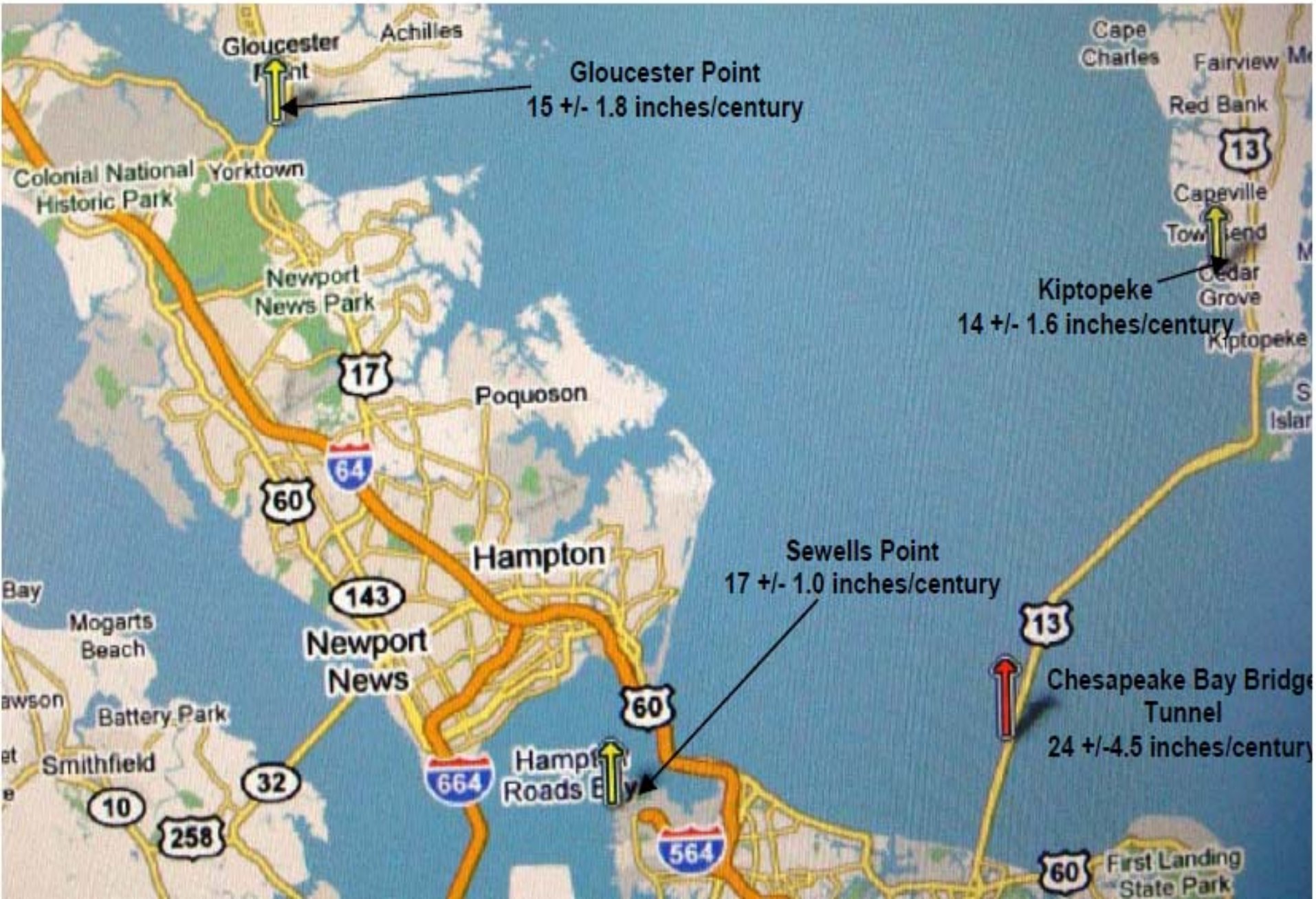
Our Regional "Water Problem" A Very Quick Look

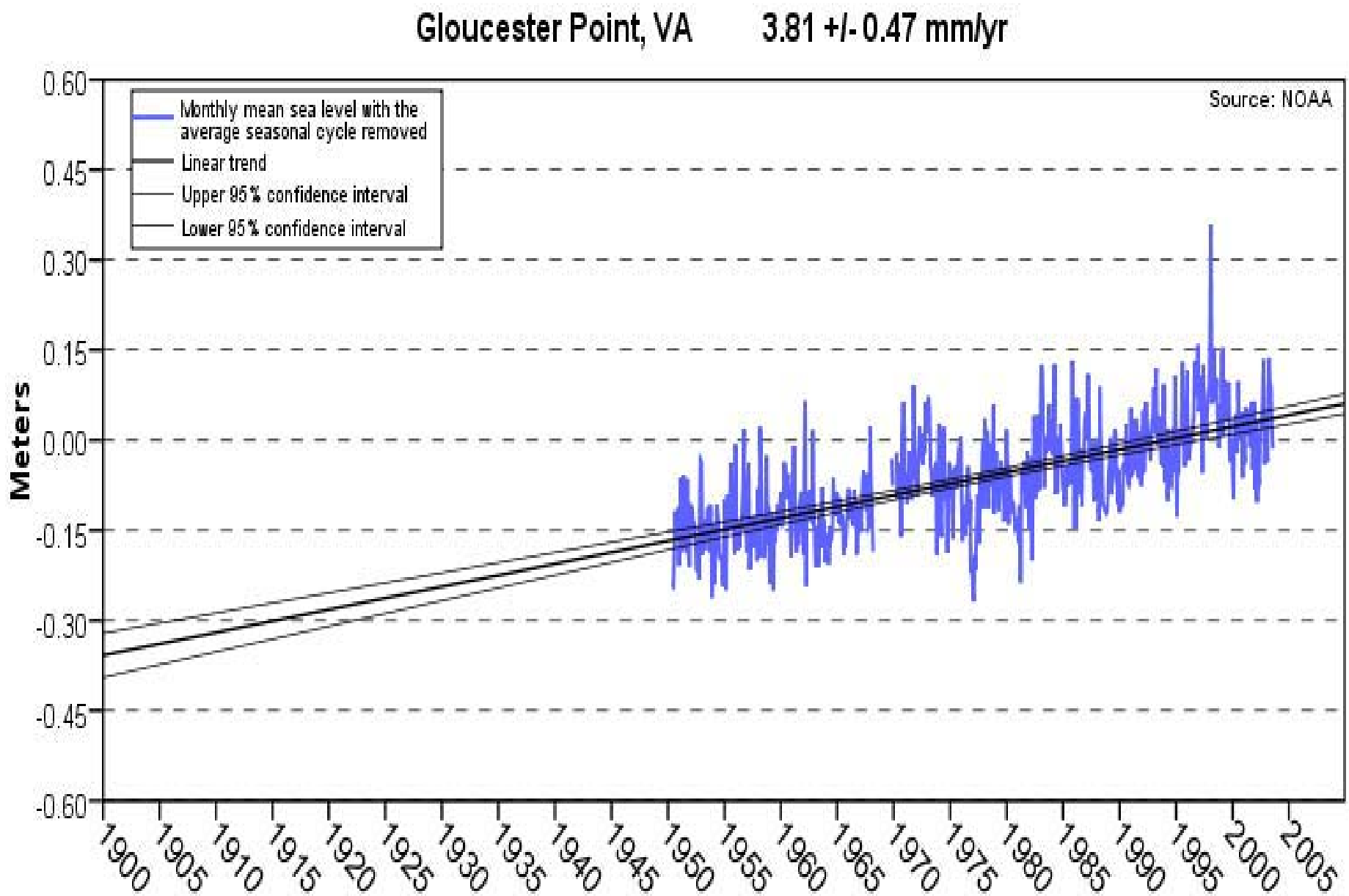
James V. Koch

21 July 2010

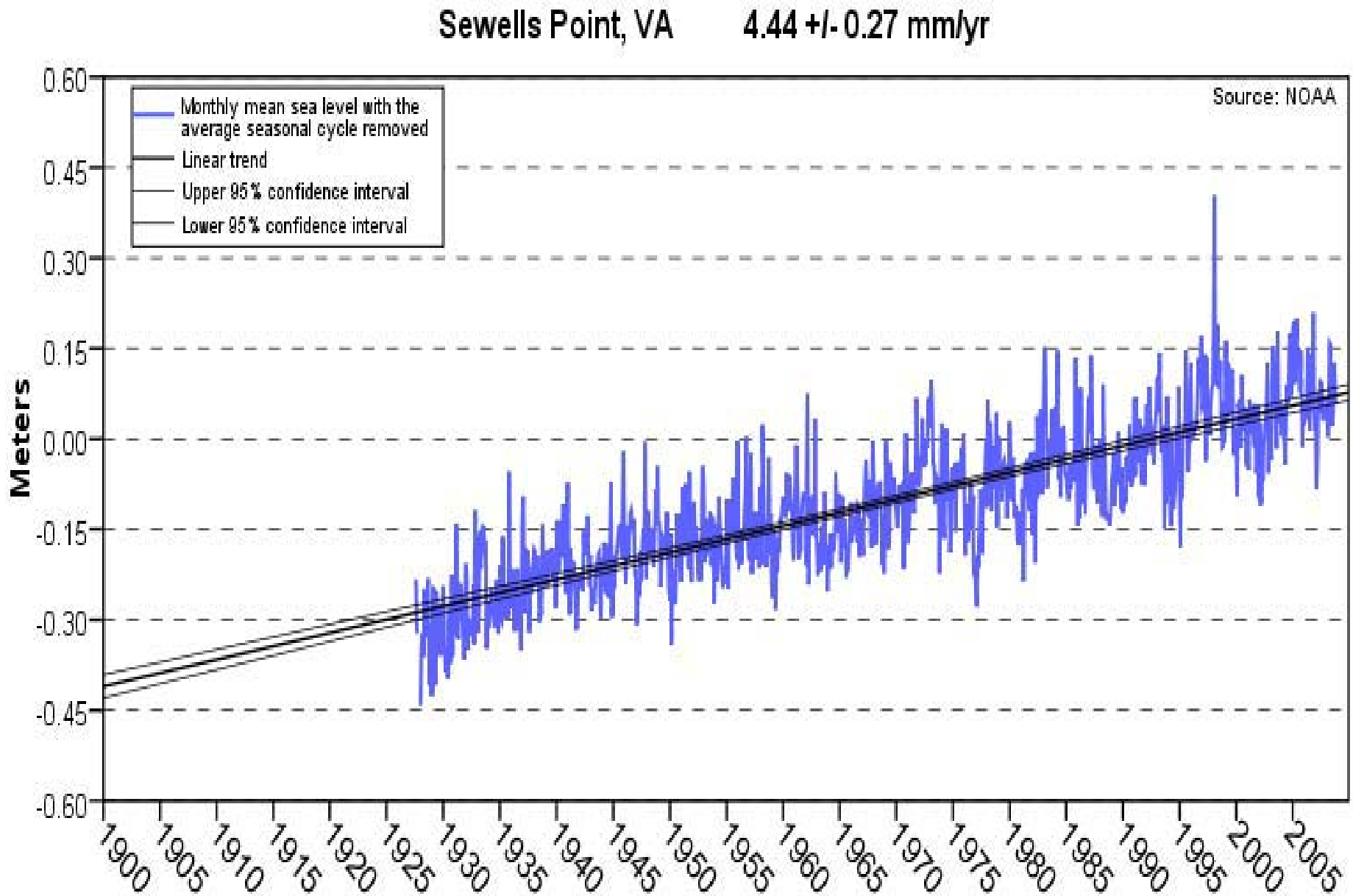
Trends, Regional Tidal Gauges, 1900-2008



Tidal Gauge, Gloucester Point, 1900-2008



Tidal Gauge, Sewell's Point, 1900-2008



Rising Sea Levels, East Coast

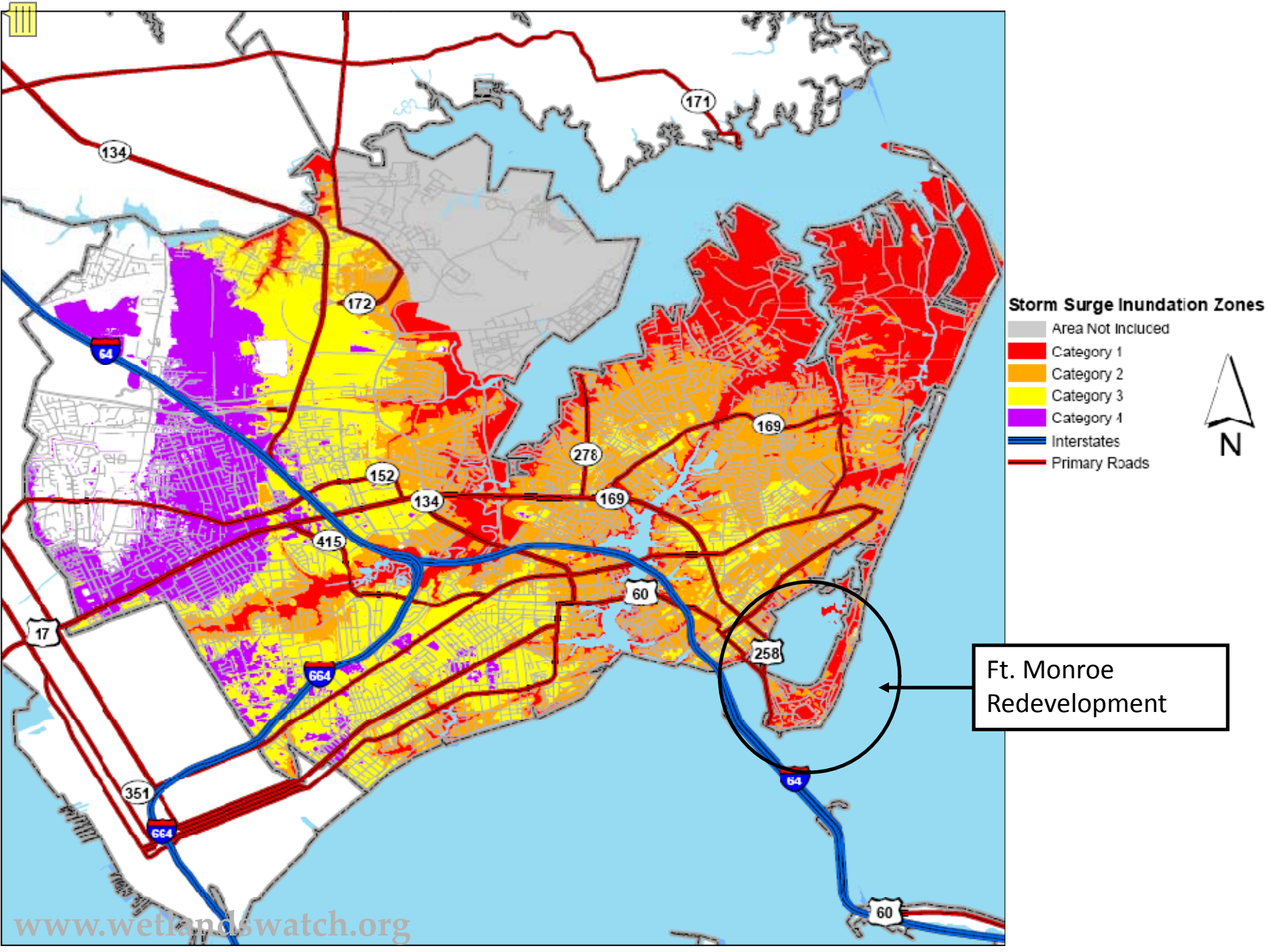
Station	Rate of Sea-Level Rise (mm per year)	Time Span of Record
Lewes, DE	3.16 ±0.16	1919-1999
Baltimore, MD	3.12 ±0.16	1902-1999
Annapolis, MD	3.53 ±0.13	1928-1999
Solomons Island, MD	3.29 ±0.17	1937-1999
Washington, DC	3.13 ±0.21	1931-1999
Hampton Roads, VA	4.42 ±0.16	1927-1999
Portsmouth, VA	3.76 ±0.23	1935-1999
Wilmington, NC	2.22 ±0.25	1935-1999
Charleston, SC	3.28 ±0.14	1921-1999
Fort Pulaski, GA	3.05 ±0.20	1935-1999
Fernandina Beach, FL	2.04 ±0.12	1897-1999
Mayport, FL	2.43 ±0.18	1928-1999
Miami, FL	2.39 ±0.22	1931-1999
Key West, FL	2.27 ±0.09	1913-1999

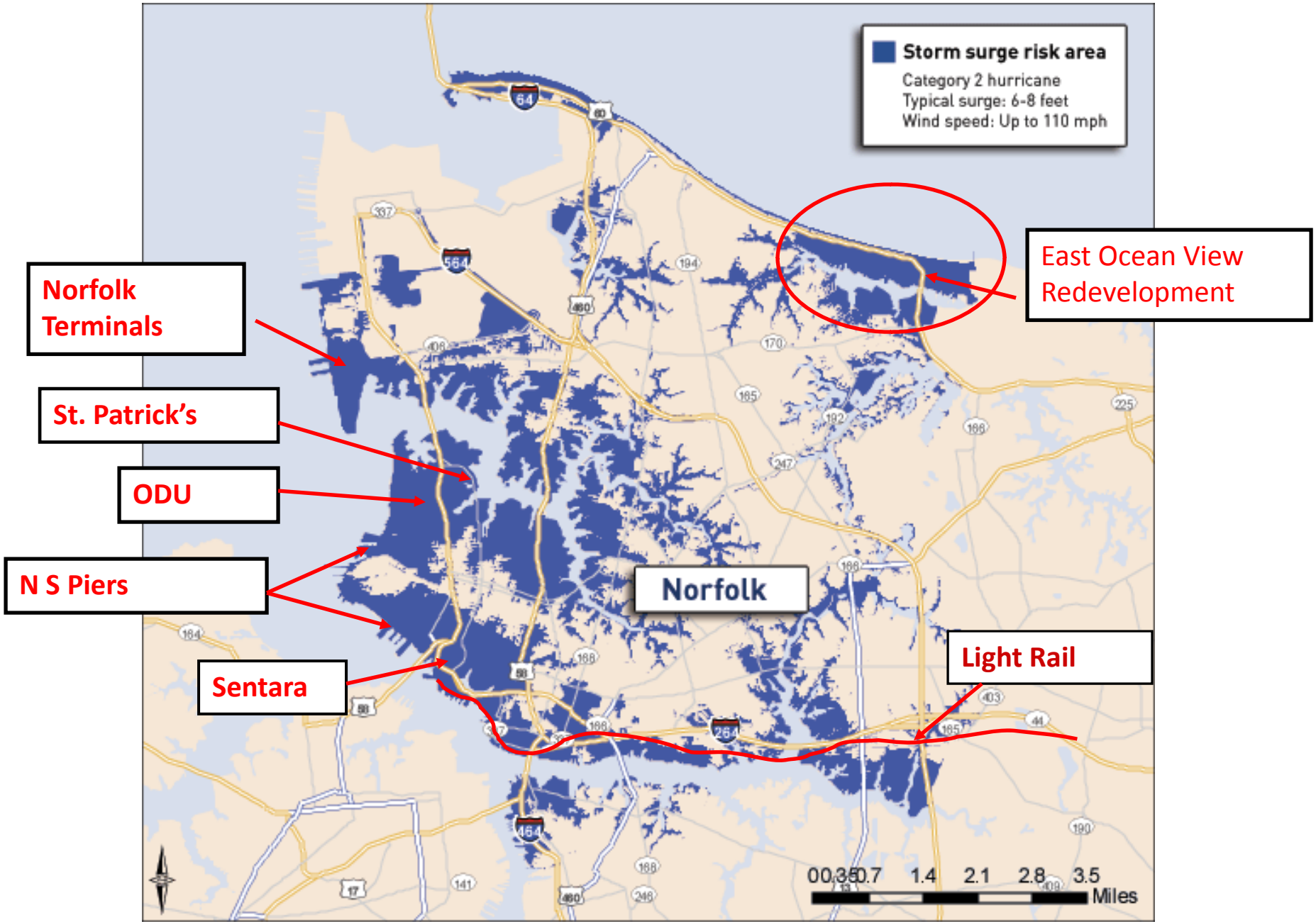
DATE	STORM TYPE	ABOVE MHHW
August 23, 1933	Hurricane	6.27 feet
September 18, 2003	Hurricane Isabel	5.12 feet
March 7, 1962	Ash Wednesday Storm	5.05 feet
November 12, 2009	Veterans Day nor’easter	4.99 feet
September 18, 1936	Hurricane	4.92 feet
September 16, 1933	Hurricane	4.36 feet
November 22, 2006	Thanksgiving nor’easter	3.96 feet
October 6, 2006	Columbus Day nor'easter	3.76 feet
January 28. 1998	Twin nor’easters (#1)	3.26 feet
September 16, 1999	Hurricane Floyd	3.21 feet
February 5, 1998	Twin nor’easters (#2)	3.12 feet

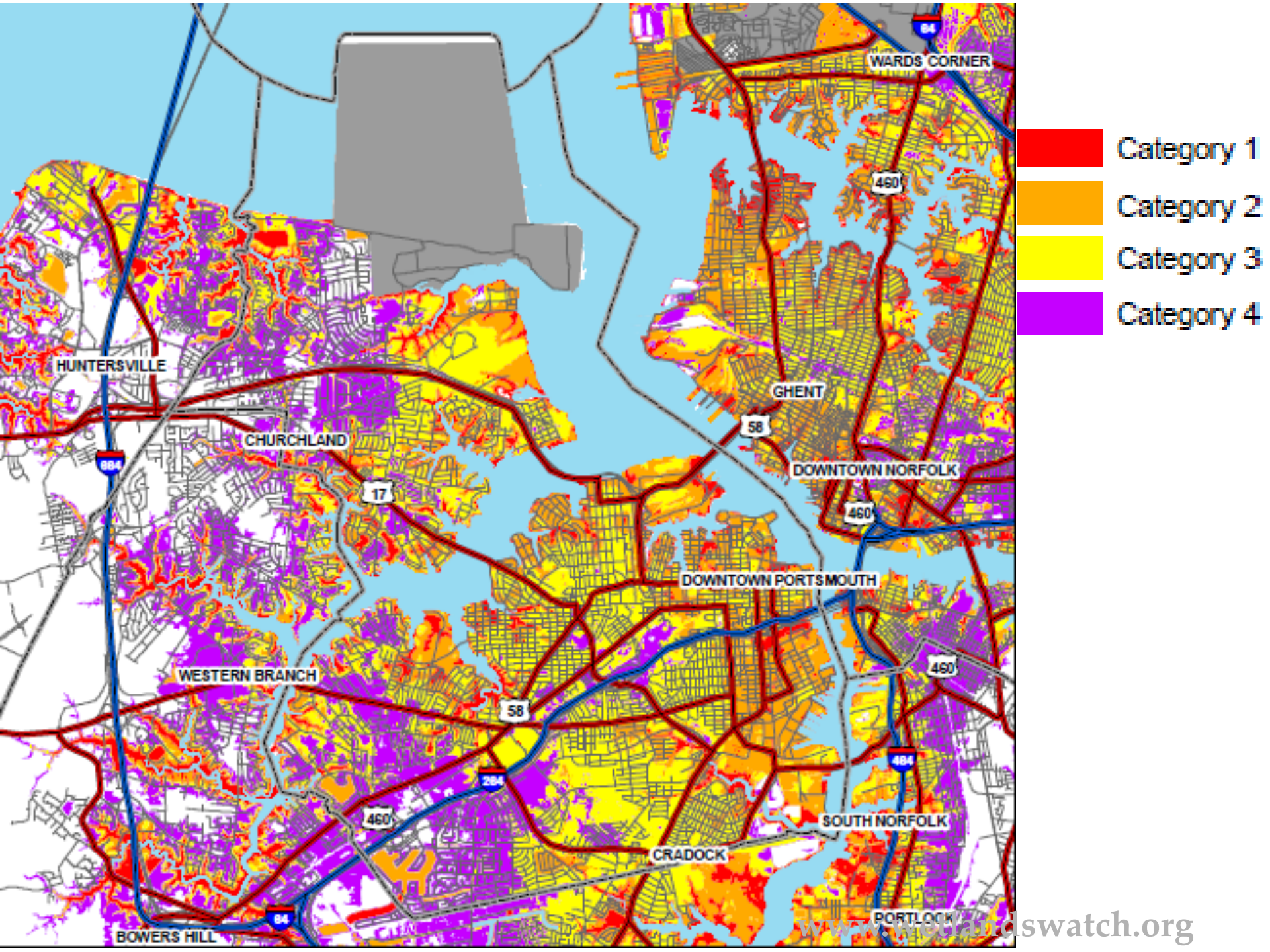
Source – NOAA Tides and Currents

www.wetlandswatch.org

www.wetlandswatch.org

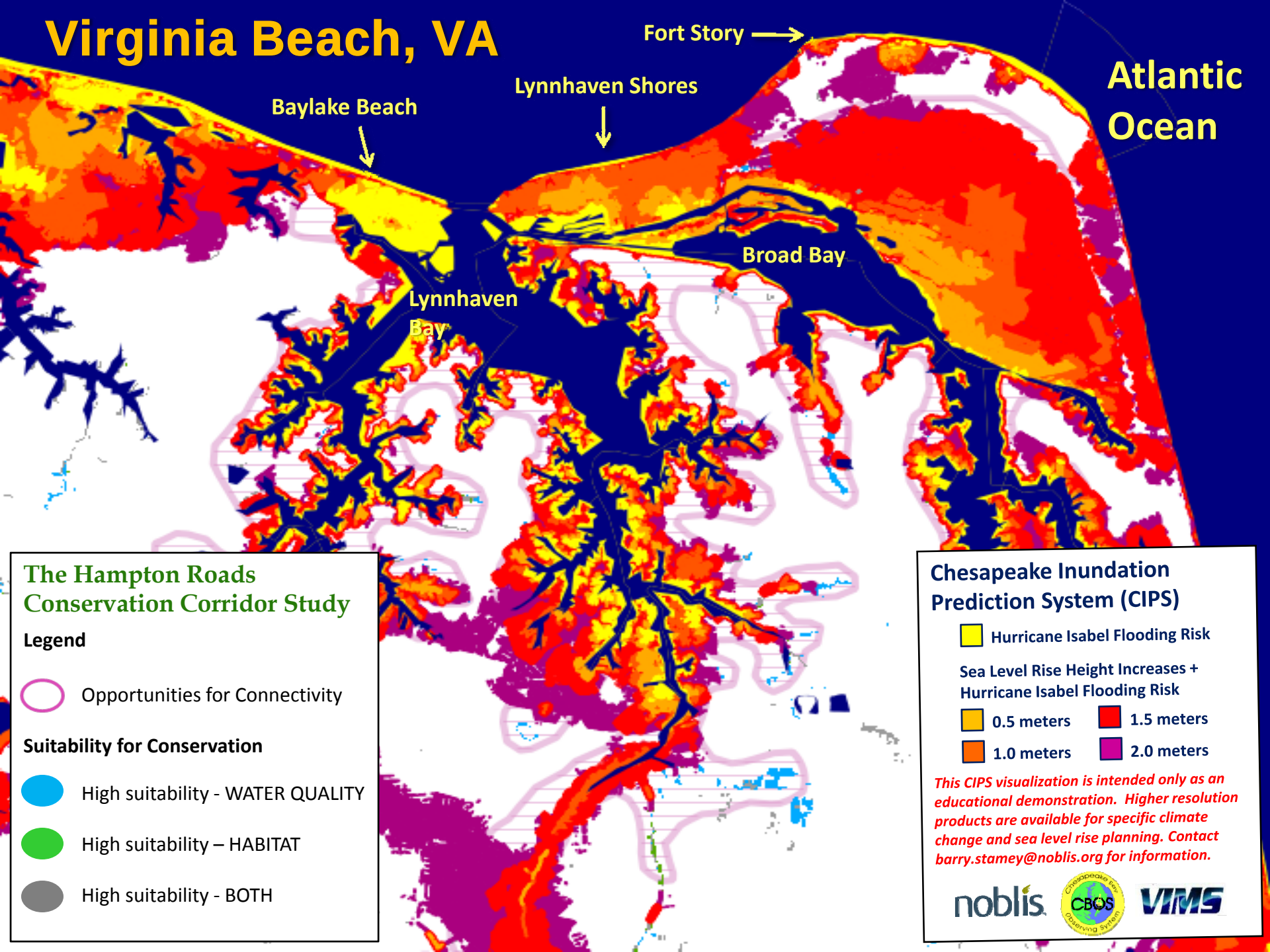

Storm Surge Inundation Zones
Area Not Incluced
Category 1
Category 2
Category 3
Category 4
Interstates
Primary Roads
N
Ft. Monroe Redevelopment
134
171
172
64
152
134
278
169
169
415
60
17
258
664
351
664
64
60
www.wetlandswatch.org


Storm surge risk area
Category 2 hurricane
Typical surge: 6-8 feet
Wind speed: Up to 110 mph
Norfolk Terminals
St. Patrick's
ODU
N S Piers
Sentara
Norfolk
East Ocean View Redevelopment
Light Rail
0 0.35 0.7 1.4 2.1 2.8 3.5
Miles



www.redandswatch.org

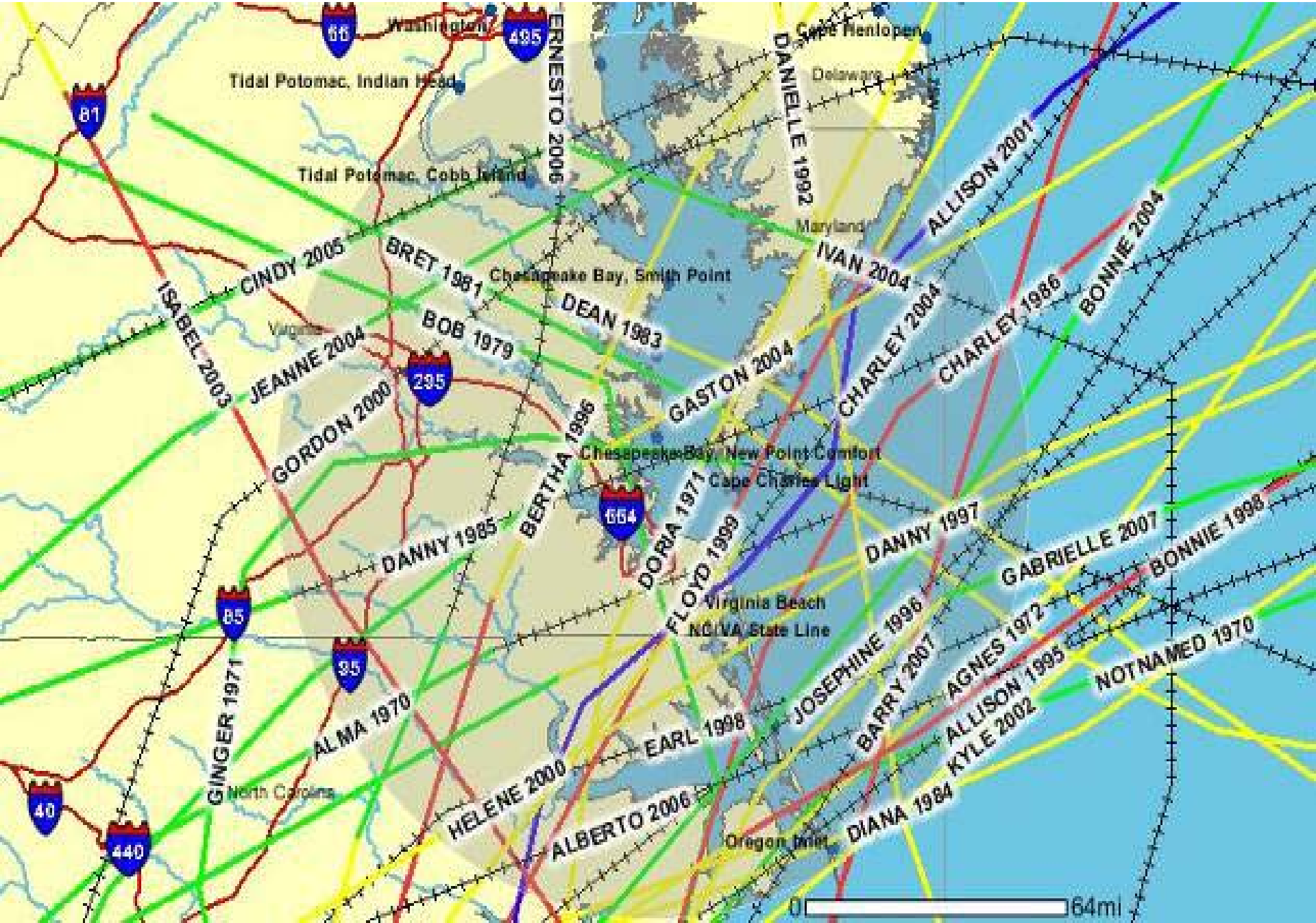
Virginia Beach, VA



Impact of Sea Level Rise on Virginia Beach

www.wetlandswatch.org

Major Storms in H.R., 1970-2008



OECD Environment Working Papers
No. 1

Ranking Port Cities with High Exposure and Vulnerability to Climate Extremes

EXPOSURE ESTIMATES

R. J. Nicholls*, S. Hanson, C. Herweijer,
N. Patmore, S. Hallegatte,
J. Corfee-Morlot, J. Château,
R. Muir-Wood

Hampton Roads # 10 in the World = total assets at risk from Sea Level Rise/Climate Extremes

What Needs To Be Done

1) **We need to recognize the nature of our challenge and place it high on our regional priority list.**

2) **We need more and better information.**

- **We need precise regional ground mapping (LIDAR)-**

  -- ***"Light Detection And Ranging" is an optical remote sensing technology that uses laser radar pulses to measure things. In this case, it is the ground and is done from an airplane.*** **Some regional jurisdictions already have some of this information, or are in the process of acquiring it.**

- **We need improved GIS information. Literally, we need to know what's what, and where it is, in our region.**

- **We need better information on ground subsidence. Most of the ground east of Route 17 is slowly sinking and this is an important reason why our sea level problem is larger than it is in other East Coast metro areas.**

3) We need to do *"what ifs" ("if we do nothing"*) over the next several decades and the rest of the century---how much inundation will there be and where will it occur?

- We need to compute prospective damages relating to the *"what ifs"*
- We need to focus on plausible remedies
- Poquoson provides a good example.

Poquoson Structural Count

Table 14. Structure Exposure by Occupancy Type

Occupancy Type	Structure Count	Building Value	Contents Value	Total Value
Single Family Residential	4,106	$ 972,162,100	$ 486,081,050	$ 1,458,243,150
Multi-Family Residential	289	$ 62,401,100	$ 31,200,550	$ 93,601,650
Commercial	108	$ 58,440,100	$ 29,220,050	$ 87,660,150
Total	4,503	$1,093,003,300	$ 546,501,650	$ 1,639,504,950

Source: City of Poquoson Assessor, November 2008

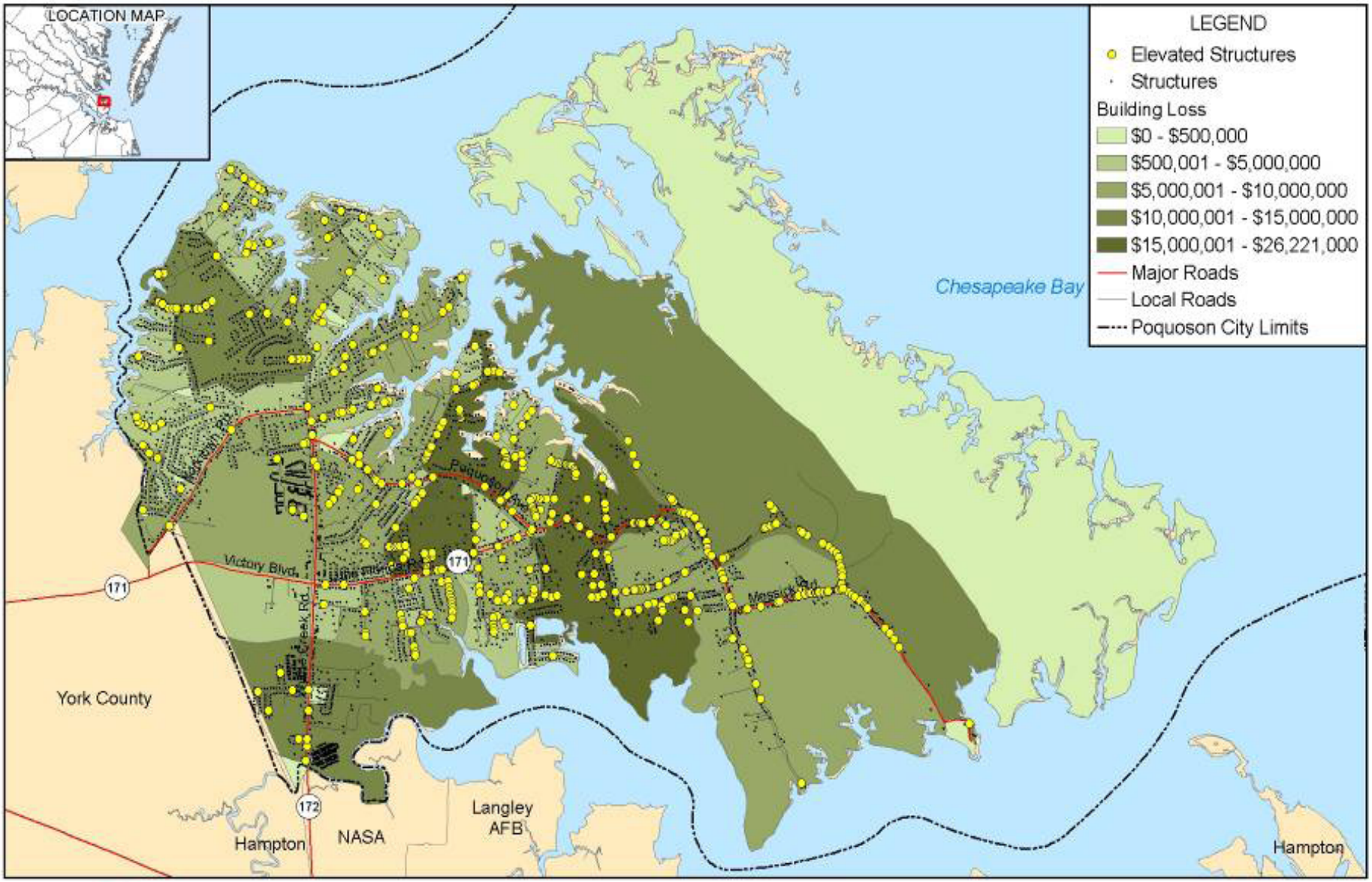
Estimated Losses, Poquoson (AMEC)

Table 16. HAZUS-MH Loss Estimates, 100-Year Coastal Storm*

Occupancy Type	Building Loss	Contents Loss	Total Loss	Loss Ratio
Single Family Residences	$226,395,000	$138,958,000	$365,353,000	25%
Multi-Family Residences	$ 7,330,000	$ 4,672,000	$ 12,002,000	13%
Commercial Structures	$ 10,013,000	$ 7,579,000	$ 17,592,000	20%
Total	$243,738,000	$151,209,000	$394,947,000	24%

*Assumes all structures constructed at-grade; does not account for structures elevated above BFE.

Damaged Structures, Poquoson



amec

Map compiled 2/2009; intended for planning purposes only.
Data Source: City of Poquoson, HAZUS-MH MR3

- **I would like HRPDC to consider going 50/50 with Old Dominion University on a project to do a Poquoson-like study for the entire region once we have LIDAR-quality mapping available. A primary aim will be to generate credible financial data that you can use at home as you talk to constituents and council members. This will not be the last word on the subject, but it will focus attention. However, we need to know precisely what is at stake.**

- **Old Dominion University President John Broderick has designated water inundation as a priority University research area and ODU has brought together oceanographers, engineers and economists to tackle problems, consider solutions and seek funding.**

4) **More ahead on federal advisory and funding possibilities for any additional mapping needed, remedial actions (on- and off-shore defenses, building codes, storm surge gates, evacuations, etc).**

We can become a funded test regional site because: (a) our water problems may be more severe than those of most other regions; (b) our military presence; and, (c) most other large metro areas along the Atlantic Coast are not yet focused intently on the problem.