



DELAWARE CENTER FOR THE
INLAND BAYS
Research. Educate. Restore.

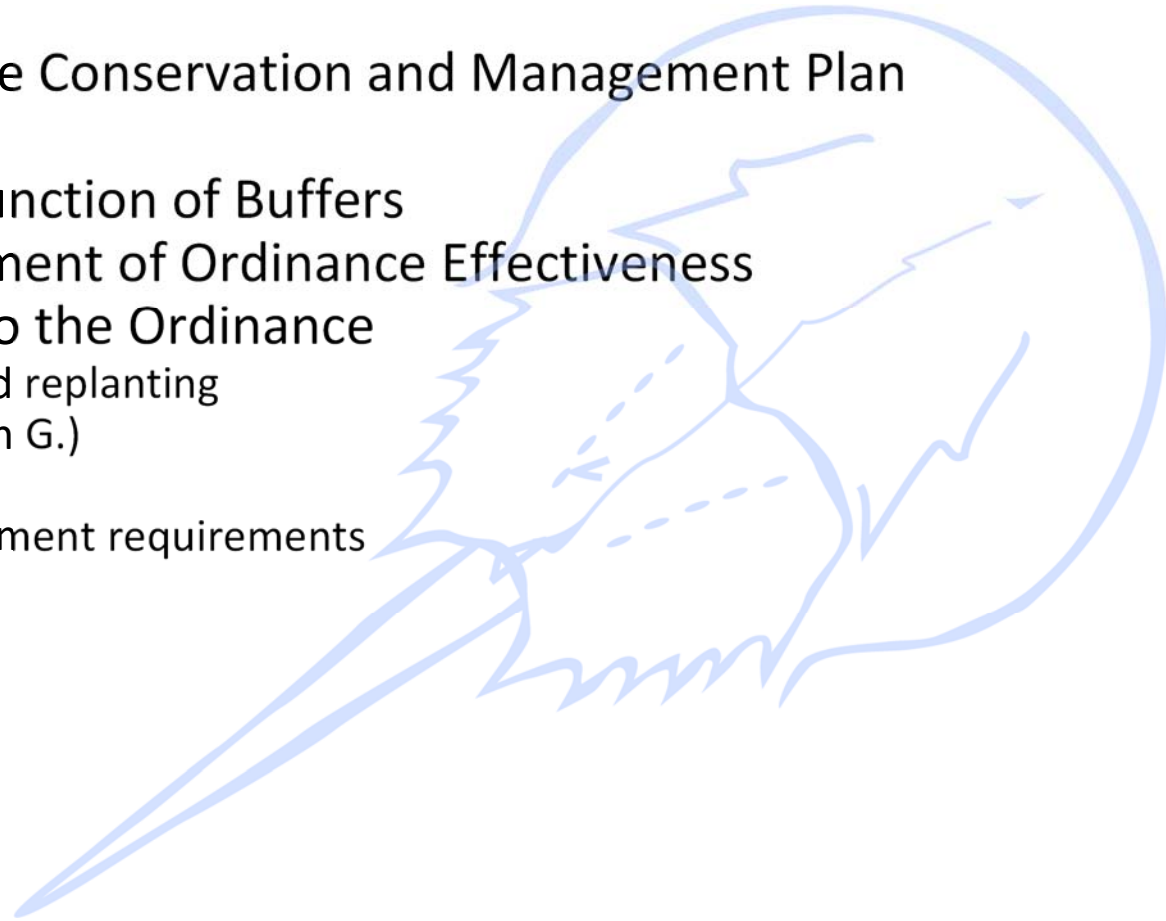
Hearing Testimony Presentation

SUSSEX COUNTY ORDINANCE REGARDING CERTAIN DRAINAGE FEATURES, WETLAND
AND WATER RESOURCES AND THE BUFFERS THERETO

Chris Bason, Executive Director, January 11, 2021

Contents

- Inland Bays Comprehensive Conservation and Management Plan
- Status of Resources
- Review of Purposes and Function of Buffers
- Achievements and Assessment of Ordinance Effectiveness
- Requested Amendments to the Ordinance
 - Requirement for forests and replanting
 - Removal of Options (Section G.)
 - Minor amendments
 - Addition of specific enforcement requirements



Buffers are an important action of the 2021 Inland Bays CCMP

- 67 actions focused on
 - reducing nutrient pollution to achieve water quality
 - protecting and restoring natural habitats
 - public education and engagement
 - mitigating & adapting to flooding and climate change
- County 1 of 7 Plan Signatories
- 60% of 500 public surveyed identified runoff from developments as the biggest threat.
- Increasing protection of buffers is in 1995 CCMP, 2012 Addendum, and 2021 Revision.
- CM 2-5: Revise the Sussex County Code related to buffers for improved water quality.



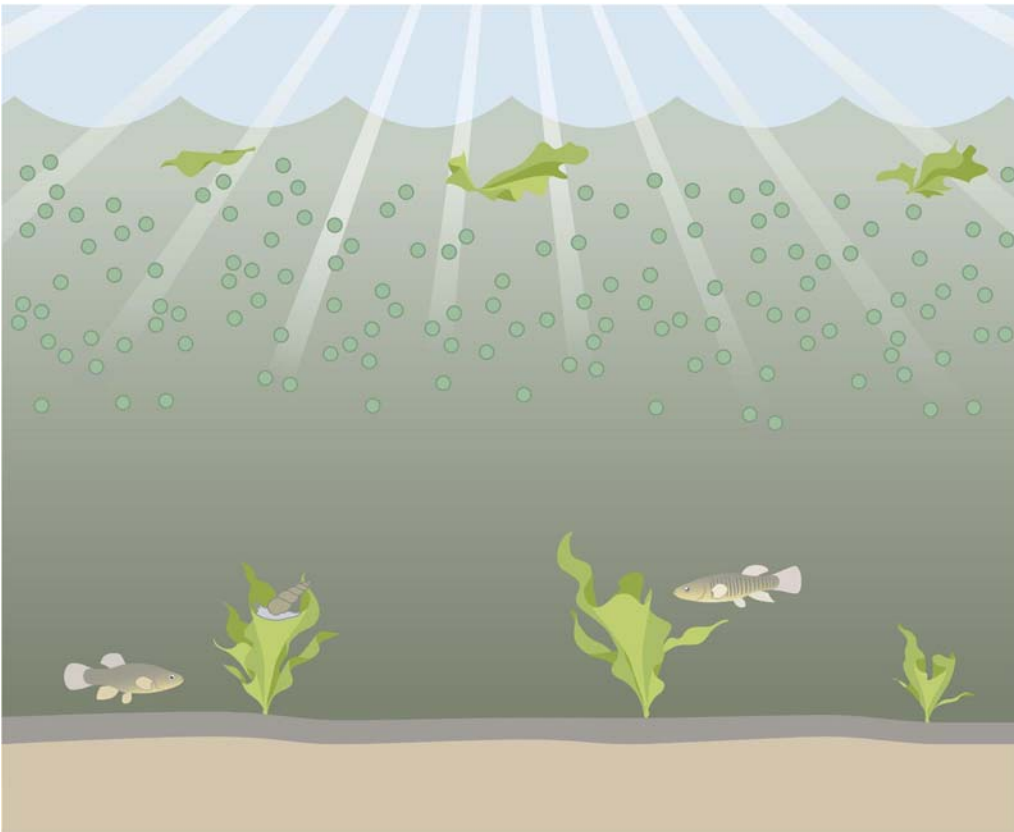


Bay Grasses

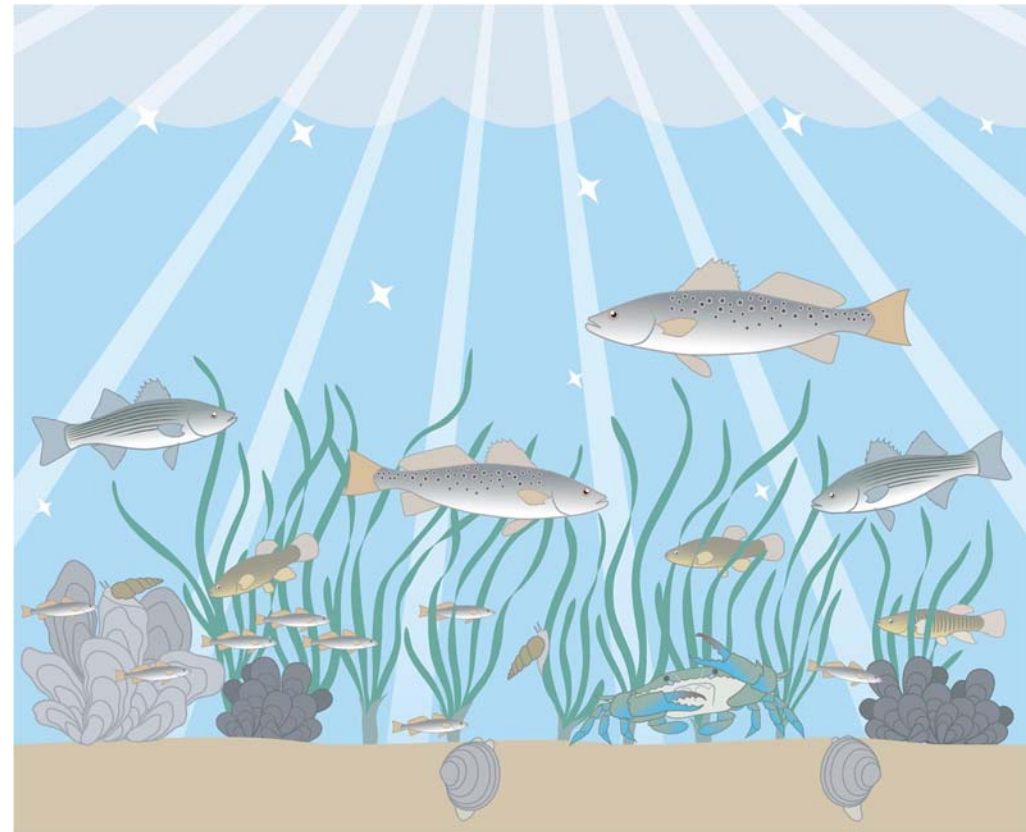
Love Creek

Restoring the Inland Bays = Pollution Prevention + Habitat Protection & Restoration

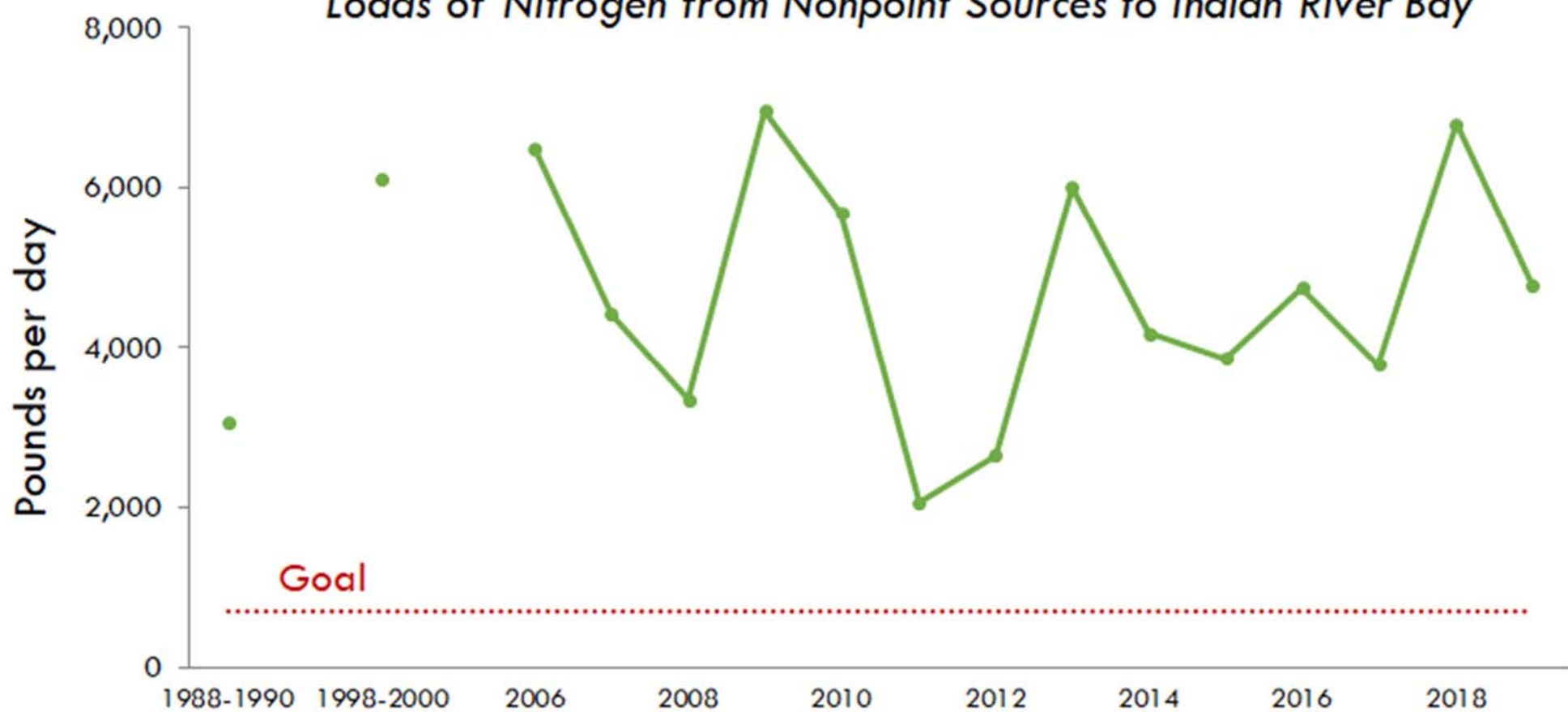
Excess Nutrients: Current Condition



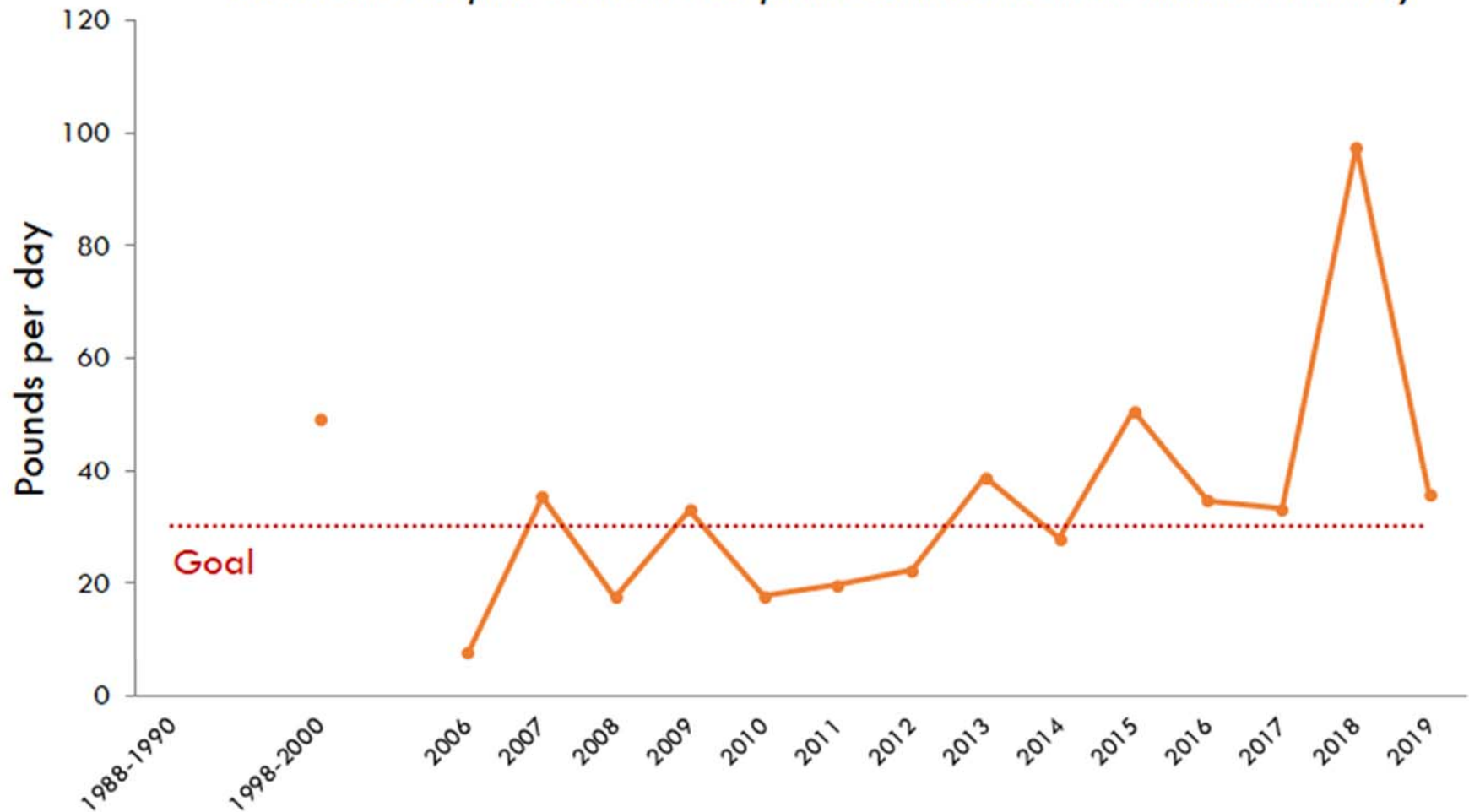
Healthy Bay: Restoration Target



Loads of Nitrogen from Nonpoint Sources to Indian River Bay



Loads of Phosphorus from Nonpoint Sources to Little Assawoman Bay



Watershed Trends Show Mixed Results That Differ for Nitrogen and Phosphorus

USGS updates trends in total nitrogen and phosphorus on the basis of data from the nontidal monitoring network. Trends (fig. 1) are normalized for watershed area and the magnitude of stream flow, to make it easier to compare sites and distinguish trends resulting from human actions.

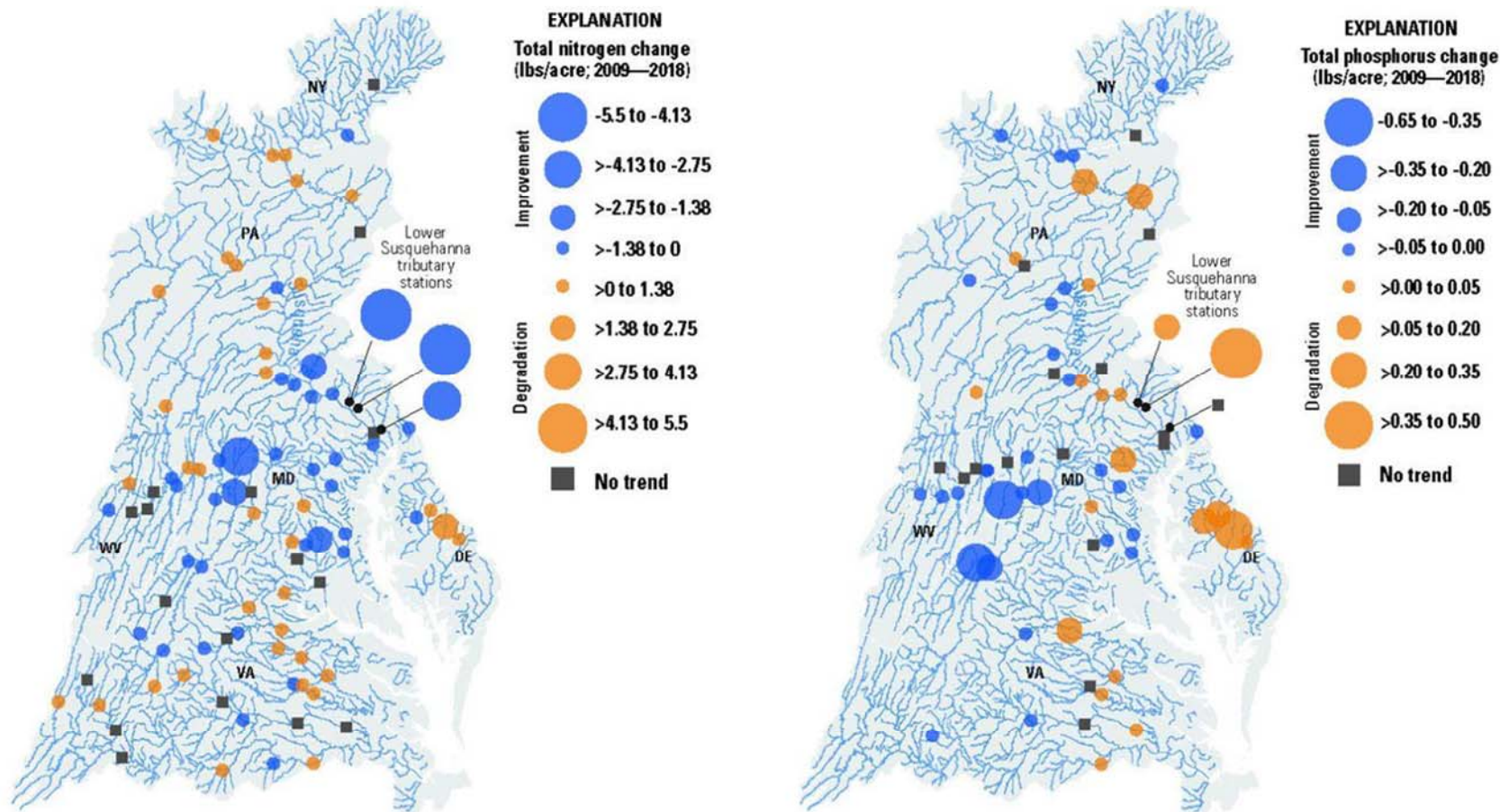
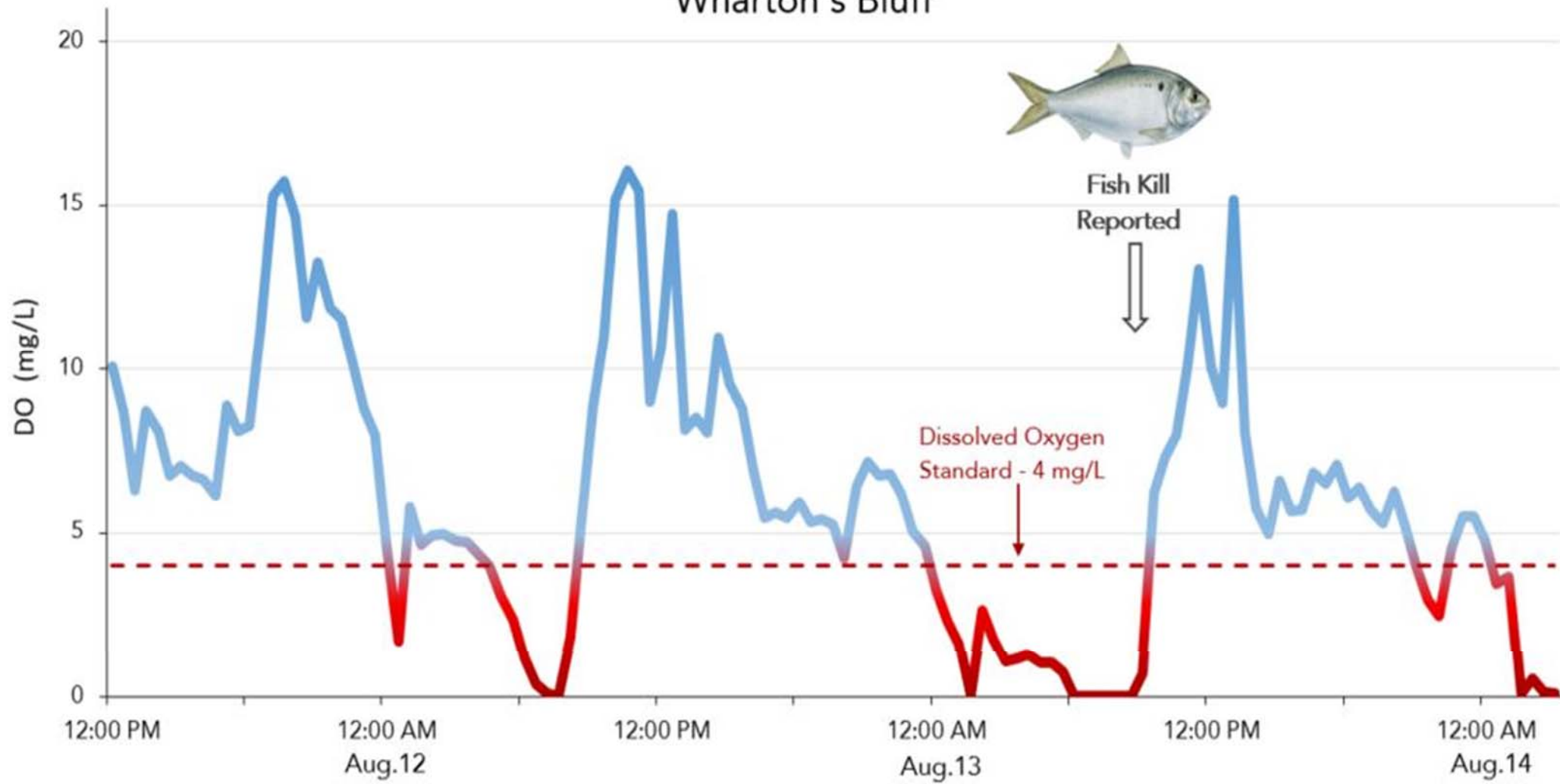


Figure 1. Total nitrogen and total phosphorus trends at nontidal monitoring stations in the Chesapeake Bay watershed. Data from Moyer and Langland (2020). (lbs, pounds; NY, New York; MD, Maryland; PA, Pennsylvania; VA, Virginia; WV, West Virginia; DE, Delaware)

CREDIT USGS



Dissolved Oxygen Concentration Wharton's Bluff

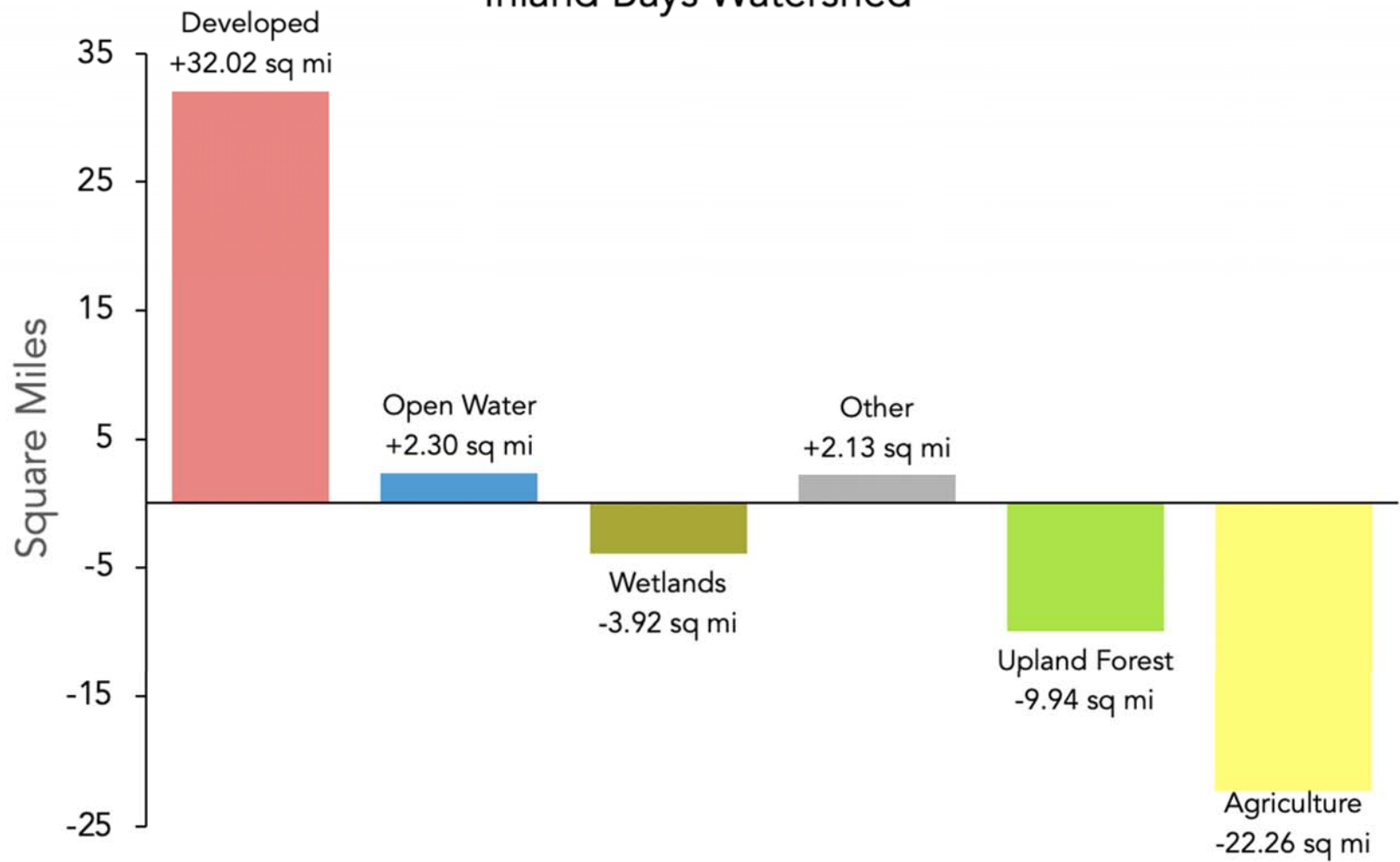


2021 set record for number of Inland Bays fish kills

- 15 recorded
- In canals creeks and open waters
- ~2 million fish mostly menhaden
- Low dissolved oxygen



Land Cover Changes 1992-2017 Inland Bays Watershed



Changes in Upland Forest Cover Over Time

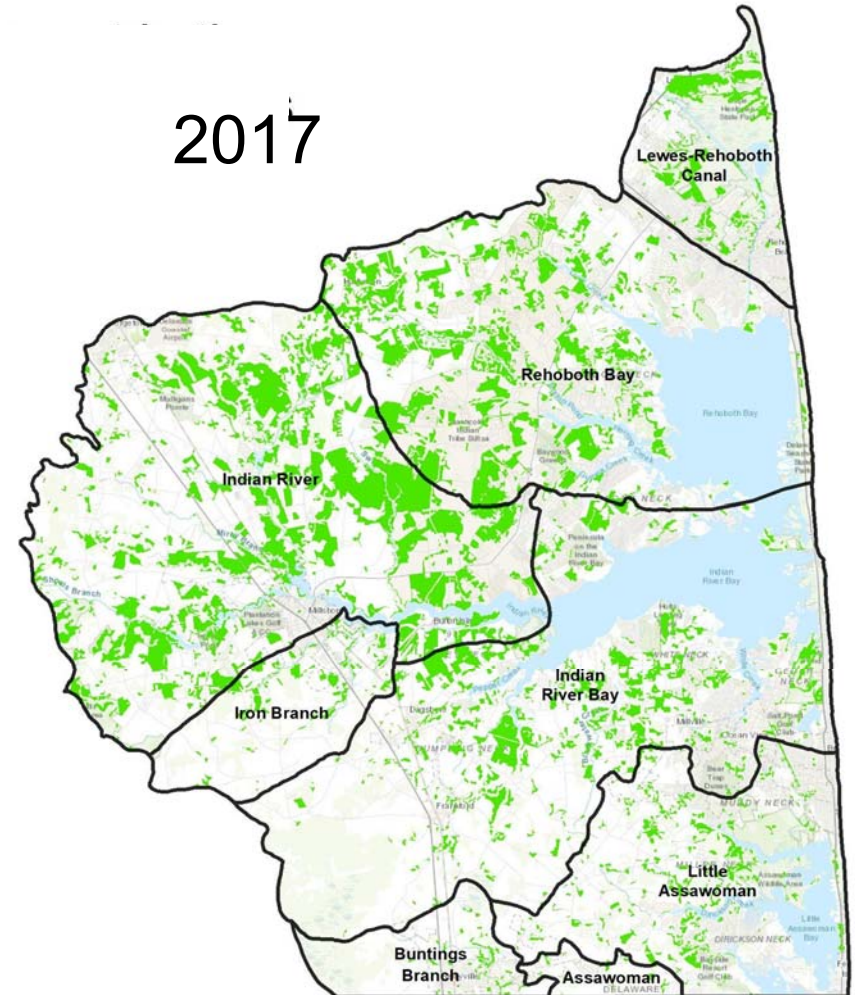
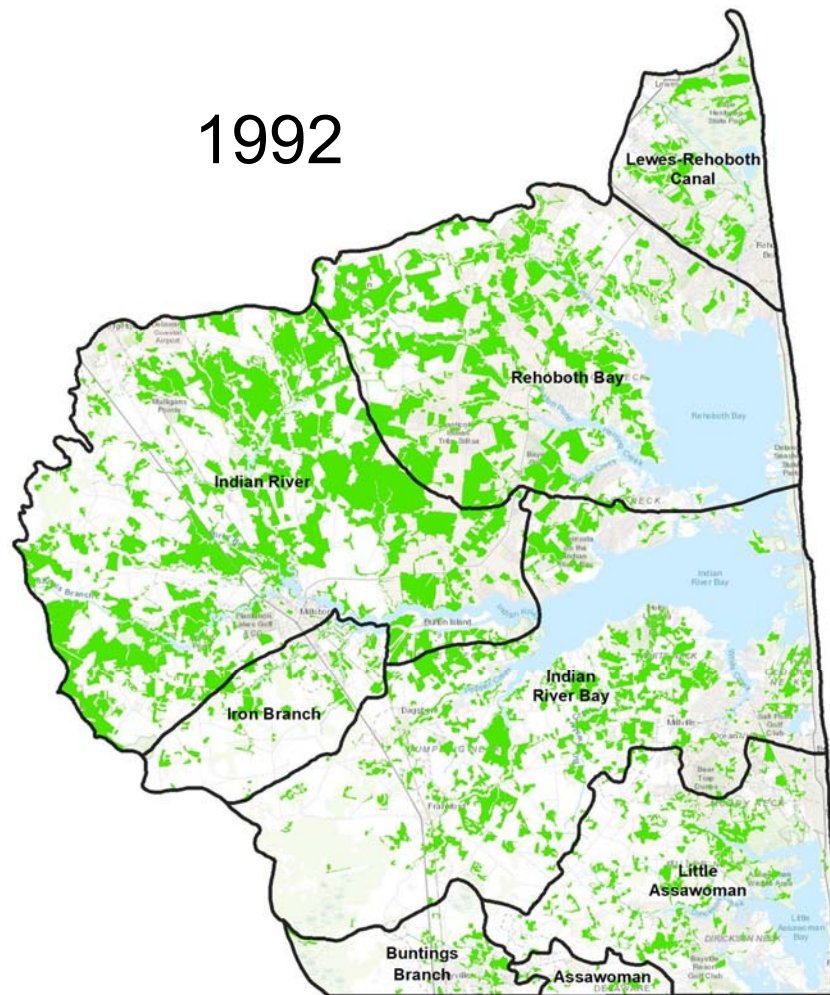




Photo: Driscoll Drones

A photograph of a riverbank. In the foreground, there is a body of water reflecting the sky. The middle ground shows a line of tall, slender pine trees. Behind the trees, a large area of land has been cleared, showing bare soil and some debris. A black plastic mulch barrier is visible in the cleared area. The sky is clear and blue.

On average, 51% of forest in a proposed Sussex
development is cleared.

*From 108 Preliminary Land Use Applications over 2017-2019, 2 square
miles of forest were intended for clearing.*

White Creek

Building happening in flood prone areas

From 2010 to 2017 Sussex Co. had 3rd-highest number of homes built in 10-year flood risk zone of any ocean coastal county in US.

Flood risk zone defined as area projected to be exposed to at least a 10-year flood threat in yr 2050 under sea level rise projections corresponding to moderate green house gas emission cuts.

From *Ocean at the Door: New Homes and the Rising Sea 2019 Edition*. Climate Central.



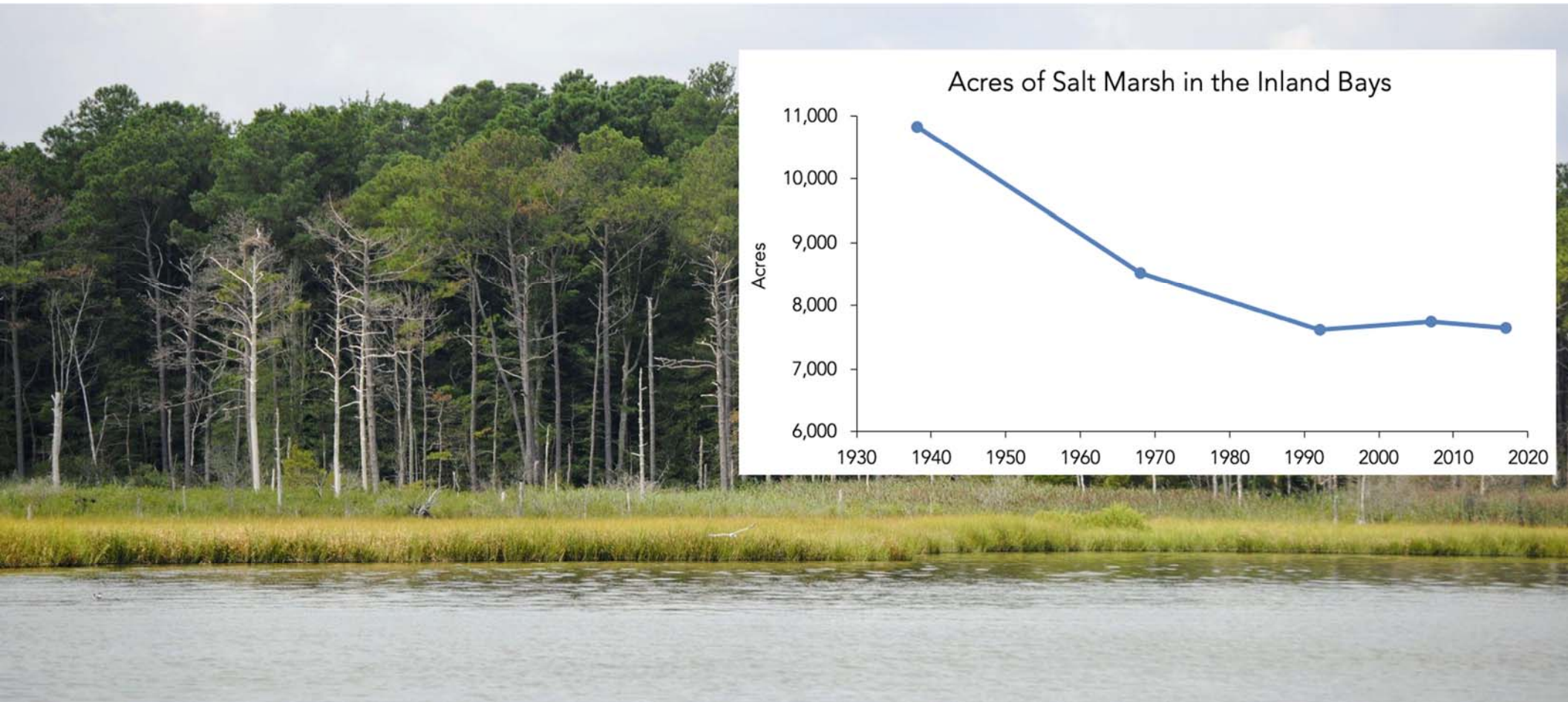


Long Neck 2019 - credit
Driscoll Drones

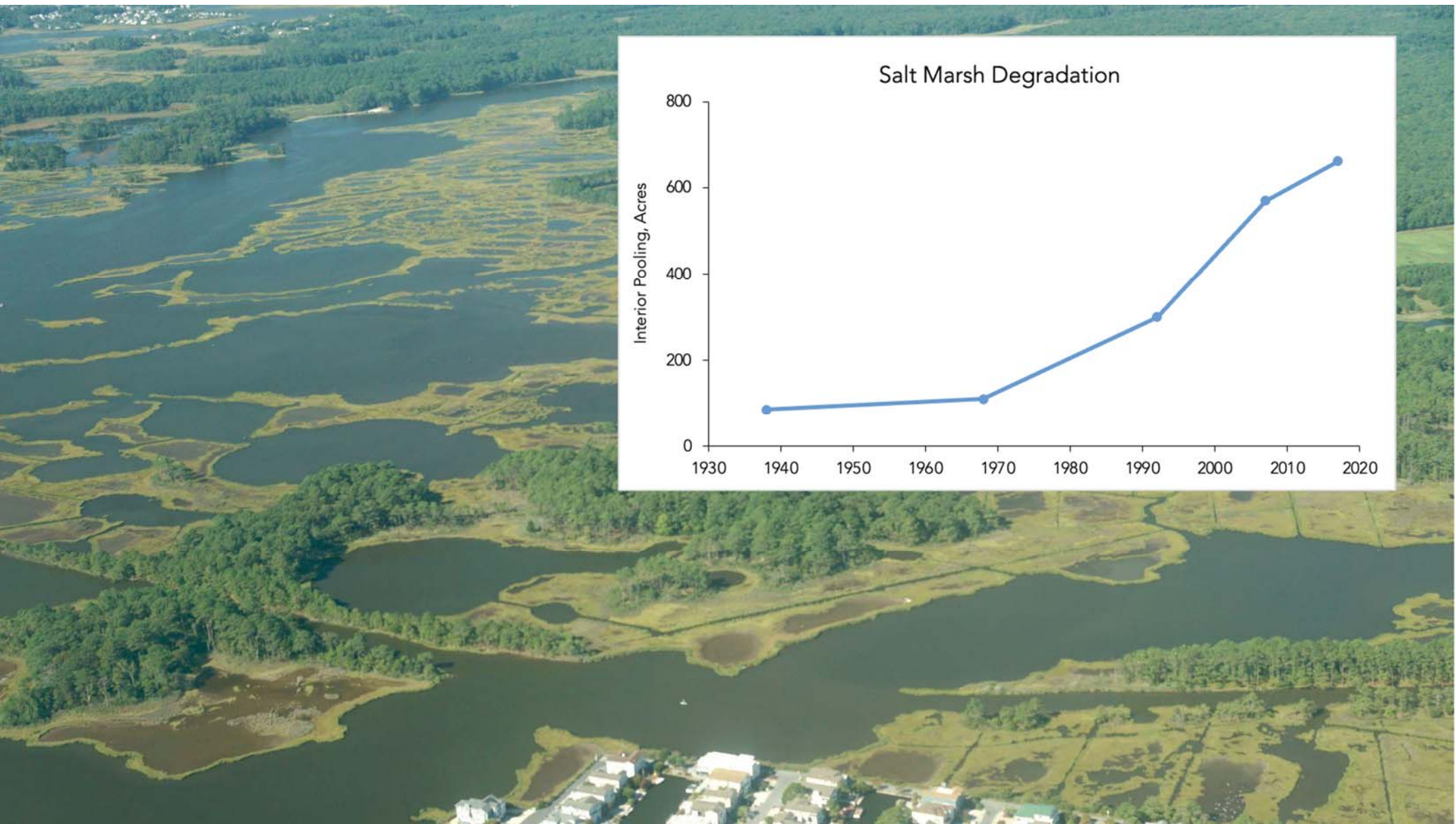
Values of Wetlands

- Sussex County has 47% of DE's wetlands.
- Protect drinking water, streams, and bays by filtering pollutants.
- Protect property by storing flood waters and buffering coastal storm surge.
 - East coast wetlands avoided \$625 million in direct flood damages during Hurricane Sandy (Narayan et al. 2017. Scientific Reports.)
- Provide biodiversity and hold high concentrations of rare species
 - 41% of wetland plant species in Delaware are rare.
- Delaware's wetlands estimated to provide \$1 billion to \$3 billion in annual economic value (Kauffman, G.J. 2018. *Socioeconomic Value of Delaware Wetlands*)

Salt Marsh Acreage and Condition Trends









Rates of tidal wetland migration

derived from metric mapping analysis 1926-1989

Slope of Adjacent Upland	Indian River Bay	Rehoboth Bay
Gradual (<0.08 rise/run)	5.25 ft/yr	6.07 ft/yr
Steep (>0.09 rise/run)	1.44 ft/yr	0.82 ft/yr

2008 Nor'easter: Indian River Bay



Achievements of Ordinance

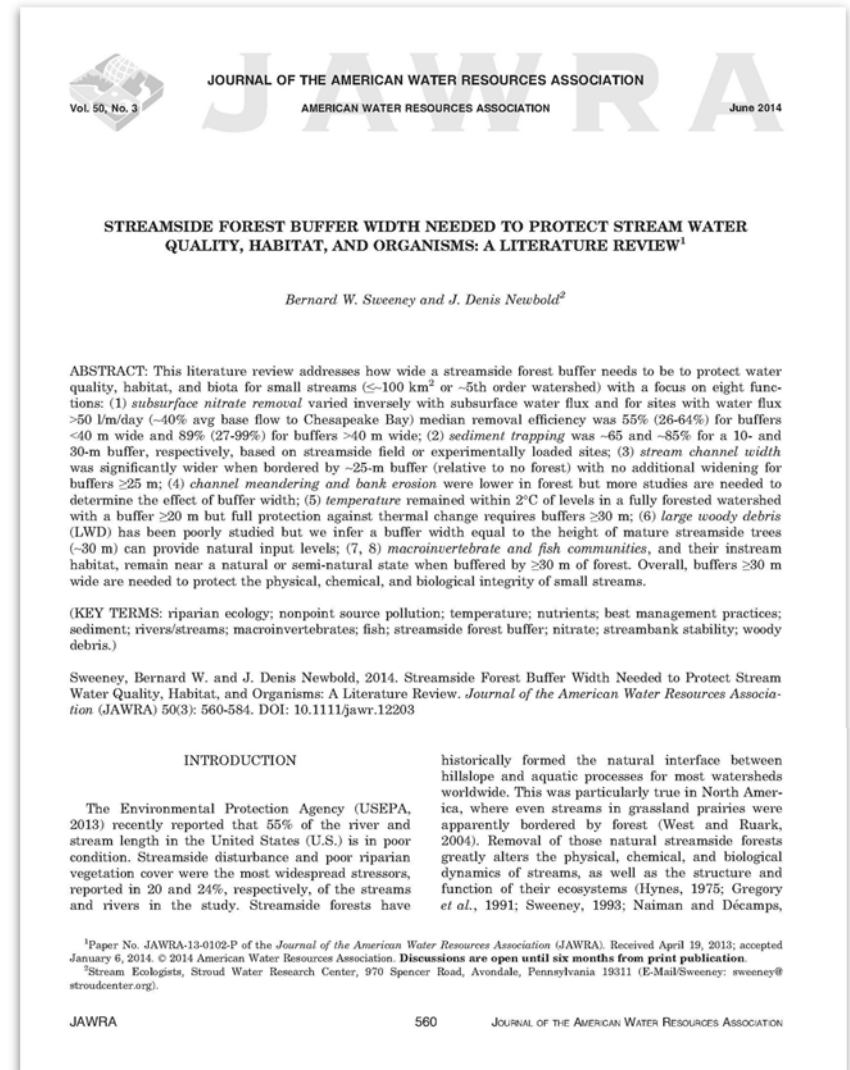
- Includes consensus points of buffer work group regarding features, widths, activities, and site design flexibility (buffer averaging only)
- Specifies purposes of buffer
- Requires Management Plan
- Excludes lot lines from the buffer
- Addresses invasive species
- Includes access to features through easement

Review of Ordinance Purposes

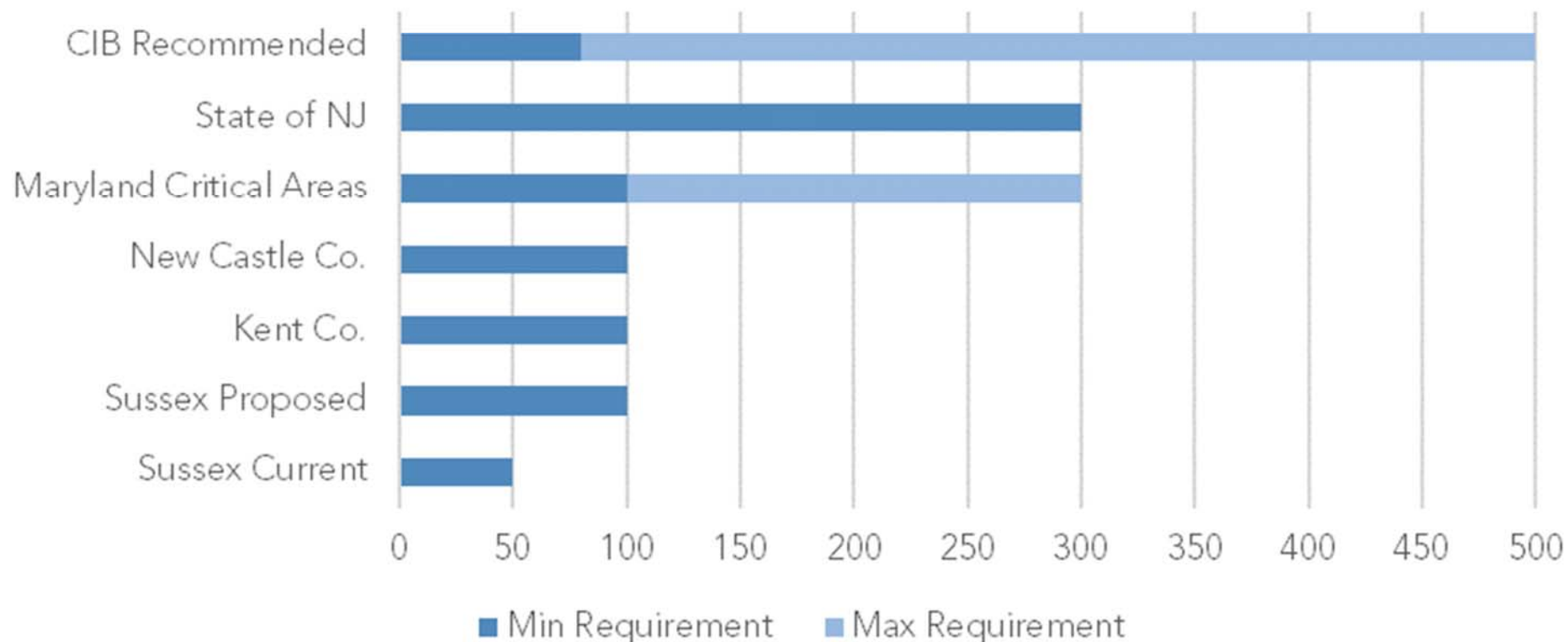
- Protect the Resources and their associated functions.
- Improve/protect water quality via sediment filtration, reduce impact of nutrient loading on Resources, moderate water temperature, and enhance infiltration and stabilization of channel banks.
- Provide wildlife habitat via nesting, breeding, and feeding opportunities; provide sanctuary/refuge during high water events; protect critical water's edge habitat; and protect rare, threatened, and endangered species associated with each Resource and its upland edge.
- Enhance and/or maintain the floodplain storage functionality via reduction of flood conveyance velocities as well as dissipation of stormwater discharge energy.

Buffer Widths

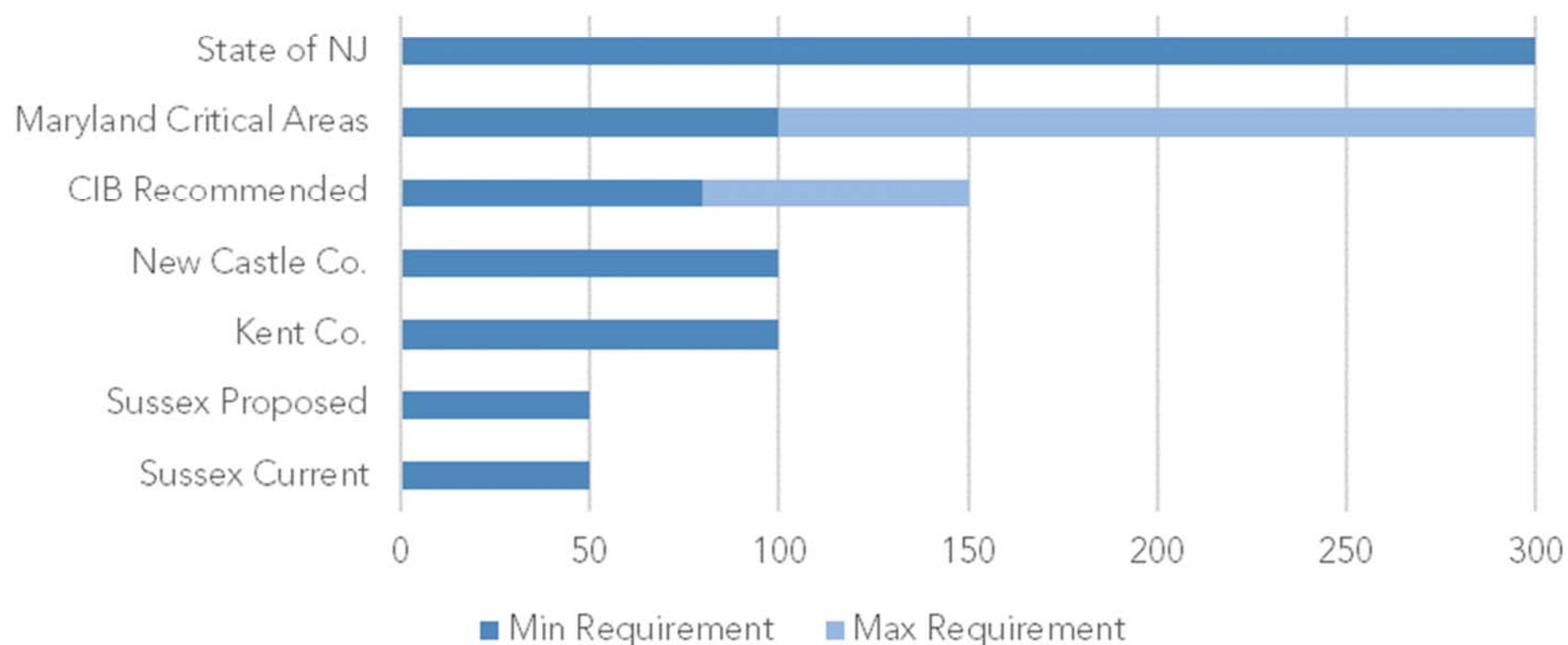
- The wider the buffer the more functional, to a point
- Minimum effective widths vary by buffer purpose and buffer type
- Very wide buffers needed for marsh migration and wildlife protection
- Narrow parts of the buffer can reduce effectiveness
- Streamside buffers often recommended at 100 feet minimum



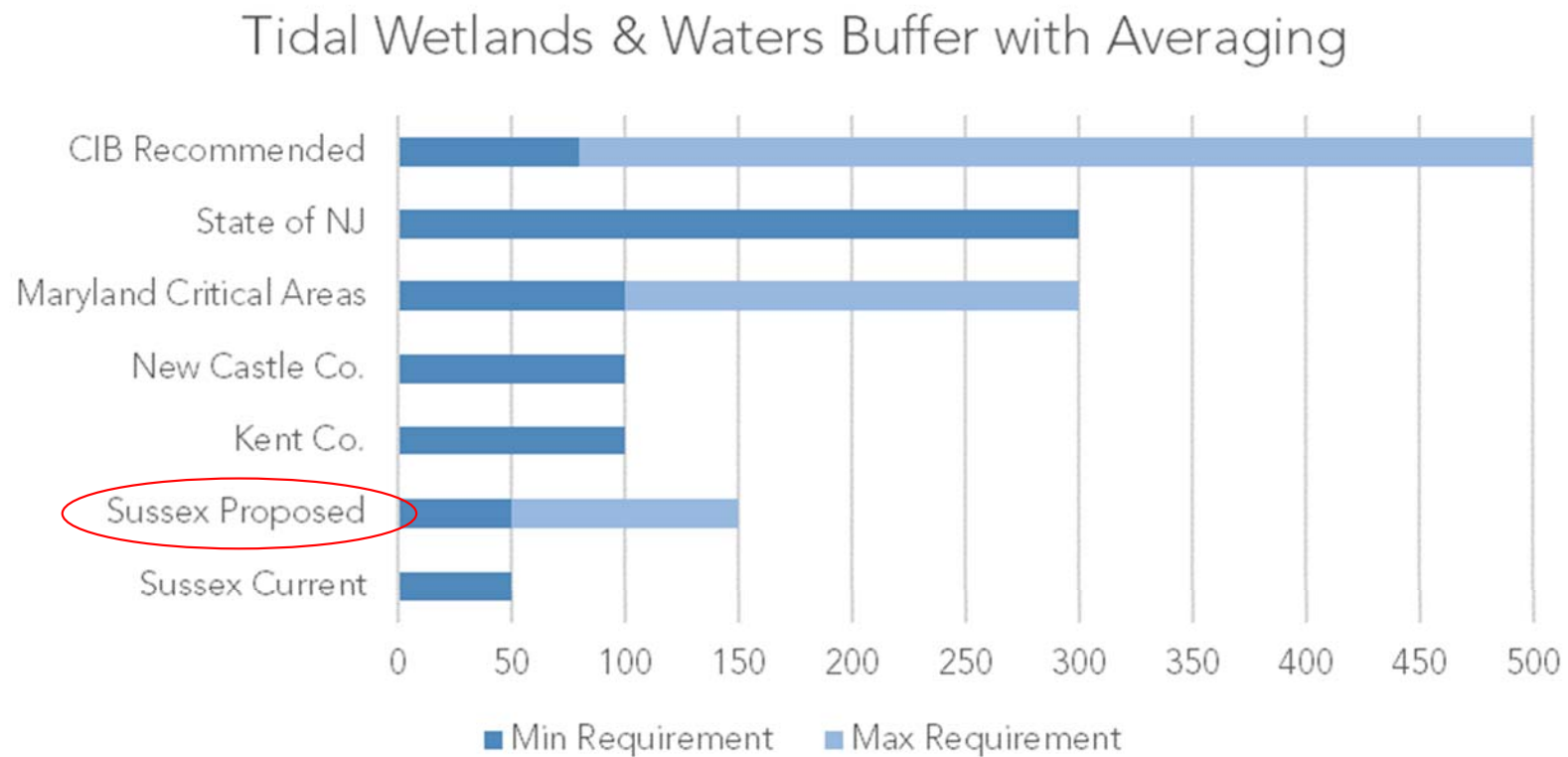
Tidal Wetlands & Waters Buffer Widths



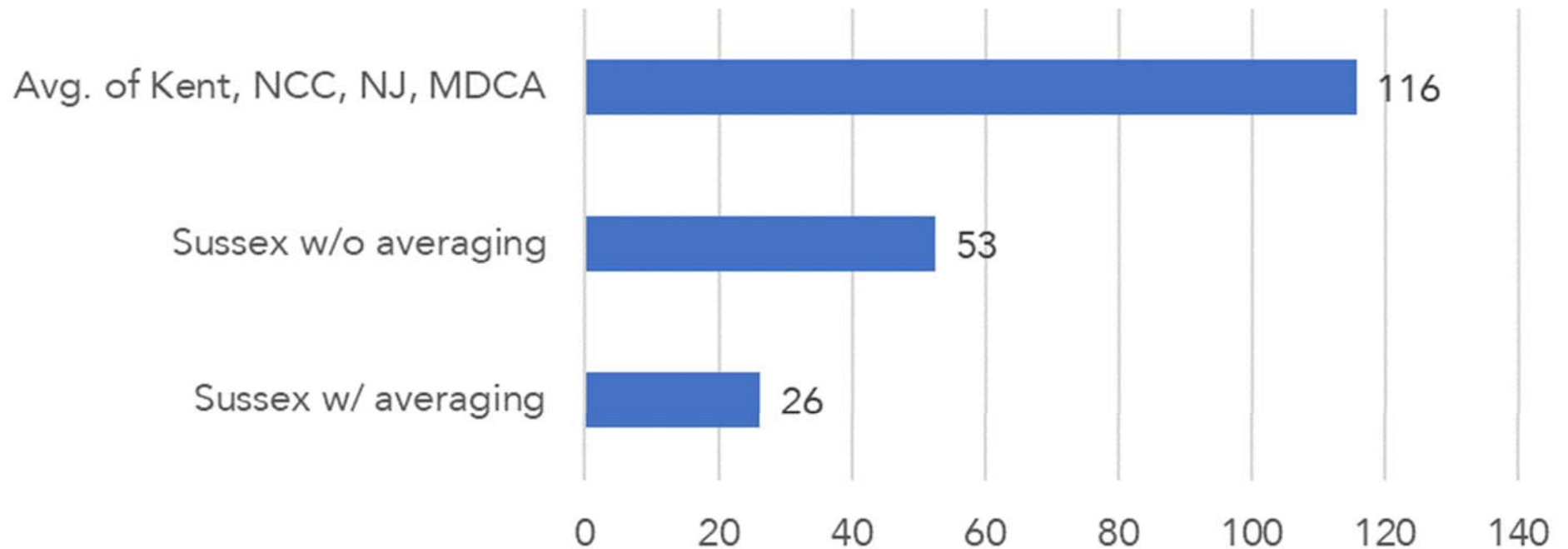
Perennial Stream Buffer Widths



Buffer Averaging Allowed for Design Flexibility



Average Minimum Buffer Widths Required by Jurisdiction Across Resource Types



*Sussex is as Proposed but does not include Options for Sussex Ordinance (Section G.)
NCC = New Castle County, DE; MDCA = Maryland Critical Areas*

Wetlands and Waterways Buffer Policy Comparison

Character- istic	Sussex Co. Crnt.	Sussex Co. Prpsd.	CIB Reco- mends	Kent Co.	New Castle Co.	State of NJ	State of MD Critical Areas.
Veg. Type	Natural	Forest or meadow** **	Natural/ Forest	Natural/ Forest	Natural/ Forest	Existing Veg. or Natural/ Forest	Natural/ Forest
Protects Existing Forest	Yes, but not enfrcd.	No	Yes	Yes	Yes	Yes	Yes
Reveg. with Trees	Yes, not enfrcd.	No	Yes	Yes	Yes	Yes	Yes

Requested Amendments to the Proposed Ordinance

- Requirement for protecting and restoring forest in Resource Buffer Standards (Section D. begins at line 701.)
- Removal of Resource Buffer Options (Section G. begins at line 781)
- Clarify Maintenance of Drainage Conveyance
- Specify enforcement and penalties

Buffers should be forested

'Forests are the most beneficial land use for protecting water quality, due to their ability to capture, filter, and retain water, as well as air pollution from the air. Forests are also essential to the provision of clean drinking water to over 10 million residents of the watershed and provide valuable ecological services and economic benefits including carbon sequestration, flood control, wildlife habitat, and forest products'.

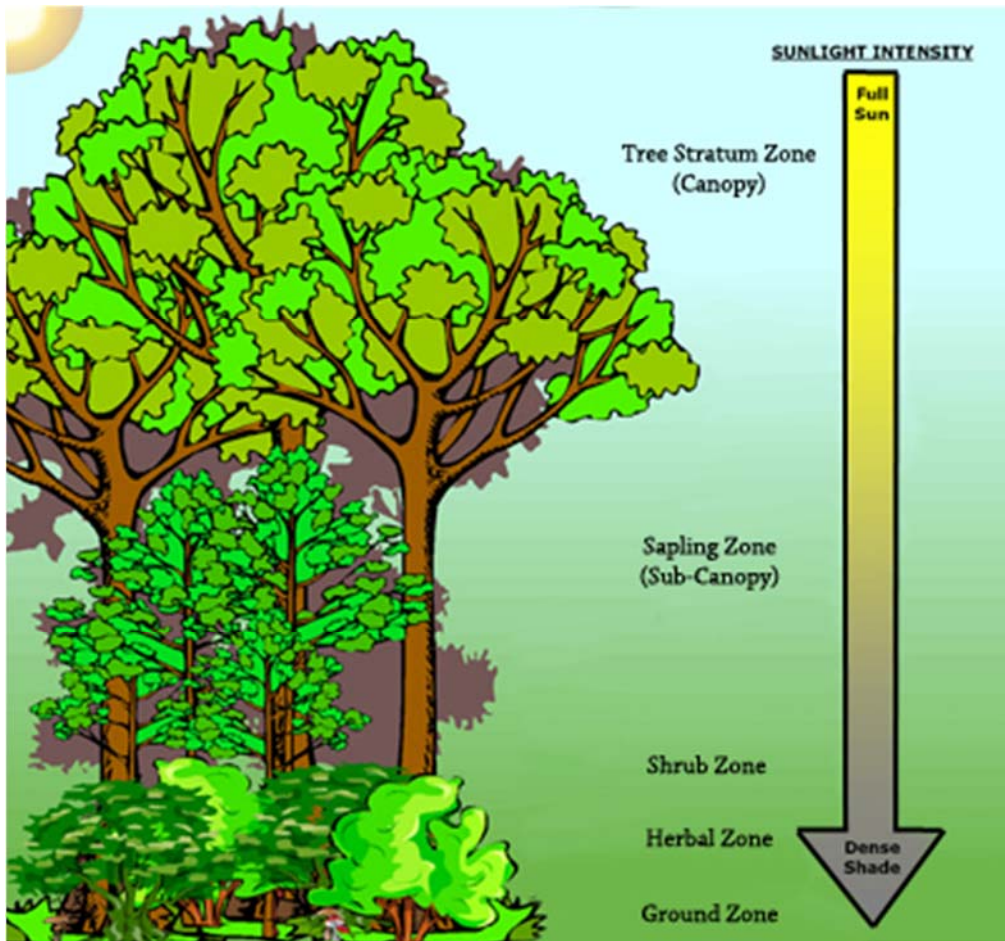
-- Chesapeake Bay Executive Council, 2006



Forests provide better water quality protection

- Forested buffers remove 36% more nitrogen on average than grassed buffers (*Mayer et al. 2007 Journal of Environmental Quality*)
- Forested buffers take up 11 – 37 lbs of nitrogen and 2 – 5 lbs of phosphorus per acre per year into wood
- Soil organic matter is over twice as high in forested buffers
- Forested buffers improve instream processing of nutrients
- Forested buffers support wildlife habitat and don't contribute pollution

FOREST STRUCTURE



Native forests are essential for habitat and flood control

- The amount of forest in an estuary's watershed, particularly near the water, has significant positive influence on the health of the estuary's baygrasses, crabs, and marsh birds (*Li et al. 2007. Estuaries and Coasts. 30, 840-854; and references therein*)
- Each layer provides habitat niches for wildlife and physical buffering



Protection and Restoration of Forest

- Eliminate non-forest buffer standard and require forest in all buffer areas except where otherwise permitted by activities list.
- Buffers without forest at time of application must submit native species planting plan and invasive species control plan to restore native forest to defined standard and time period
 - similar in approach to forested and/or landscape buffer strip code
 - Include forest maintenance requirement in management plan
 - diversity of Delaware natives trees and shrubs required
 - planting and survival standards by stock size
 - Natural revegetation allowed within 25 feet of mature native forest

Resource Buffer Options Description

- Retaining forest in a buffer allows reduction of buffer width by half.
- Retaining forest in a buffer allows reduction of development perimeter buffer.
- Retaining forest connected to but not within buffer allows reduction in buffer width by half.
- Retaining forest connected to but not within buffer allows reduction of development perimeter buffer.
- Preserving wider wetland buffers allows reduction in development perimeter buffers.

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Tidal Water

50' Tidal Water Forested Buffer
(req'd under previous code)

100' Tidal Water Forested Buffer

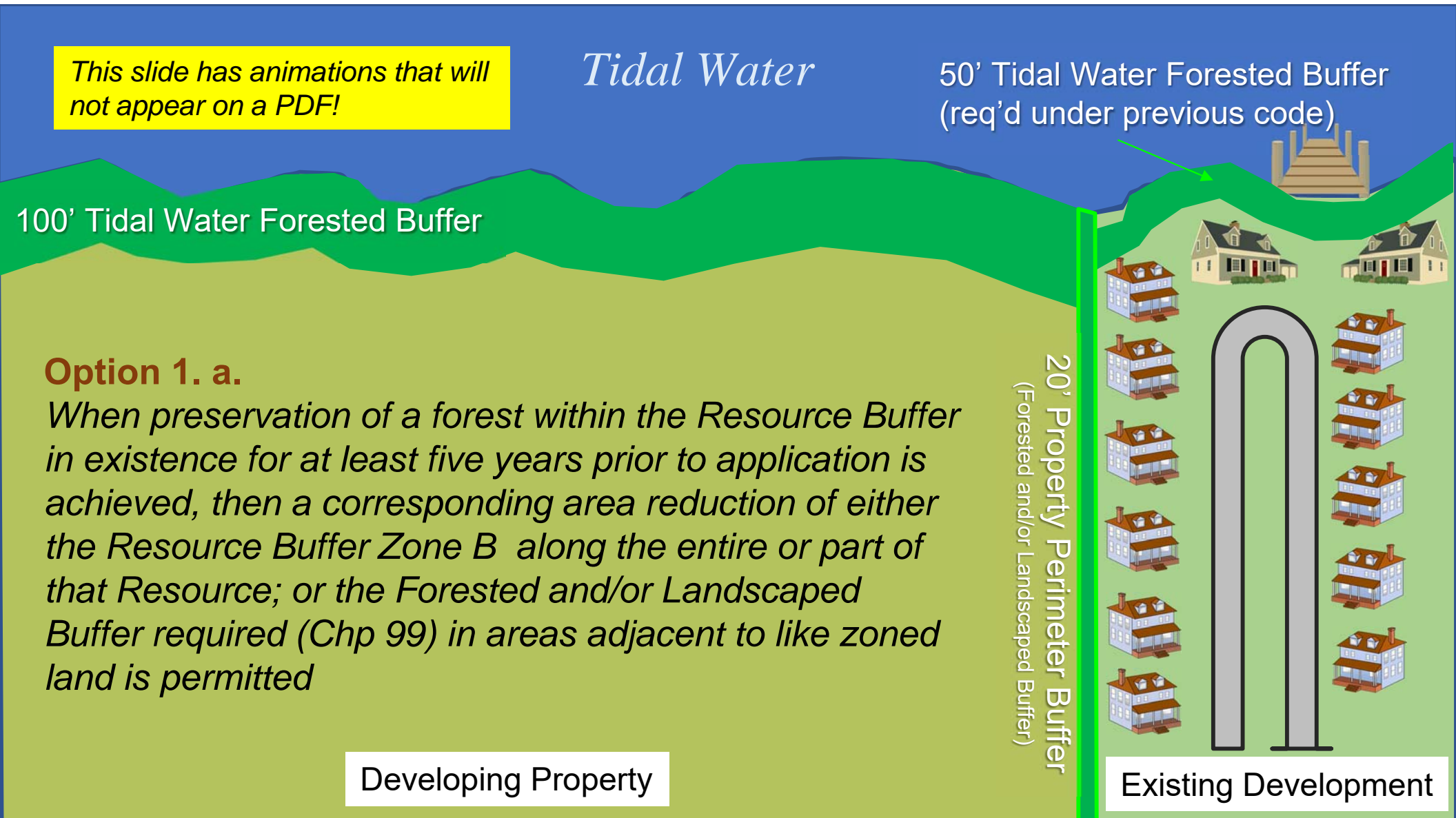
Option 1. a.

When preservation of a forest within the Resource Buffer in existence for at least five years prior to application is achieved, then a corresponding area reduction of either the Resource Buffer Zone B along the entire or part of that Resource; or the Forested and/or Landscaped Buffer required (Chp 99) in areas adjacent to like zoned land is permitted

Developing Property

20' Property Perimeter Buffer
(Forested and/or Landscaped Buffer)

Existing Development



This slide has animations that will not appear on a PDF!

Tidal Water

50' Tidal Water Forested Buffer
(req'd under previous code)

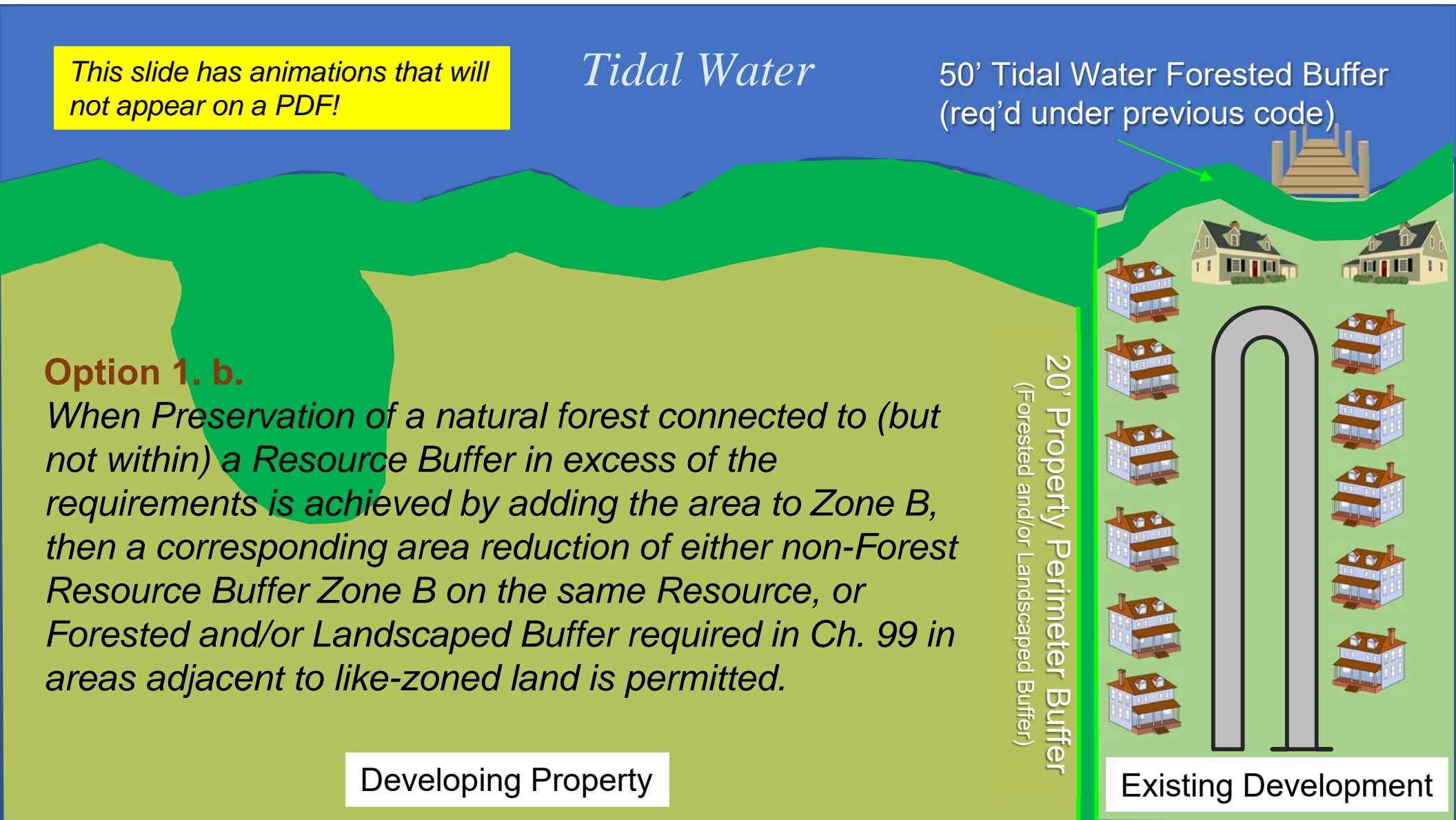
Option 1. b.

When Preservation of a natural forest connected to (but not within) a Resource Buffer in excess of the requirements is achieved by adding the area to Zone B, then a corresponding area reduction of either non-Forest Resource Buffer Zone B on the same Resource, or Forested and/or Landscaped Buffer required in Ch. 99 in areas adjacent to like-zoned land is permitted.

Developing Property

20' Property Perimeter Buffer
(Forested and/or Landscaped Buffer)

Existing Development



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Tidal Water

50' Tidal Water Forested Buffer
(req'd under previous code)

100' Tidal Water Forested Buffer

20' Additional Forested or non-forested buffer

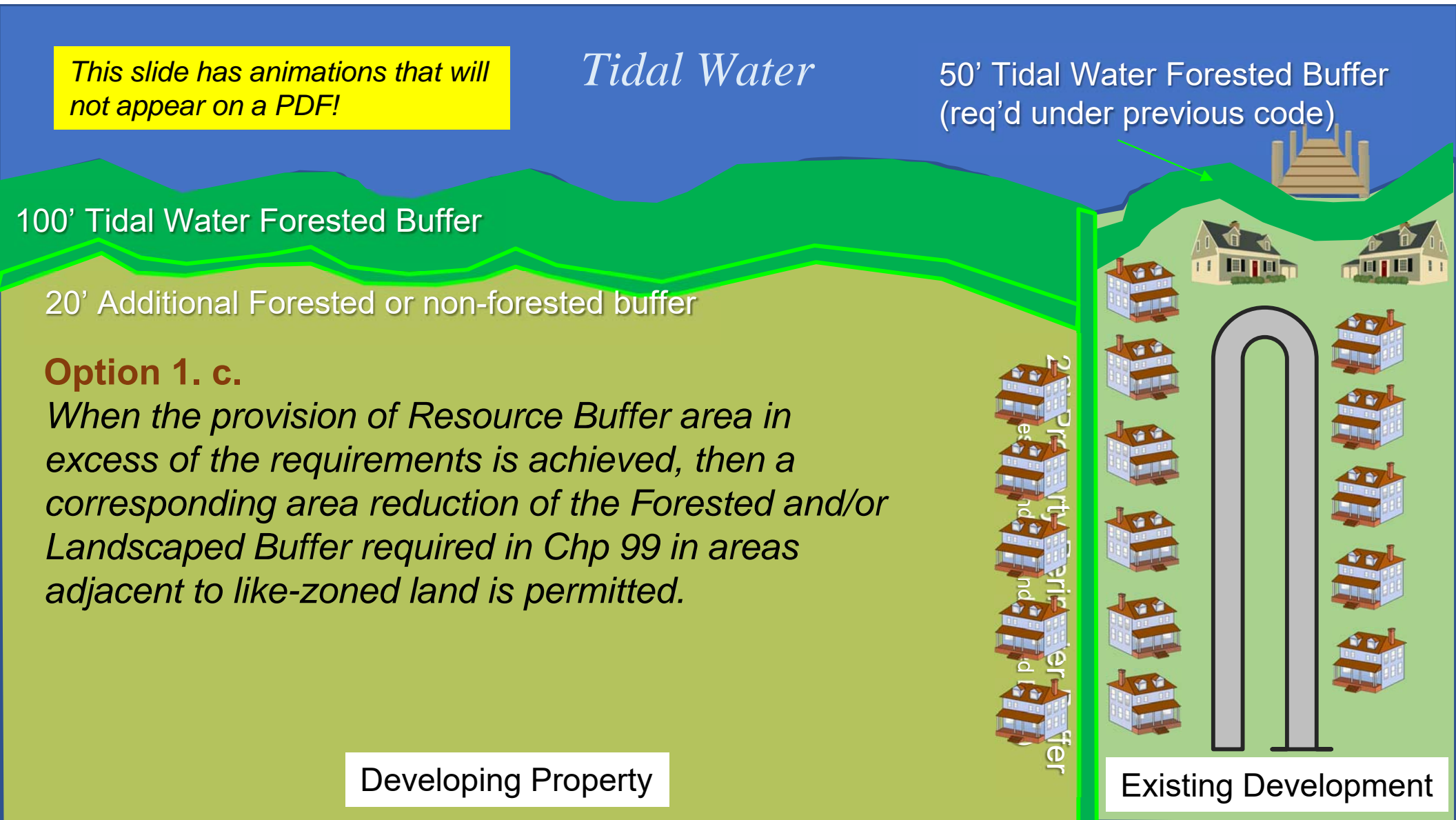
Option 1. c.

When the provision of Resource Buffer area in excess of the requirements is achieved, then a corresponding area reduction of the Forested and/or Landscaped Buffer required in Chp 99 in areas adjacent to like-zoned land is permitted.

Developing Property

20' Property Separation Buffer

Existing Development



This slide has animations that will not appear on a PDF!

Tidal Water

50' Tidal Water Forested Buffer (req'd under previous code)

100' Tidal Water Forested Buffer

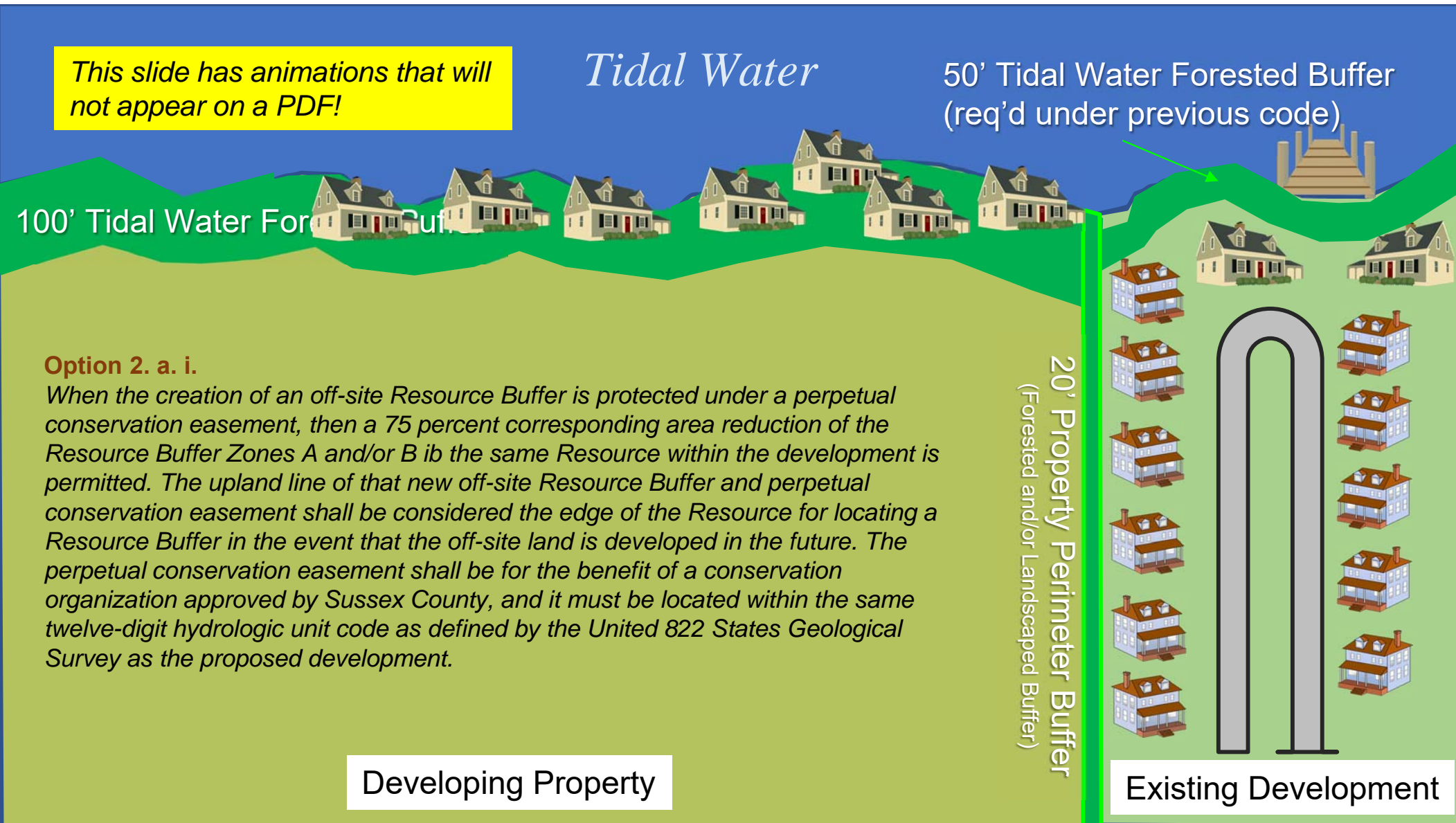
Option 2. a. i.

When the creation of an off-site Resource Buffer is protected under a perpetual conservation easement, then a 75 percent corresponding area reduction of the Resource Buffer Zones A and/or B in the same Resource within the development is permitted. The upland line of that new off-site Resource Buffer and perpetual conservation easement shall be considered the edge of the Resource for locating a Resource Buffer in the event that the off-site land is developed in the future. The perpetual conservation easement shall be for the benefit of a conservation organization approved by Sussex County, and it must be located within the same twelve-digit hydrologic unit code as defined by the United States Geological Survey as the proposed development.

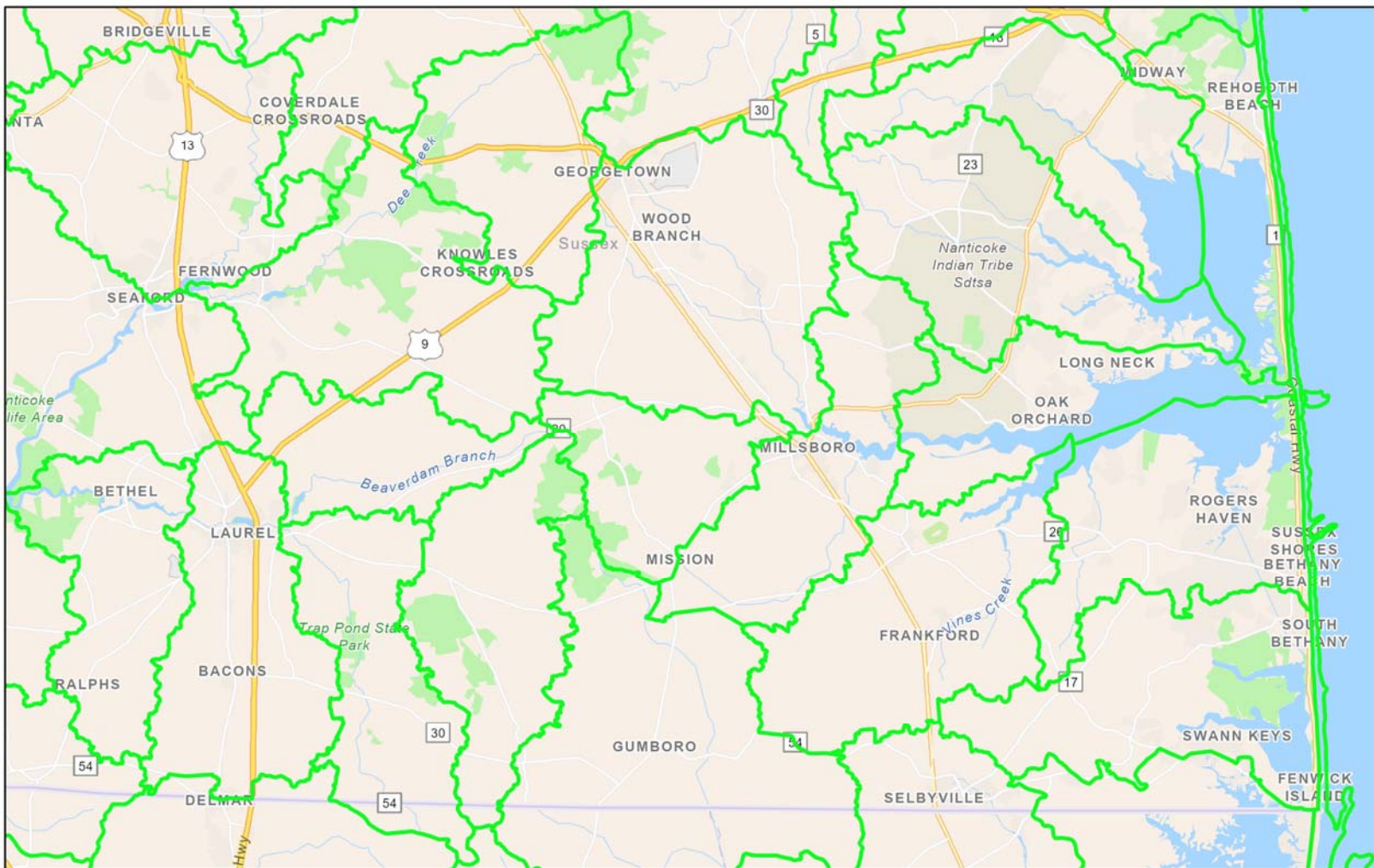
Developing Property

20' Property Perimeter Buffer
(Forested and/or Landscaped Buffer)

Existing Development



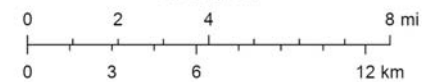
HUC – 12 Watersheds



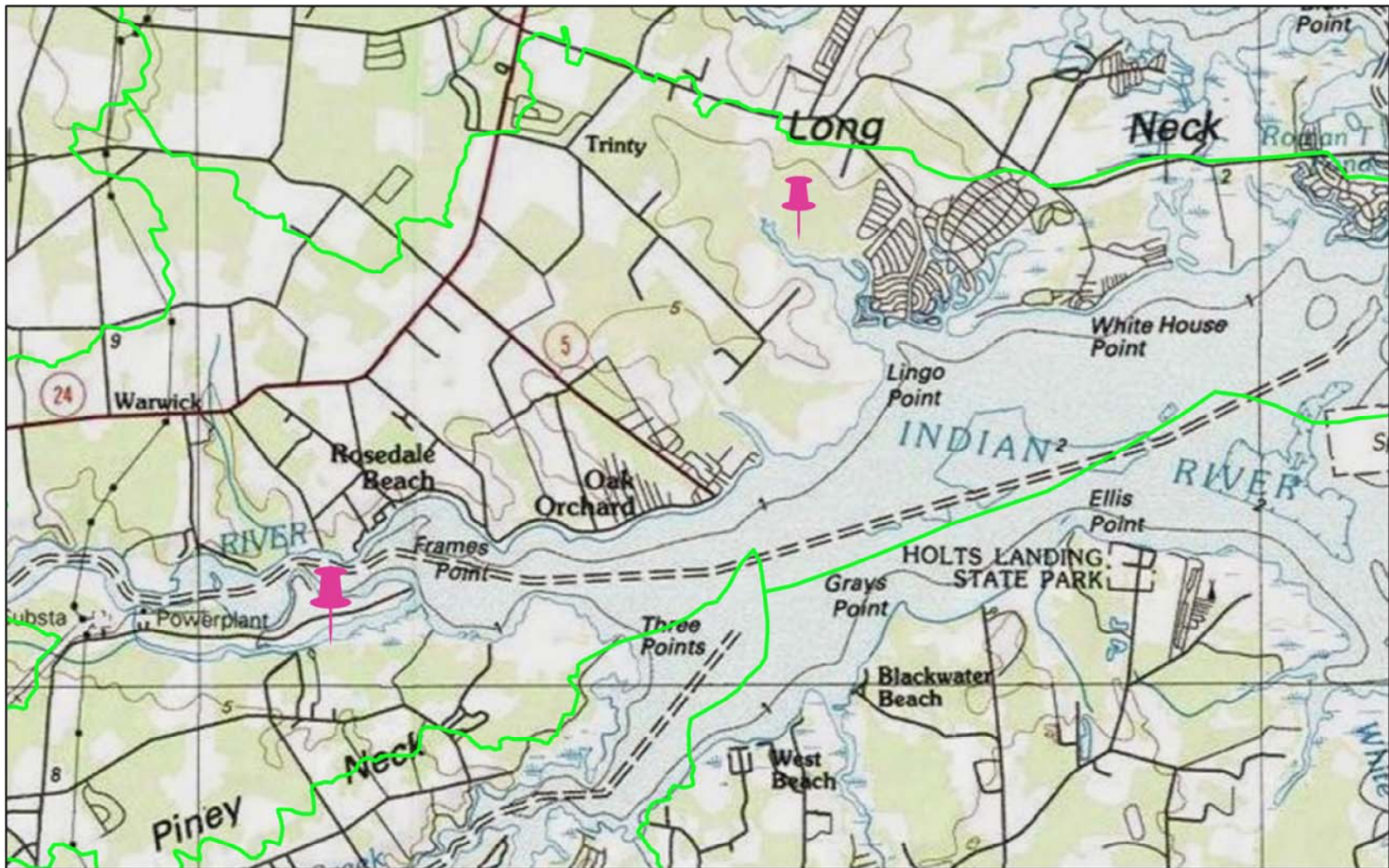
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 HUC 12

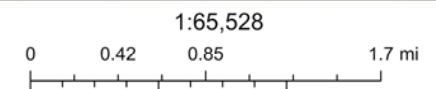
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U.S. Geological Survey, County of Sussex, DE, Delaware FirstMap, VITA,

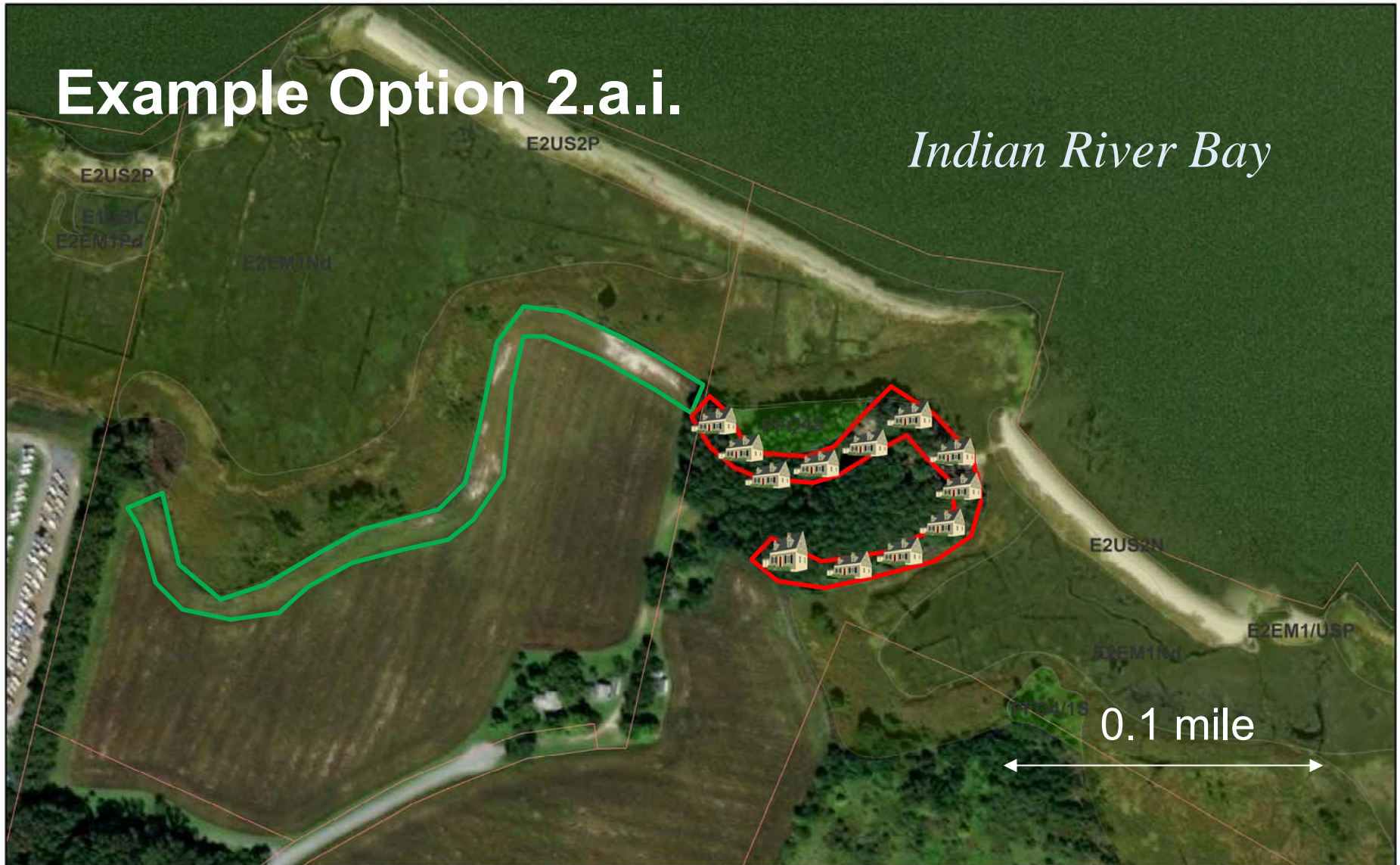


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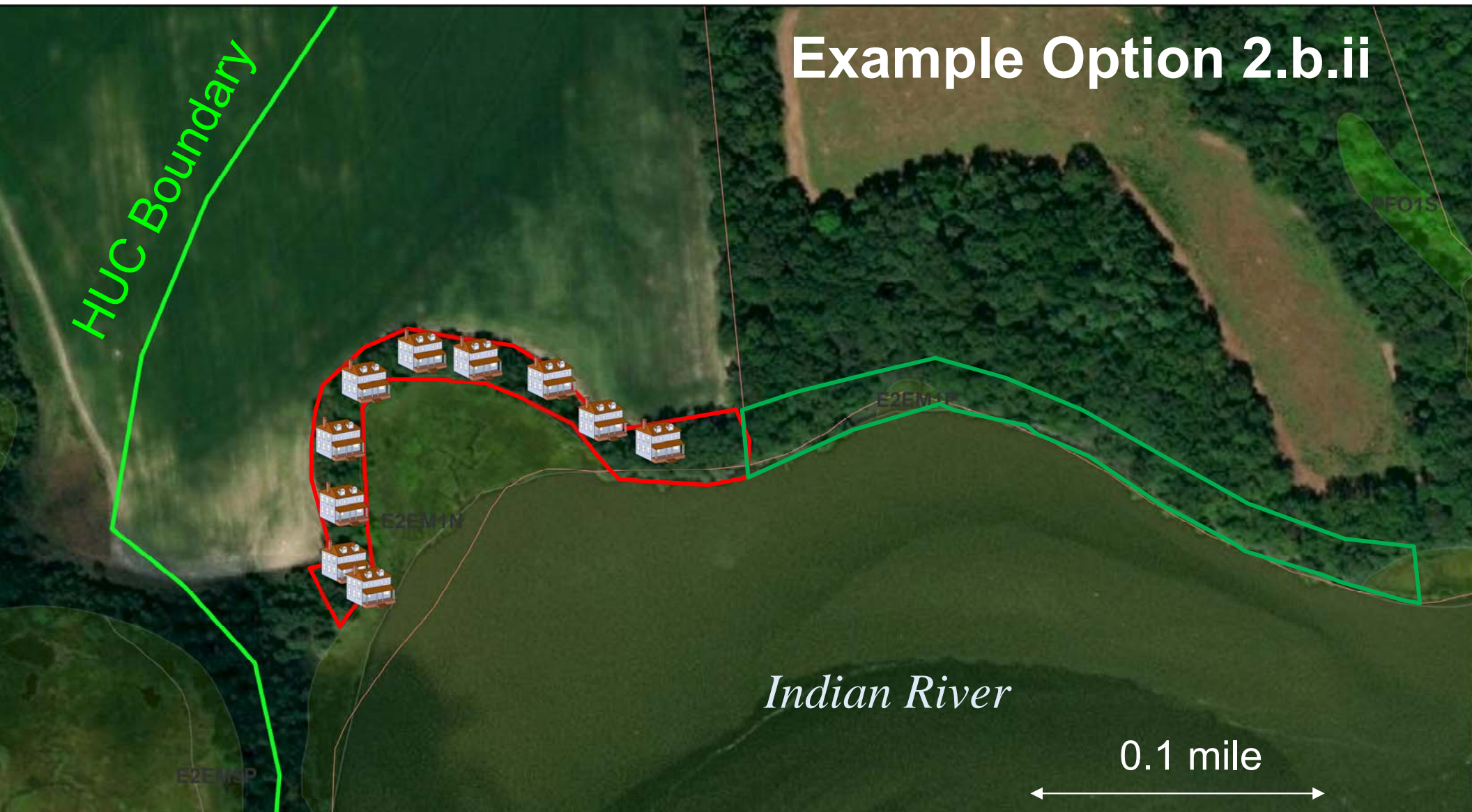


Example Option 2.a.i.

Indian River Bay



Example Option 2.b.ii





Remove Resource Buffer Options

- Need for flexibility in site design provided by buffer averaging.
- Options should not reduce width of buffers which are already on the low end of effectiveness.
- Options should not reduce the effectiveness of another ordinance with a separate purpose (perimeter buffer) to attempt to create an effective waterway and wetland buffer ordinance.

Clarification of Maintenance of Drainage Conveyances

- Section F.2. “The location of any stream blockages such as debris jams, fallen or unstable trees, beaver dams or similar impediments to conveyance...”
- Add... “that have a high likelihood of causing flooding resulting in damage to property and infrastructure.”
- Clarifies that these are natural and beneficial features of streams to be managed appropriately.
- Define “positive conveyance.”

Stormwater Features in Buffer







*Tidal
Wetland*



White Creek watershed pollution due to lack of buffers

