NORTH CAROLINA
Cooperating Technical State
FEMA'S COOPERATING TECHNICAL PARTNER

2016 NC Coastal Local Governments Annual Meeting

NCFMP Coastal Map Maintenance Flood Study Updates and Changes

April 21, 2016

Tom Langan, PE, CFM – Engineering Supervisor
NCEM-Risk Management - Floodplain Mapping Program

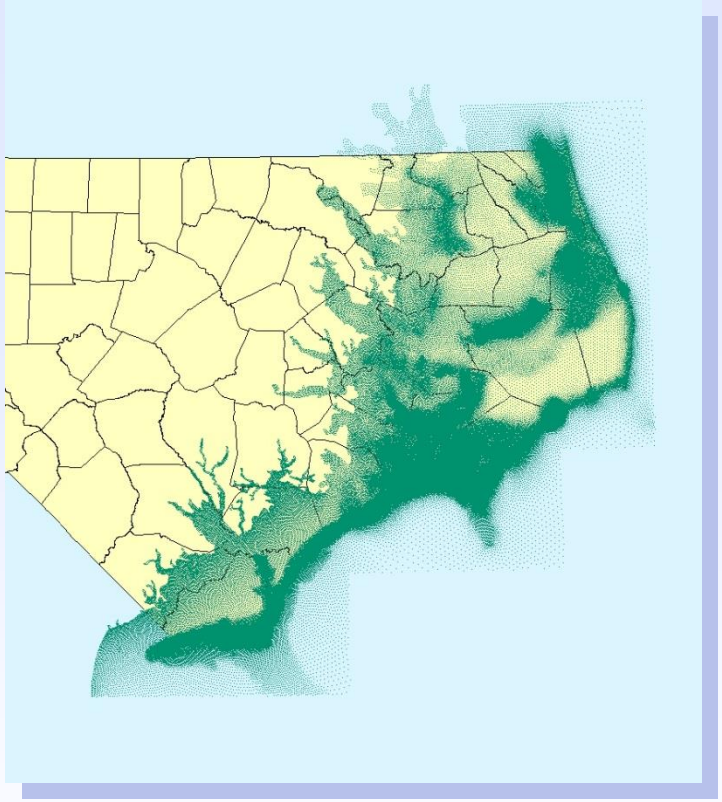
NCFMP Coastal Restudy

Scale

- Entire Coastline
- Barrier Islands
- "Closed Coast"
- Sounds – Albemarle, Pamlico
- Intracoastal Waterway
- Rivers

Scope

- Storm Surge
- Onshore Wave Analysis
- Storm Frequency Analysis
- Coastal Hazard Analysis and Mapping
- DFIRM Production
- Study QA/QC – NCFMP, Independent Contractor, FEMA and Academia

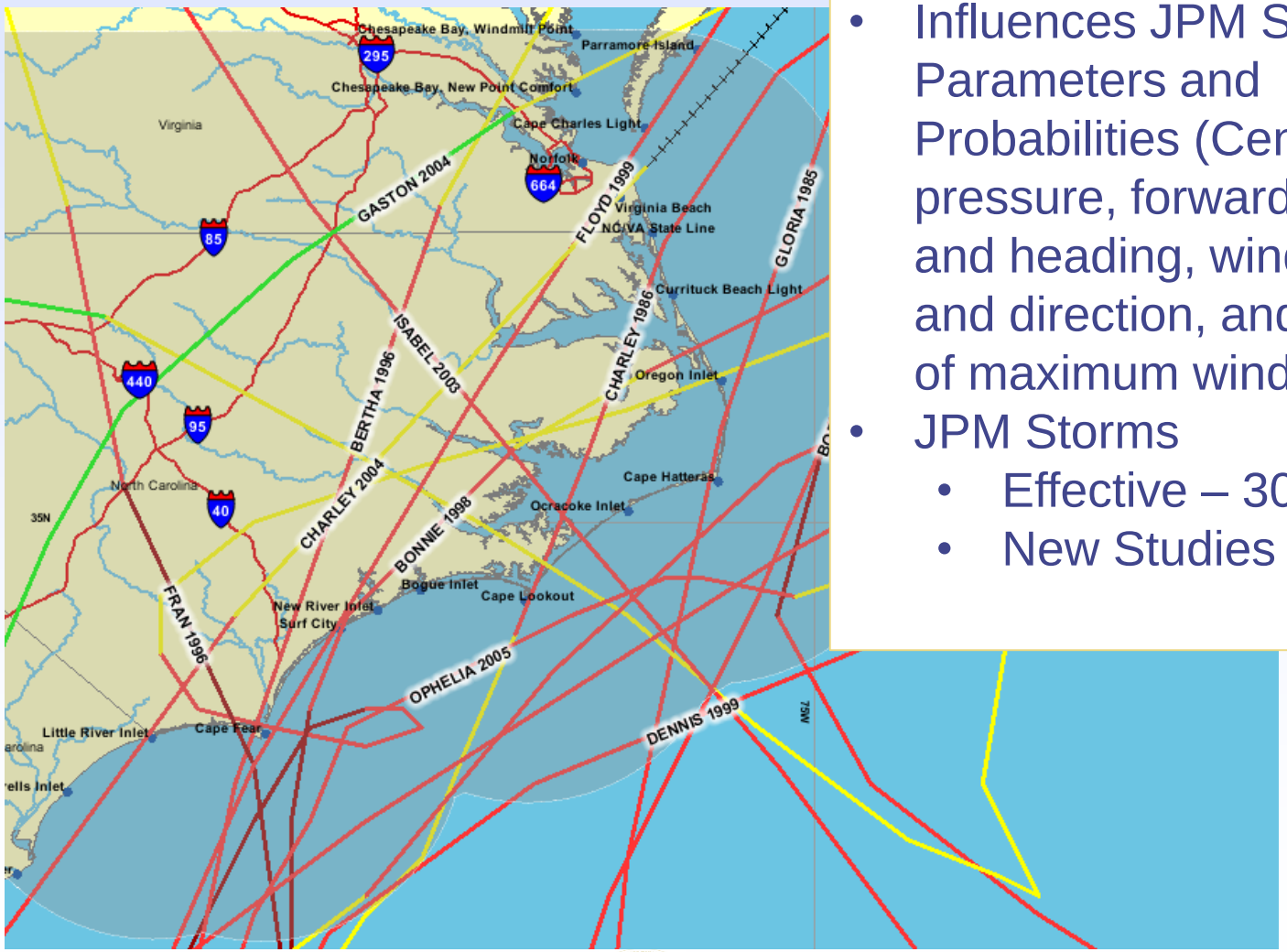


Sea Level Rise and Climate Change on the FIRMs

- FEMA maps coastal flood hazards are based on existing shoreline characteristics, and wave and storm climatology at the time of the flood study. In accordance with the current Code of Federal Regulations, FEMA does not map flood hazards based on anticipated future sea levels or climate change. Over the lifespan of a study, changes in flood hazards from sea level rise and climate change are typically not large enough to affect the validity of the study results.
- In accordance with the Biggert-Water Flood Insurance Reform Act of 2012, FEMA is to establish a Technical Mapping Advisory Council that will provide recommendations to FEMA on flood hazard mapping guidelines—including recommendations for future mapping conditions, the impacts of sea level rise and future development. FEMA will be required to incorporate future risk assessment in accordance with the recommendations of the Council.

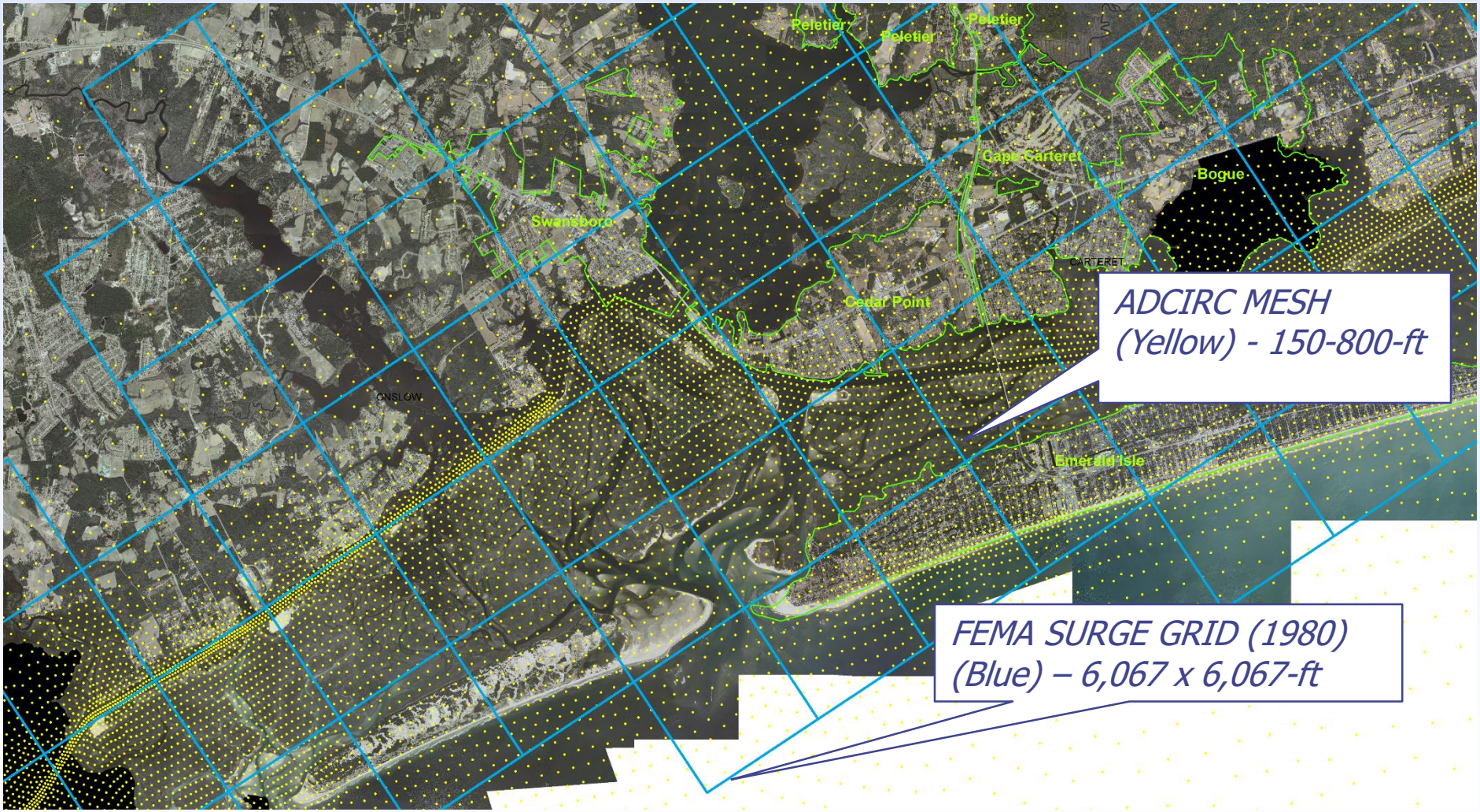
FACTORS CONTRIBUTING TO COASTAL MAP CHANGES

21 Additional Hurricanes since 1980

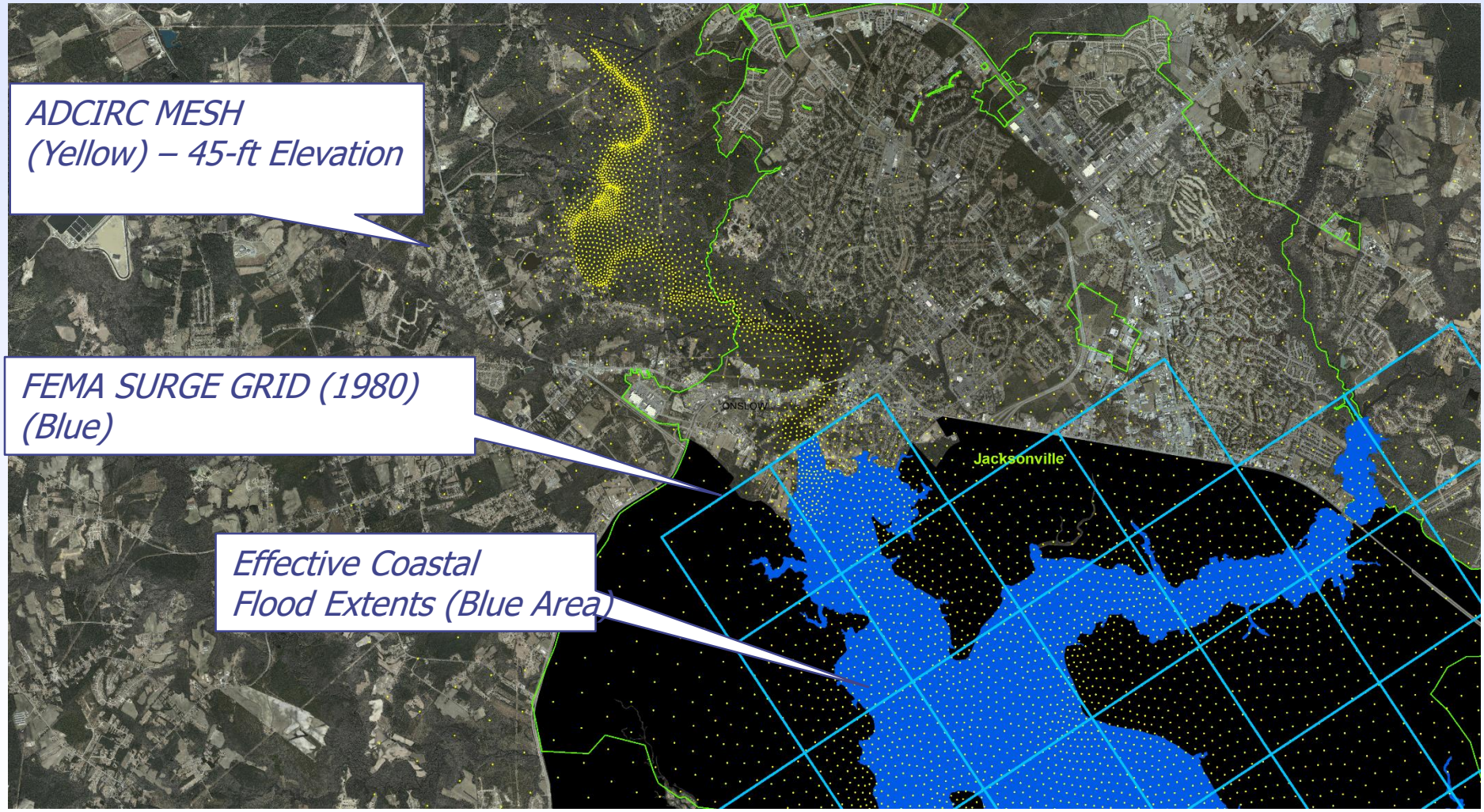


- Influences JPM Storm Parameters and Probabilities (Central pressure, forward speed and heading, wind speed and direction, and radius of maximum winds)
- JPM Storms
  - Effective – 300
  - New Studies - 675

Surge Model GRID/MESH Resolution



Surge Model GRID/MESH Extents



Topographic Constrictions

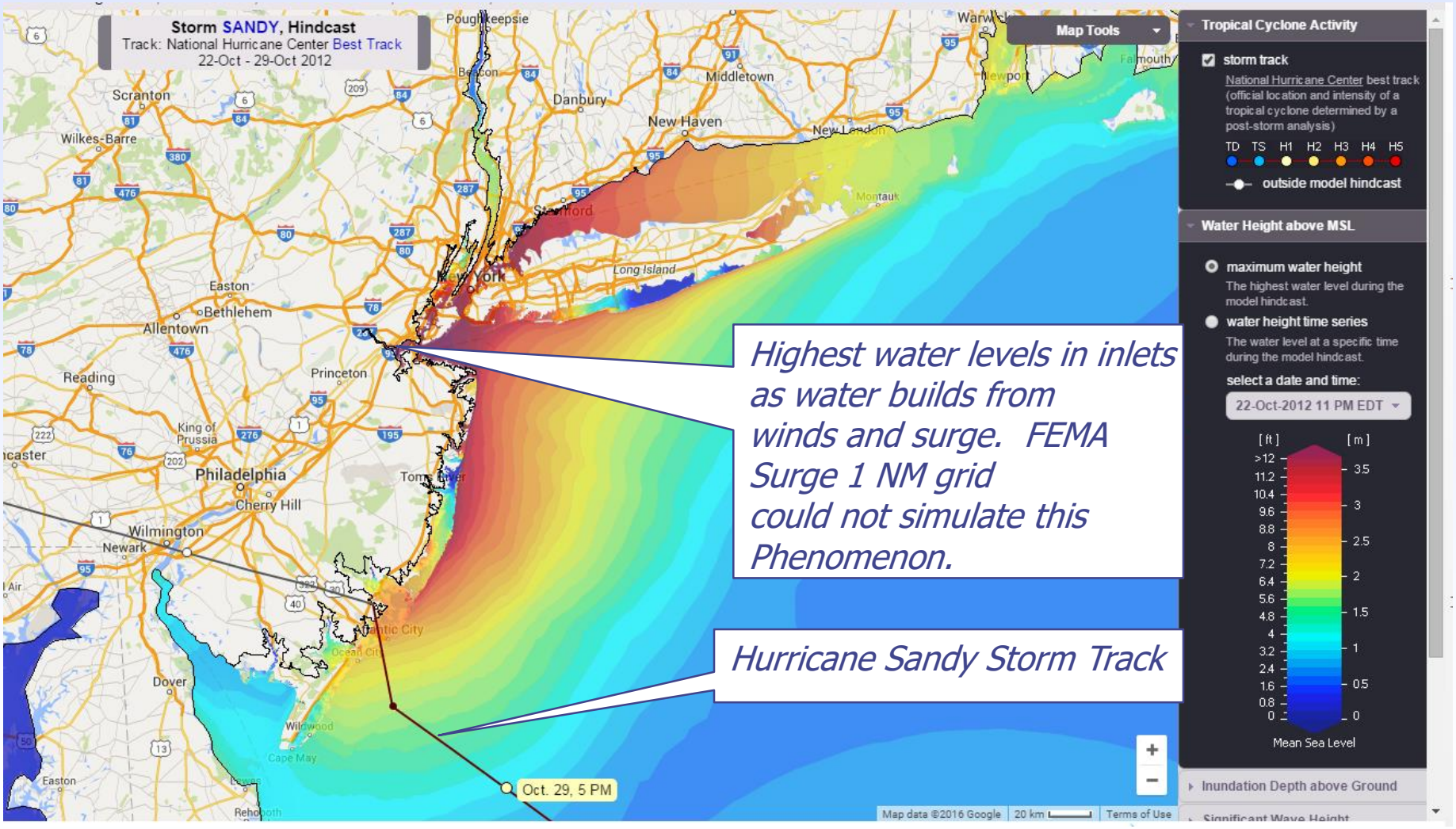
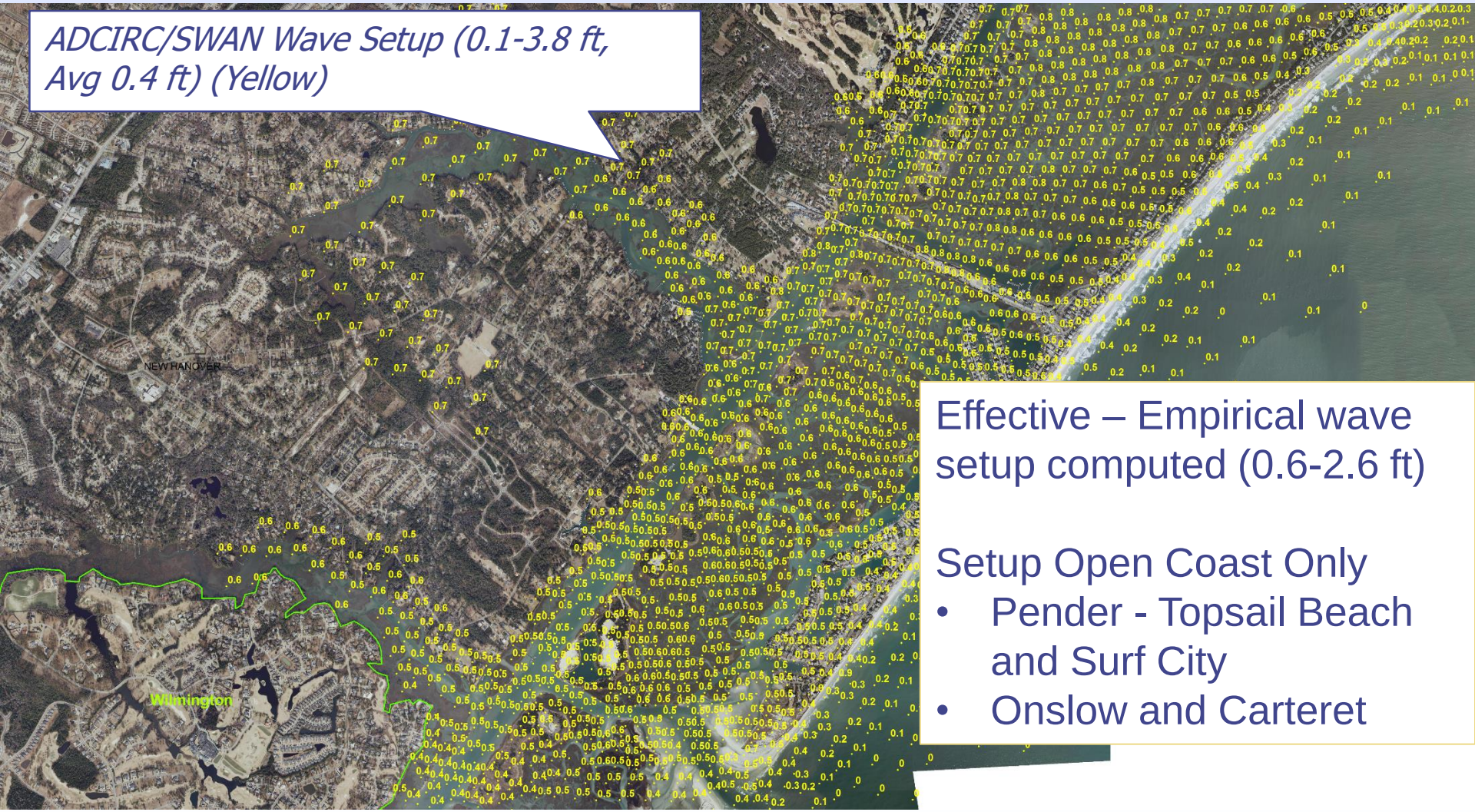


Image source: http://nc-cera.renci.org/

Wave Setup



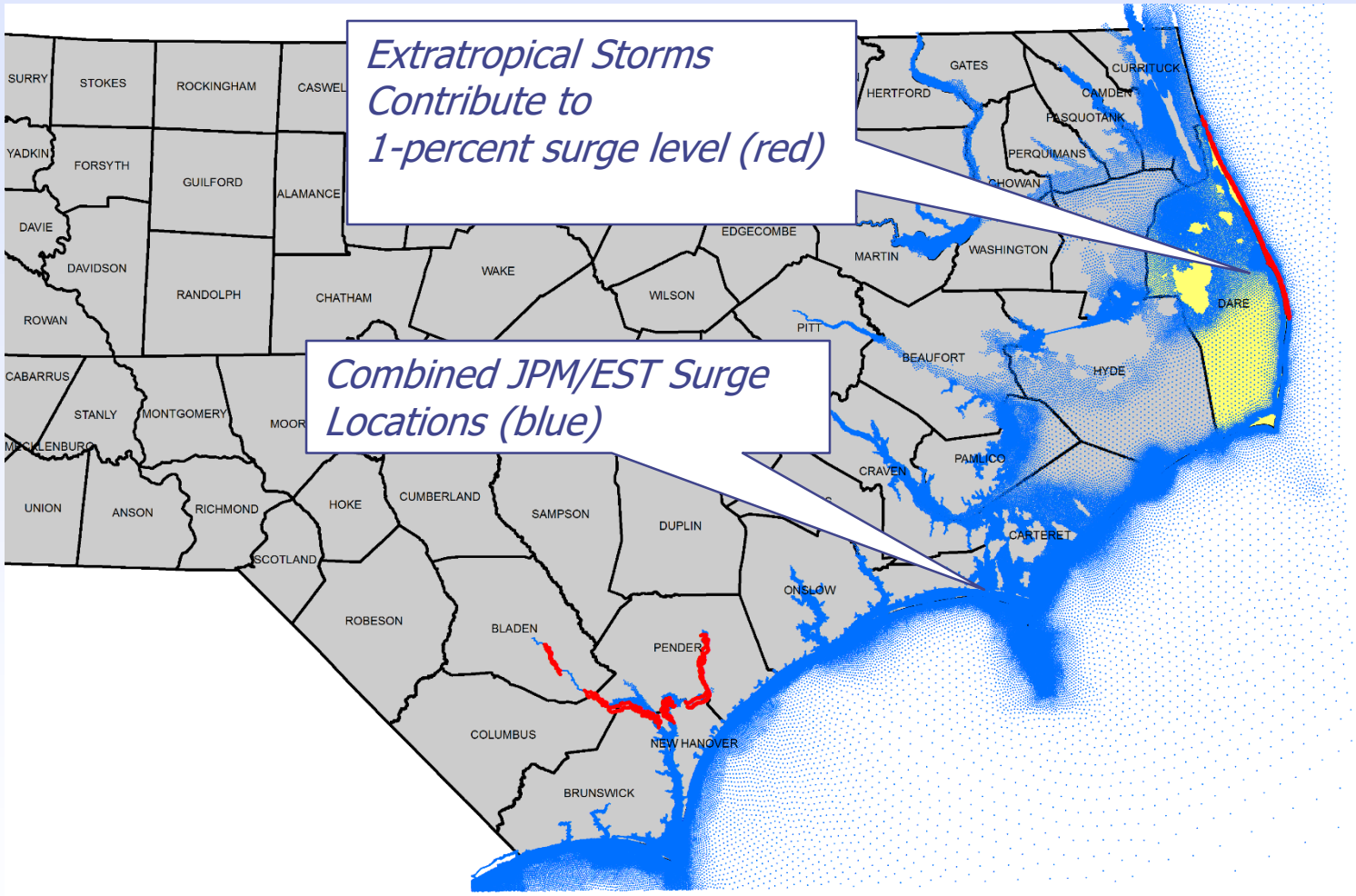
ADCIRC/SWAN Wave Setup (0.1-3.8 ft, Avg 0.4 ft) (Yellow)

Effective – Empirical wave setup computed (0.6-2.6 ft)

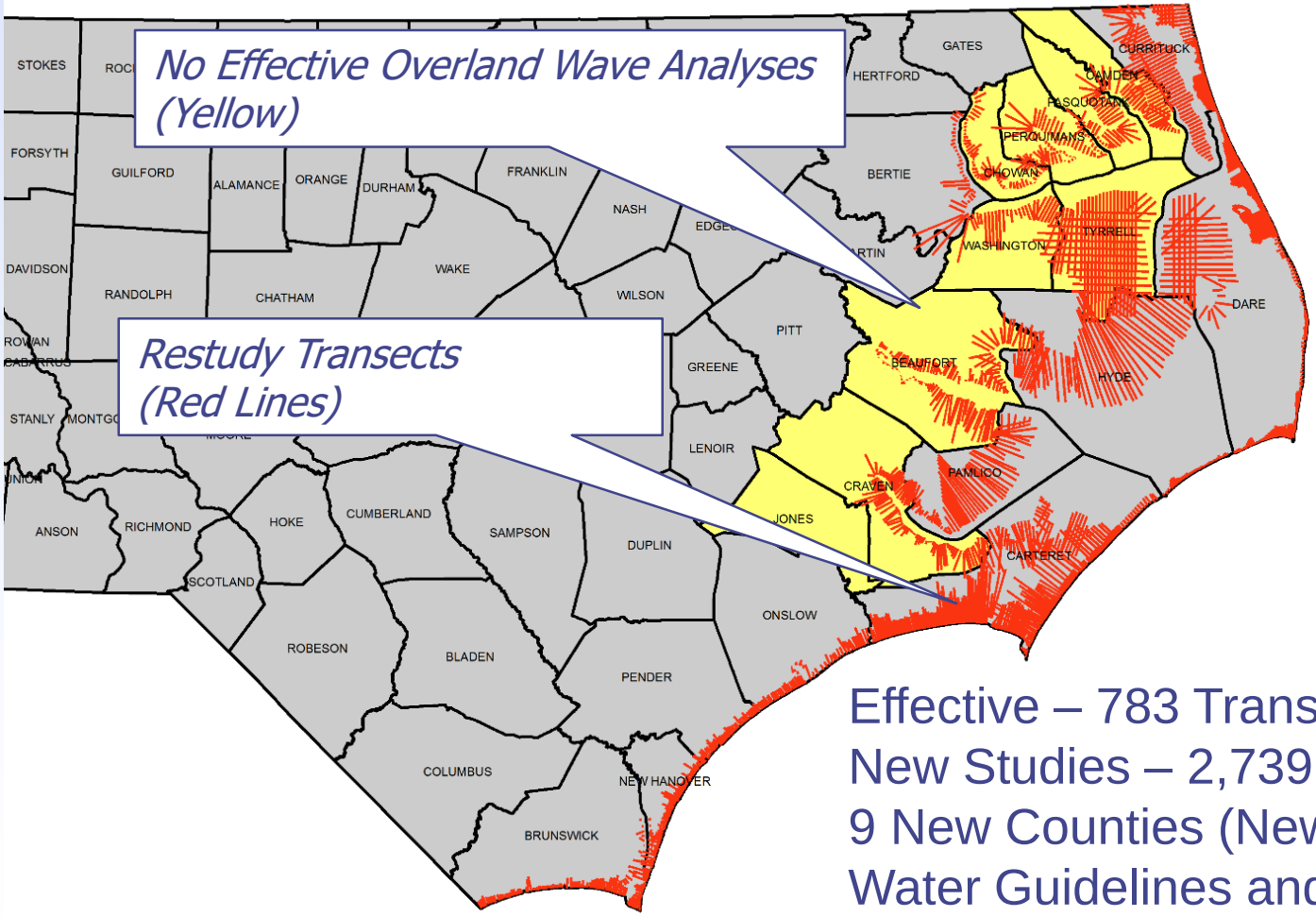
Setup Open Coast Only

- Pender - Topsail Beach and Surf City
- Onslow and Carteret

Extratropical Storms

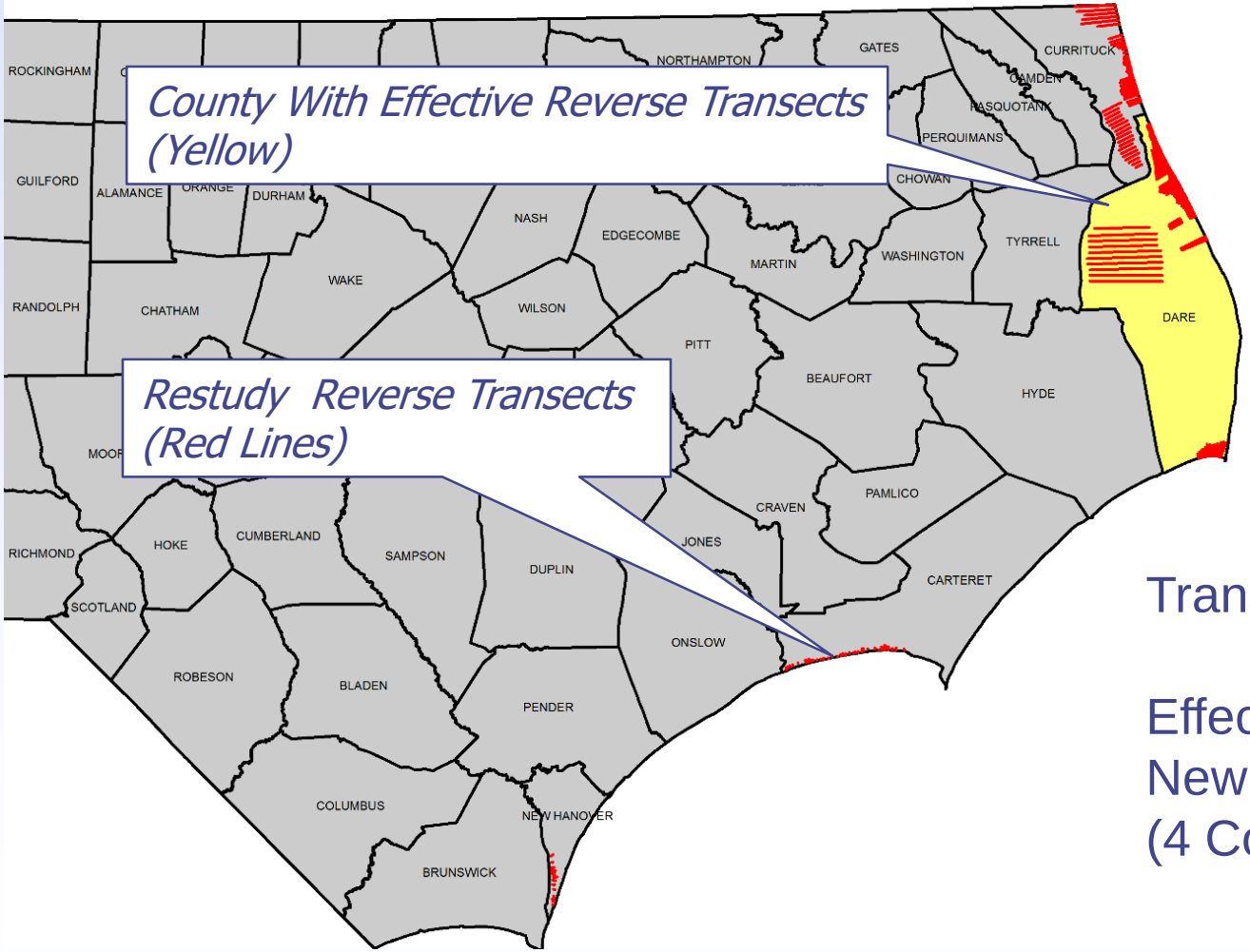


Overland Wave Analyses



Effective – 783 Transects
New Studies – 2,739 Transects
9 New Counties (New FEMA Sheltered Water Guidelines and Specifications)

Reverse Transects

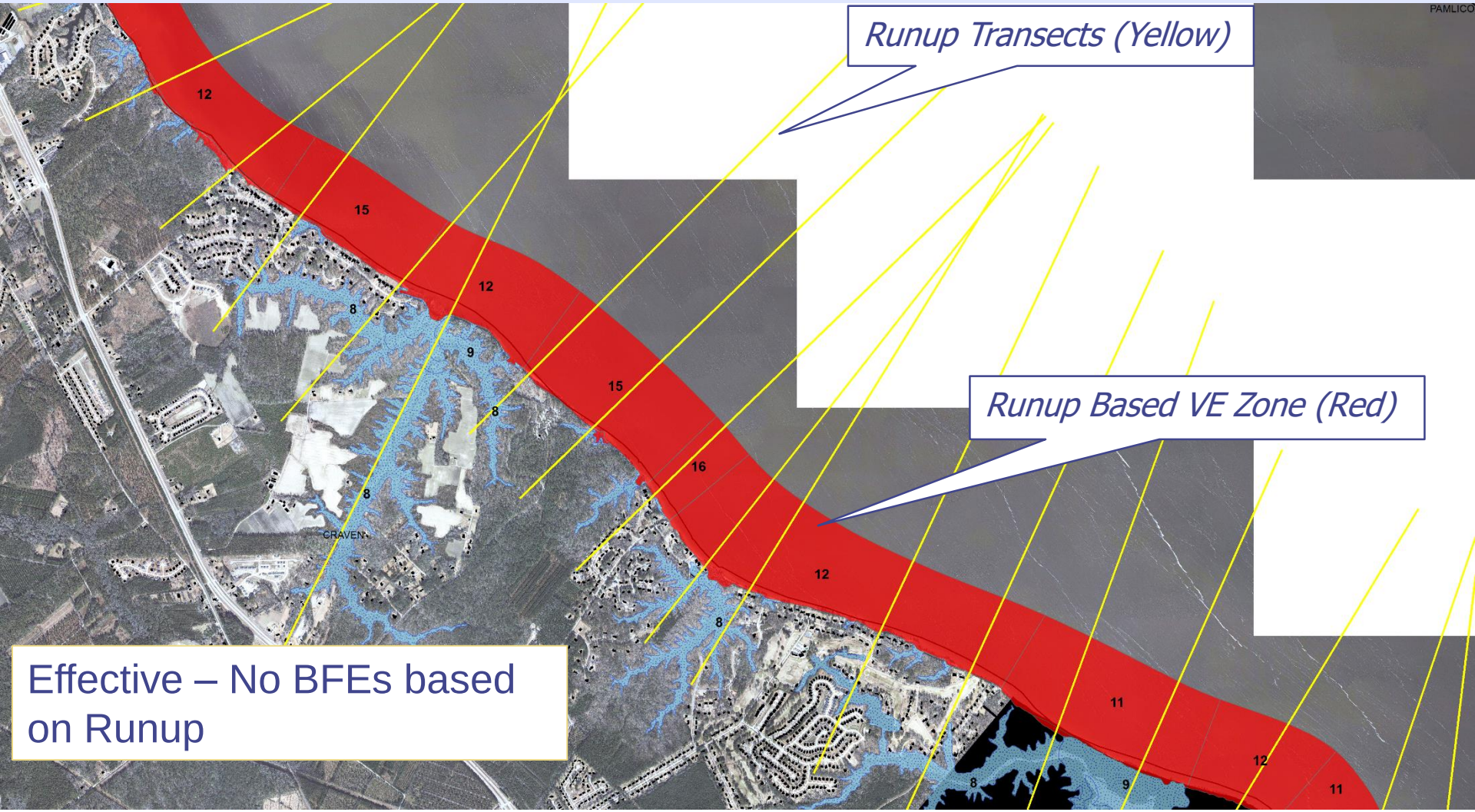


Transects

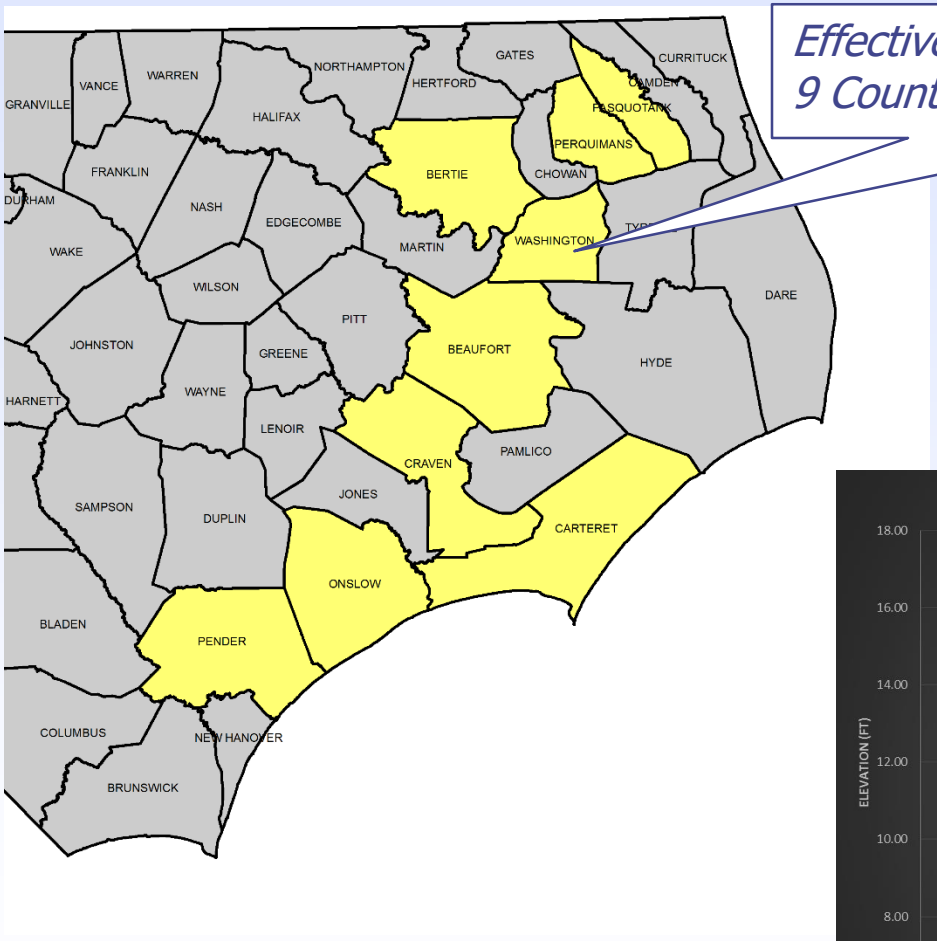
Effective - 67
New Studies – 192
(4 Counties)

Primary Frontal Dune Refinement

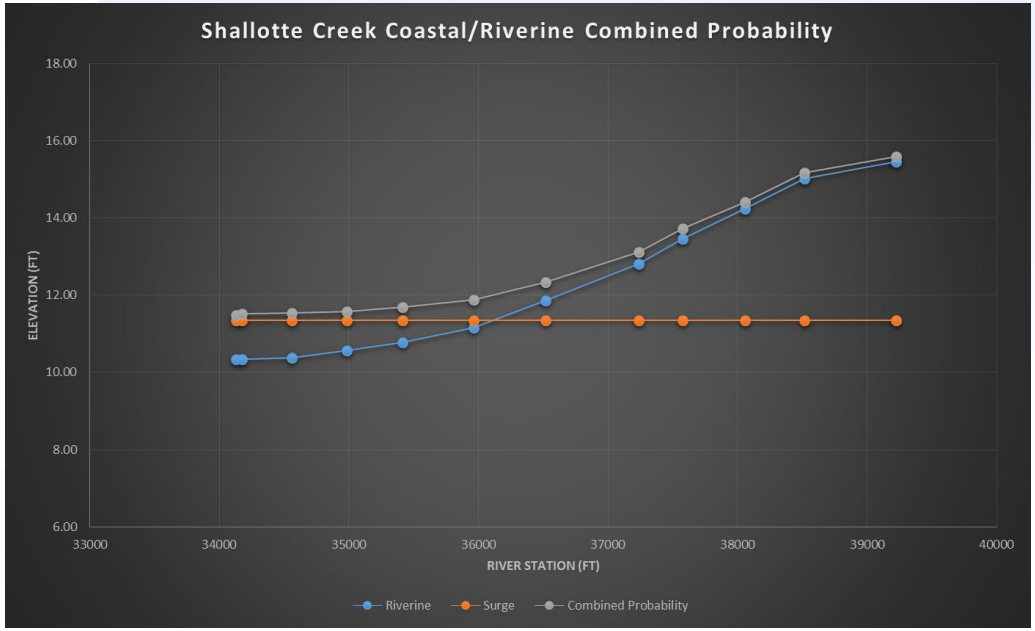
Wave Runup


Runup Transects (Yellow)
Runup Based VE Zone (Red)
Effective – No BFEs based on Runup
PAMLICO
CRAVEN
12
15
12
8
9
8
15
16
8
12
8
11
12
8
9
11

Coastal/Riverine Combined Probability

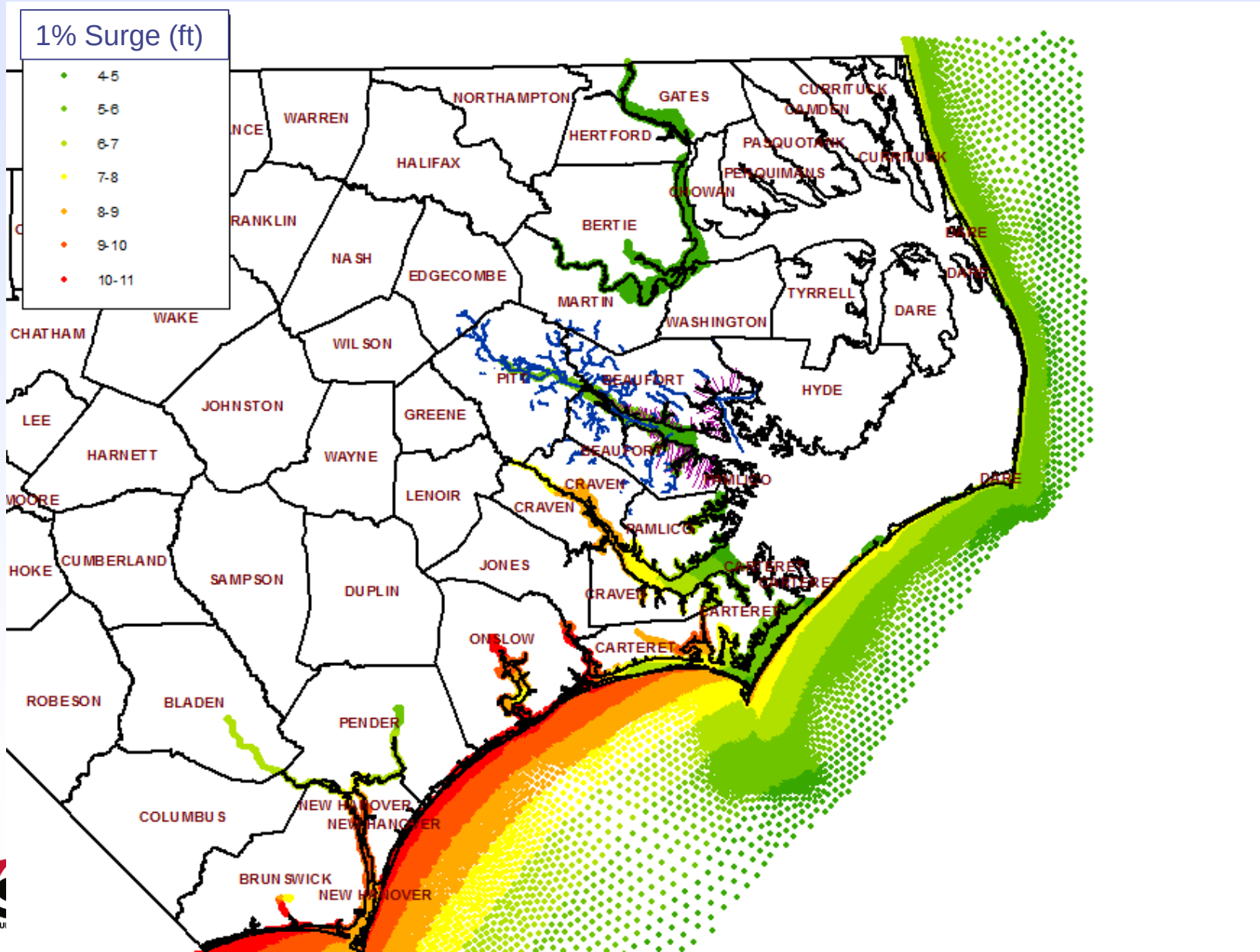


Effective Combined Probability (Yellow)
9 Counties

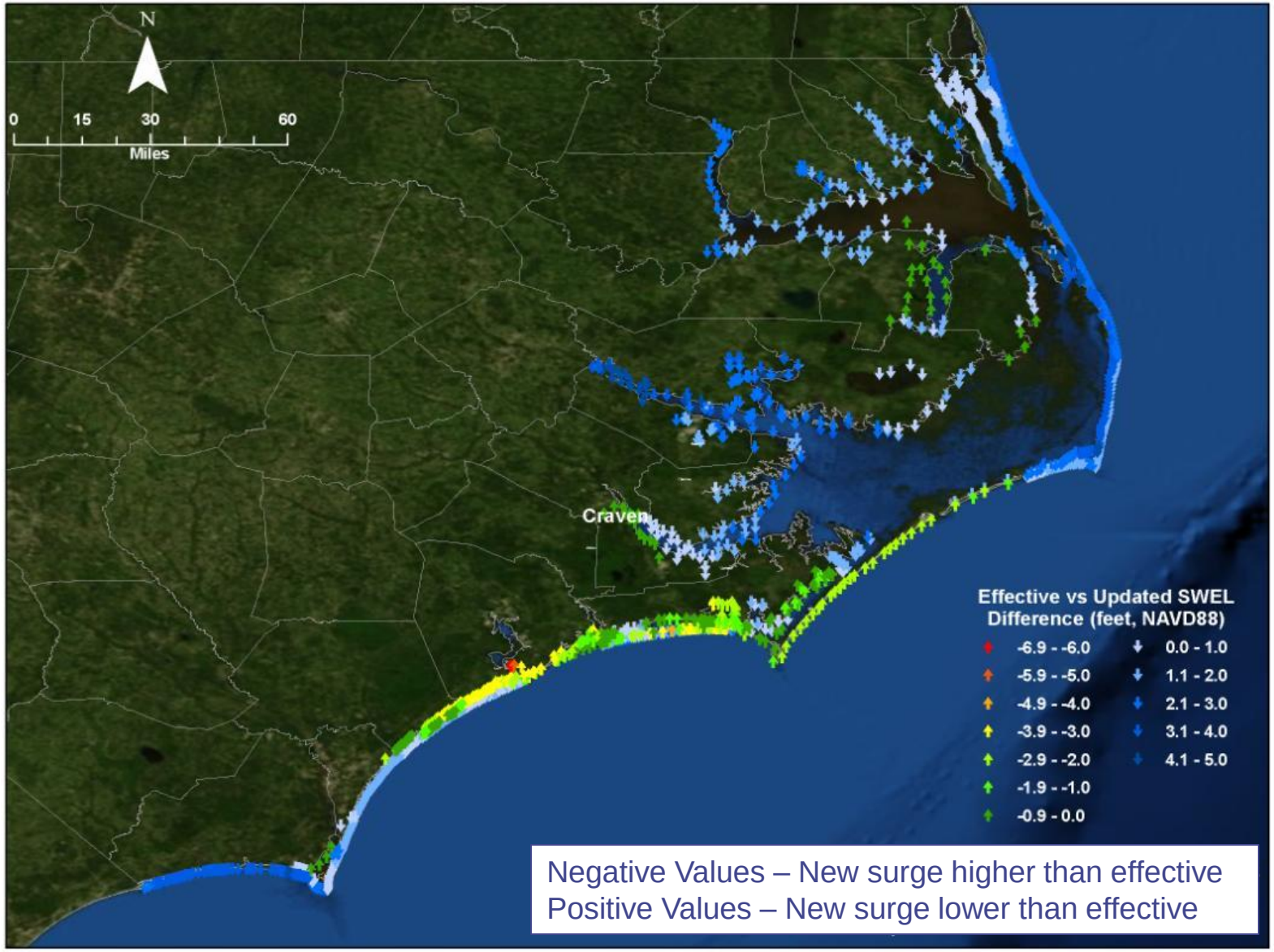


COASTAL FLOOD STUDY REVISION CHANGES

Statewide Surge Values

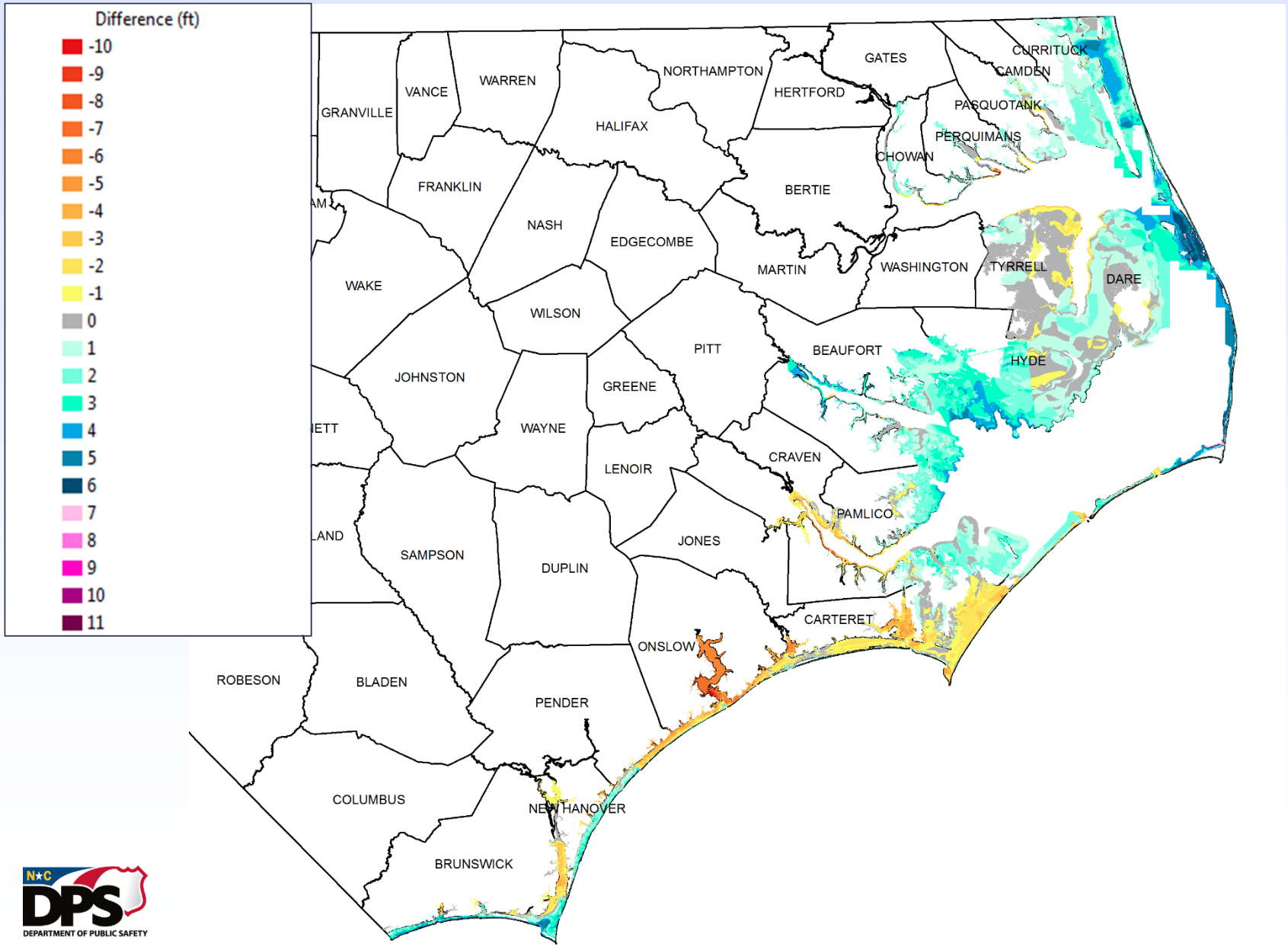


Statewide Surge Differences



Negative Values – New surge higher than effective
Positive Values – New surge lower than effective

Statewide Base Flood Elevation (BFE) Changes



Building and NFIP Policy Changes

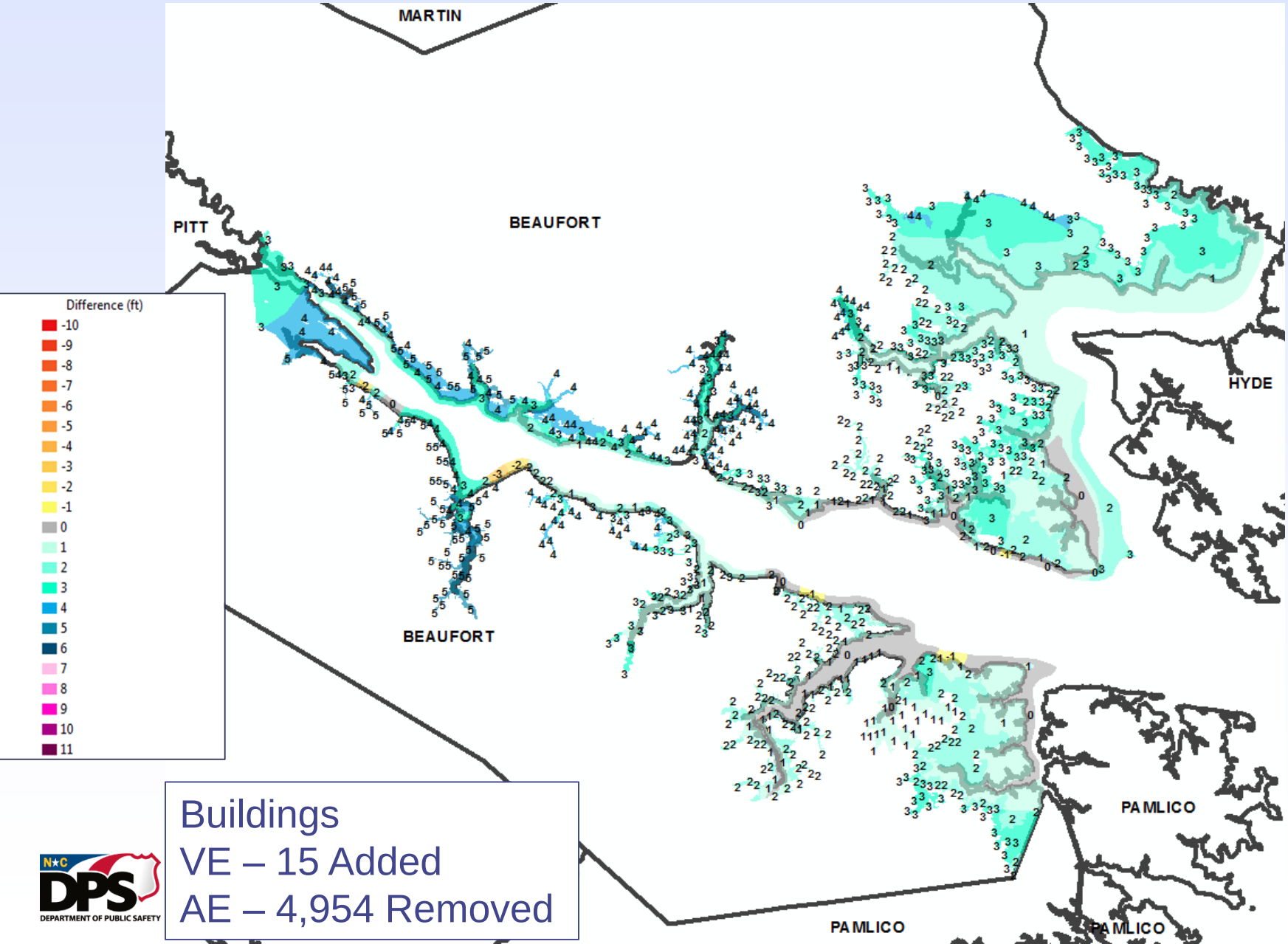
County	Buildings						NFIP Policies					
	V Zone			A Zone			V Zone			A Zone		
	Current	Updated	Changes	Current	Updated	Changes	Current	Updated	Changes	Current	Updated	Changes
Beaufort	-	15	15	11,003	6,049	(4,954)	-	-	-	3,746	2,053	(1,693)
Brunswick	6,468	1,438	(5,030)	7,610	10,971	3,361	5,368	856	(4,512)	5,094	8,079	2,985
Camden	-	-	-	2,418	1,430	(988)	-	-	-	731	389	(342)
Carteret	3,700	1,159	(2,541)	14,050	16,287	2,237	1,261	387	(874)	5,293	5,921	628
Chowan	-	1	1	828	460	(368)	-	1	1	178	91	(87)
Craven	-	77	77	7,662	8,386	724	-	21	21	2,115	2,159	44
Currituck	1,097	126	(971)	7,020	2,767	(4,253)	587	23	(564)	2,952	741	(2,211)
Dare	5,001	1,731	(3,270)	24,867	12,167	(12,700)	3,300	1,062	(2,238)	14,202	6,172	(8,030)
Hyde	27	-	(27)	6,636	5,432	(1,204)	3	-	(3)	1,355	1,077	(278)
Jones	-	-	-	352	381	29	-	-	-	53	54	1
New Hanover	2,869	1,429	(1,440)	7,600	9,724	2,124	2,108	913	(1,195)	4,405	5,427	1,022
Onslow	3,484	2,039	(1,445)	3,707	7,217	3,510	1,071	536	(535)	871	1,617	746
Pamlico	16	30	14	4,955	3,811	(1,144)	8	7	(1)	1,667	1,129	(538)
Pasquotank	-	-	-	6,754	3,816	(2,938)	-	-	-	2,025	985	(1,040)
Pender	1,953	1,686	(267)	4,953	5,870	917	1,099	820	(279)	1,923	2,358	435
Perquimans	-	2	2	1,610	706	(904)	-	-	-	299	100	(199)
Tyrrell	-	-	-	2,722	2,268	(454)	-	-	-	563	439	(124)
Totals	**24,615**	**9,733**	**(14,882)**	**114,747**	**97,742**	**(17,005)**	**14,805**	**4,626**	**(10,179)**	**47,472**	**38,791**	**(8,681)**

() - Indicates net reduction in building or policies in V or A Zone.

JUNE 30, 2016 SCHEDULED PRELIMINARY ISSUANCE – DRAFT DATA

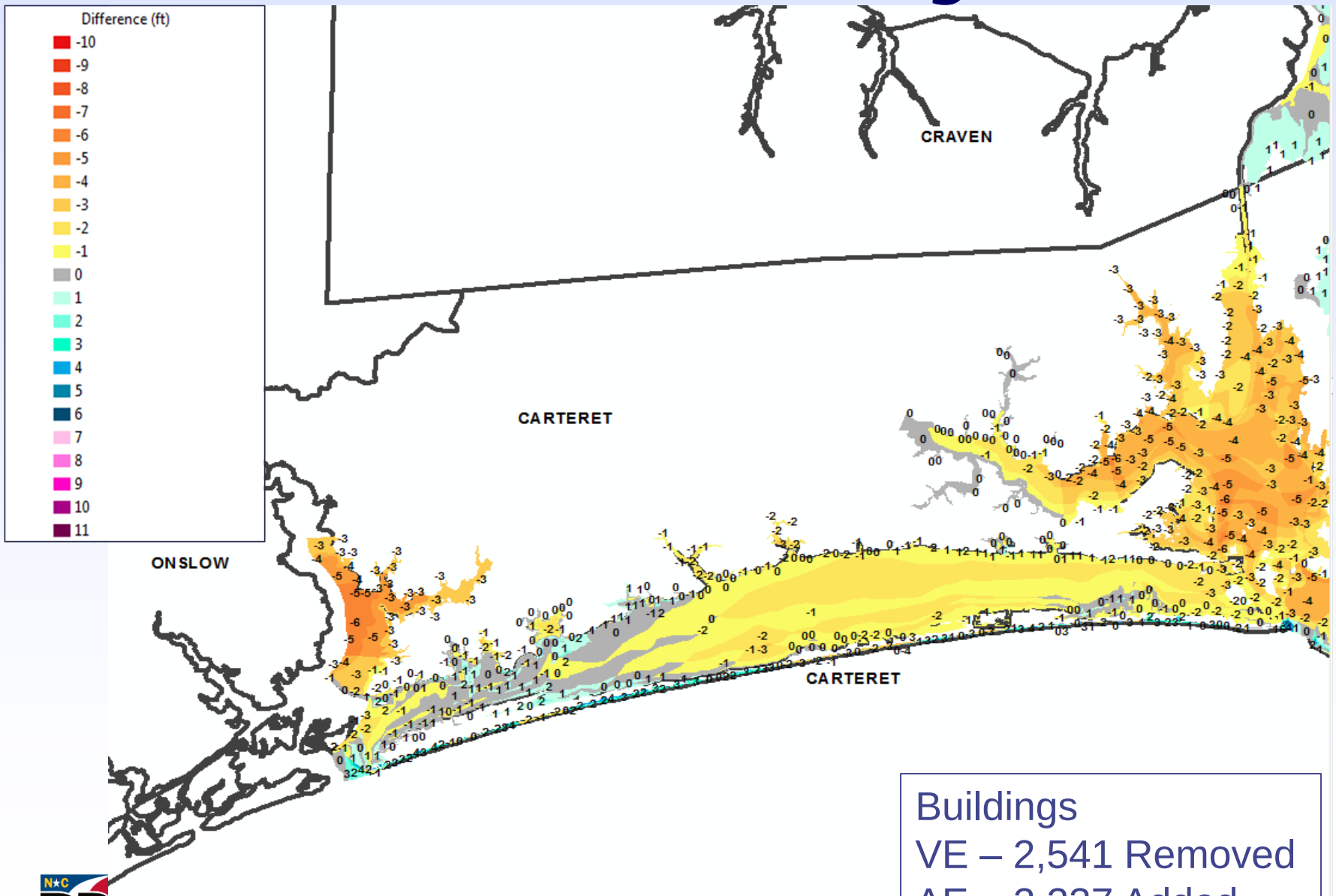
BEAUFORT, CARTERET, CRAVEN, DARE, HYDE, JONES, ONSLOW, PAMLICO, AND TYRRELL

Beaufort Co. Coastal Changes: BFEs



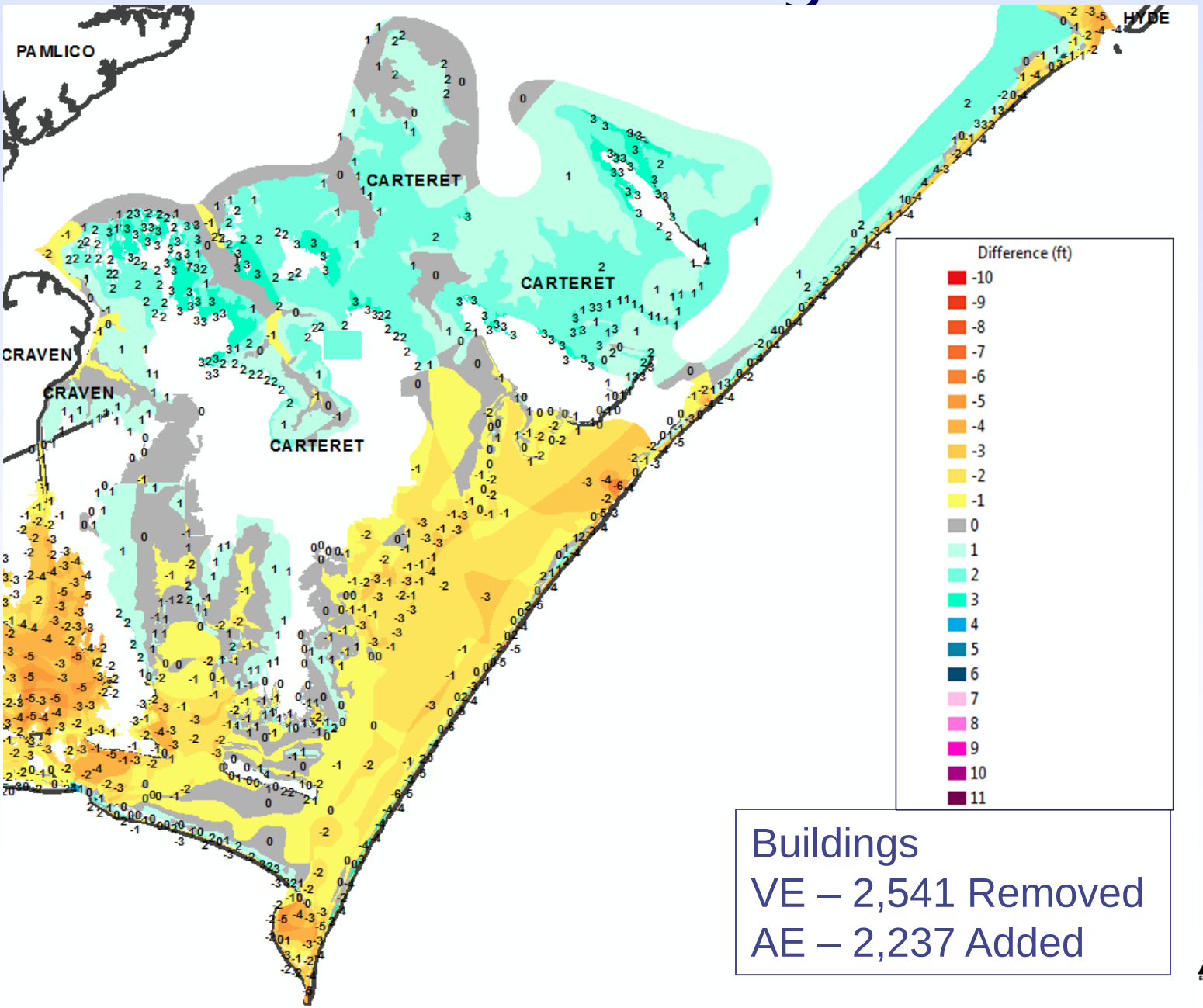
Buildings
VE – 15 Added
AE – 4,954 Removed

Carteret Co. Coastal Changes: BFEs



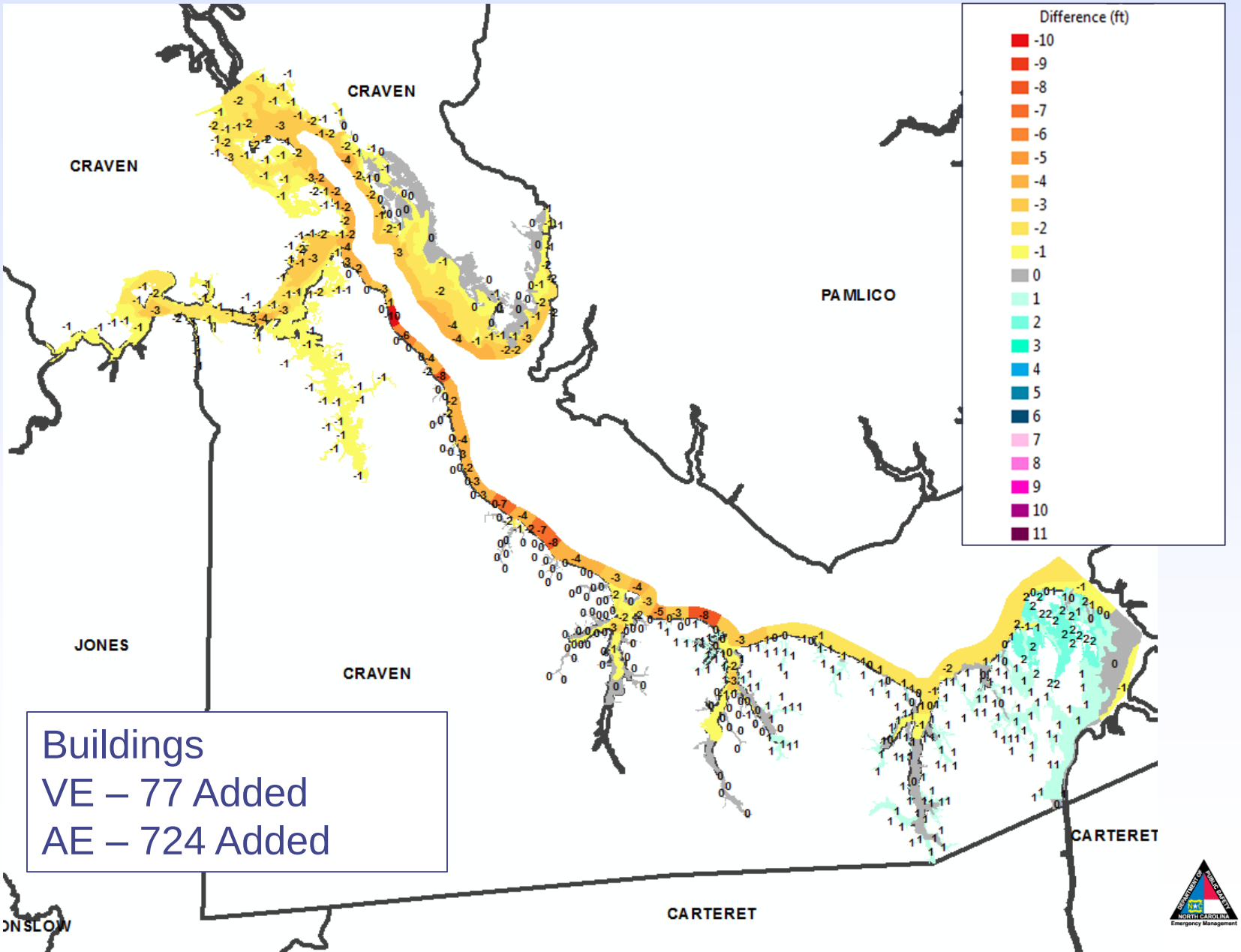
Buildings
VE – 2,541 Removed
AE – 2,237 Added

Carteret Co. Coastal Changes: BFEs



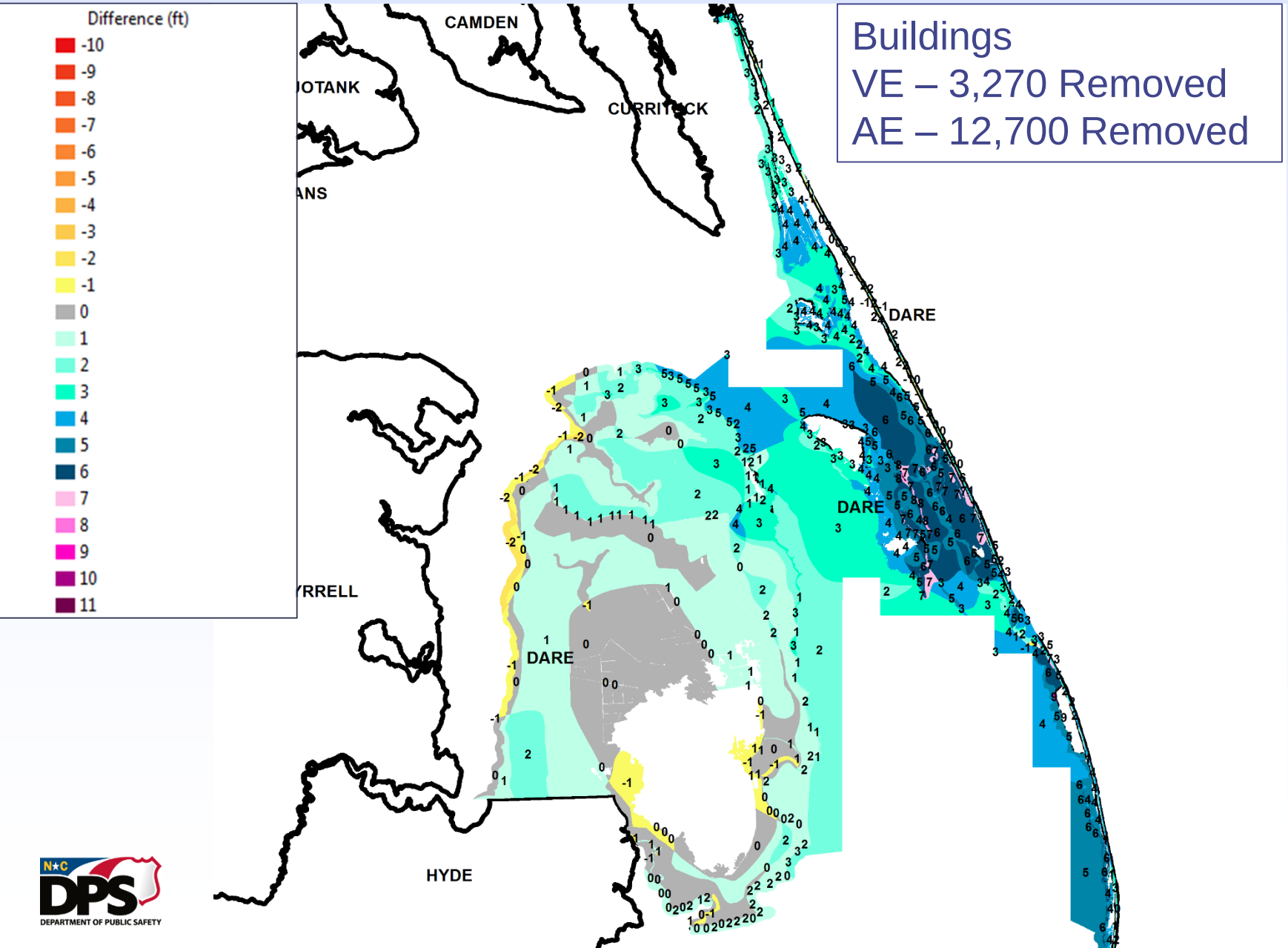
Buildings
VE – 2,541 Removed
AE – 2,237 Added

Craven Co. Coastal Changes: BFEs



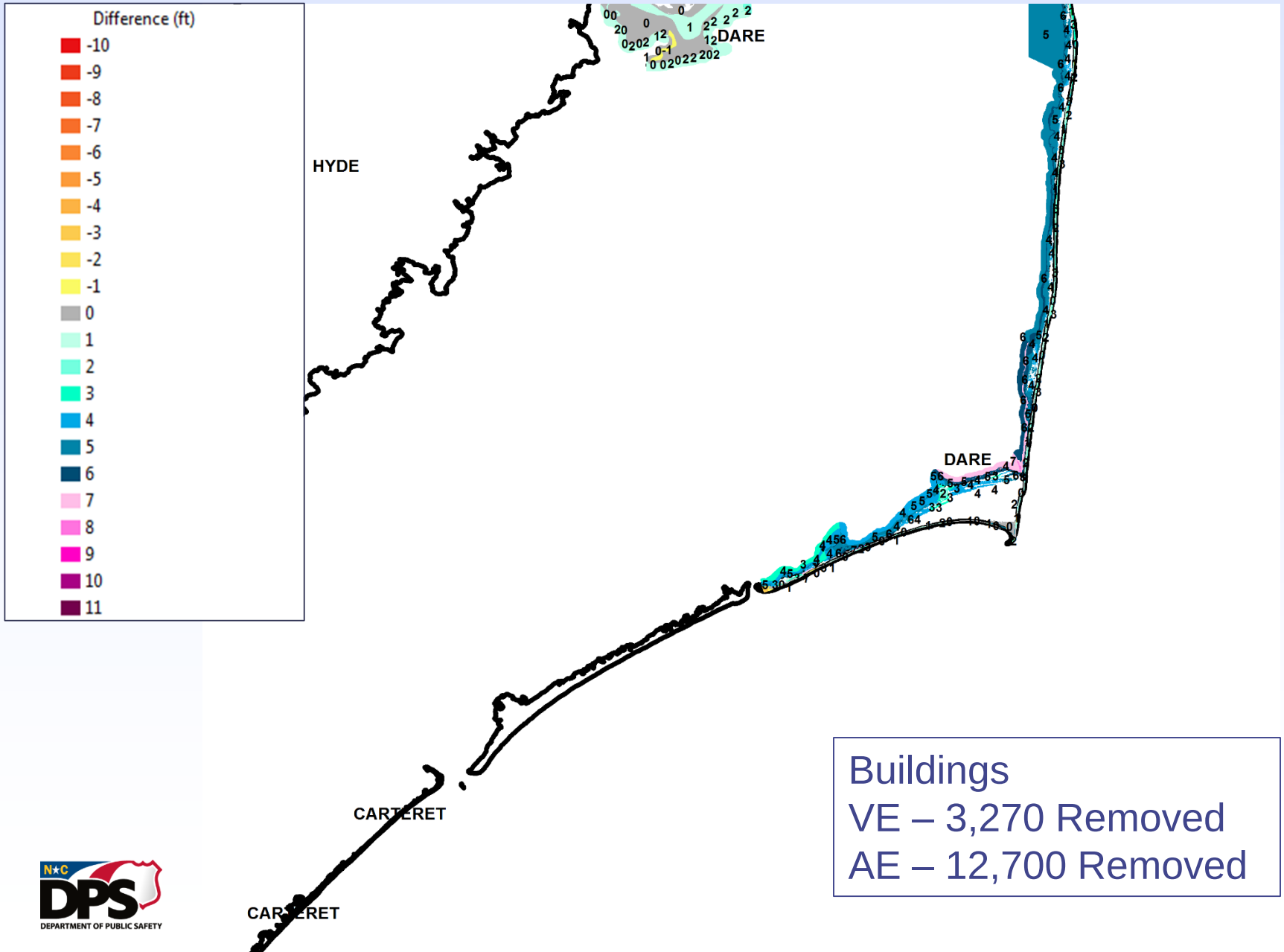
Buildings
VE – 77 Added
AE – 724 Added

Dare Co. Coastal Changes: BFEs



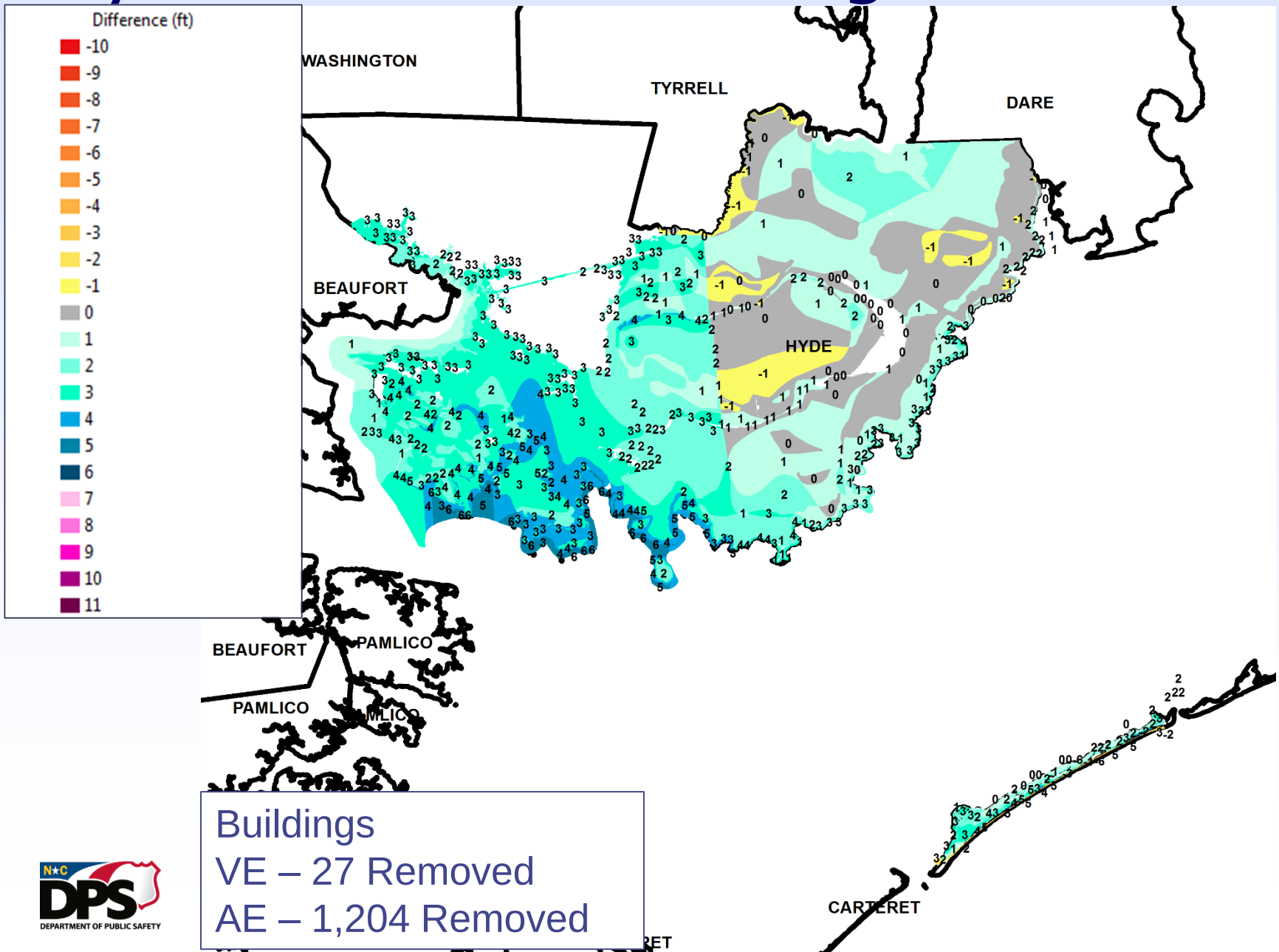
Buildings
VE – 3,270 Removed
AE – 12,700 Removed

Dare Co. Coastal Changes: BFEs



Buildings
VE – 3,270 Removed
AE – 12,700 Removed

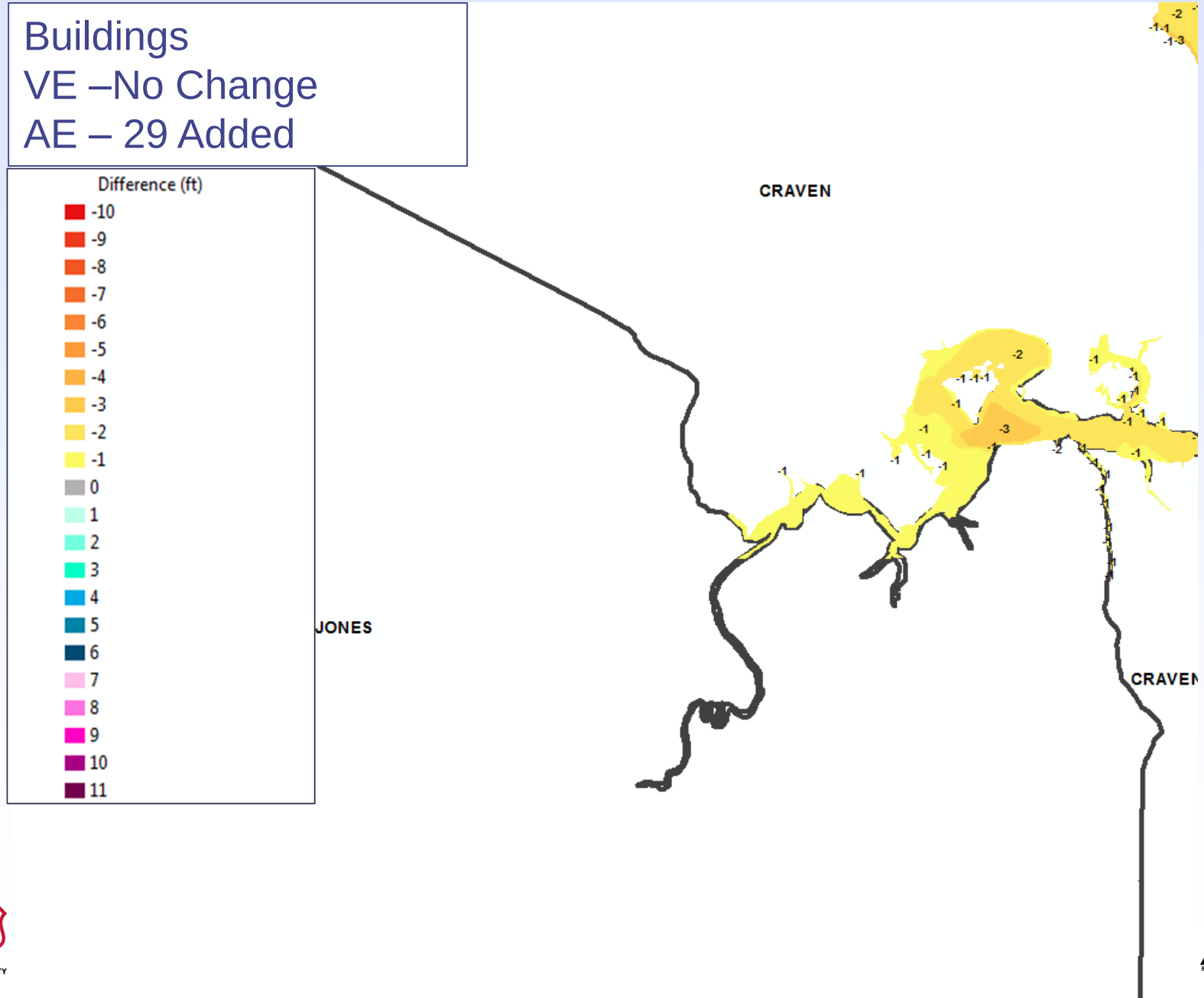
Hyde Co. Coastal Changes: BFEs



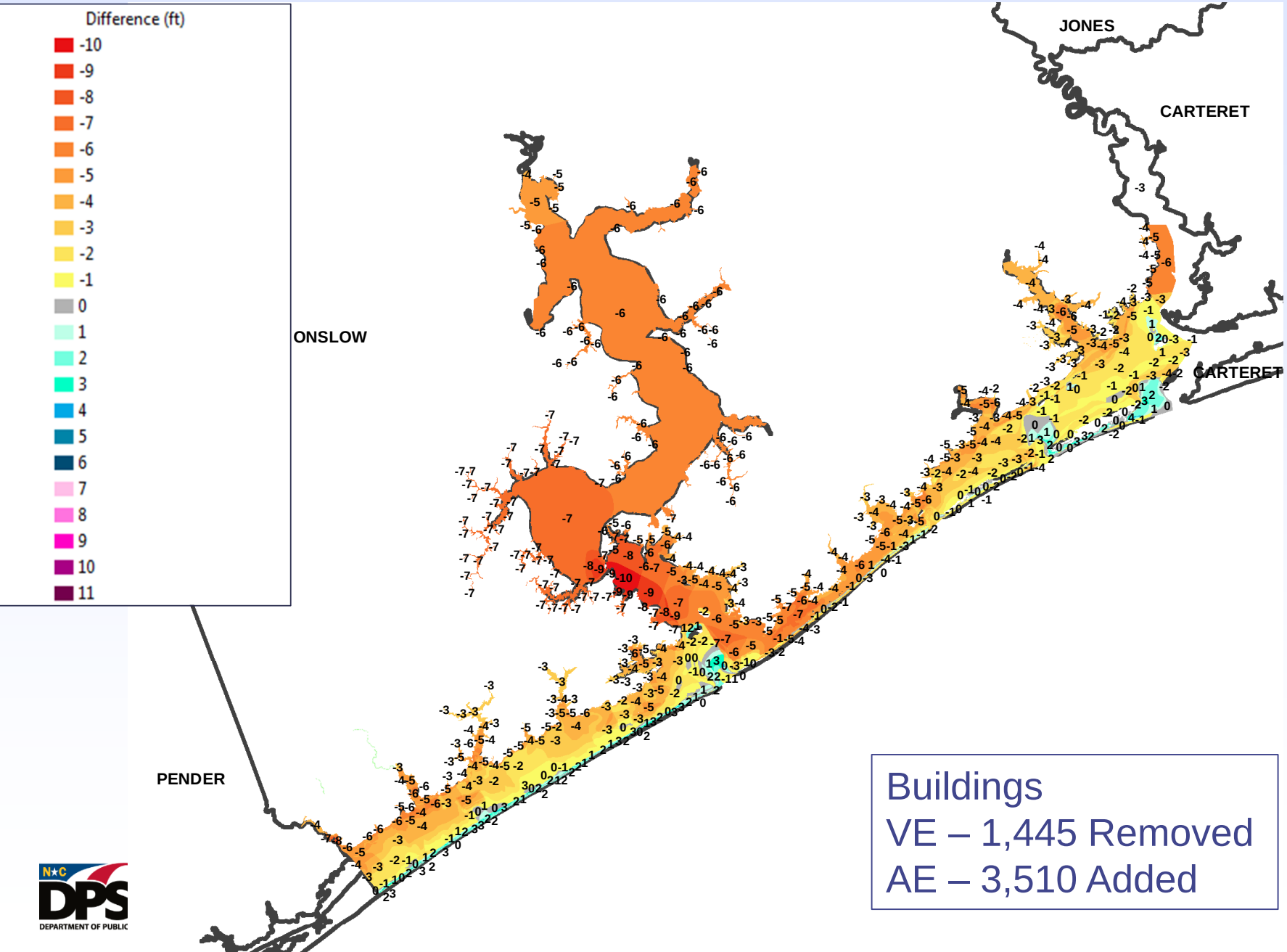
Buildings
VE – 27 Removed
AE – 1,204 Removed

Jones Co. Coastal Changes: BFEs

Buildings
VE –No Change
AE – 29 Added



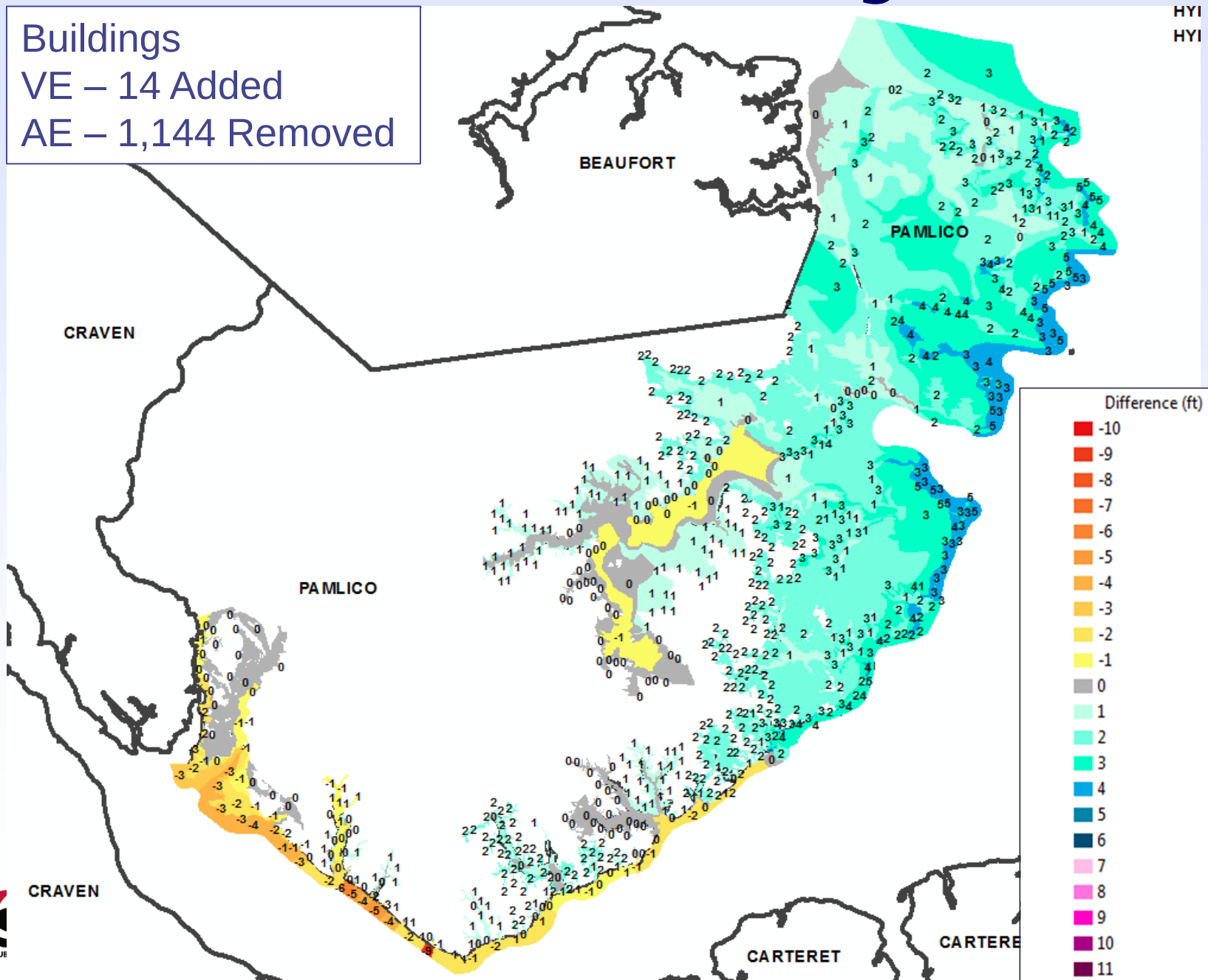
Onslow Co. Coastal Changes: BFEs



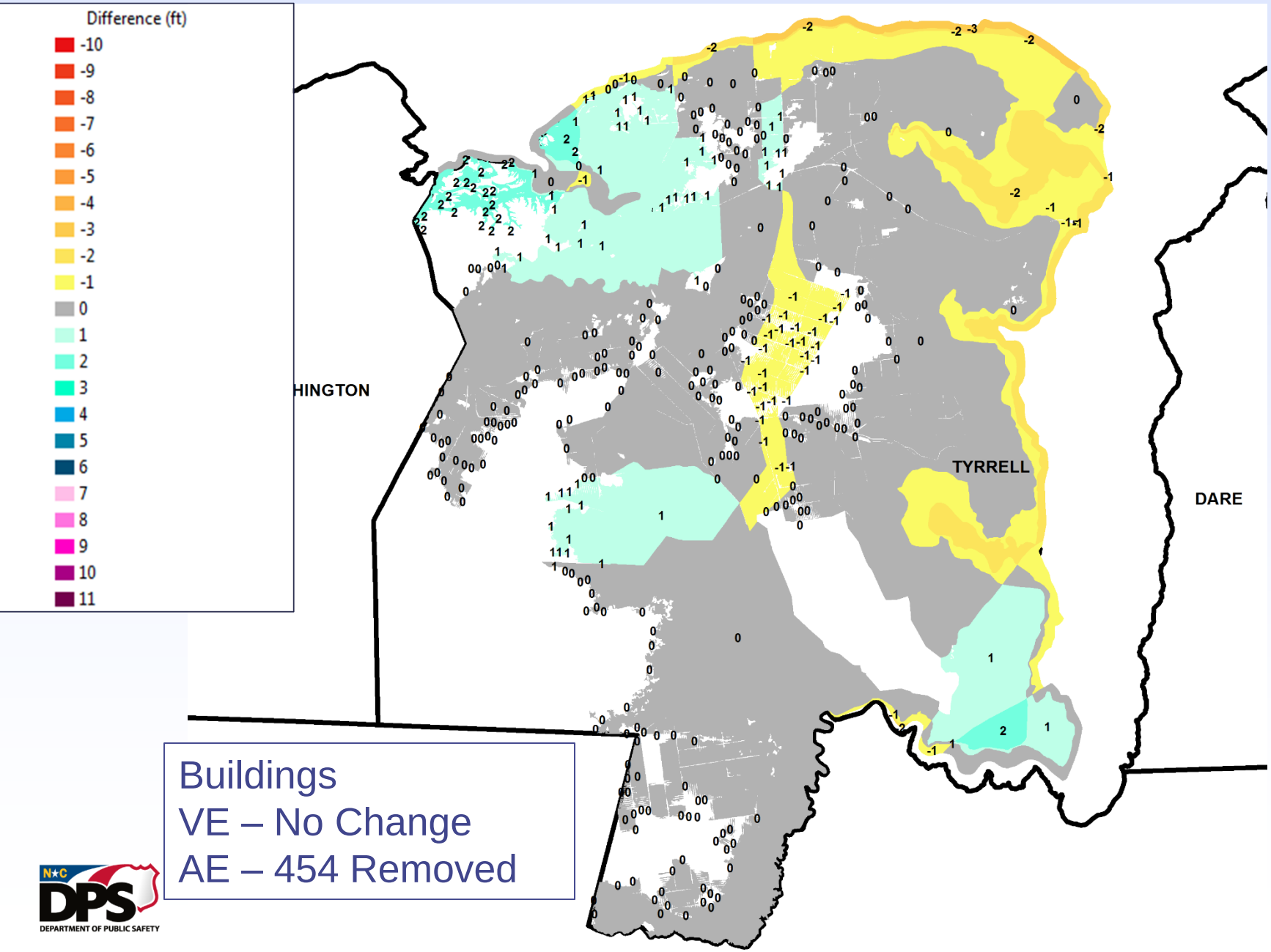
Buildings
VE – 1,445 Removed
AE – 3,510 Added

Pamlico Co. Coastal Changes: BFEs

Buildings
VE – 14 Added
AE – 1,144 Removed



Tyrrell Co. Coastal Changes: BFEs



Buildings
VE – No Change
AE – 454 Removed

POST-PRELIMINARY PROCESSING

- Preliminary panels are issued
  - Federal Register Notification (& 30 day comment period)
  - 2 notices in local newspaper
- 90-day Appeal/Protest Period
  - Educational/Open House Meeting(s)
- Resolution of Appeals and Protests
- Resiliency Meeting: tie-in Risk data with Mitigation Plans
- The 6-month Compliance Period
  - Letter of Final Determination from FEMA
  - Map Adoption and Update of Flood Damage Prevention Ordinance

IMPORTANT DATES

- Preliminary Issuance: June 30, 2016
  - Beaufort County
  - Carteret County
  - Craven County
  - Dare County
  - Hyde County
  - Jones County
  - Onslow County
  - Pamlico County
  - Tyrrell County

- Next Preliminary Issuance: Late 2016
  - Bertie County
  - Martin County
  - Washington County

QUESTIONS?

Contact Information

NC Division of Emergency Management
Risk Management Office
Floodplain Mapping Program
www.ncfloodmaps.com

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FEMA MAP ASSISTANCE CENTER
FMAC
1- 877- FEMA MAP

Federal Emergency Management Agency
1-877-FEMA-MAP
http://www.fema.gov/plan/prevent/fhm/fmc_main.shtm

POST-PRELIMINARY STATUS:
Brunswick, New Hanover, and Pender, and Counties

- Preliminary flood hazard data (FIS/FIRM) released: **August 29, 2014**
- 90-Day Appeal/Protest Period: **Ended January 26, 2016**
- Meetings with Public Officials: **Held in fall of 2014**
- Public Participation Meeting: **Held in fall of 2015**
  - Opportunity for public to view, comment on, and ask questions about the new flood hazard data
- Revised Preliminary Panels: **(tent.) Fall 2016 (w/ 30-day comment)**
- Letter of Final Determination: **TBD; estimate winter 2016- '17 for issuance ;** FEMA determines flood hazard data is official for flood insurance rating and floodplain management applications
- Effective Data (for Insurance Rating): **Summer 2017 (estimate)**

POST-PRELIMINARY STATUS: Camden, Chowan, Currituck, Pasqoutank, and Perquimans Counties

- Preliminary flood hazard data (FIS/FIRM) released: **November 30, 2015**
- 90-Day Appeal/Protest Period: **PENDING; EXPECT SUMMER 2016**
- Meetings with Public Officials: **NOVEMBER 17, 2015**
- Public Participation Meeting: **APRIL 19, 20, 21, 2016**
  - Opportunity for public to view, comment on, and ask questions about the new flood hazard data
- Revised Preliminary Panels: **UNKNOWN (DEPENDENT ON APPEALS)**
- Letter of Final Determination: **TBD; estimate winter 2016- '17 for issuance ;** FEMA determines flood hazard data is official for flood insurance rating and floodplain management applications
- Effective Data (for Insurance Rating): **Summer 2017 (estimate)**

Effective and Update Study Comparison

	Effective	New Coastal Studies
Storm Surge and Nearshore Waves		
Surge Model	FEMA Surge	ADCIRC/SWAN
Nearshore Wave Model	None	SWAN
Surge Study Completion Year	1980	2010
Topo/Bathy Data Sources	USGS quad sheets, NOAA nautical charts and aerial photos.	NC LiDAR data and numberous bathymetric sources
Average Near Shore GRID (Effective)/Mesh (New) Spacing (ft)	6076 (Dare is 12,152)	200-500
Wave Setup Method	Empirical	Hydrodynamic (ADCIRC/SWAN)
Wave Setup Extents	Open Coast Only	19 Counties
Surge Water Level Statistical Method	JPM - JMP/EST (Dare/Currituck)	Combined JPM/EST
Overland Wave Analysis Data		
Overland Wave Analysis	9 Counties	19 Counties
Number of WHAFIS Transects	783	2,739
Reverse WHAFIS Transects	67	192
Runup Contributes to Regulatory BFEs	No	Yes

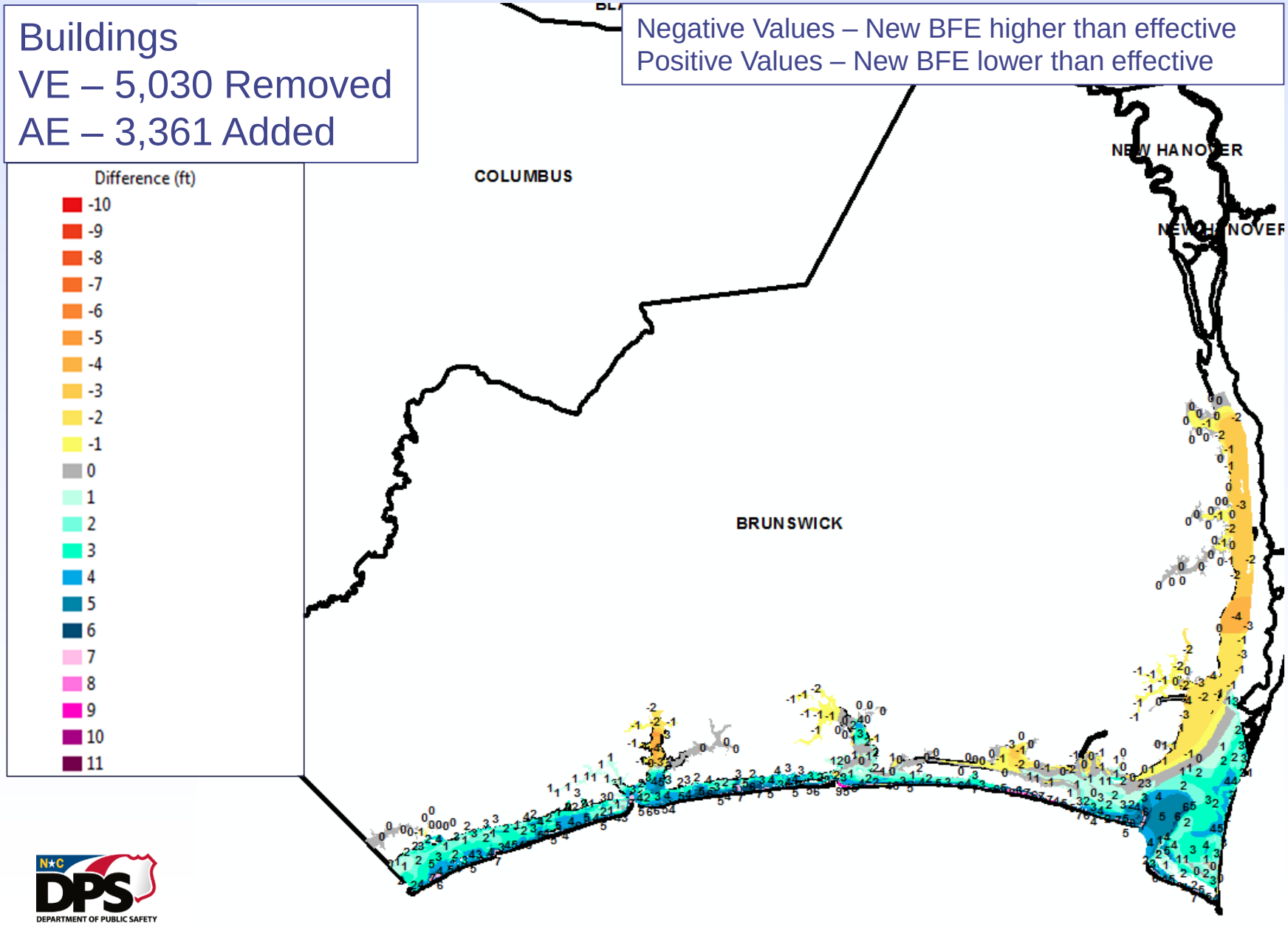
AUGUST 30, 2014
PRELIMINARY ISSUANCE

BRUNSWICK, PENDER AND NEW HANOVER

Brunswick County Changes: BFEs

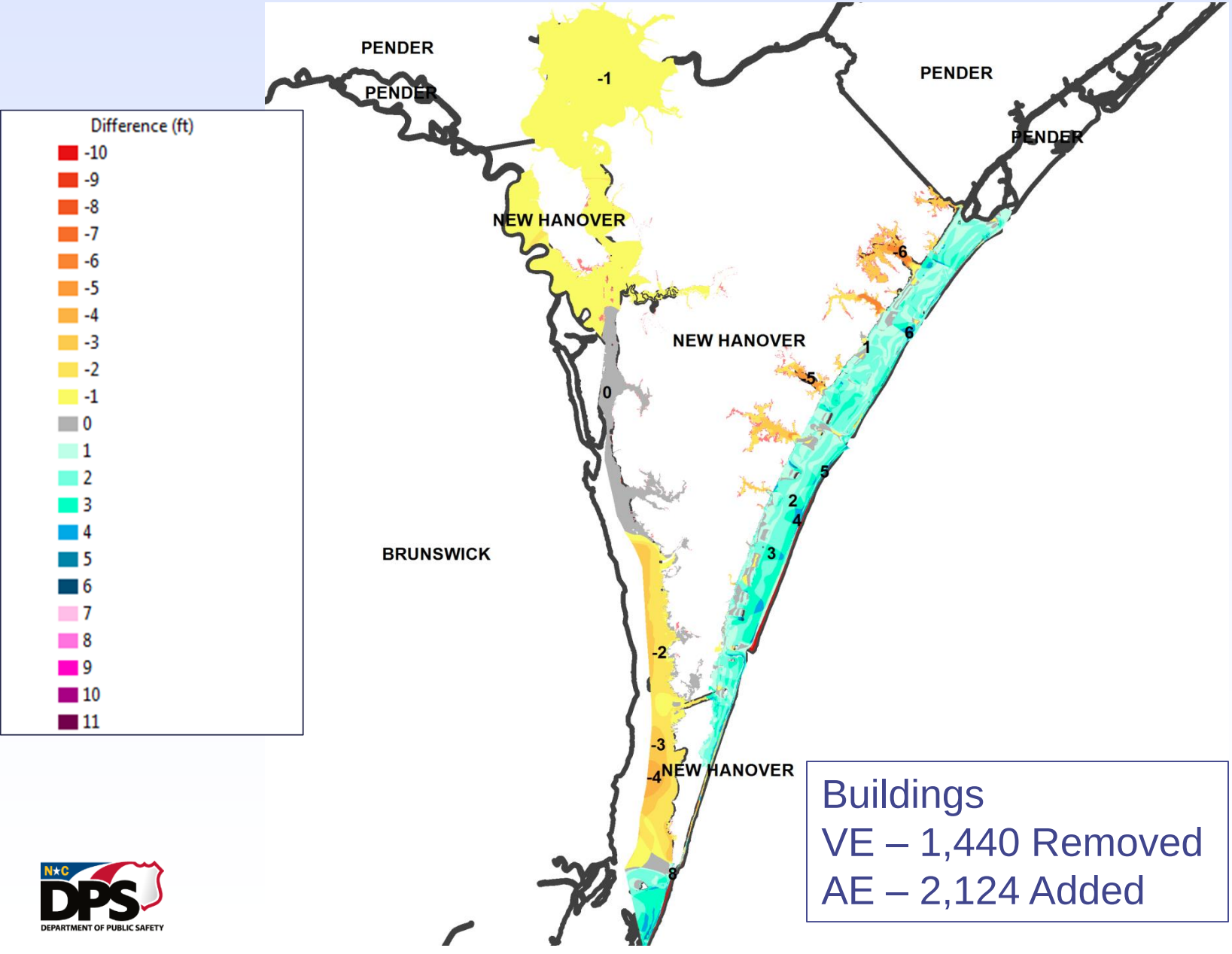
Buildings
VE – 5,030 Removed
AE – 3,361 Added

Negative Values – New BFE higher than effective
Positive Values – New BFE lower than effective



DEPARTMENT OF PUBLIC SAFETY

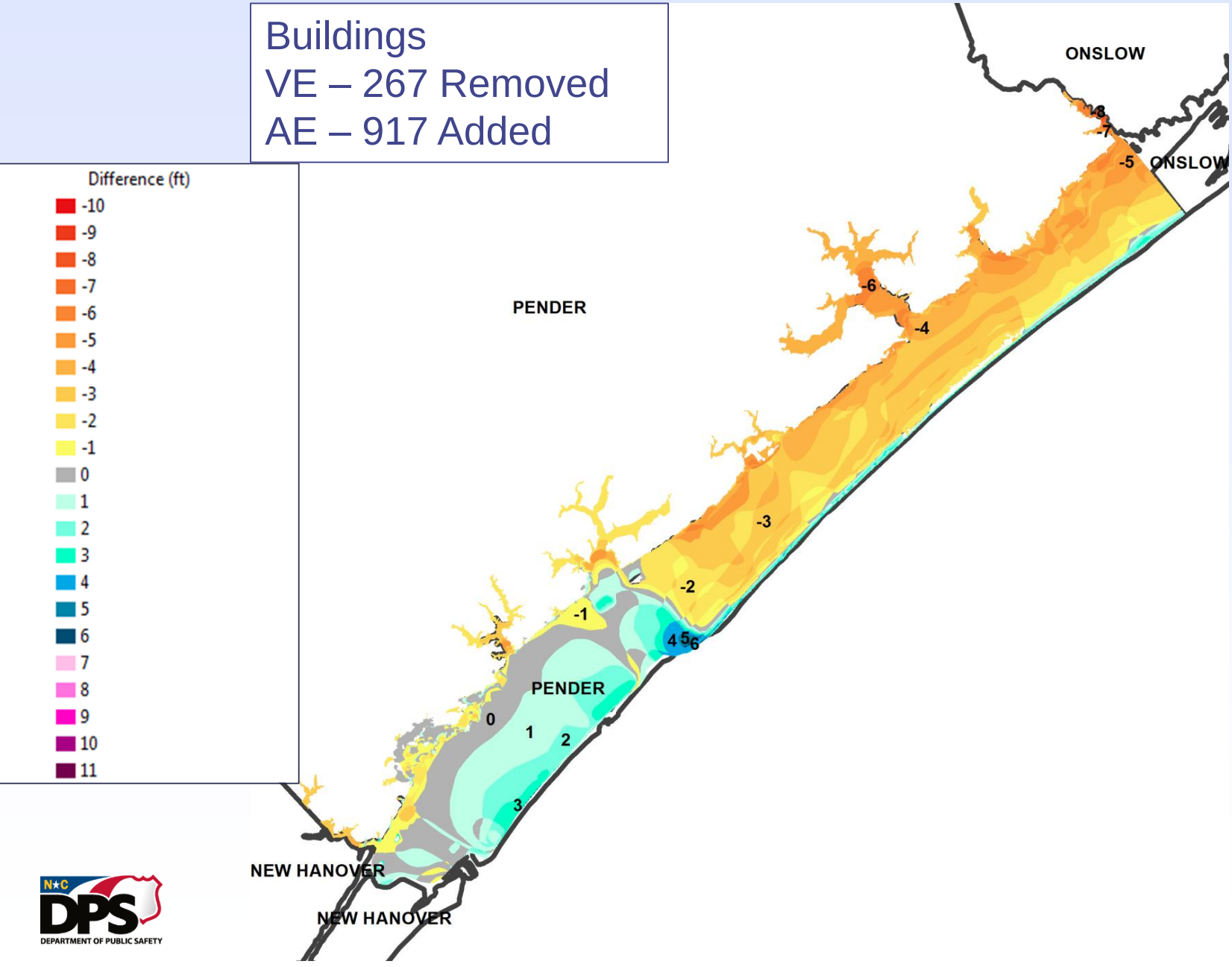
New Hanover County Changes: BFEs



Buildings
VE – 1,440 Removed
AE – 2,124 Added

Pender County Changes: BFEs

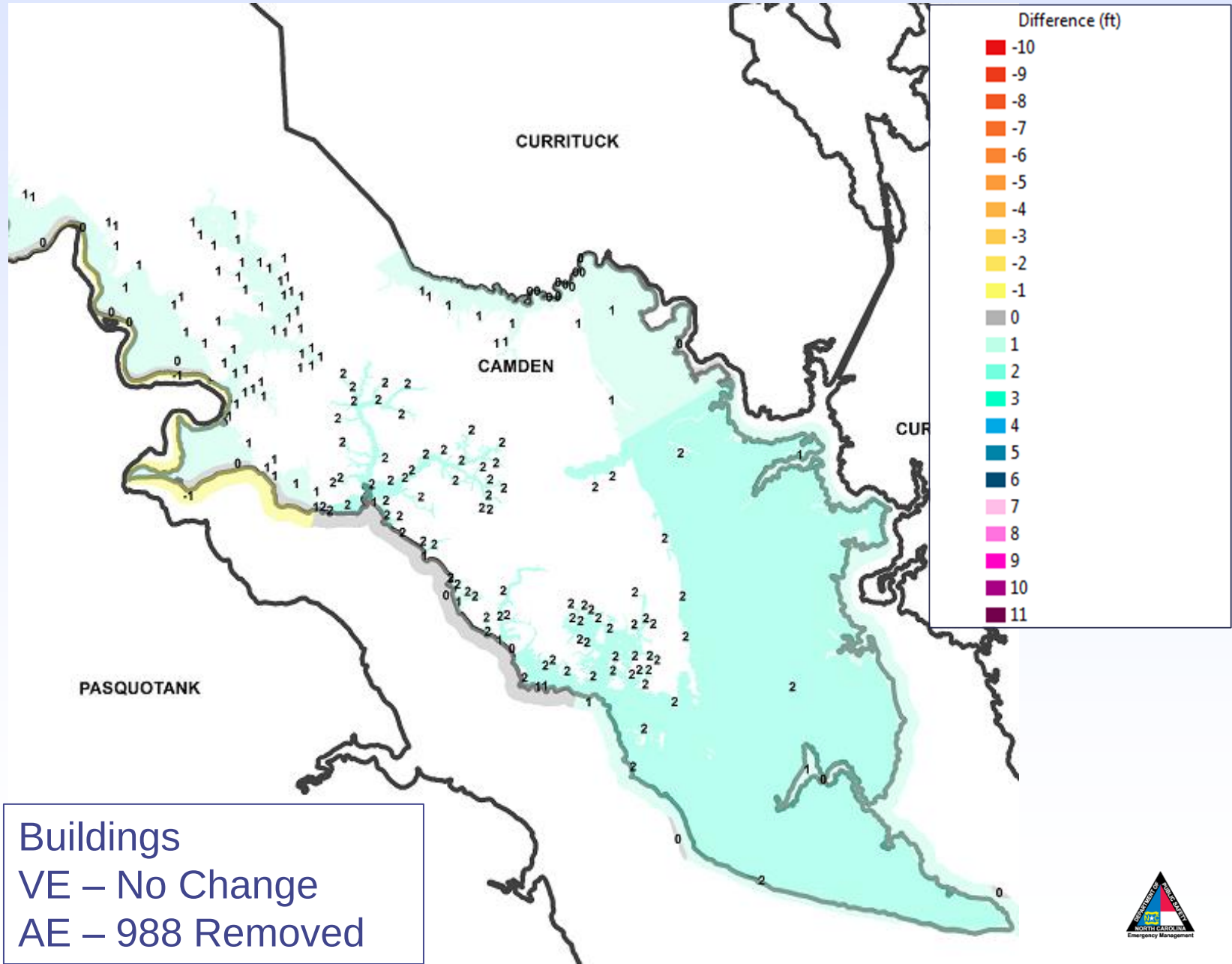
Buildings
VE – 267 Removed
AE – 917 Added



NOVEMBER 30, 2015
PRELIMINARY ISSUANCE

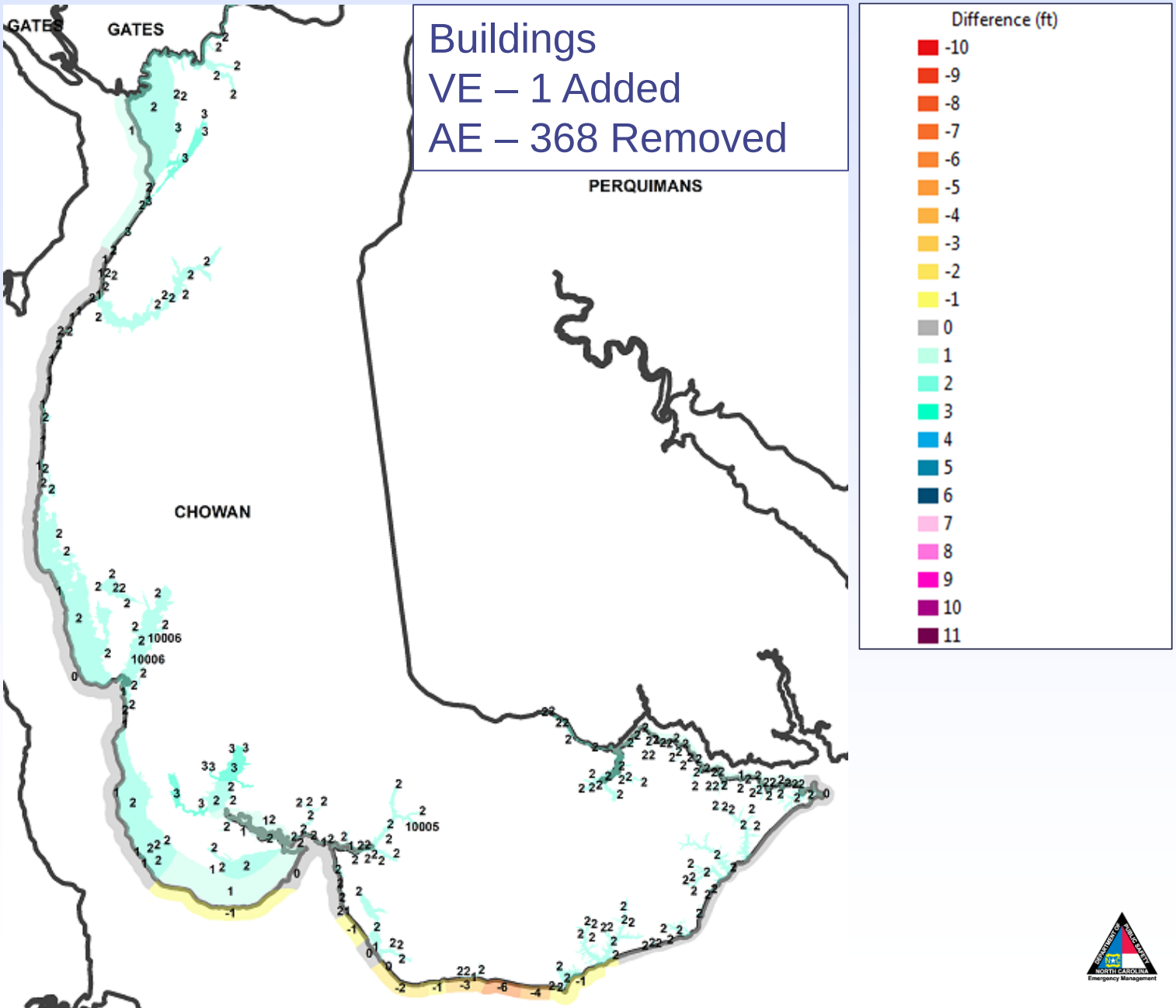
CAMDEN, CHOWAN, CURRITUCK, PASQUOTANK, AND PERQUIMANS

Camden County Changes: BFEs

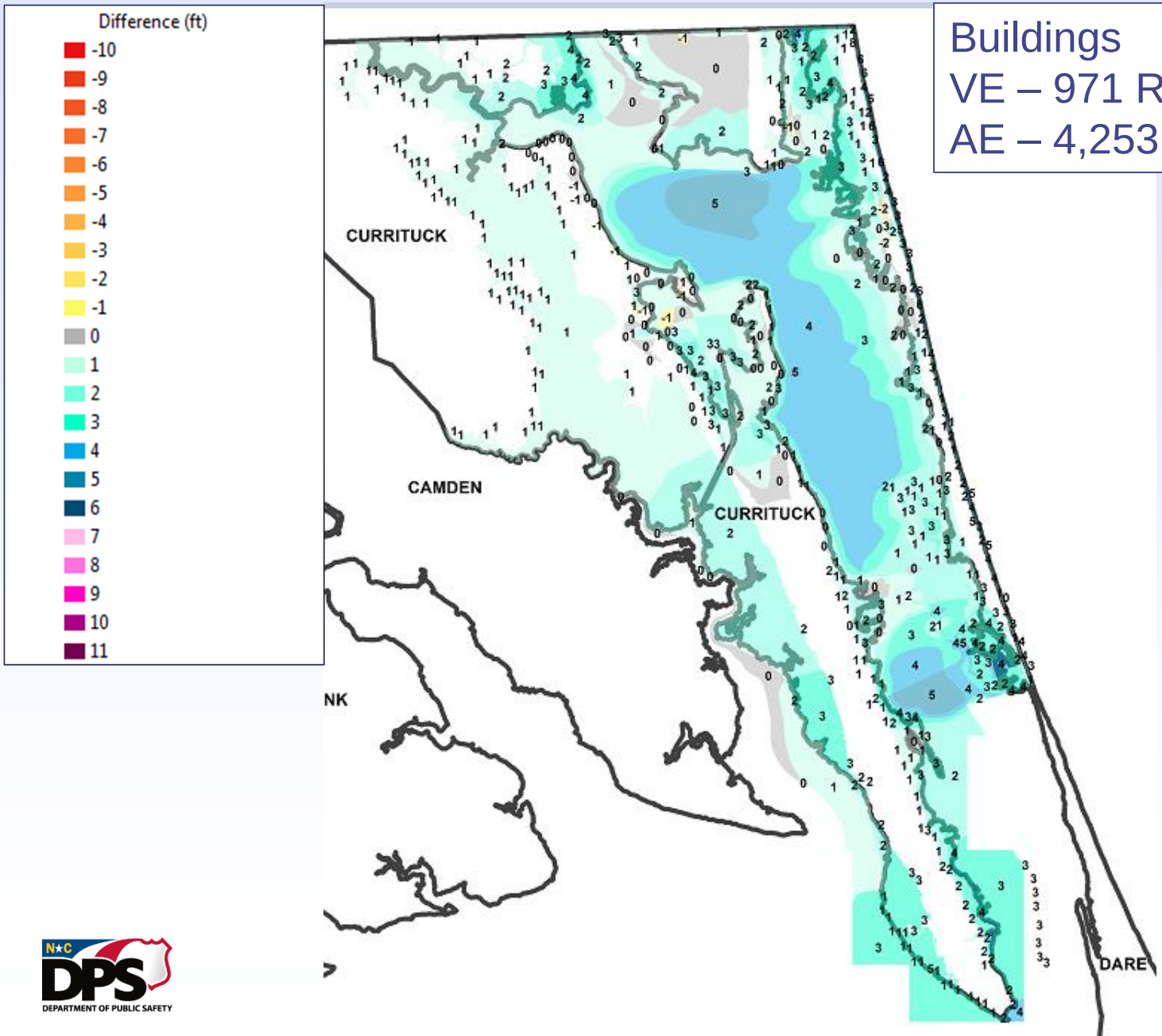


Buildings
VE – No Change
AE – 988 Removed

Chowan County Changes: BFEs

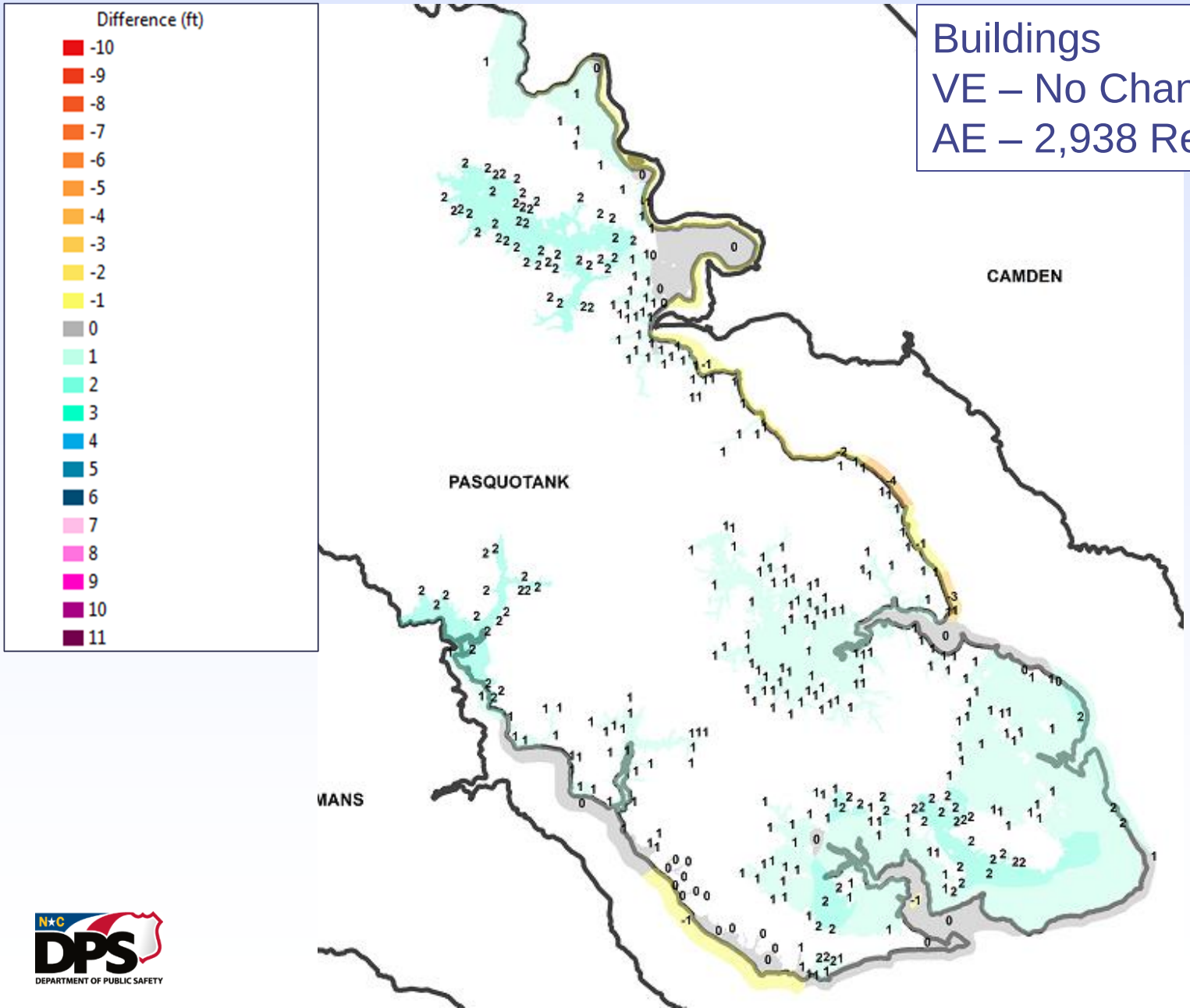


Currituck County Changes: BFEs



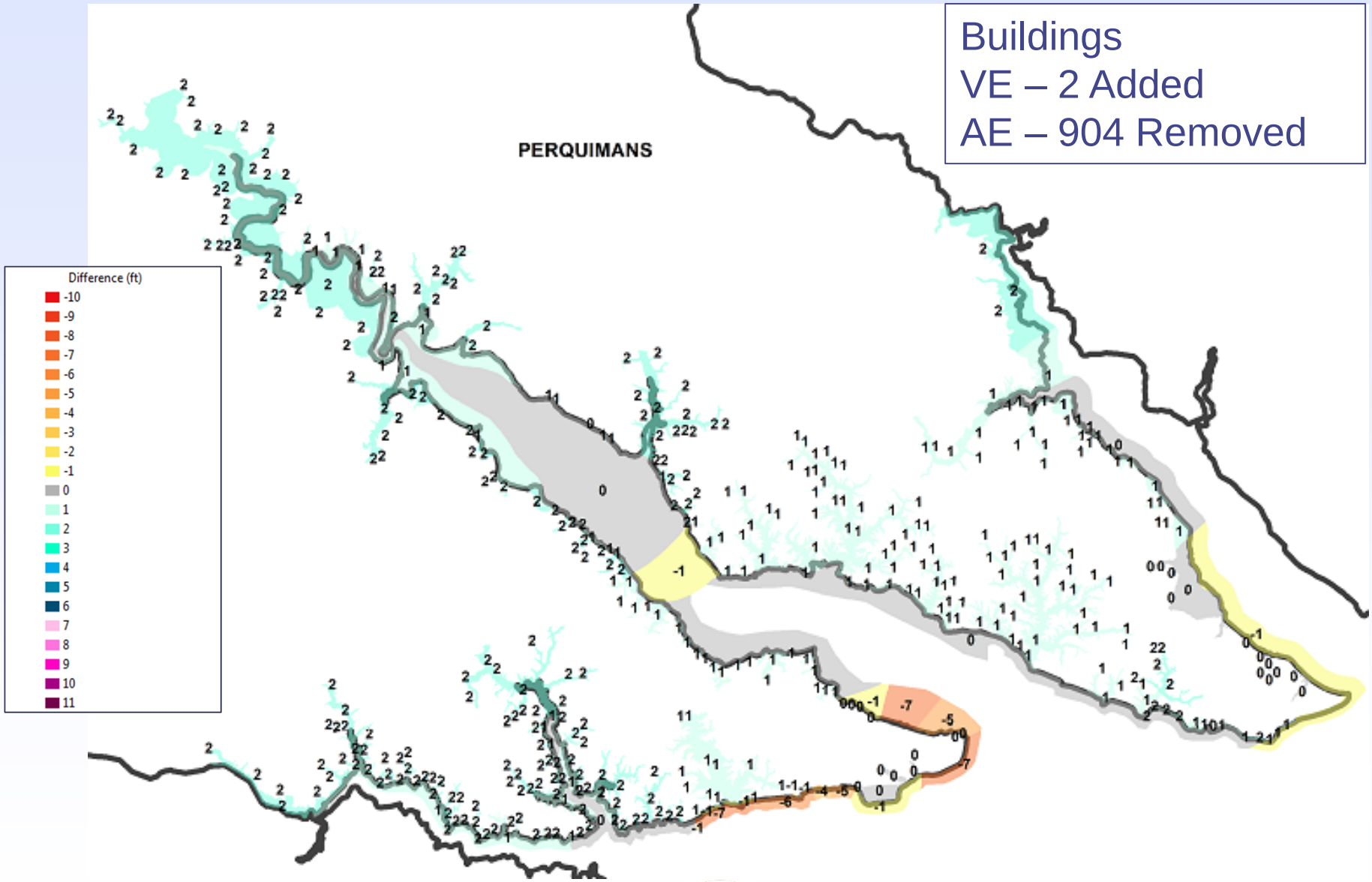
Buildings
VE – 971 Removed
AE – 4,253 Removed

Pasquotank Co. Changes: BFEs



Buildings
VE – No Change
AE – 2,938 Removed

Perquimans Co. Changes: BFEs



Buildings
VE – 2 Added
AE – 904 Removed

Why the Coastal Flood Risk Study is Being Updated?

- Current surge analysis is from the early-1980's
- New climatological data based on recent storms
- Computing Resources updates since 1980's
- Updated coastal hazard methodologies and modeling (LIMWA, PFD and 2% Runup)
- Updated elevation data and imagery
- Improvement in GIS technologies, improves coastal mapping accuracy
- Absence of effective overland wave analyses for some Counties