Nothing Compares
NORTH CAROLINA

31st Annual National Conference on Beach Preservation Technology

Defining Inlet Hazard Areas

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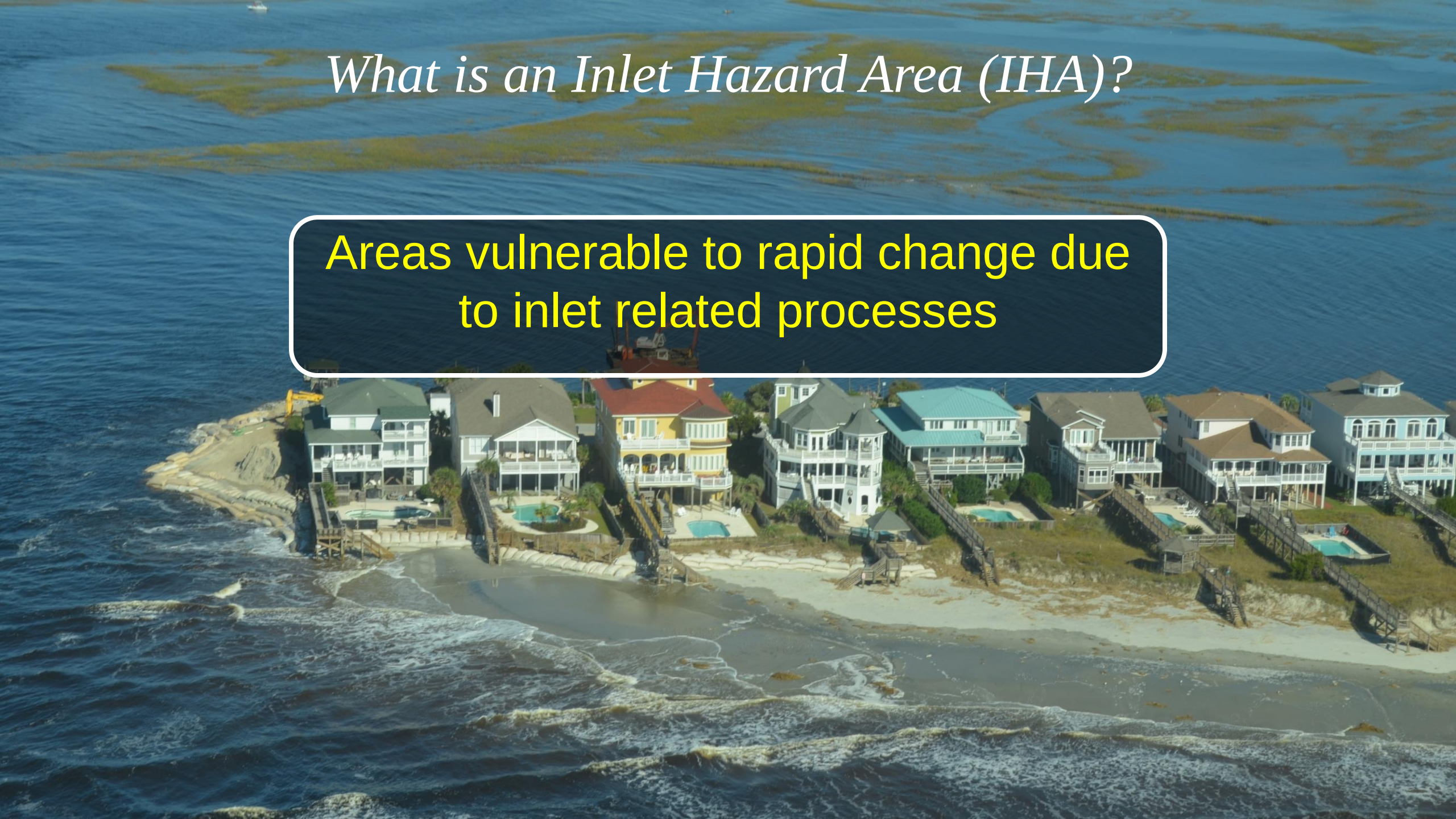
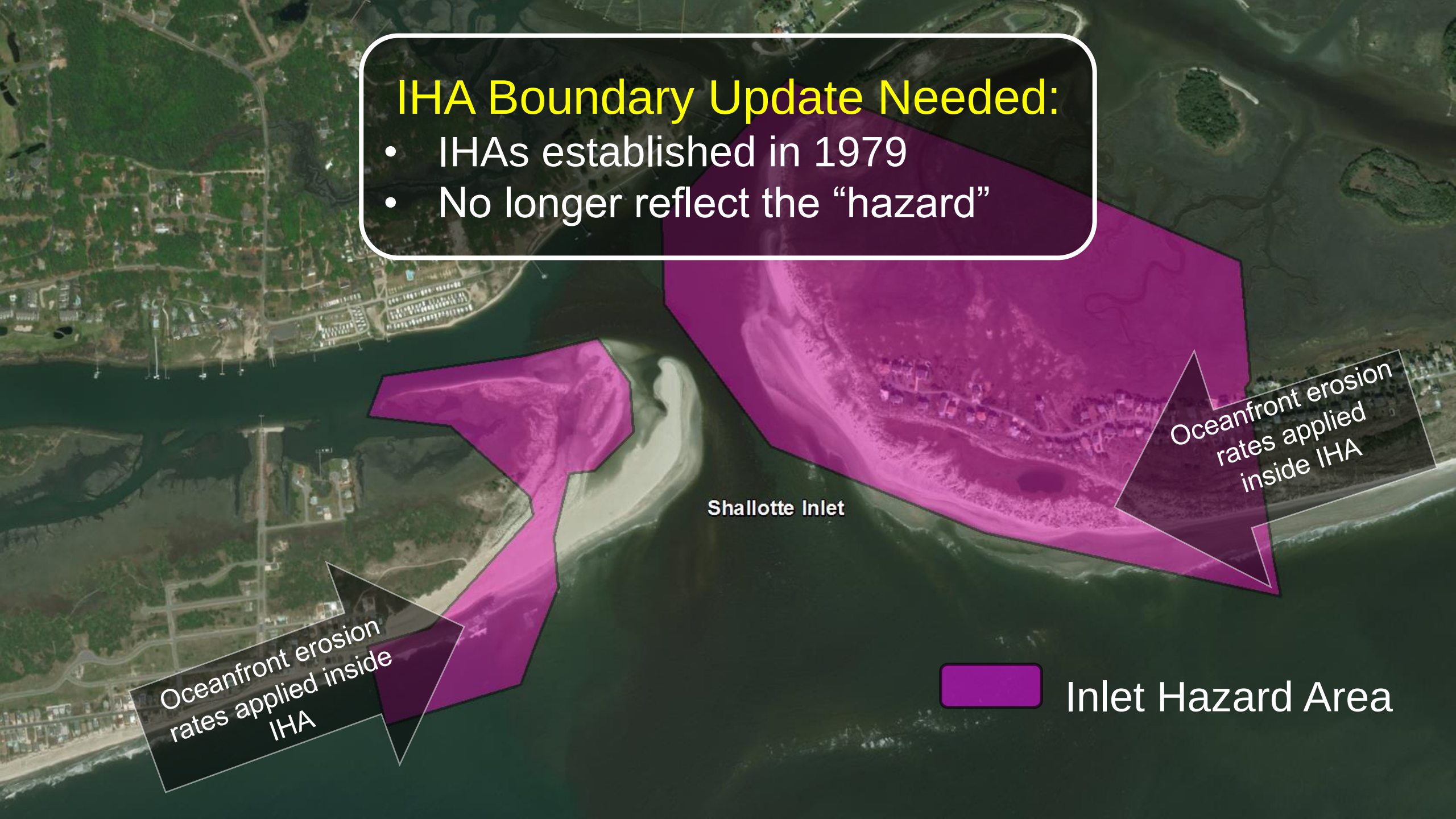
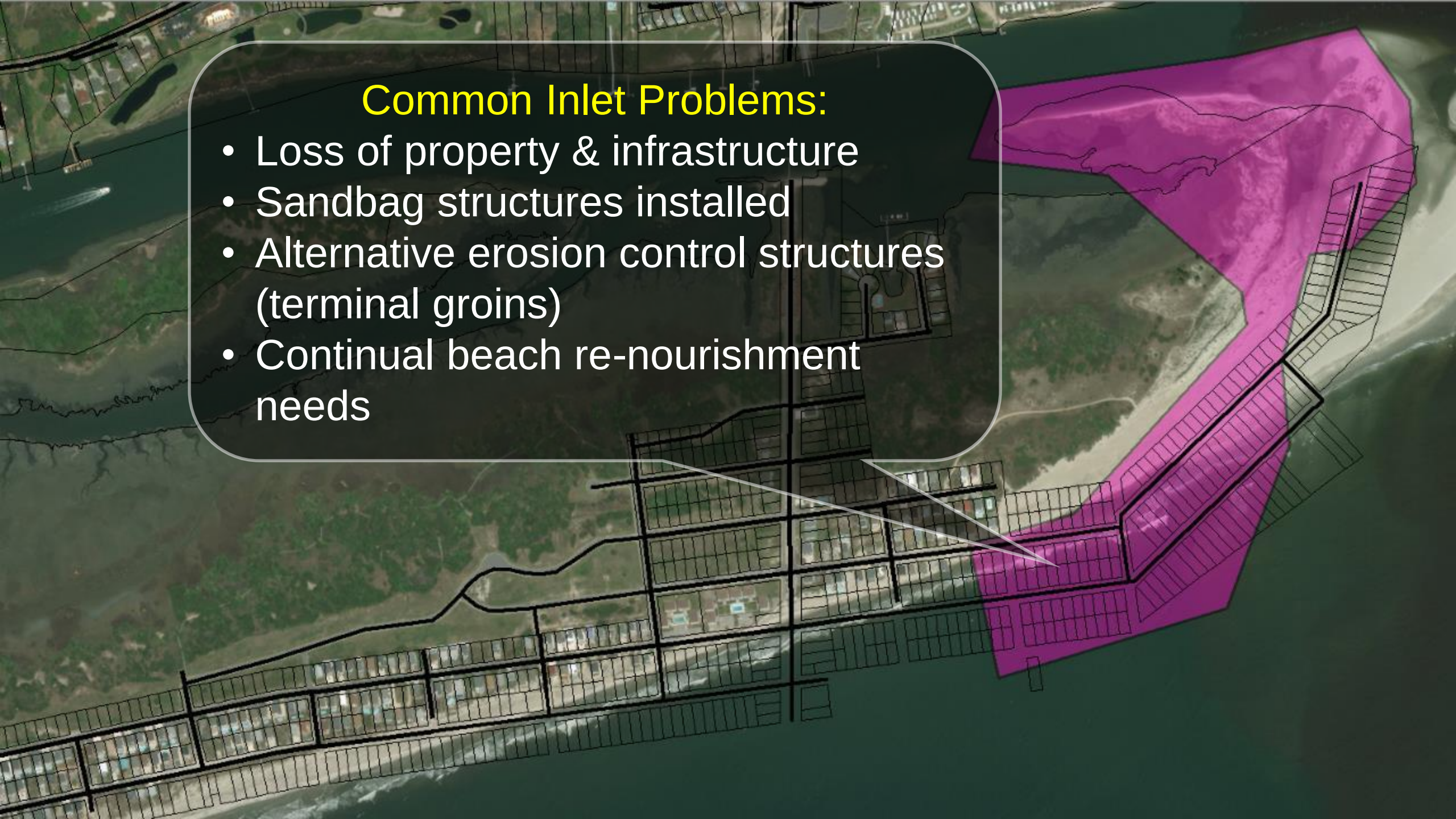
What is an Inlet Hazard Area (IHA)?

Areas vulnerable to rapid change due to inlet related processes




North Carolina has 19 active inlets:
• 12 with adjacent development
• 7 no adjacent development
• 2 Deep-Draft Inlets
• 17 Shallow-Draft Inlets
• 4 Migrating Inlets
• 15 “Oscillating” Inlets
Oregon Inlet
Hatteras Inlet
Ocracoke Inlet
Drum Inlet
Barden Inlet
Beaufort Inlet
Bogue Inlet
Bear Inlet
Brown Inlet
New River Inlet
Mason Inlet (Relocated)
Masonboro Inlet
Carolina Beach Inlet
Cape Fear River
Lockwood Folly Inlet
Shallotte Inlet
Tubbs Inlet


IHA Boundary Update Needed:
• IHAs established in 1979
• No longer reflect the “hazard”
Shallotte Inlet
Oceanfront erosion rates applied inside IHA
Oceanfront erosion rates applied inside IHA
Inlet Hazard Area



Common Inlet Problems:

- Loss of property & infrastructure
- Sandbag structures installed
- Alternative erosion control structures (terminal groins)
- Continual beach re-nourishment needs

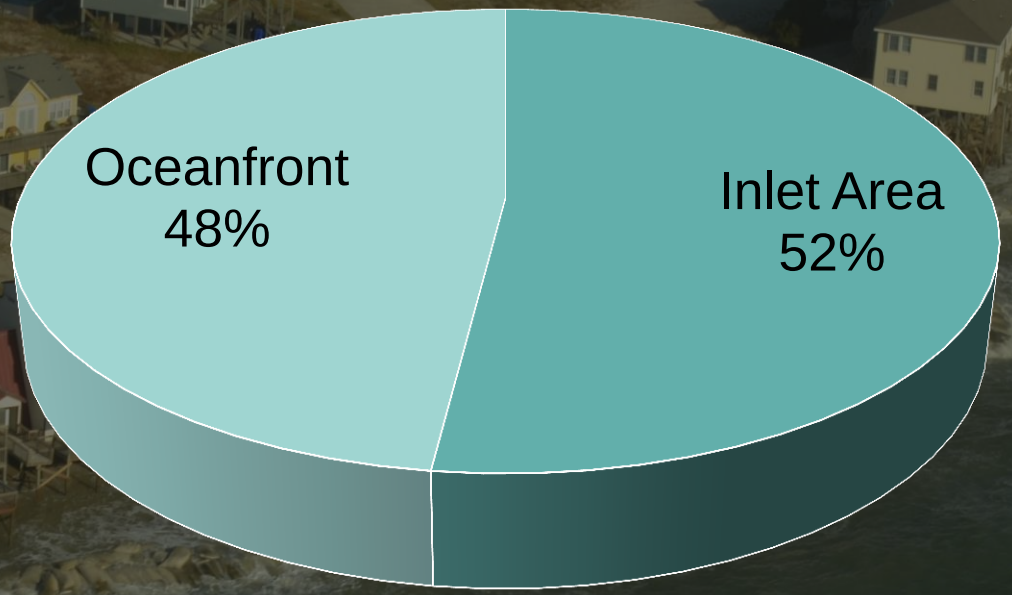
Inlet Areas Subject to Rapid Change

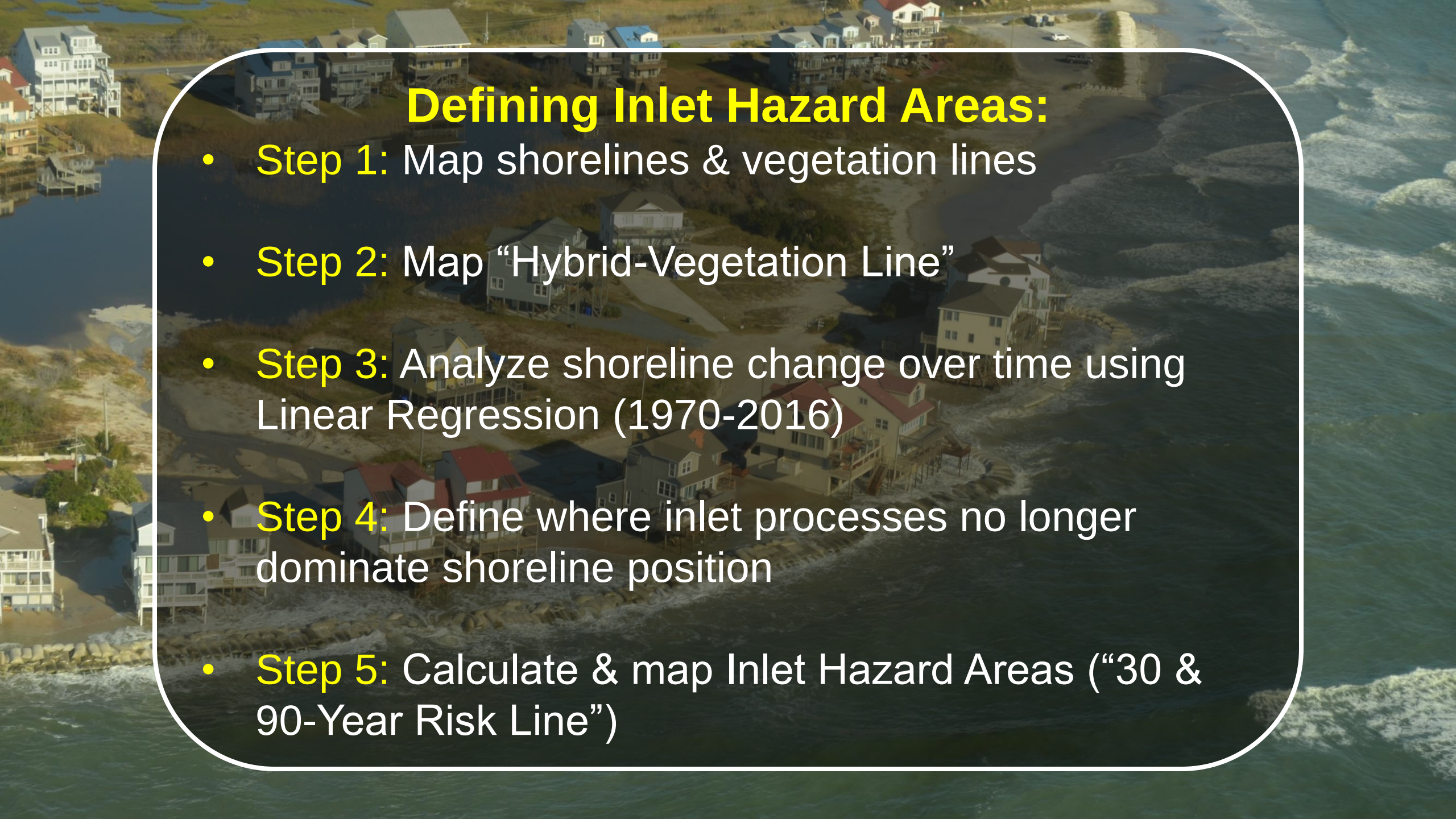
Constructed on Lea-Hutaff Island in 1990, this private home sat 500 feet from the ocean

The same house sat at the ocean's edge at low tide until finally being destroyed by a storm in 2015

Sandbag Usage:

Inlet vs. Oceanfront

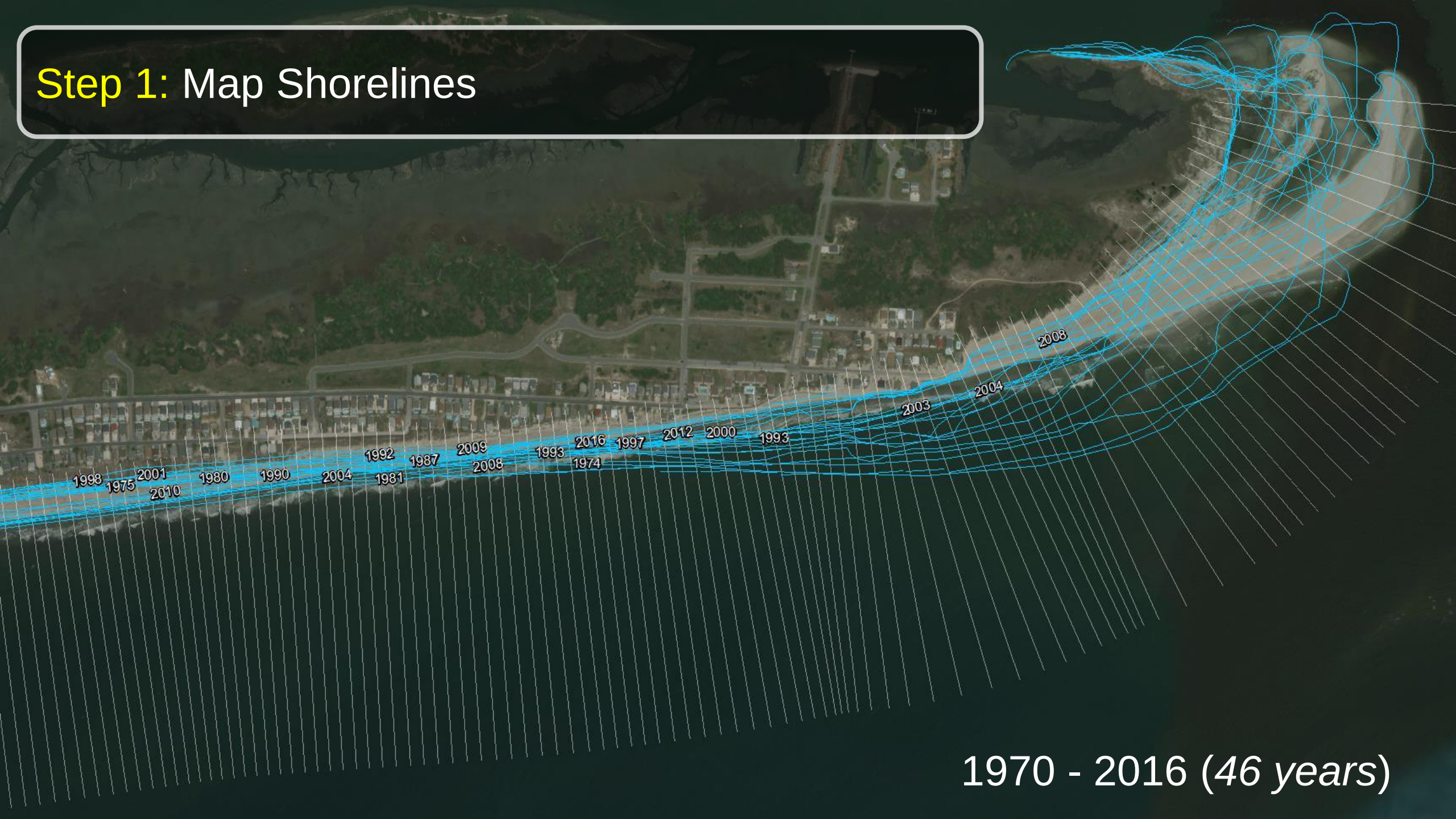




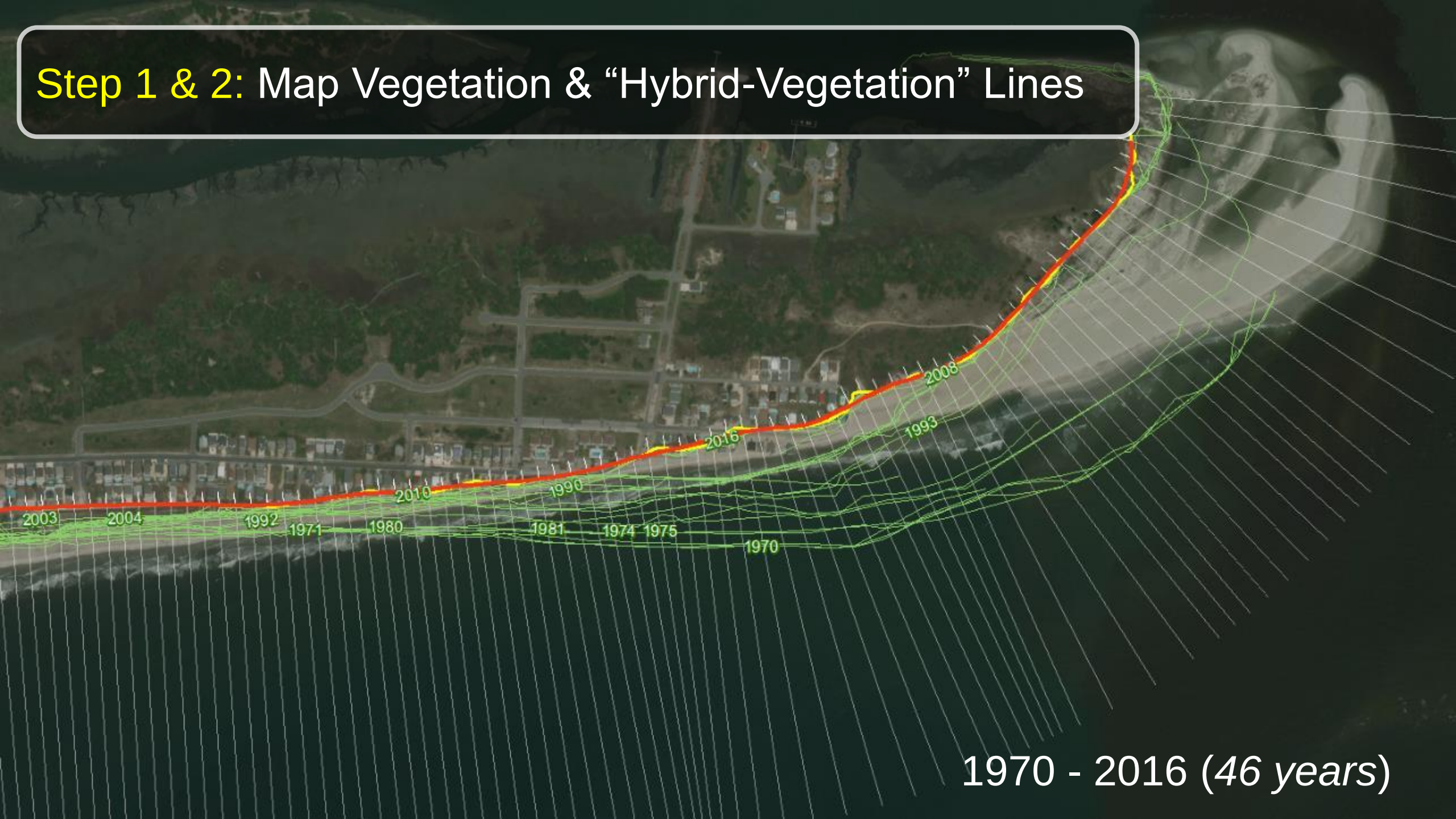
Defining Inlet Hazard Areas:

- Step 1: Map shorelines & vegetation lines
- Step 2: Map “Hybrid-Vegetation Line”
- Step 3: Analyze shoreline change over time using Linear Regression (1970-2016)
- Step 4: Define where inlet processes no longer dominate shoreline position
- Step 5: Calculate & map Inlet Hazard Areas (“30 & 90-Year Risk Line”)

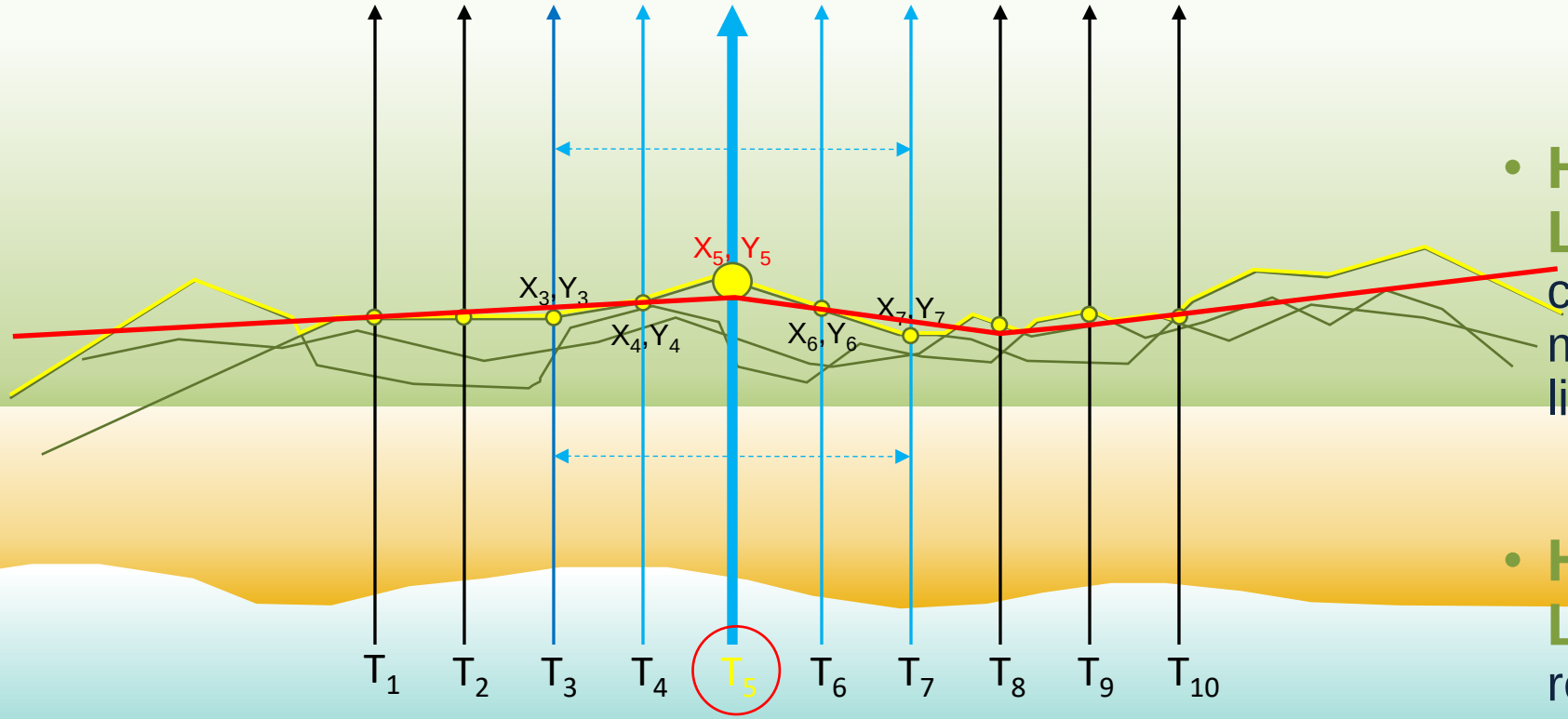
Step 1: Map Shorelines



1970 - 2016 (*46 years*)


Step 1 & 2: Map Vegetation & “Hybrid-Vegetation” Lines
2008
2016
1993
2010
1990
2003
2004
1992
1971
1980
1981
1974
1975
1970
1970 - 2016 (*46 years*)

Defining Inlet Hazard Areas:
Hybrid-Vegetation Line 5-Point Smoothing



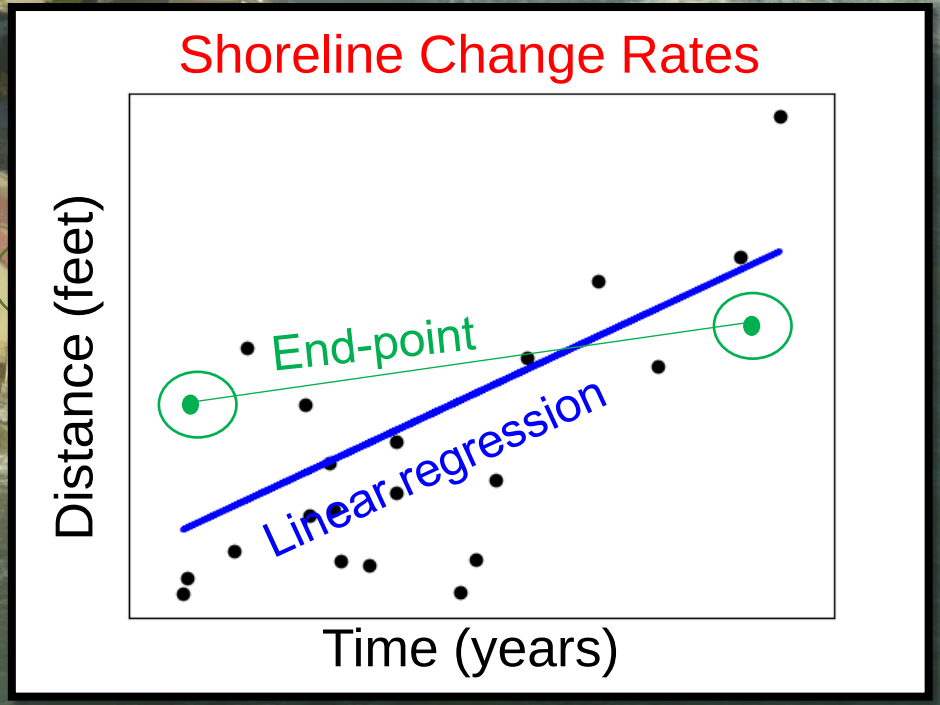
$$\bar{x}_{T_5} = \frac{1}{5}\sum_{i=3}^{7} X_i \qquad \bar{y}_{T_5} = \frac{1}{5}\sum_{i=3}^{7} y_i$$

Smoothed Hybrid-Vegetation Position at Transect #7

- **Hybrid Vegetation Line:** represents a composite of the landward-most position of vegetation lines.
- **Hybrid Vegetation Line (Smoothed):** represents a 5-point running average of raw hybrid-vegetation line and 25-meter transect intersections.

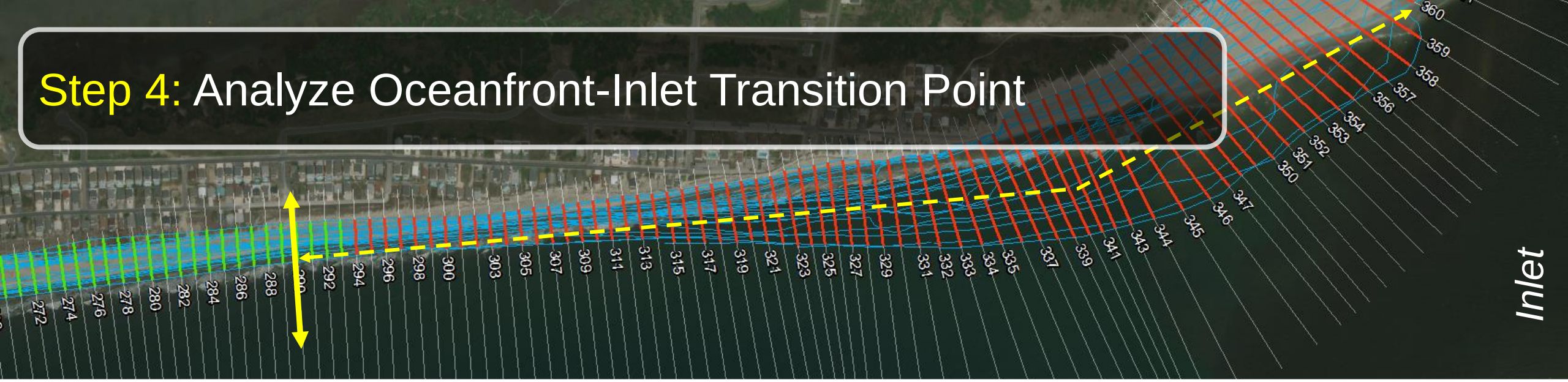
Step 3: Analyze Shoreline Change

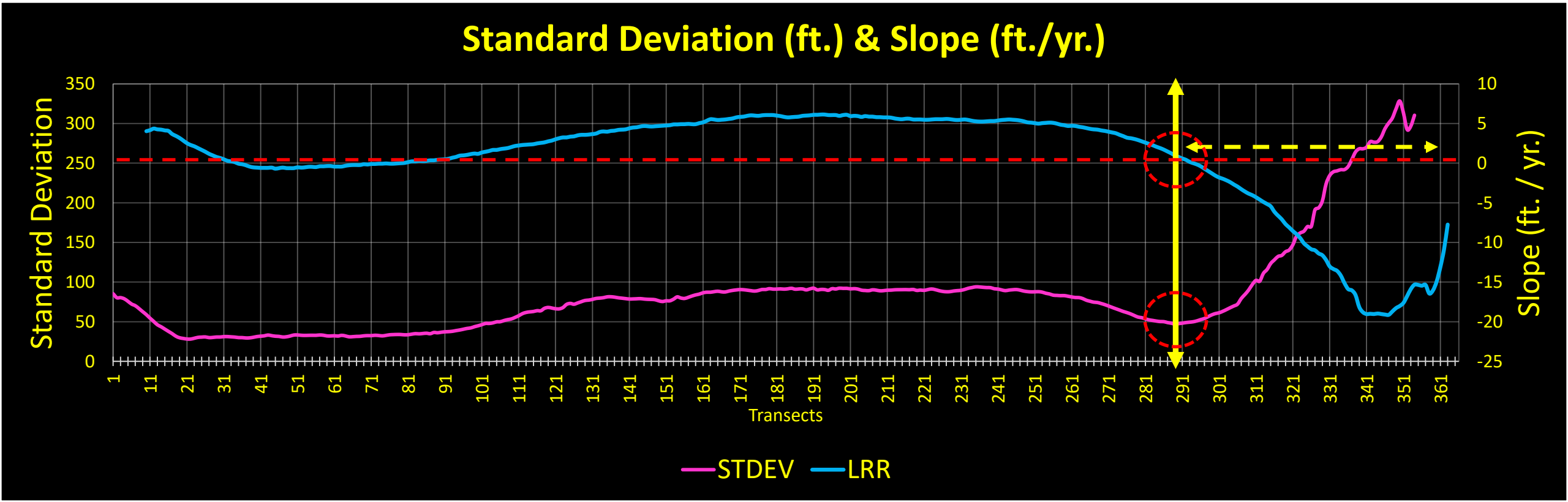
- Transect Spacing (25 meters)
- Linear Regression Rates (LRR) (*ESRI's ArcMap & DSAS*)
- Smooth Raw Data using 5-Point Running Average



Step 3: Analyze Shoreline Change

Step 4: Analyze Oceanfront-Inlet Transition Point





Step 3: Calculate & Map “Risk”

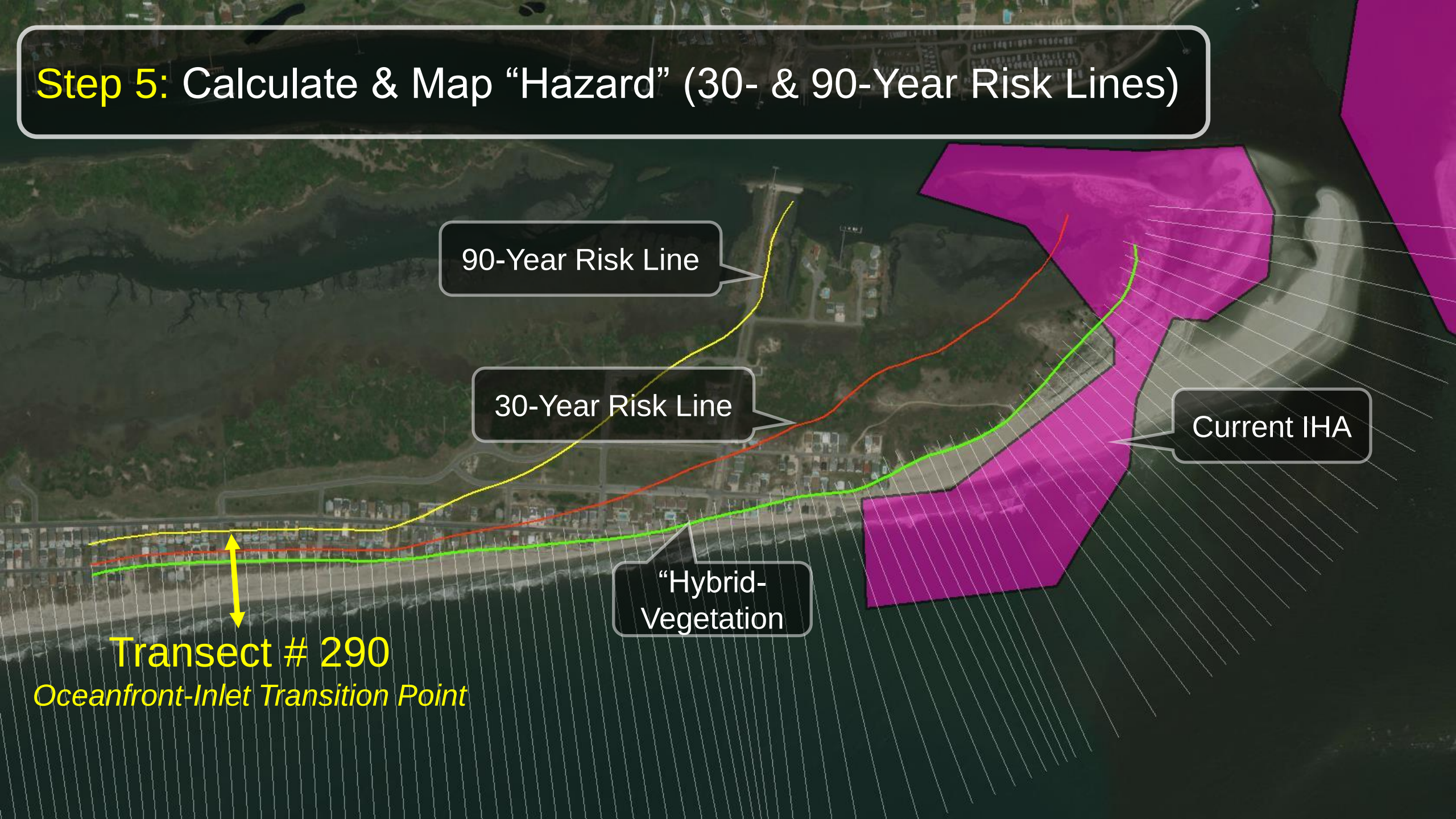
Measured from “Hybrid-Vegetation”

30-Year Risk Line = 30 x LRR x Multiplier
90-Year Risk Line = 90 x LRR X Multiplier

If accreting: Risk Line = 30 x 2 or90 x 2

If eroding:
If $SE_{IHA} / SE_A \leq 1$, Multiplier = 1
If $SE_{IHA} / SE_A > 1$, Multiplier = SE_{IHA} / SE_A

Step 5: Calculate & Map “Hazard” (30- & 90-Year Risk Lines)



Defining Inlet Hazard Areas: Next Steps?

Defining Inlet Hazard Areas: Questions?

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