

# Hurricane Harvey's impact on Texas: What can Hampton Roads learn?

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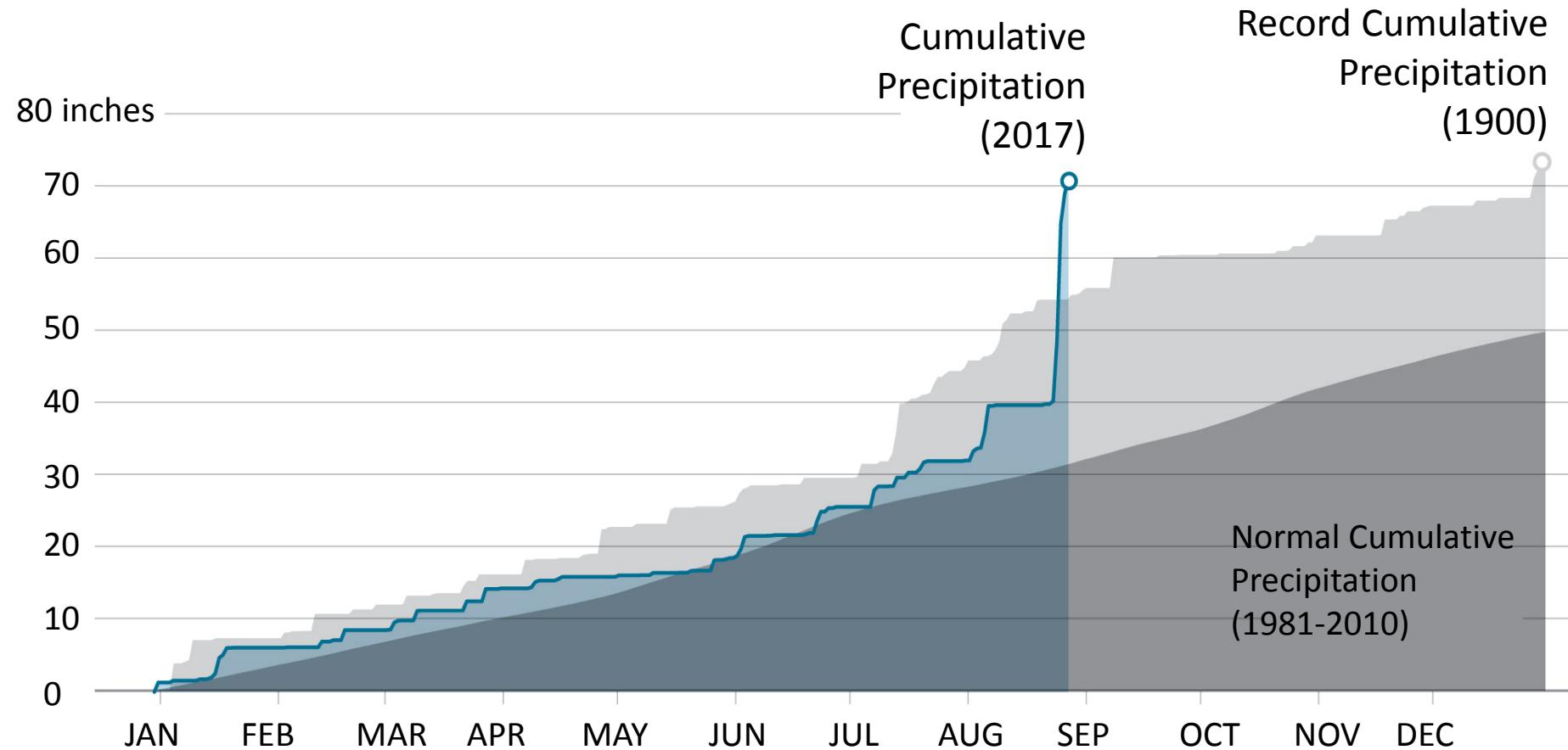
November 16, 2017





Over 40 inches of rain in 48 hours  
136,000 structures flooded in Harris County Flood District

# Is 40 inches of rain in 48 hours a lot? YES



## Media Coverage

**Hurricane Harvey shows how we underestimate flooding risks in coastal cities, scientists say –  
*Washington Post***

**How Houston's Growth Created the Perfect Flood Conditions – New York Times**

***Houston's Flood Is a Design Problem – The Atlantic***

**After Harvey, buyouts won't be the answer for frequent flood victims in Texas – Texas Tribune**

***Boomtown, Flood Town – Texas Tribune***

***Houston is Drowning in its Freedom from Regulations - Newsweek***

## Underestimating Risk - Compound Flooding

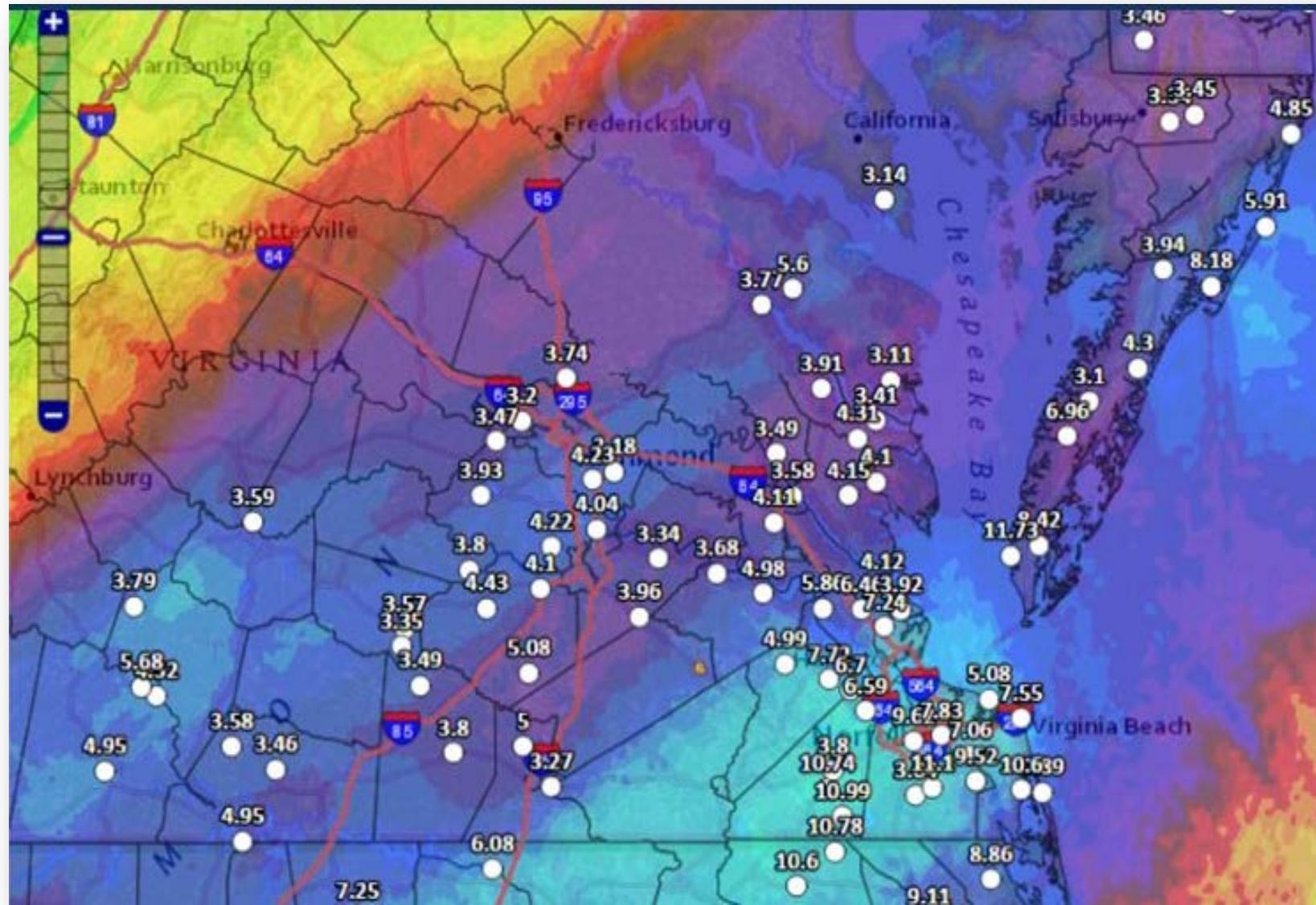
Areas of coastal Texas had 6-10 feet of storm surge  
Plus 10 inches rain in 48 hours

Predictive models of coastal flooding typically focus on storm surge

Storm surge is caused by rising of the sea as a result of atmospheric pressure changes and wind associated with a storm.

**But often it's raining too....**

# Hurricane Matthew – 11 inches rain in 24 hrs



# Do we know where it floods?

Flooding from storm surge?

Flooding from extreme precipitation?

Storm surge and extreme precipitation at the same time?

Impact of wind speed and direction?

Impact of recent rainfall and elevated water table?

Impact of sea level rise on future flooding?

HRPDC staff is collecting data from local staffs on where it floods...received data from 3 localities.

**Locality solution:**

**If you are relying on staff experience,**

**document that knowledge?**

**train new staff ?**

**implement a process to expand that knowledge?**



# Do we know where it floods?

No regional model that captures all of these factors. Is it important to build one?

*What could localities do with a better predictive model?*

## In Emergency

- Warn people to leave
- Warn people to move cars
- Close roads
- Stage generators and fuel

## Long Term

- Determine where to build more flood walls & gates
- Determine where to build bigger stormwater pipes & pumps
- Change freeboard requirements
- Determine where to raise roads or structures



# StormSense Project

Forecasting Flooding from Storm Surge, Rain, and Tide

Regional Solution....  
Comprehensive?  
Operational?  
Urgent?

Dr. Derek Loftis  
Virginia Institute of Marine Science,  
College of William & Mary

## Flood Risks outside of Floodplain

### *Harvey's impact on Houston*

15% of flooded property owners have flood insurance.

Only 40% of \$30B in damage will be covered by insurance.

Flood hazard maps by the Federal Emergency Management Agency, showing the 100-year floodplain, an area with a 1 percent risk for flooding in any given year, mark where homeowners are required to have federally sponsored flood insurance.

**Problem: People believe the maps!**



# Flood Risks outside of Floodplain

Maps are wrong because:

Poor methodology (compound flooding) or out of date

Repetitive Loss Properties in Hampton Roads

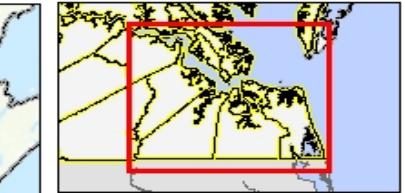
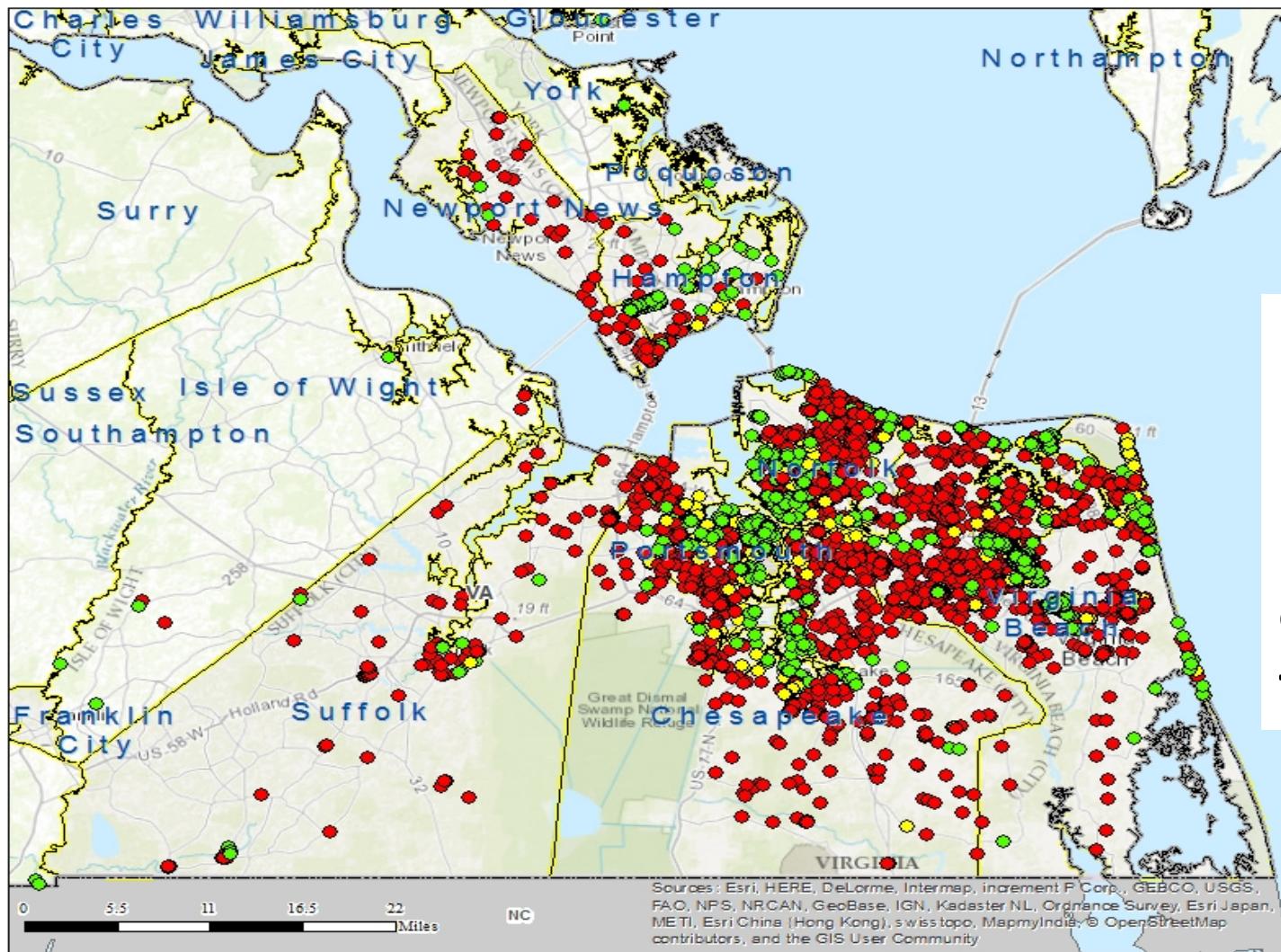
Roughly 10% are outside the floodplain

Region	Locality	Number of Properties	Number of Properties Outside 100-year flood plain
Peninsula	Hampton	936	61
	Newport News	121	30
	Poquoson	971	3
	Williamsburg*	4	3
	James City County	35	4
	York County	236	26
Southside	Norfolk	958	81
	Portsmouth	229	23
	Suffolk	17	7
	Virginia Beach	574	116
	Chesapeake	395	95
Western Tidewater	Isle of Wight County	23	9
	Smithfield	3	0
	Franklin	6	1
	Southampton County	9	1
	Totals	4517	460

# Flood Risks outside of Floodplain

Maps are wrong because:

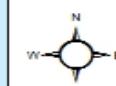
Extreme weather events happen



**Data Layer/Map Description:**  
This map shows where IA Registrations, PDAs, and Claims are inside or outside the FEMA Special Flood Hazard Area.  
Data Currency is 11/17/2016.

**Hurricane  
Matthew**

**Red = claims  
outside  
floodplain**



**Data Sources:**  
FEMA, ESRI;  
**Initial Declaration:** 11/02/2016  
**Disaster Federal Registry Notice:**  
00/00/0000  
**Datum:** WGS 1984  
**Projection:** Mercator

# Flood Risks outside of Floodplain - Solutions

## **Make better Maps (maybe)**

Exert more political pressure to improve FEMA's methodology and adequately fund the map updates

## **Convince people not to trust the maps**

Public Outreach campaign

Buy insurance even if it isn't required



## Buyouts: Pros & Cons

Harris County Flood Control District has spent \$342M buying 3100 homes that have flooded.

Additional 3300 property owners are on the volunteer list for buyouts.

Flood Control District's buyout budget = \$43M / year  
(\$10M HUD, \$13M FEMA, \$20M county)

Criticized for spending too much, too little, and in the wrong places.  
Need will exceed available funds. Why has area spent more on post-disaster instead of pre-disaster mitigation?

**Data Gap: No list of volunteers for buyouts in Hampton Roads**

In Hampton Roads, a buyout program might be called retreat.  
Do we want to know how many people want to move?  
How would the volunteers be prioritized?



# Buyouts: Pros & Cons

## Pros

Eliminate risk

Avoid repeat emergency services

Avoid maintenance of structural solutions

## Cons

Lose property tax

Empty parcels create blight

Displace people and change neighborhood culture

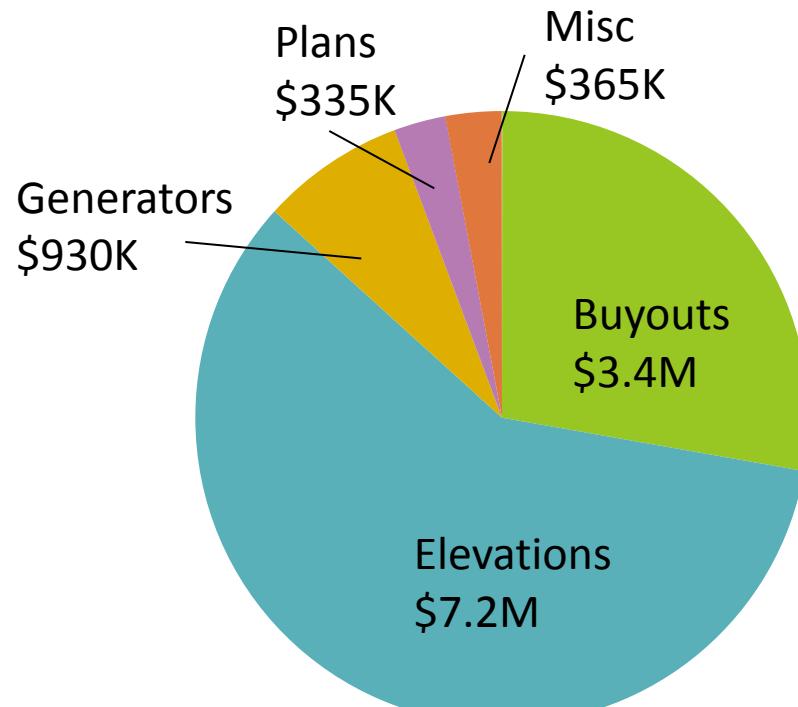
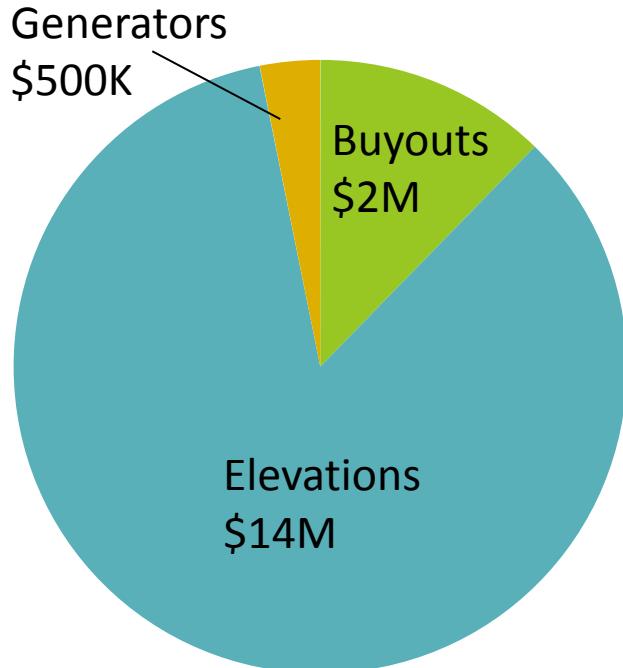
Newport News has buyout program but no funding. FEMA funds go through VDEM; prioritized with new process.

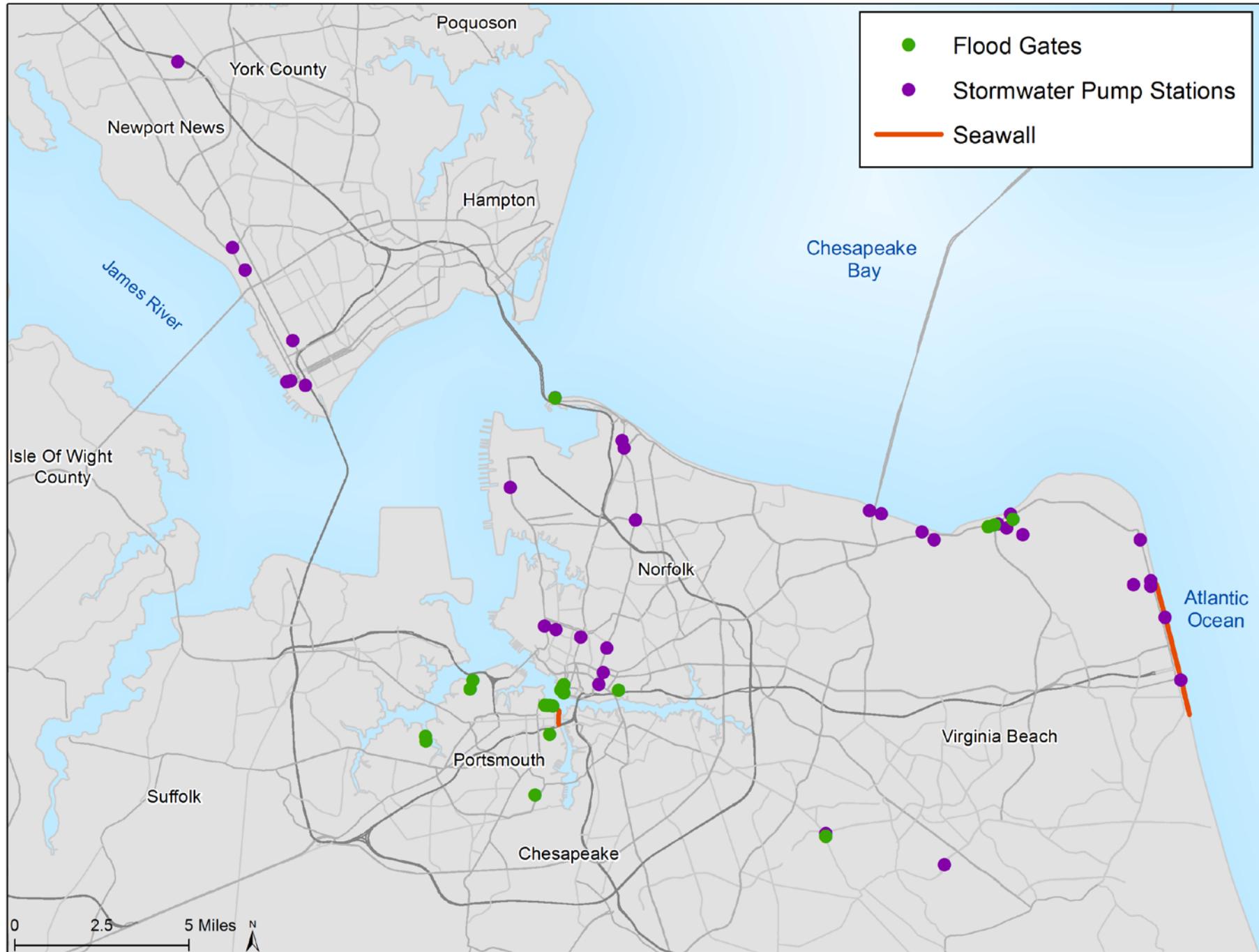
Alternative to buyouts typically home elevations and structural flood controls (gates, walls, pumps).

# Buyouts: Pros & Cons

*Not as much debate in Hampton Roads because we haven't funded many buyouts or structural flood controls.*

## Last 10 years FEMA funds for Hampton Roads region Total = \$29M







## Buyouts or Structures - Solutions

**Consolidate list of volunteers to identify magnitude of need**

- Work with VDEM to prioritize.

- Exert political pressure for more state or federal funding.

**Consolidate proposed structural flood control projects to convey progress and magnitude of need**

- Exert political pressure for more state or federal funding.

**Public education on policy choices and consequences.**

## Imperviousness and Lack of Zoning

Did Houston's lack of zoning & rapid growth cause the flooding? No...40 inches of rain in 48hrs!



Could  
prairie grass  
have  
prevented  
flooding?



In Hampton Roads,

- Are wetlands our prairie grass?
- Does new development cause flooding because of cumulative volume of water exceeds the capacity of the existing stormwater pipes and ditches?

# Imperviousness and Storage in Roads



In Hampton Roads,

- Should we use roads for storage?
- Could VDOT do more to help store water?
- Is there a plan to ensure evacuation routes will not be used for storage?

## Imperviousness - Solutions

### Reduce imperviousness requirements

Revise local ordinances that to minimize parking and road widths

### Design stormwater systems and roads for the future

Incorporate sea level rise and changing rainfall patterns

Require VDOT's designs to incorporate more flood mitigation features



## Next Steps

Coastal Resiliency is relatively new HRPDC program.

- Checking in – how are we doing?
- Ideas on how to work through new challenges and evaluate potential solutions.

The Special Committee on Recurrent Flooding and Sea Level Rise is an official advisory committee to the Hampton Roads Planning District Commission charged with three responsibilities:

1. Developing specific recommendations related to recurrent flooding and sea level rise adaptation and mitigation for local governments.
2. Advocating for support and action by the state government and federal government.
3. Serving as the primary regional contact to coordinate efforts with federal agencies and academic institutions.

