

Hampton Roads Hazard Mitigation Plan Update Briefing to Regional Environmental Committee Members

August 4, 2016

Leigh Chapman, Lead Mitigation Planner
Salter's Creek Consulting, Inc.



Participating Communities

- Isle of Wight County
 - Town of Smithfield
 - Town of Windsor
- City of Franklin
- Southampton County
 - Town of Boykins
 - Town of Branchville
 - Town of Capron
 - Town of Courtland
 - Town of Ivor
 - Town of Newsoms
- City of Poquoson
- City of Chesapeake
- City of Hampton
- City of Newport News
- City of Williamsburg
- James City County
- York County
- City of Norfolk
- City of Portsmouth
- City of Suffolk
- City of Virginia Beach



A 10-Step Process within the 4-Phase FEMA Guidance

Phase I: Organize Resources

- Get organized
- Plan for public involvement
- Coordinate with other departments & agencies

Phase II: Assess Risk

- Identify the hazards
- Assess the risks

Phase III: Develop Mitigation Plan

- Review mitigation alternatives
- Draft an action plan
- Set planning goals

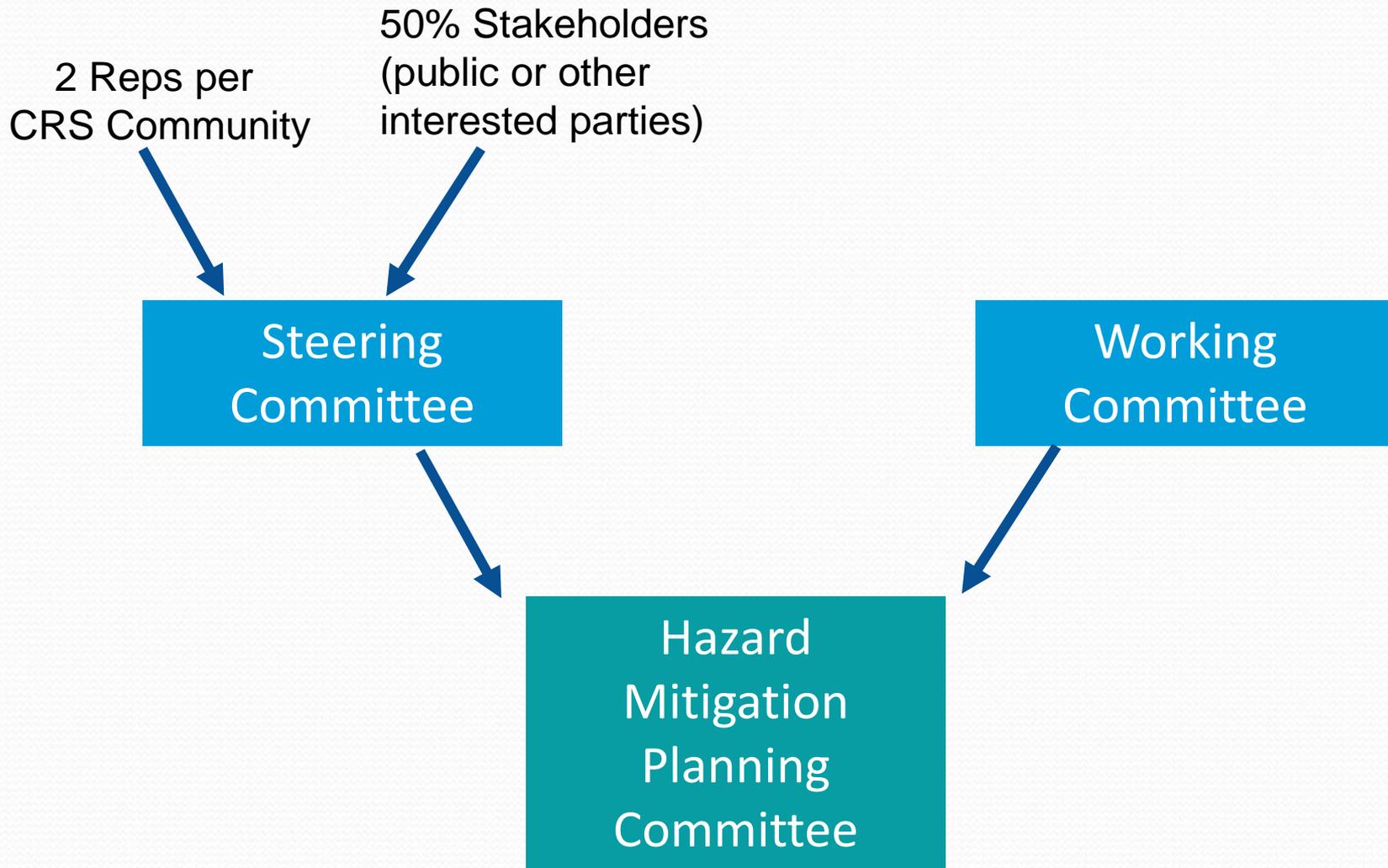
Phase IV: Adopt & Implement

- Adopt the plan
- Implement the plan

We Are Here ←

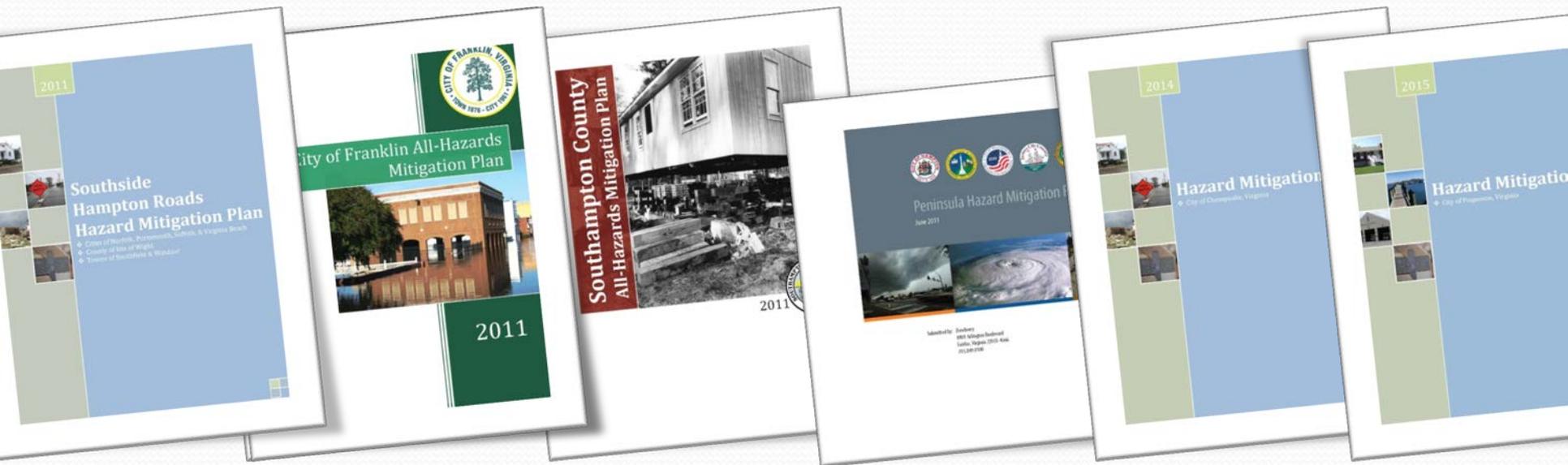


Committee Structure



Updating the Mitigation Plan

- Opportunity to integrate plan into existing planning mechanisms
- Combine existing plans into regional, multi-jurisdictional plan
- Simplify list of hazards and focus on capabilities, mitigation actions and implementation



Previous Plans Natural Hazards

	Flood	Sea Level Rise	Tropical Storm	Severe T-Storm	Tsunami	Urban Fire	Winter Storm/ Nor'easter	Drought	Dam Failure	Tornado	Extreme Heat	Earthquake	Wildfire	Erosion	Sinkhole	Mosquito Diseases
Franklin	Critical Hazard – High Risk	Noncritical Hazard – Low Risk	Critical Hazard – High Risk	Critical Hazard – High Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk
Southampton County	Critical Hazard – High Risk	Noncritical Hazard – Low Risk	Critical Hazard – High Risk	Critical Hazard – High Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk
Peninsula	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Critical Hazard – High Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk
Southside	Critical Hazard – High Risk	Critical Hazard – High Risk	Critical Hazard – High Risk	Critical Hazard – Moderate Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Critical Hazard – High Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk
Chesapeake	Critical Hazard – High Risk	Critical Hazard – Moderate Risk	Critical Hazard – High Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Critical Hazard – High Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk
Poquoson	Critical Hazard – High Risk	Critical Hazard – Moderate Risk	Critical Hazard – High Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk	Noncritical Hazard – Low Risk

Critical Hazard – High Risk

Critical Hazard – Moderate Risk

Noncritical Hazard – Low Risk

Previous Plans

Manmade/Tech Hazards Summary

	Hazardous Materials Incidents	Terrorism	Biological Threats	Radiological Threats	Pandemic Flu
Franklin	Critical Hazard – High Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk
Southampton County	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk
Peninsula	Noncritical Hazard – Low Risk				
Southside	Critical Hazard – Moderate Risk	Noncritical Hazard – Low Risk			
Chesapeake	Noncritical Hazard – Low Risk	Critical Hazard – Moderate Risk			
Poquoson	Noncritical Hazard – Low Risk				

Critical Hazard – High Risk

Critical Hazard – Moderate Risk

Noncritical Hazard – Low Risk

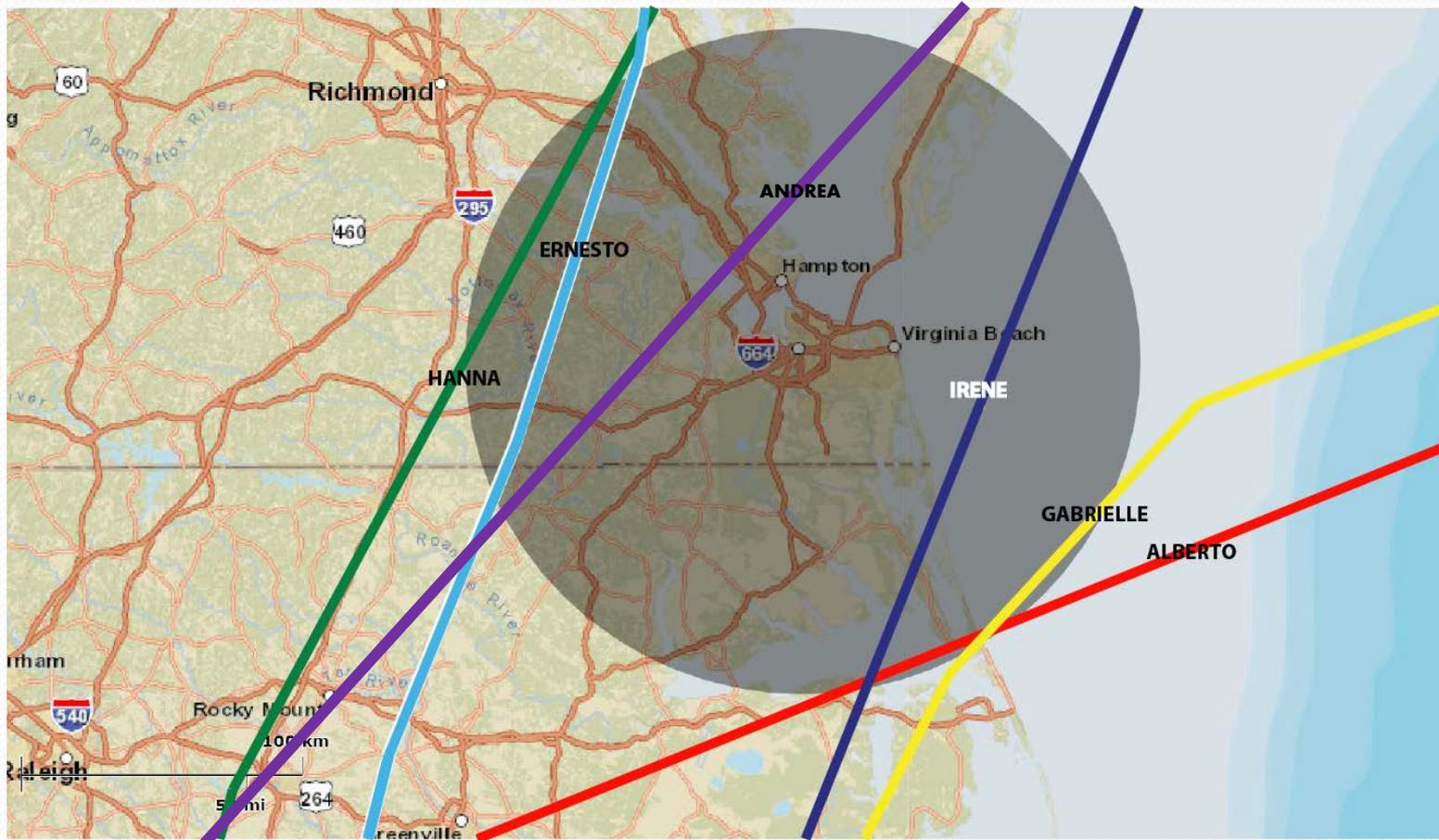
2015/2016 Update

Final Hazards Examined

- FLOODING
- SEA LEVEL RISE AND LAND SUBSIDENCE
- TROPICAL/COASTAL STORM
- SHORELINE EROSION
- TORNADO
- WINTER STORM
- EARTHQUAKE
- WILDFIRE
- HAZARDOUS MATERIALS INCIDENTS

Hurricanes

Storms Since 2005,
75-mile radius



HAZUS
Level 1

Hurricanes

Probabilistic Loss Estimates

100-YEAR WIND EVENT, Southside

Community	Building Damage	Contents & Inventory Damage	Total*
Isle of Wight County	\$8,008,000	\$2,592,000	\$10,789,000
Norfolk	\$168,291,000	\$28,515,000	\$213,399,000
Portsmouth	\$48,722,000	\$8,960,000	\$61,573,000
Suffolk	\$23,969,000	\$6,293,000	\$31,191,000
Virginia Beach	\$579,495,000	\$190,242,000	\$815,974,000
Chesapeake	\$160,748,000	\$55,549,000	\$224,879,000

* Also includes income losses from relocation, lost wages, and lost rental income.





Hurricanes

Probabilistic Loss Estimates

100-YEAR WIND EVENT, Peninsula

Community	Building Damage	Contents & Inventory Damage	Total*
Hampton	\$91,781,000	\$42,021,000	\$138,514,000
Newport News	\$53,985,000	\$10,663,000	\$68,841,000
Poquoson	\$9,575,000	\$3,971,000	\$13,874,000
Williamsburg	\$1,366,000	\$392,000	\$1,766,000
James City County	\$10,477,000	\$3,944,000	\$14,428,000
York County	\$35,966,000	\$18,024,000	\$55,067,000

* Also includes income losses from relocation, lost wages, and lost rental income.





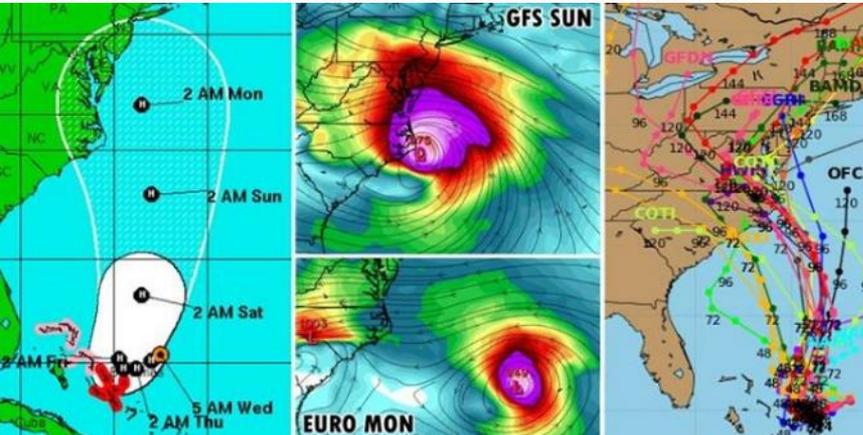
Hurricanes

Probabilistic Loss Estimates

100-YEAR WIND EVENT, Western Tidewater

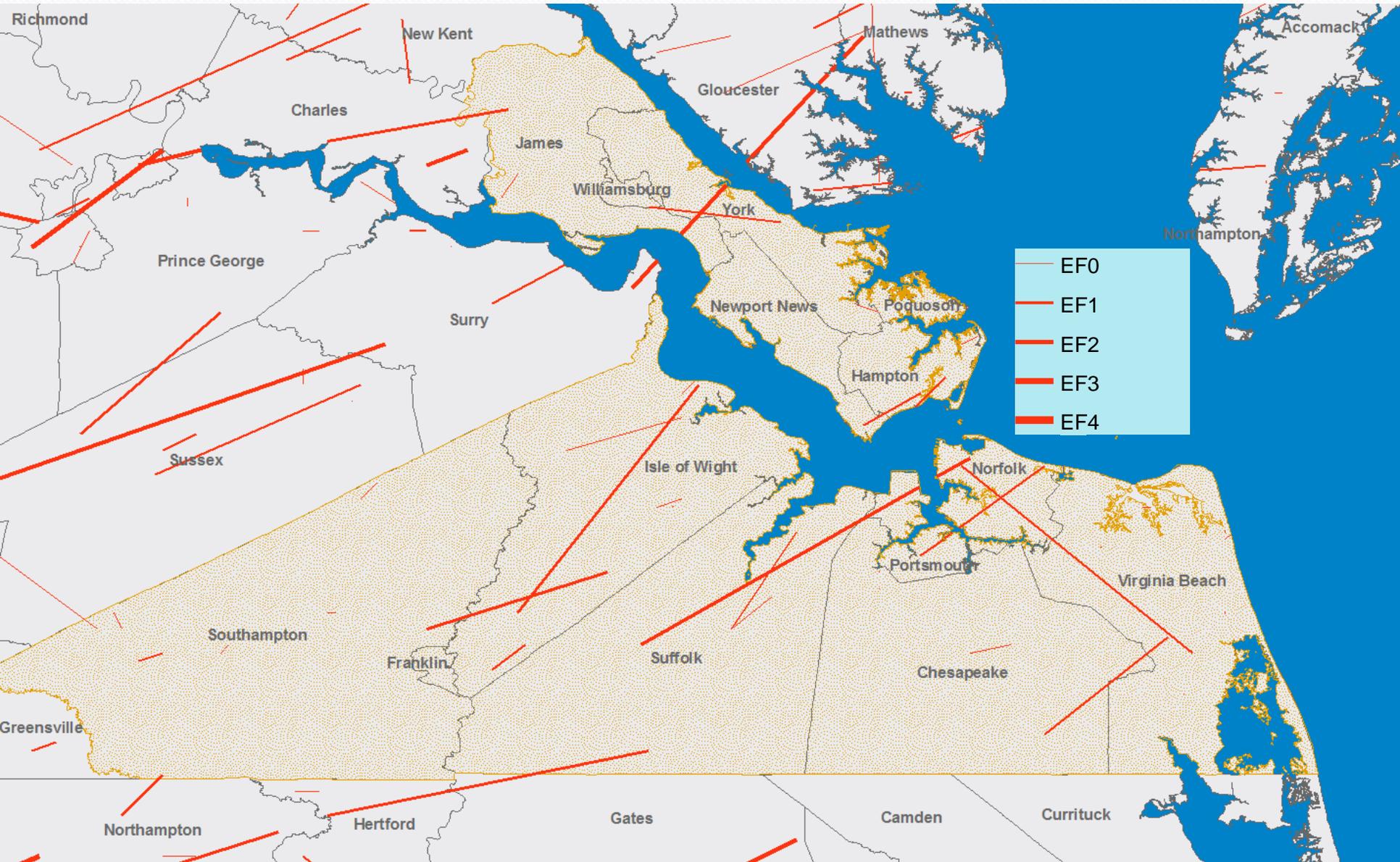
Community	Building Damage	Contents & Inventory Damage	Total*
Franklin	\$381,000	\$110,000	\$491,000
Southampton County	\$650,000	\$268,000	\$919,000

* Also includes income losses from relocation, lost wages, and lost rental income.

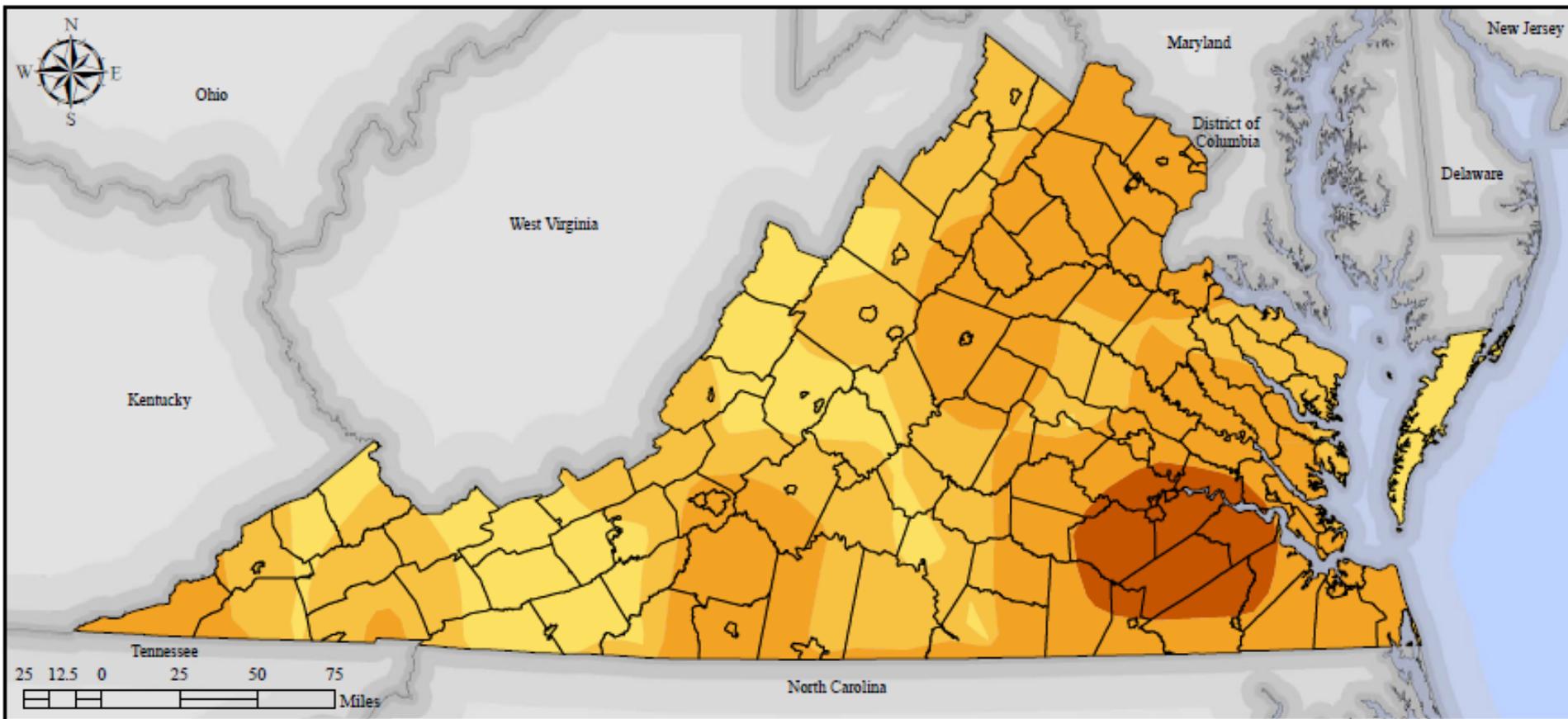


Virginia Tornado History

Historic Tornado Touchdowns and Tracks: 1950-2014



Tornado Hazard Frequency



DATA SOURCES:
 SVRGIS / SeverePlot
 VGIN Jurisdictional Boundaries
 ESRI State Boundaries

LEGEND:

Annual Tornado Hazard Frequency Times One Million	
Light Yellow	0 - 1.25 Low
Yellow-Orange	1.251 - 10 Medium-Low
Orange	10.1 - 100 Medium-High
Dark Orange	100.1 - 252 High

HAZARD IDENTIFICATION:
 Annual tornado hazard frequency is an estimate of the frequency with which a point will experience a tornado, interpolating from neighboring tornado impact areas over the period of record. This map shows hazard frequency of "significant" tornadoes, defined as F2 or greater. Note that "high" frequency in the state of Virginia is still rather low in comparison to many midwestern and southern states.

PROJECTION: VA Lambert Conformal Conic
 North American Datum 1983

DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the Commonwealth available data has been used beyond the original intent.

Winter Storms

- Property damage, power, phone outages, and closures of streets, highways, schools, businesses, and nonessential government operations
- Tree damage from ice accumulation
- Transportation accidents
- Snow removal costs



According to *Commonwealth of Virginia Hazard Mitigation Plan (2013)*, Hampton Roads has:

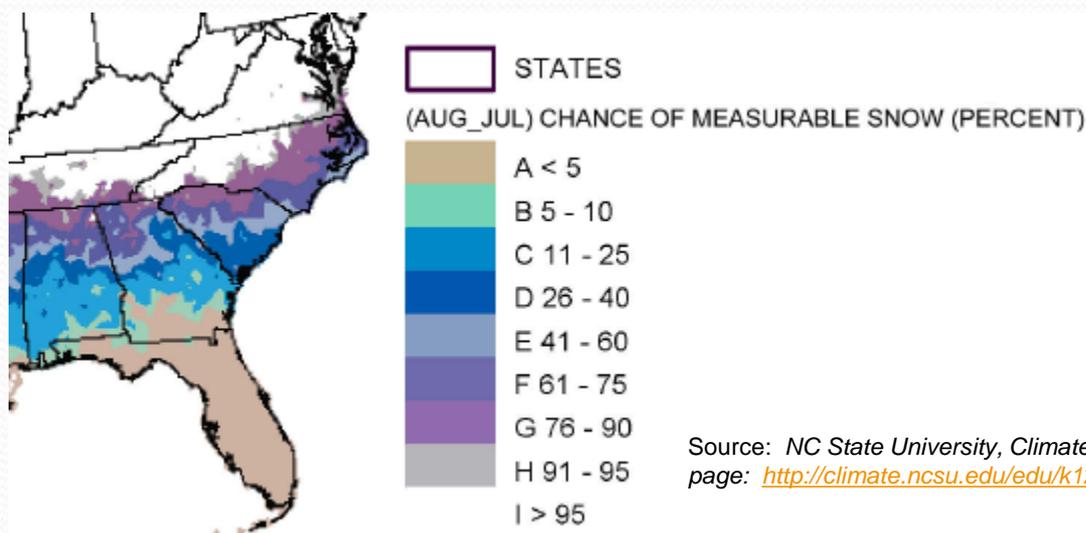
- 1.5 or fewer days per year with at least 3 inches of snow
- 0.5 or fewer days per year with at least 6 inches of snow
- 3 or fewer days per year entirely at or below 32°F
 - Parts of James City Co, York Co and Newport News = 3 to 9 days per year

Winter Storms

PROBABILITY OF RECEIVING A MEASURABLE SNOWFALL

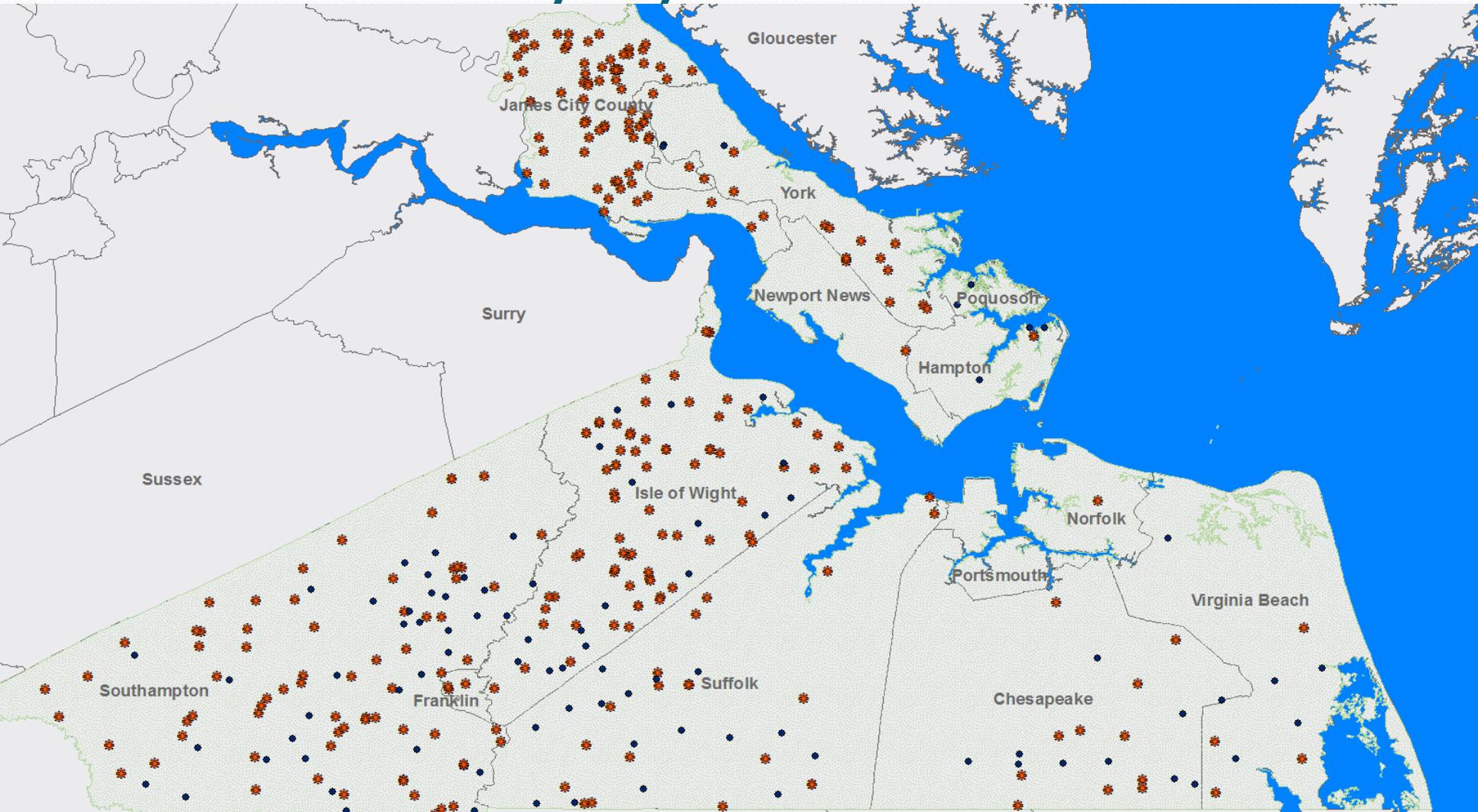
JURISDICTION	ANNUAL PROBABILITY	WINTER PROBABILITY	SPRING PROBABILITY	FALL PROBABILITY
Isle of Wight	83.3%	94.1%	25.0%	4.0%
Norfolk	89.8%	88.7%	36.4%	5.5%
Suffolk	No data	90.0%	63.6%	29.1%
Virginia Beach	84.0%	85.7%	23.5%	2.7%

Source: NOAA, NCDC, Snow Climatology Page, 2011

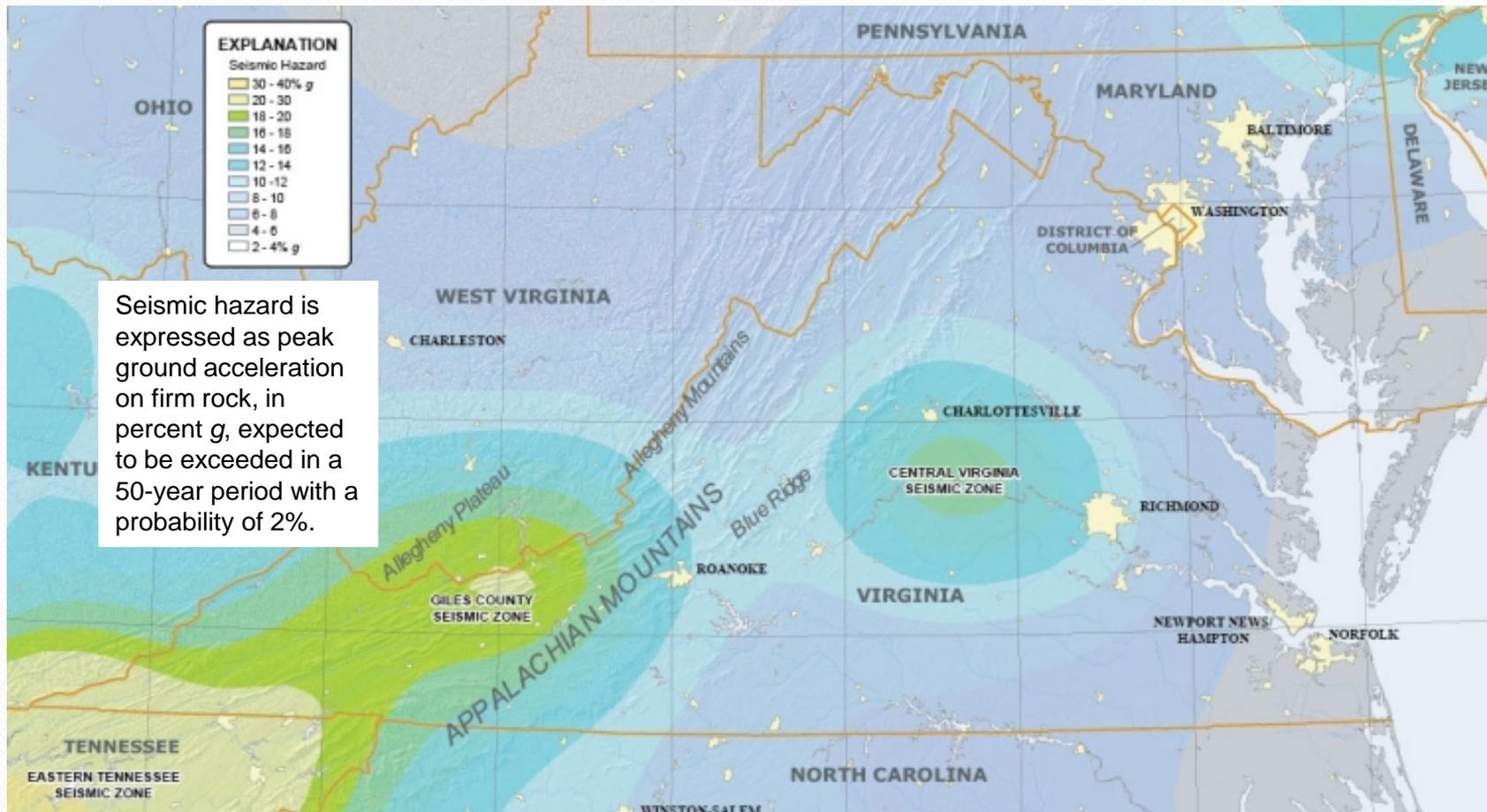


Source: NC State University, Climate Education web page: <http://climate.ncsu.edu/edu/k12/SEPrecip>

Wildfire History, 2002-2013, with Dry Hydrant Locations



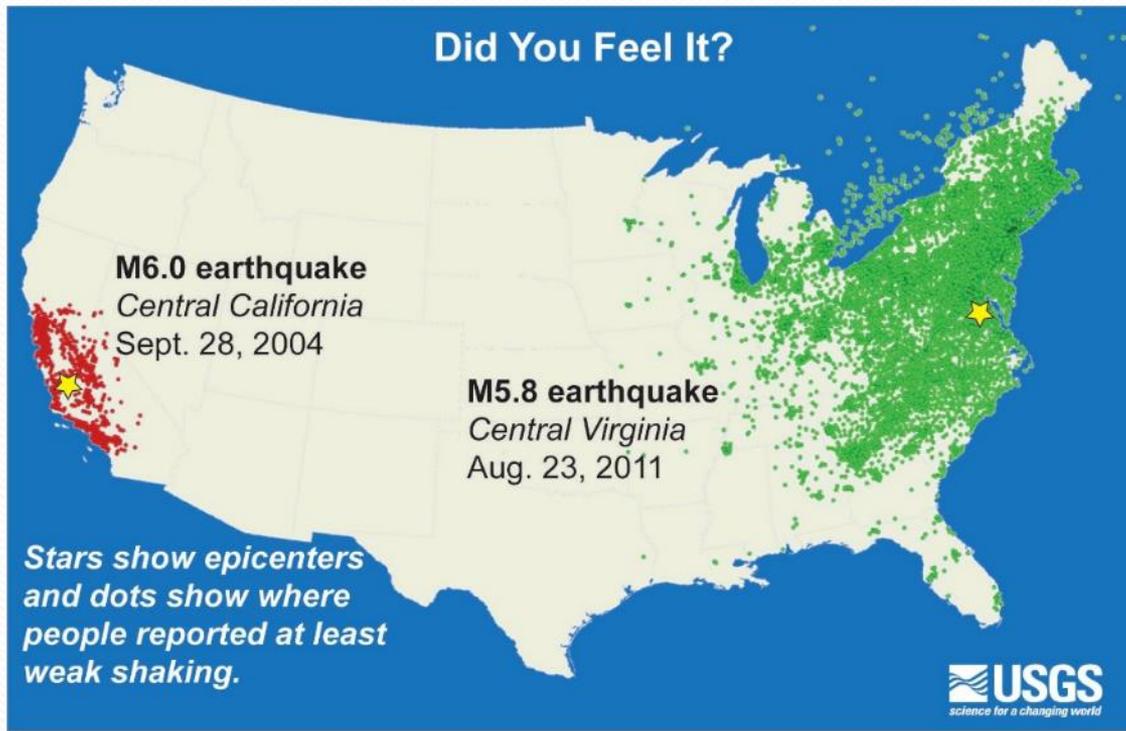
Earthquakes – Central Virginia Seismic Zone



Source: Virginia Department of Mines Minerals and Energy, web site, 2014

Earthquakes – Recent History

August 23, 2011: Earthquake (M 5.8) and aftershocks in Louisa County, Virginia



- 534 residences impacted
 - 4 destroyed
- FEMA IA approved
 - \$16.6 million
- FEMA PA approved
 - \$41.9 million

HAZUS
Level 1

Earthquakes

Probabilistic Loss Estimates

1000-YEAR FREQUENCY EVENT, M₅ - Southside

Community	Building Damage	Non-Structural, Contents & Inventory Damage	Total*
Isle of Wight County	\$1,587,000	\$3,705,000	\$6,576,000
Norfolk	\$8,393,000	\$18,849,000	\$36,396,000
Portsmouth	\$2,906,000	\$6,632,000	\$12,771,000
Suffolk	\$3,067,000	\$6,868,000	\$12,617,000
Virginia Beach	\$13,530,000	\$27,488,000	\$53,882,000
Chesapeake	\$7,246,000	\$15,124,000	\$28,734,000

* Also includes income losses from relocation, lost wages, and lost rental income.





Earthquakes

Probabilistic Loss Estimates

1000-YEAR FREQUENCY EVENT – M5, Peninsula

Community	Building Damage	Non-Structural, Contents & Inventory Damage	Total*
Hampton	\$4,614,000	\$4,664,000	\$20,172,000
Newport News	\$6,840,000	\$7,658,000	\$31,661,000
Poquoson	\$535,000	\$355,000	\$2,097,000
Williamsburg	\$825,000	\$1,200,000	\$4,409,000
James City County	\$4,396,000	\$3,799,000	\$19,609,000
York County	\$3,167,000	\$2,610,000	\$13,386,000

* Also includes income losses from relocation, lost wages, and lost rental income.





Earthquakes

Probabilistic Loss Estimates

1000-YEAR FREQUENCY EVENT – M5, Western Tidewater			
Community	Building Damage	Non-Structural, Contents & Inventory Damage	Total*
Franklin	\$337,000	\$481,000	\$1,706,000
Southampton County	\$780,000	\$685,000	\$3,314,000

* Also includes income losses from relocation, lost wages, and lost rental income.



Flooding

- Broad definition used in this plan.
- Regionally, encompasses impacts from:
 - Nor'easters
 - Coastal storms and storm surge
 - Stormwater, “urban” flooding
 - Riverine flooding
 - Dam breaks



Flood Risk Assessment

Multiple Approaches Taken

1. Risk to structures and populations by 100-year flood event – **HAZUS analysis results**
2. Critical Facilities analysis
3. Structure analysis
 - National Flood Insurance Program Claims & Coverage
 - Repetitive Flood Loss Analysis





Flood Risk Assessment

100-year Flood Analysis - Damages Expected

Peninsula

COMMUNITY	NUMBER OF BUILDINGS DAMAGED				DOLLAR LOSSES		
	0-14%	15-29%	30-49%	SUBSTANTIAL DAMAGE	BUILDING	CONTENTS	INVENTORY
Hampton	2,127	1,686	10	0	\$66,454,685	\$36,858,927	\$5,537,339
Newport News	122	447	16	8	\$49,965,691	\$102,837,473	\$48,883,533
Poquoson	745	1,054	34	12	\$39,310,852	\$19,174,311	\$539,678
Williamsburg	2 structures in SFHA; no damage predicted						
James City Co	61	20	0	0	\$1,453,197	\$473,439	\$0
York County	494	144	2	0	\$109,911,650	\$204,923,596	\$211,317,219



Flood Risk Assessment

100-year Flood Analysis - Damages Expected

Southside

COMMUNITY	NUMBER OF BUILDINGS DAMAGED				DOLLAR LOSSES		
	0-14%	15-29%	30-49%	SUBSTANTIAL DAMAGE	BUILDING	CONTENTS	INVENTORY
Isle of Wight	115	24	2	0	\$8,492,225	\$23,167,062	\$23,848,520
Norfolk	1543	1141	13	0	\$81,875,507	\$99,171,200	\$28,227,113
Portsmouth	345	90	4	5	\$14,015,336	\$20,583,938	\$30,098,433
Suffolk	9	5	0	0	\$190,938	\$447,274	\$503,228
Virginia Bch	1443	354	2	0	\$19,861,960	\$20,552,564	\$3,542,009
Chesapeake	2,171	1,235	25	0	\$73,665,489	\$50,414,821	\$14,776,711



Flood Risk Assessment

100-year Flood Analysis - Damages Expected

Western Tidewater

COMMUNITY	NUMBER OF BUILDINGS DAMAGED				DOLLAR LOSSES		
	0-14%	15-29%	30-49%	SUBSTANTIAL DAMAGE	BUILDING	CONTENTS	INVENTORY
Franklin	103	68	7	0	\$7,174,366	\$21,436,438	\$19,024,847
Southampton County	60	44	46	3	\$4,332,161	\$3,958,881	\$2,017,067

Critical Facilities Analysis

Peninsula

Community	100-Year Floodplain	500-year Floodplain	Storm Surge Zone 3
Hampton	3	7	24
Newport News	2	0	4
Poquoson	3	3	0
Williamsburg	0	0	0
James City County	7	0	0
York County	7	10	2

Critical Facilities Analysis

Southside

Community	100-Year Floodplain	500-year Floodplain	Storm Surge Zone 3
Isle of Wight County	0	0	0
Norfolk	9	5	47
Portsmouth	2	3	8
Suffolk	2	0	4
Virginia Beach	26 (2 V Zone)	14	65
Chesapeake	4	3	20

Critical Facilities Analysis

Western Tidewater

Community	100-Year Floodplain	500-year Floodplain	Storm Surge Zone 3
Franklin	1	0	0
Southampton County	4	8	0

Flood Insurance Analysis

Peninsula

Community	Number of NFIP Policies	Insurance in Force
Hampton	11,076	\$2,752,401,900
Newport News	2,515	\$627,732,100
Poquoson	3,310	\$877,069,600
Williamsburg	47	\$11,971,100
James City County	1,006	\$275,598,300
York County	3,394	\$980,284,400

Flood Insurance Analysis

Southside

Community	Number of NFIP Policies	Insurance in Force
Isle of Wight County	397	\$116,904,100
Smithfield	108	\$32,979,900
Windsor	6	\$1,204,000
Norfolk	12,324	\$3,203,123,000
Portsmouth	3,618	\$884,828,100
Suffolk	943	\$280,794,800
Virginia Beach	24,200	\$6,453,533,800
Chesapeake	8,841	\$2,383,084,100

Flood Insurance Analysis

Western Tidewater

Community	Number of NFIP Policies	Insurance in Force
Franklin	148	\$39,465,400
Southampton County	127	\$26,582,600
Boykins	7	\$1,901,500
Branchville	0	\$0
Courtland	20	\$5,822,600
Ivor	1	\$350,000

Repetitive Flood Loss Analysis

- ▲ Severe Repetitive Loss
- NFIP Repetitive Loss
- ◆ Single NFIP Flood Loss



Repetitive Flood Loss Analysis

Peninsula

Community	Number of Repetitive Loss Areas	Number of Properties or Buildings
Hampton	71	8,940
Newport News	24	1,113
Poquoson	1 (entire SFHA)	4,810
James City County	10	643
York County	15	3,323

Repetitive Flood Loss Analysis

Southside

Community	Number of Repetitive Loss Areas	Number of Properties or Buildings
Isle of Wight County	13	151
Smithfield	1	45
Norfolk	89	11,933
Portsmouth	25 maps	1,974
Suffolk	12	81
Virginia Beach	6	18,939
Chesapeake	47	3,011

Repetitive Flood Loss Analysis

Western Tidewater

Community	Number of Repetitive Loss Areas	Number of Properties or Buildings
Franklin	2	462
Southampton County	4	74

Sea Level Rise & Land Subsidence

What's Happening? “*The Double Whammy*”

1. Sea Level is Rising

- Increased volume of water in the oceans from melting ice
- Thermal expansion of warming ocean increases ocean volume

2. Land in this Region is Subsiding

- Groundwater withdrawals
- Glacial isostatic rebound

Source: USGS, *Land Subsidence and Relative Sea-Level Rise in the Southern Chesapeake Bay Region*, 2013

Ranking Hazards

**CRITICAL HAZARD - HIGH
RISK**

**FLOODING
TROPICAL/COASTAL STORM**

**CRITICAL HAZARD -
MODERATE RISK**

**SEA LEVEL RISE AND LAND
SUBSIDENCE
TORNADO
WINTER STORM
HAZARDOUS MATERIALS
INCIDENT**

**NONCRITICAL HAZARD -
LOW RISK**

**SHORELINE EROSION
EARTHQUAKE
WILDFIRE**

Revisiting Goals & Objectives

Goal 1: Increase community resiliency by reducing vulnerability to hazards.

Objective 1.1: Reduce damage to repetitively flooded properties

Objective 1.2: Protect existing and future development

Objective 1.3: Protect critical facilities/infrastructure

Objective 1.4: Maintain government services throughout hazard events

Objective 1.5: Reduce hazard-related impacts on daily routines

Objective 1.6: Preserve and enhance benefits of natural areas

Goal 2: Educate the public about hazard vulnerabilities and ways to reduce risk

Objective 2.1: Encourage property owners to assume responsibility for reducing vulnerability

Goal 3: Strengthen and develop partnerships for mitigating hazard impacts

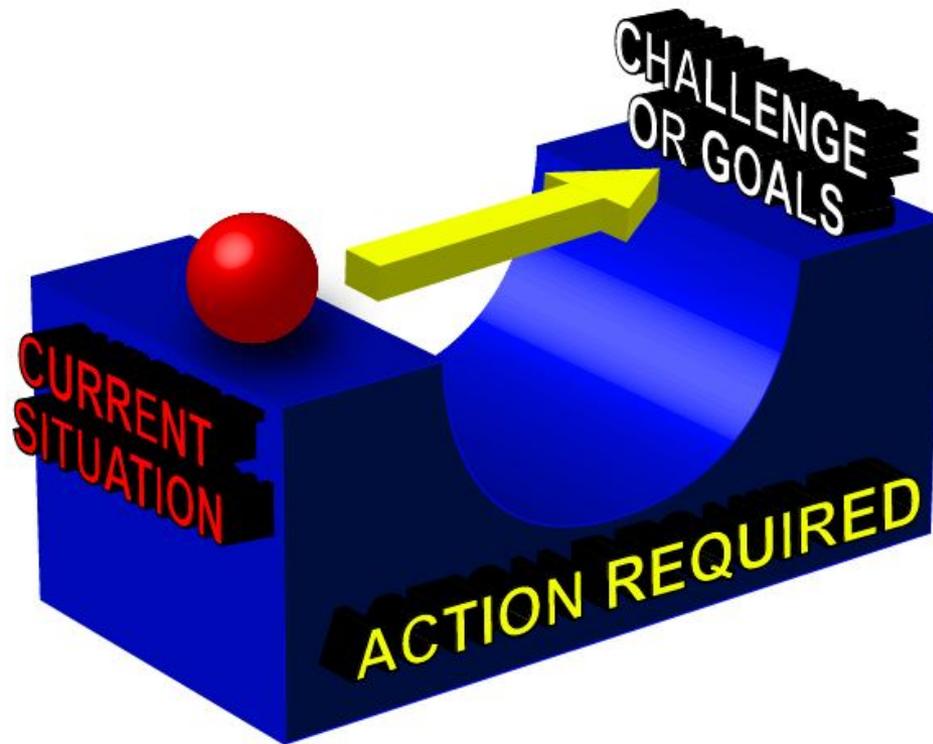
Objective 3.1: Integrate mitigation concepts into local and regional government plans, policies and actions

Objective 3.2: Improve and standardize hazard data collection and mapping

Objective 3.3: Leverage shared resources in pursuit of funding for hazard mitigation projects

Objective 3.4: Develop partnerships among local, regional, national, and international organizations

What is a Capability or Gap Analysis?



Categories of Mitigation Activities

Preventive Measures

- Floodplain mapping and data
- Open space preservation
- Floodplain regulations
- Coastal setback/erosion regs
- Planning & Zoning – Comp Plan, Zoning Ord
- Stormwater Regs
- Drainage system maintenance
- Building Codes

Property Protection Measures

- Relocation
- Acquisition – (tie to foreclosures)
- Building elevation
- Retrofitting
- Sewer backup protection
- Insurance

Categories of Mitigation Activities

Emergency Services Measures

- Hazard threat recognition
- Hazard warning
- Hazard response operations
- Critical facilities protection
- Health & safety maintenance
- Post-disaster mitigation actions

Natural Resource Protection Measures

- Wetlands protection
- Erosion & sediment control
- Natural area preservation
- Natural area restoration
- Water quality improvement
- Environmental corridors
- Natural functions protection

Categories of Mitigation Activities

Structural Projects

- Reservoirs
- Levees/floodwalls
- Diversions
- Channel modifications
- Storm drain improvements

Public information

- Map information
- Outreach projects
- Real estate disclosure
- Library
- Technical assistance
- Environmental education

Next Steps & Schedule

- Survey Monkey survey and working draft available online for comments until August 17
 - <http://www.hrpdcva.gov/departments/emergency-management/hampton-roads-hazard-mitigation-plan/>
- Final draft to be posted September 7
- Public meeting #6, September 27 at VMASC
- VDEM/FEMA reviews
- Final adoption by communities, late fall 2016