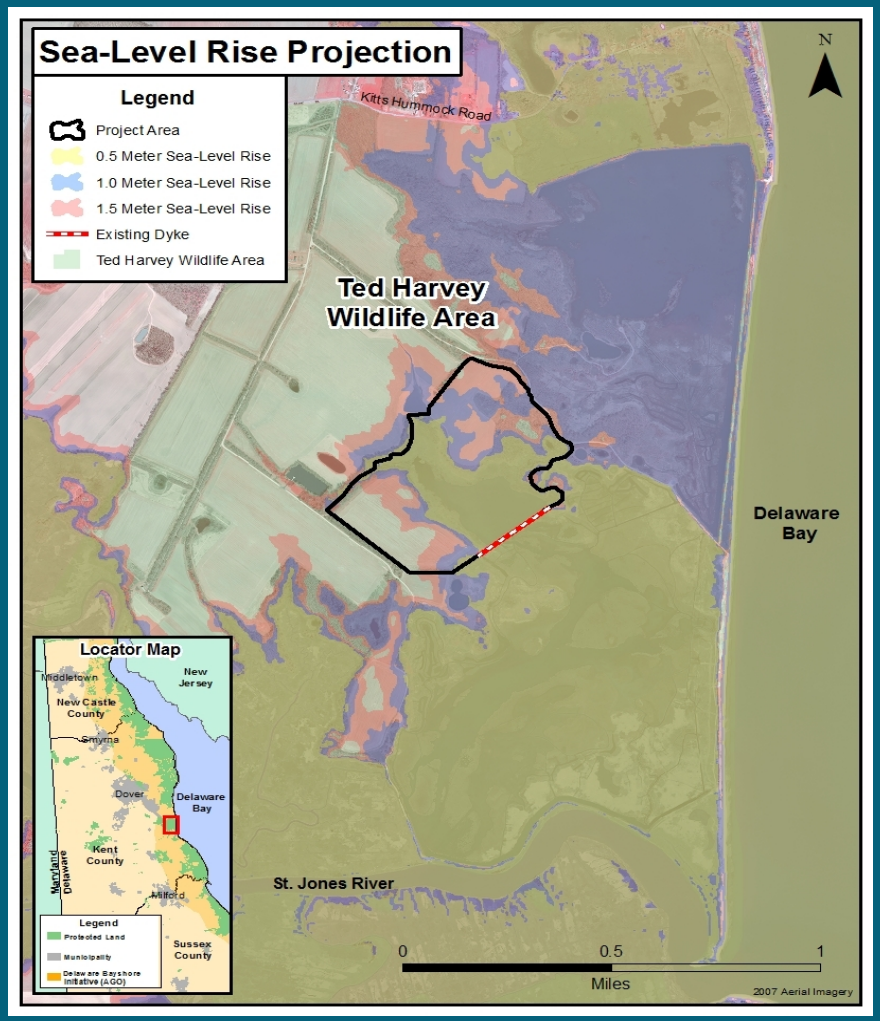
Repair water-control structure

Option: New Upland Impoundment



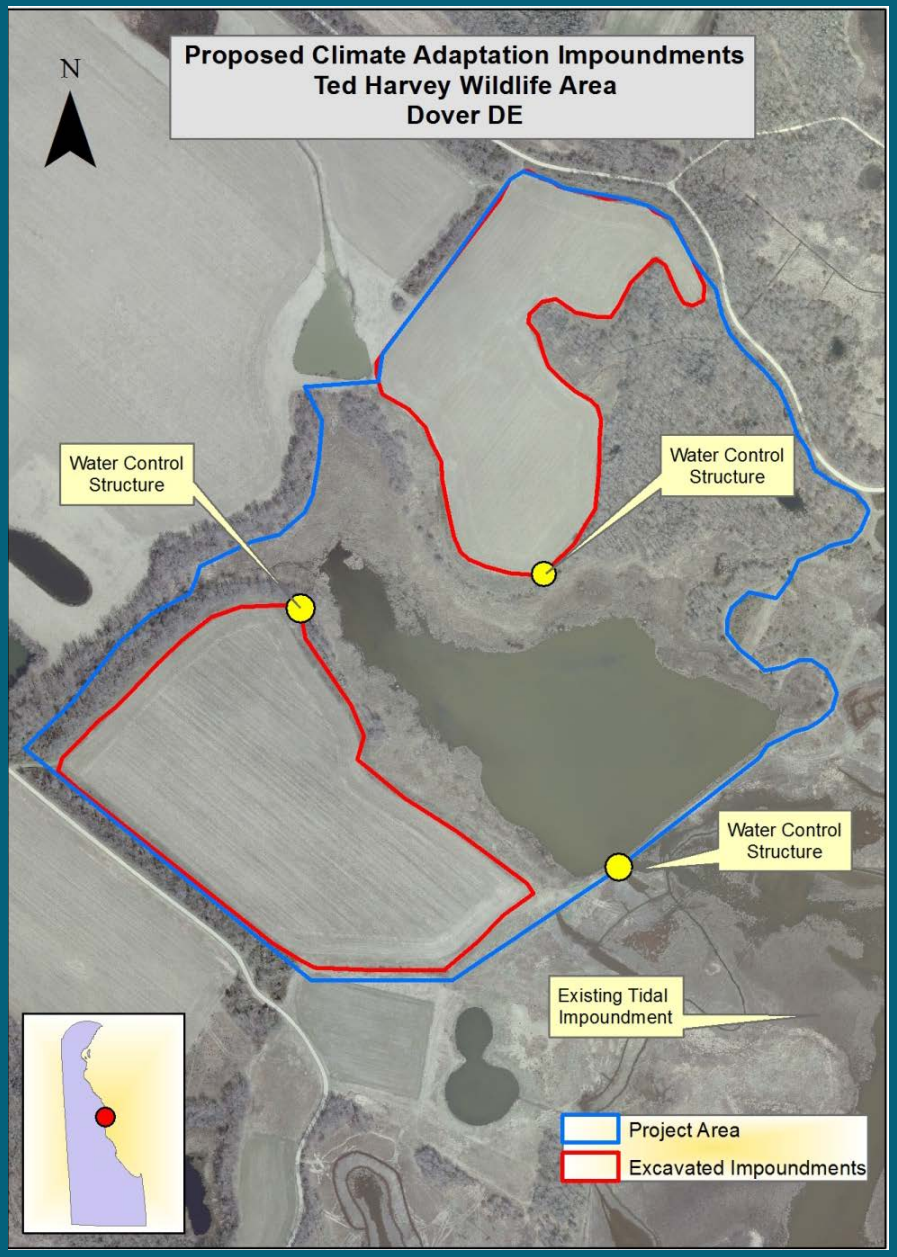
Option: New Upland Impoundment





Implementation: Upland Impoundment

- Two new impoundments (22 and 29 acres)
- Surveys and contracting
- Permitting
- Construction



Before and After

Initial Lessons

- Challenges
  - Permitting
  - Staffing
  - Contractors
  - Social dynamics
- Keys to Success
  - Buy-in at all levels
  - State funding
  - Flexibility (creativity)
  - Outside partners

Photo Credit: USFWS

Questions?

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http://www.nwf.org/What-We-Do/Energy-and-Climate/Climate-Smart-Conservation/Adaptation-Reports.aspx