

**VIRGINIA COASTAL  
RESILIENCE  
MASTER PLAN**  
2021



# Public Meeting

## Northern Virginia Regional Commission

Commonwealth of Virginia Working Document – Contents Considered Draft and Subject to Change

# An Overview of Tonight's Meeting

- **Welcome and introductions**
- **Why does Virginia need a Coastal Resilience Master Plan?**
- **How will the plan work?**
- **Introduction to interactive stations**

# The Challenge

- Over 6 million people, or 70% of Virginia's population, live in coastal areas at risk of flooding.
- In 2018 and 2019, Virginia experienced nine major floods; damage of \$1.6 billion.
- Virginia has the highest rate of sea level rise in the east coast, endangering billions of dollars in private property and public infrastructure.

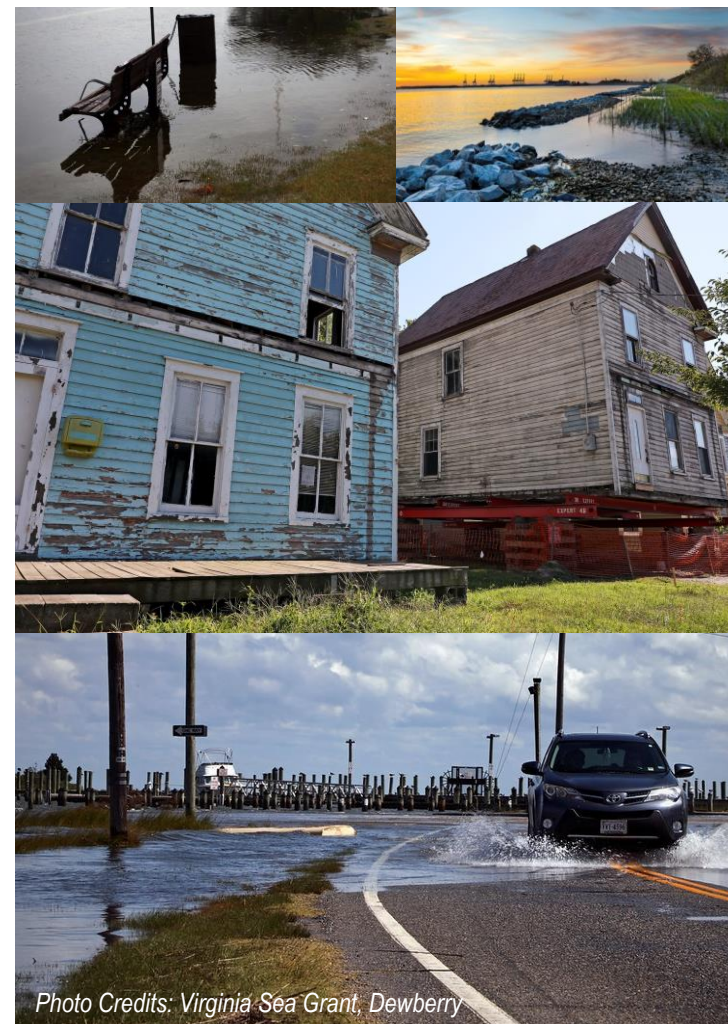


Photo Credits: Virginia Sea Grant, Dewberry

# What is Driving Increased Flooding?



New development



Changing weather patterns and severe storms



Rising seas

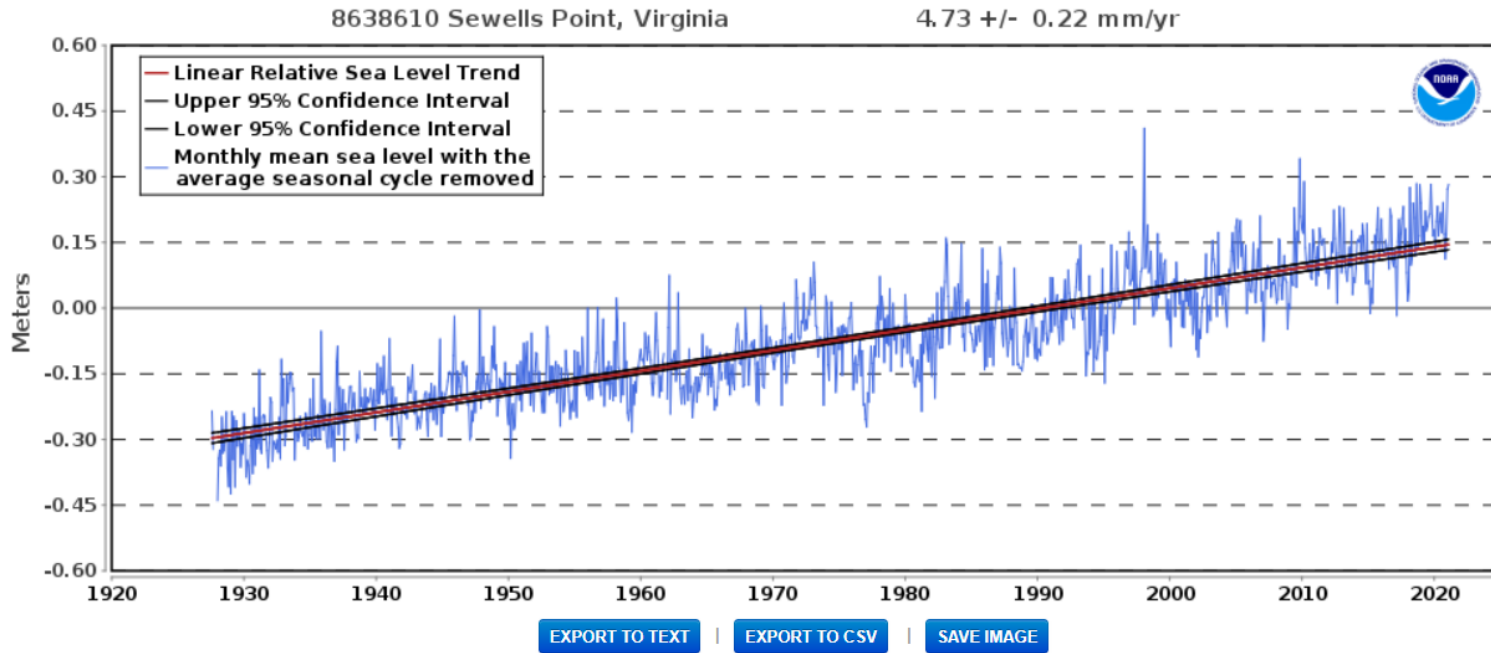


Sinking land

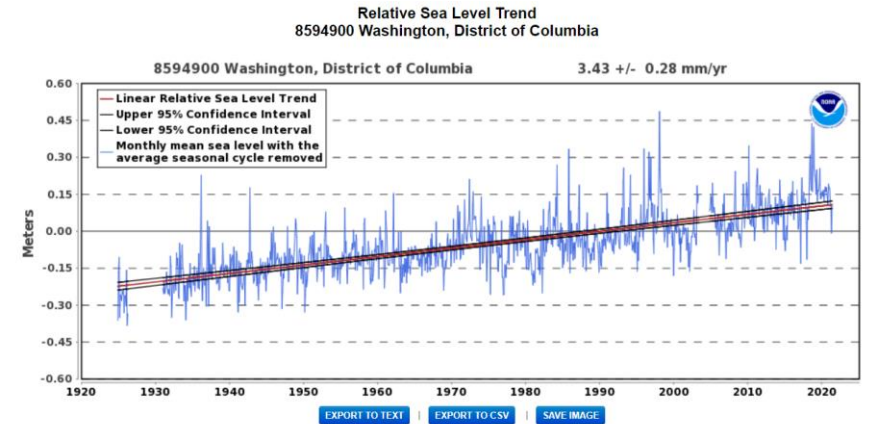


# Sea Level Change in Virginia

Relative Sea Level Trend  
8638610 Sewells Point, Virginia



The relative sea level trend is 4.73 millimeters/year with a 95% confidence interval of +/- 0.22 mm/yr based on monthly mean sea level data from 1927 to 2020 which is equivalent to a change of 1.55 feet in 100 years.

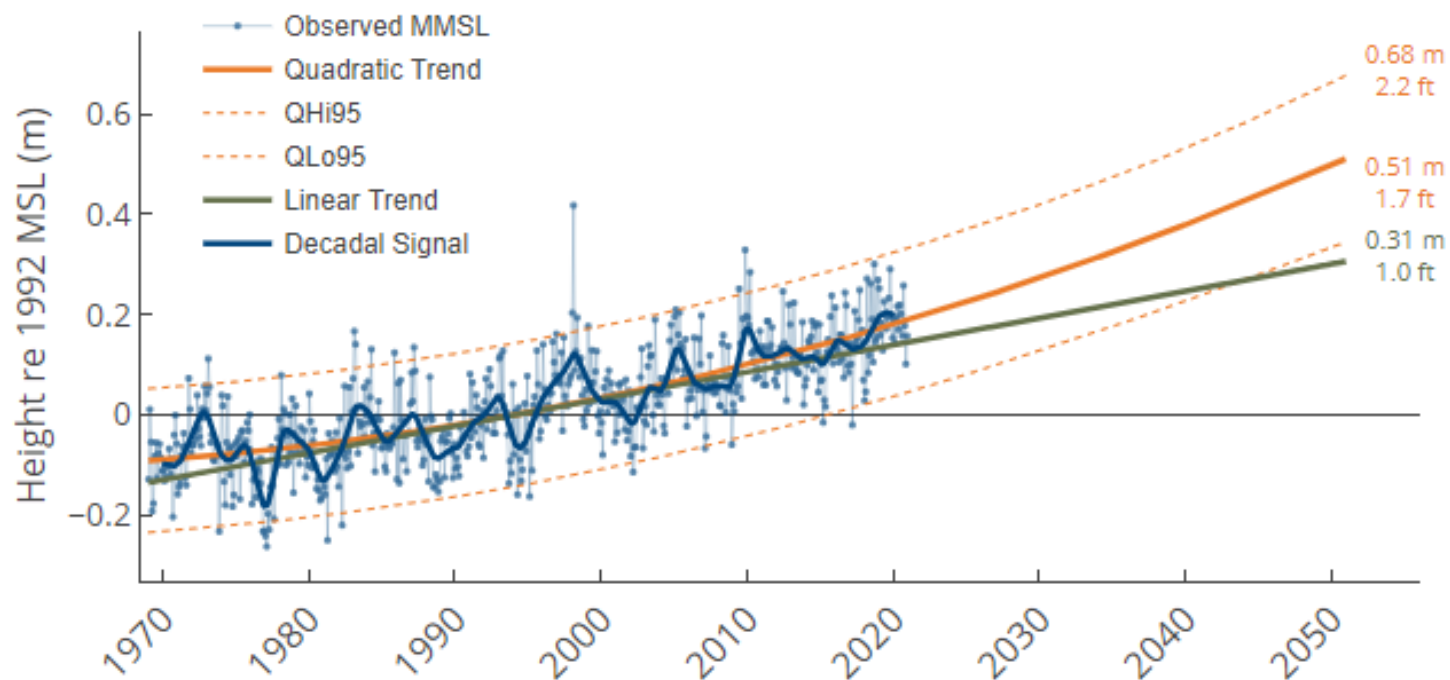


The relative sea level trend is 3.43 millimeters/year with a 95% confidence interval of +/- 0.28 mm/yr based on monthly mean sea level data from 1924 to 2020 which is equivalent to a change of 1.13 feet in 100 years.

# Sea Level Rise is Accelerating

2050 Projection

Norfolk (Sewells Point), Virginia

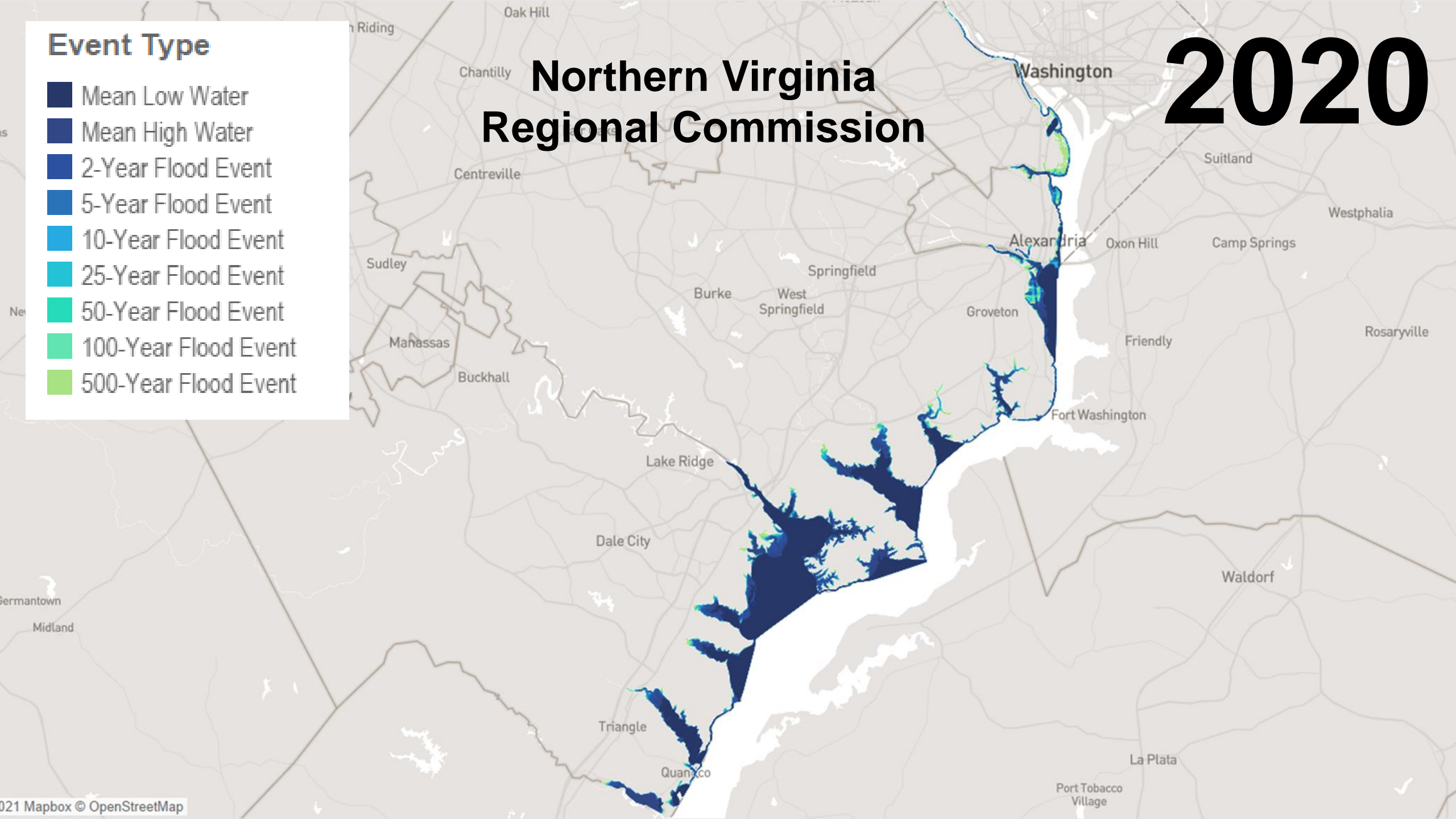


## Event Type

- Mean Low Water
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# Northern Virginia Regional Commission

# 2020

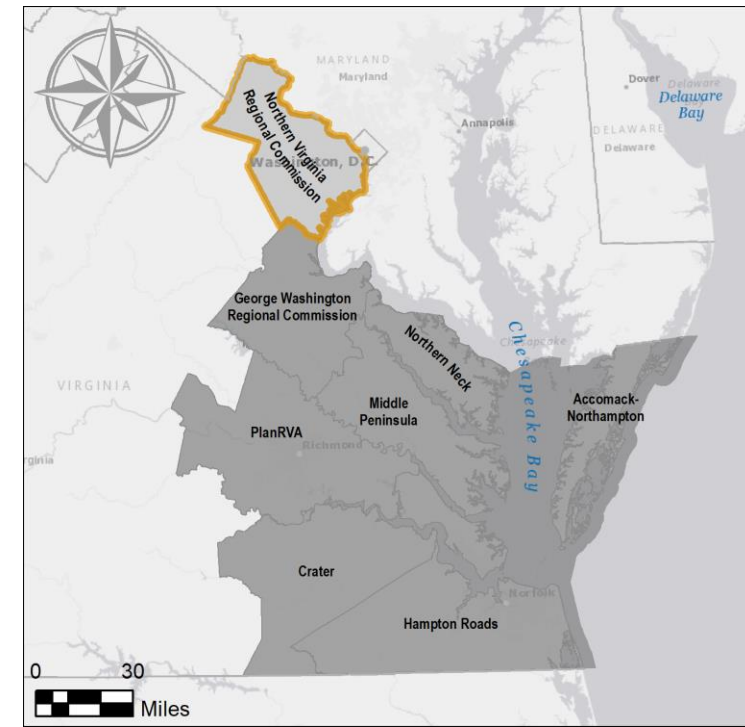




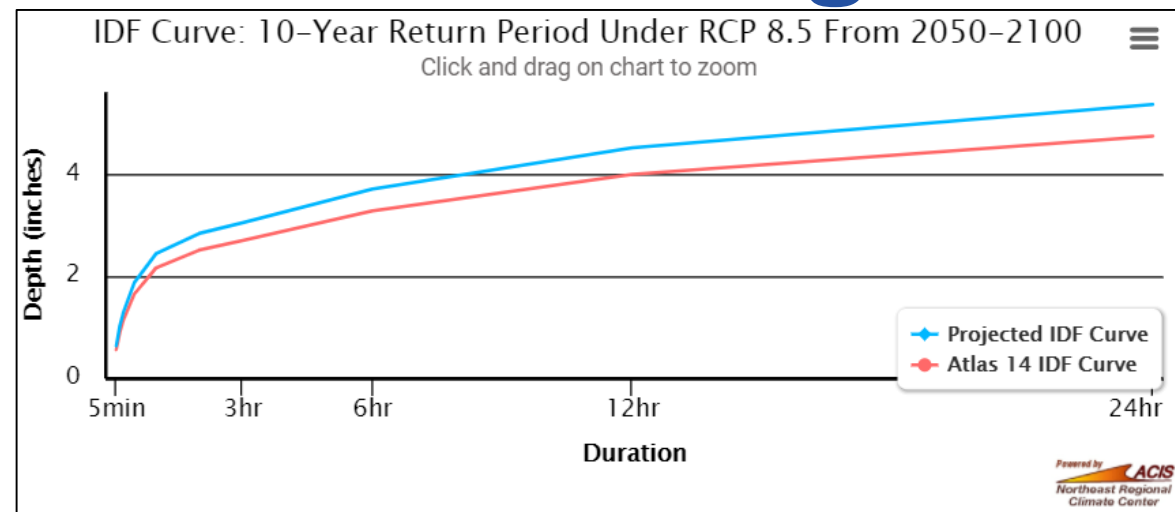
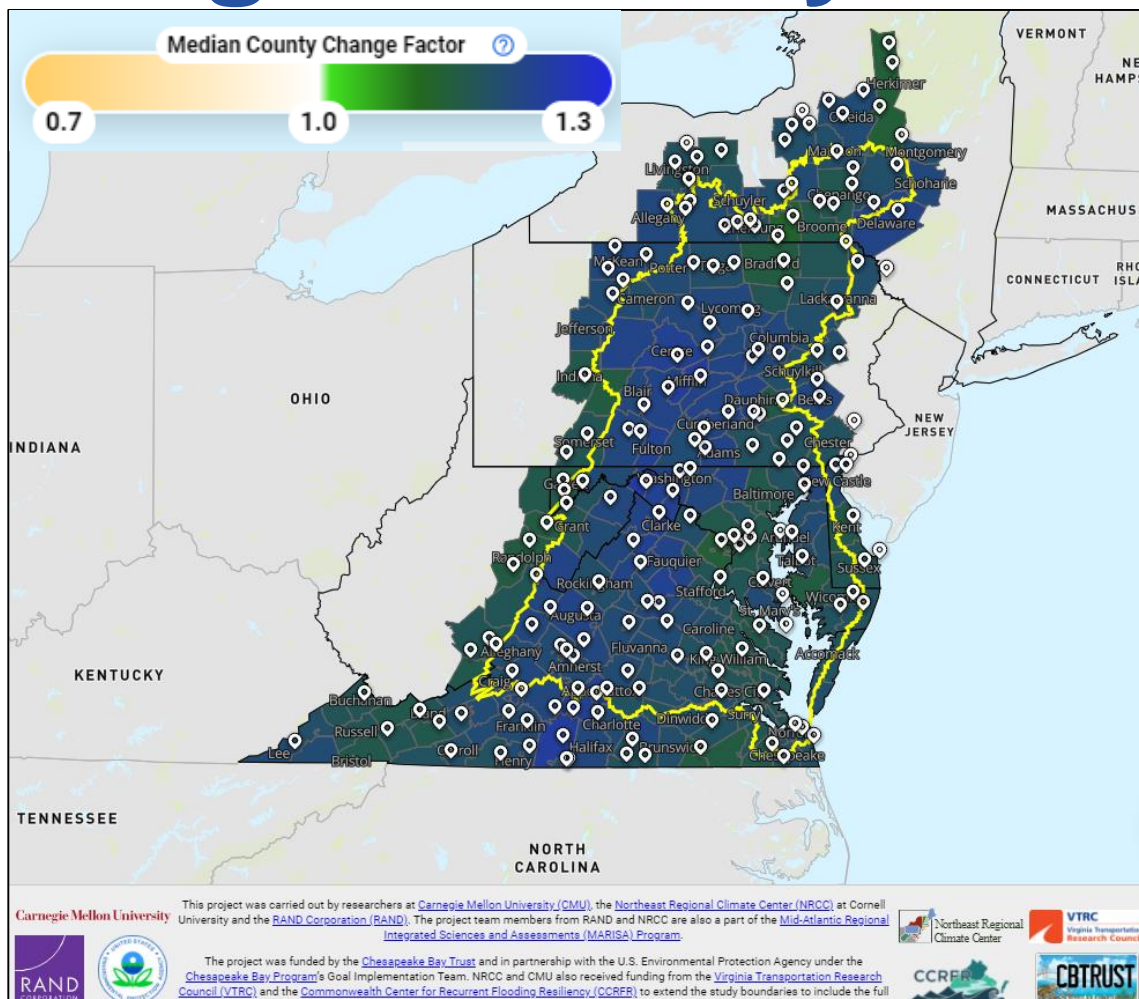


# Coastal Flooding - Projected Changes

- **Northern Virginia Regional Commission**
- **Without intervention, coastal flooding in the next 40 years will impact:**
  - 1,930 more acres of land
  - 8,000 thousand more people
  - 850 more buildings



# High-Intensity Rainfall is Increasing



## WASHINGTON REAGAN NATIONAL AIRPORT

### Atlas 14 Change Factors for Arlington County:

10th Percentile:	1.00
25th Percentile:	1.04
Median:	1.13
75th Percentile:	1.19
90th Percentile:	1.29

<https://midatlantic-idf.rcc-acis.org/>

# What is Resilience?

Strengthen communities' capability to **anticipate, prepare for, respond to, and recover from** hazards

Minimize damage to **social well-being, public health, the economy, and the environment.**

# Virginia Focus on Coastal Region Resilience Planning



Commonwealth of Virginia  
Office of the Governor

## Executive Order

NUMBER TWENTY-FOUR (2018)

### INCREASING VIRGINIA'S RESILIENCE TO SEA LEVEL RISE AND NATURAL HAZARDS

#### Importance of the Initiative

Sea level rise, land subsidence, higher average temperatures, more frequent and intense weather events, severe drought, and increased development, have increased risk and will continue to increase and exacerbate risk from natural hazards across the Commonwealth of Virginia. The number of federally declared disasters has steadily increased nationally and in Virginia. The number has experienced a 250 percent increase in federally declared disasters over the past 20 years, including declarations for flooding, hurricanes, severe storms, and wildfire.

The best available science predicts that this trend will continue to worsen. A recent report from the United Nations Intergovernmental Panel on Climate Change states that the world is likely to experience dramatic increases in coastal flooding and severe weather events. Additional studies show that water levels in the Hampton Roads region are now 18 inches higher than they were a century ago, and that they are expected to gain up to five more feet, while the land sinks as much as 7.5 inches, by 2100. That combined rise is faster than anywhere else on the East Coast. The most recent National Climate Assessment reported that the intensity, frequency, and duration of North Atlantic hurricanes, as well as the frequency of the strongest hurricanes, have all increased.

This increase in extreme weather events and natural disasters will continue to have a profound impact on Virginia. It threatens public health and safety, our environment and natural resources, and the economic wellbeing of the Commonwealth, including our ports, military installations, transportation infrastructure, tourism assets, farms, and forests. We must act now to protect lives and property from multiple threats and reduce taxpayer exposure through fiscally responsible planning.



Commonwealth of Virginia  
Office of the Governor

## Executive Order

NUMBER FORTY-FIVE

### FLOODPLAIN MANAGEMENT REQUIREMENTS AND PLANNING STANDARDS FOR STATE AGENCIES, INSTITUTIONS, AND PROPERTY

#### Importance of the Initiative

Executive Order 24 "Increasing Virginia's Resilience to Sea Level Rise and Natural Hazards," issued in November 2018, set the Commonwealth on a course towards addressing its risk and resilience to natural hazards, including flooding. A key element of that Order required an analysis of flooding and flood preparedness in the Commonwealth. Based on that analysis, the Commonwealth must establish new policies and directives to ensure that necessary actions are taken to protect state property from the risk of floods.

#### Background

Flooding remains the most common and costly natural disaster in Virginia and the United States. With more than 100,000 miles of streams and rivers, as well as 10,000 miles of estuarine and coastal shoreline, Virginia's flood risk is statewide, comes in many forms, and is increasing because of climate change and increased development in flood-prone areas. In 1987, in order to improve Virginia's flood protection programs and to consolidate all related programs in one agency, responsibility for coordination of all state floodplain programs was transferred from the State Water Control Board to the Department of Conservation and Recreation (DCR). Section 10.1-602 of the *Code of Virginia* names DCR as the manager of the state's floodplain program and the designated coordinating agency of the National Flood Insurance Program (NFIP). The Code stipulates that the Director of DCR or his designee shall serve as the State Coordinator for the NFIP.

DCR's Floodplain Management Program was created to minimize Virginia's flood hazards. In particular, it aims to prevent loss of life, reduce property damage, and conserve natural and beneficial values of state rivers and coastal floodplains. To achieve these goals, DCR promotes

COMMONWEALTH OF VIRGINIA

## 2021 Grant Manual for the Virginia Community Flood Preparedness Fund

2021 Grant Funding

Applications Due: 4 p.m., 09/03/2021

Developed by the Department of Conservation and Recreation in cooperation with the Virginia Resources Authority



## VIRGINIA COASTAL RESILIENCE MASTER PLANNING FRAMEWORK

*Principles and Strategies for Coastal Flood Protection and Adaptation*



OFFICE OF GOVERNOR RALPH S. NORTHAM  
COMMONWEALTH OF VIRGINIA  
OCTOBER 2020

# Why a Coastal Resilience Master Plan?

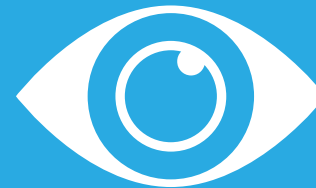
Whole of  
Government  
and  
Community  
Approach



Ensure  
Equity



Broader  
View

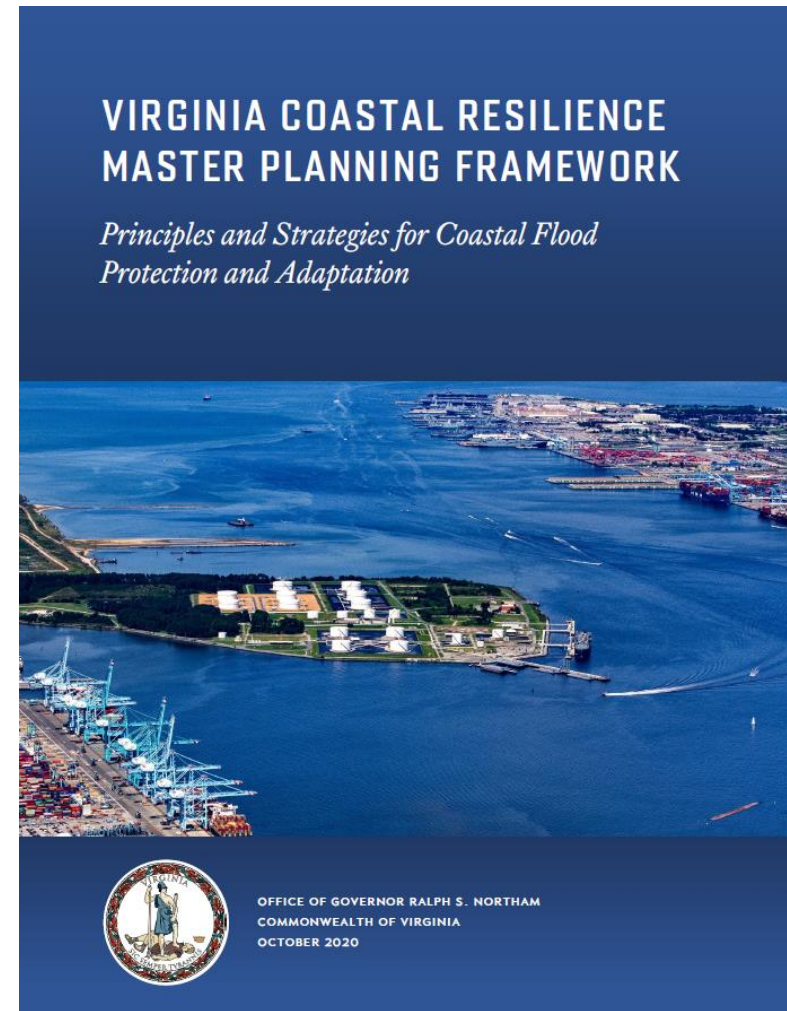


Funding  
Strategy



# Guiding Principles

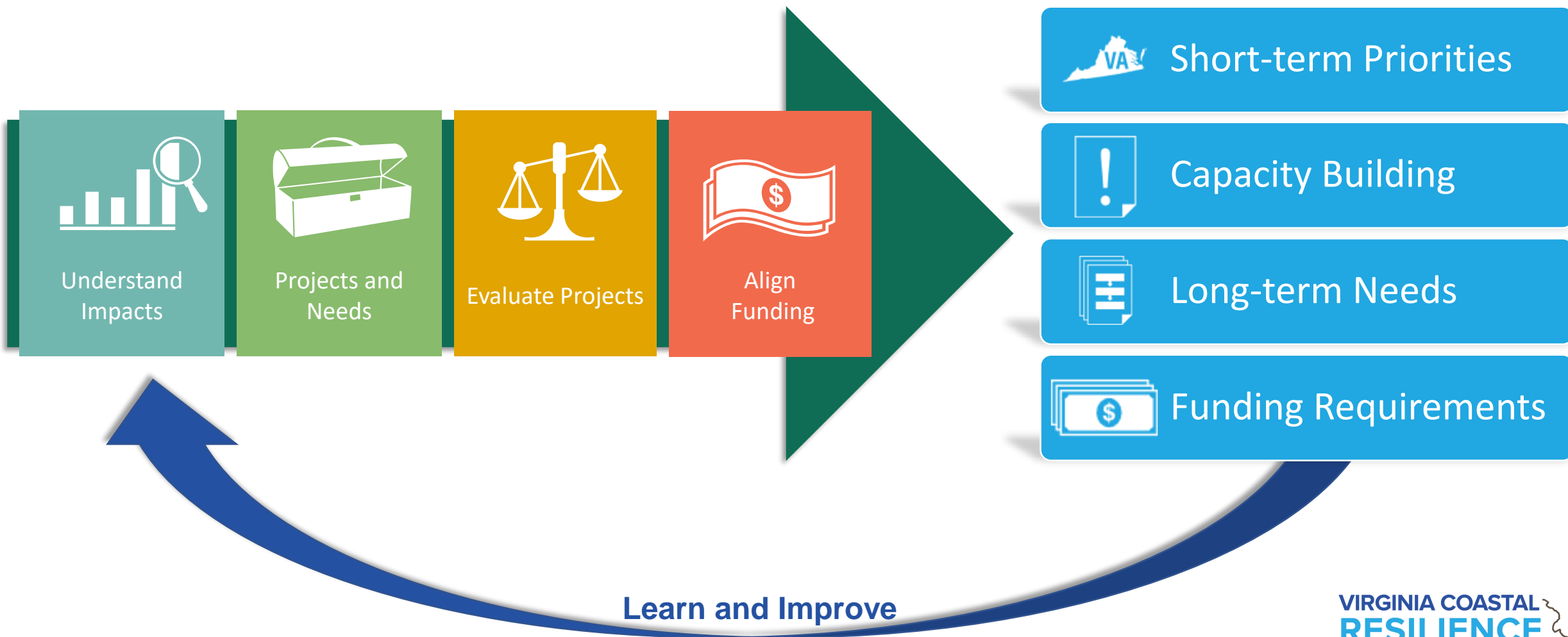
- Acknowledge climate change and its consequences, and base decision-making on the best available science.
- Identify and address socioeconomic inequities and work to enhance equity through coastal adaptation and protection efforts.
- Recognize the importance of protecting and enhancing green infrastructure like natural coastal barriers and fish and wildlife habitat by prioritizing nature-based solutions.
- Utilize community and regional scale planning to the maximum extent possible, seeking region-specific approaches tailored to the needs of individual communities.
- Understand fiscal realities and focus on the most cost-effective solutions for protection and adaptation of our communities, businesses and critical infrastructure.



# Goals:

1. Identify and prioritize projects to increase the resilience of coastal communities, including both built and natural assets at risk due to flooding and sea level rise
2. Establish a financing strategy, informed by regional differences and equity considerations
3. Incorporate and promote climate change projections into Commonwealth's programs addressing coastal adaptation and protection
4. Coordinate state, federal, regional, and local coastal region adaptation and protection efforts

# 2021 Coastal Master Plan







@NatResourcesVA



@VaCoastalResilience

# VIRGINIA COASTAL RESILIENCE MASTER PLAN

2021



**Website:**

**[www.virginia.gov/coastalresilience](http://www.virginia.gov/coastalresilience)**

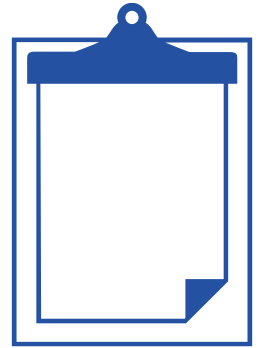
**Email Questions or Comments to:**

**[resilientcoastVA@governor.virginia.gov](mailto:resilientcoastVA@governor.virginia.gov)**

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# VA CRMP – Public Survey

<https://surveymonkey.com/r/VACRMP-Public>



# Visioning Activity

- **What does a resilient community look like for you in 30-50 years?**
  
- **What are the priorities?**



# Mapping Activity



- What areas in your community experience flooding or erosion issues?
- What type of flooding occurs?

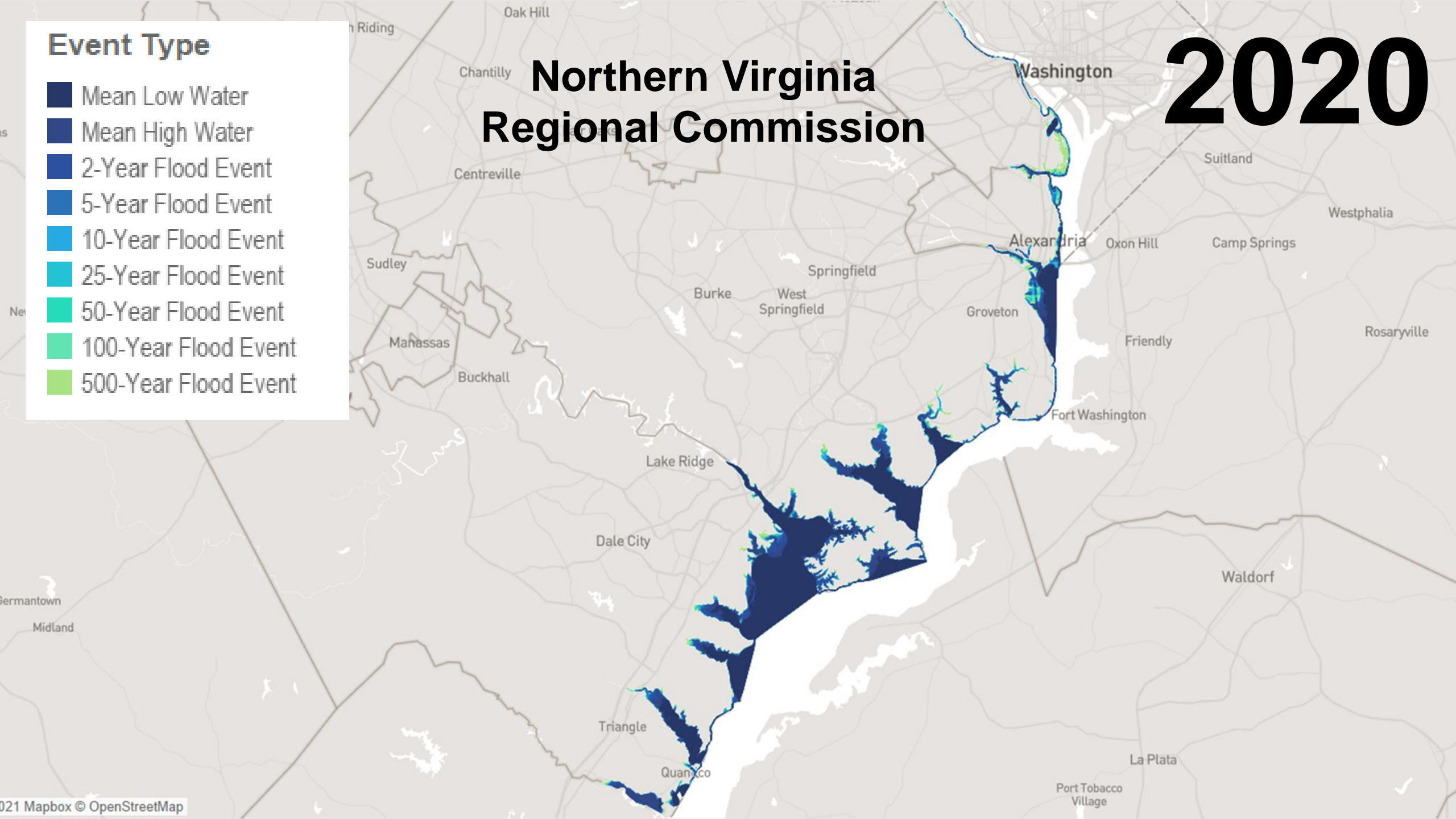


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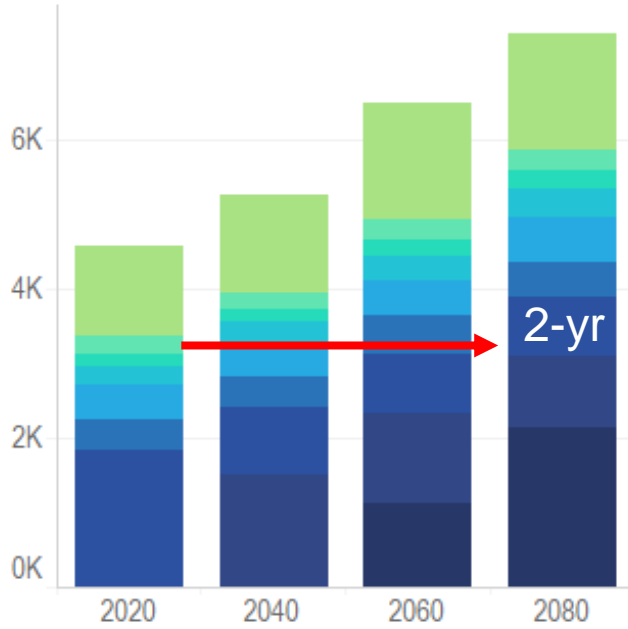
# Northern Virginia Regional Commission

# 2020



## Land Area

Acres of land area inundated by event type, relative to 2020 mean high water.

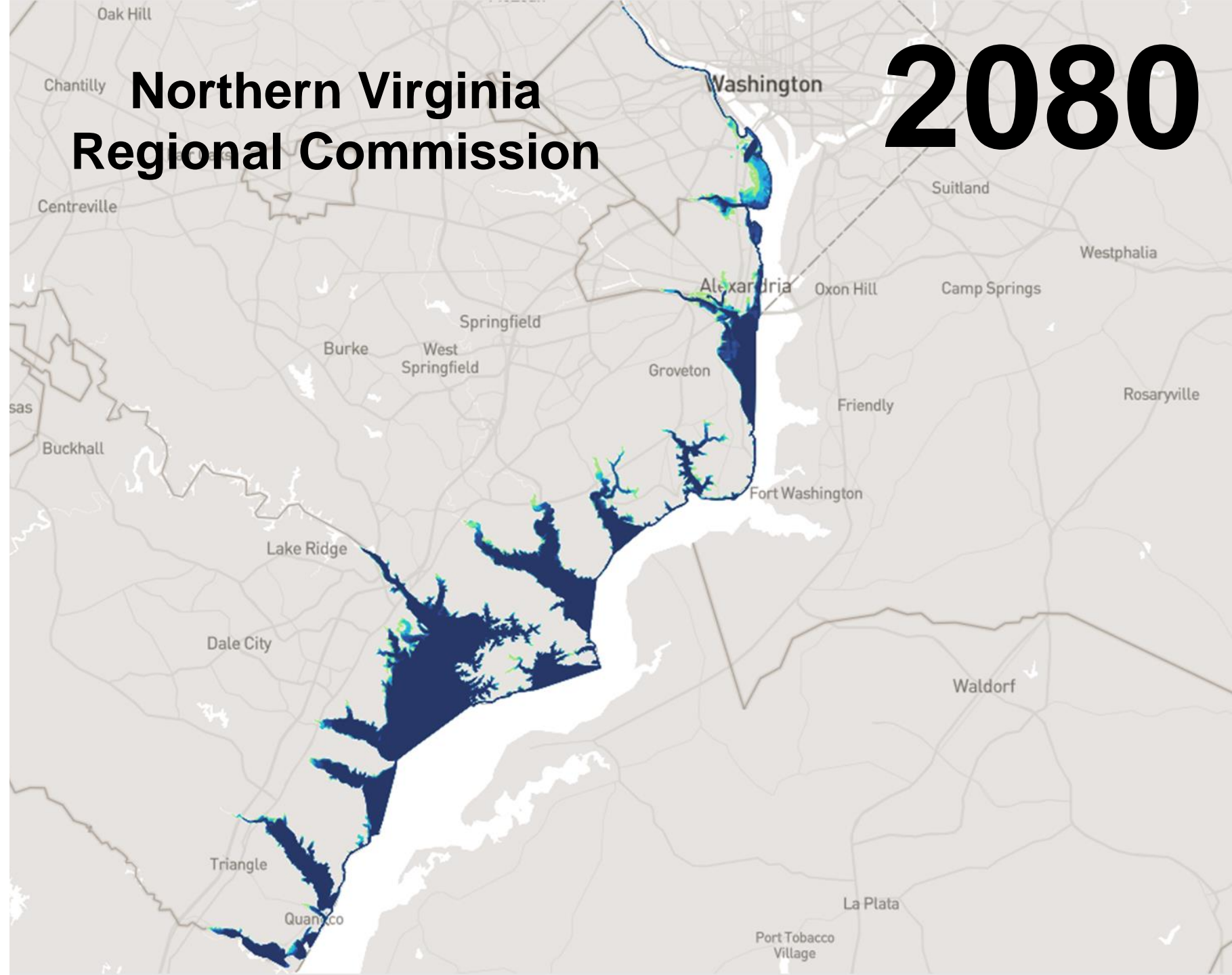


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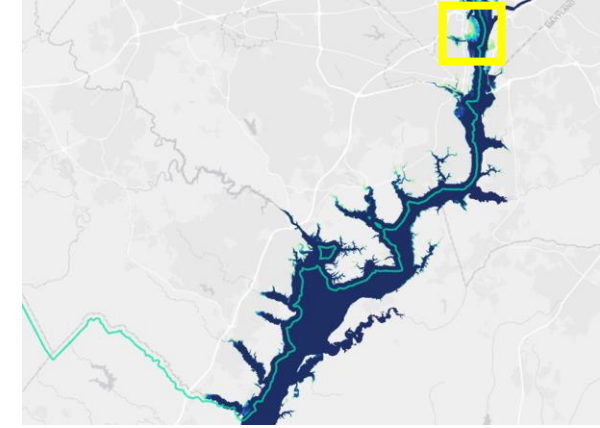
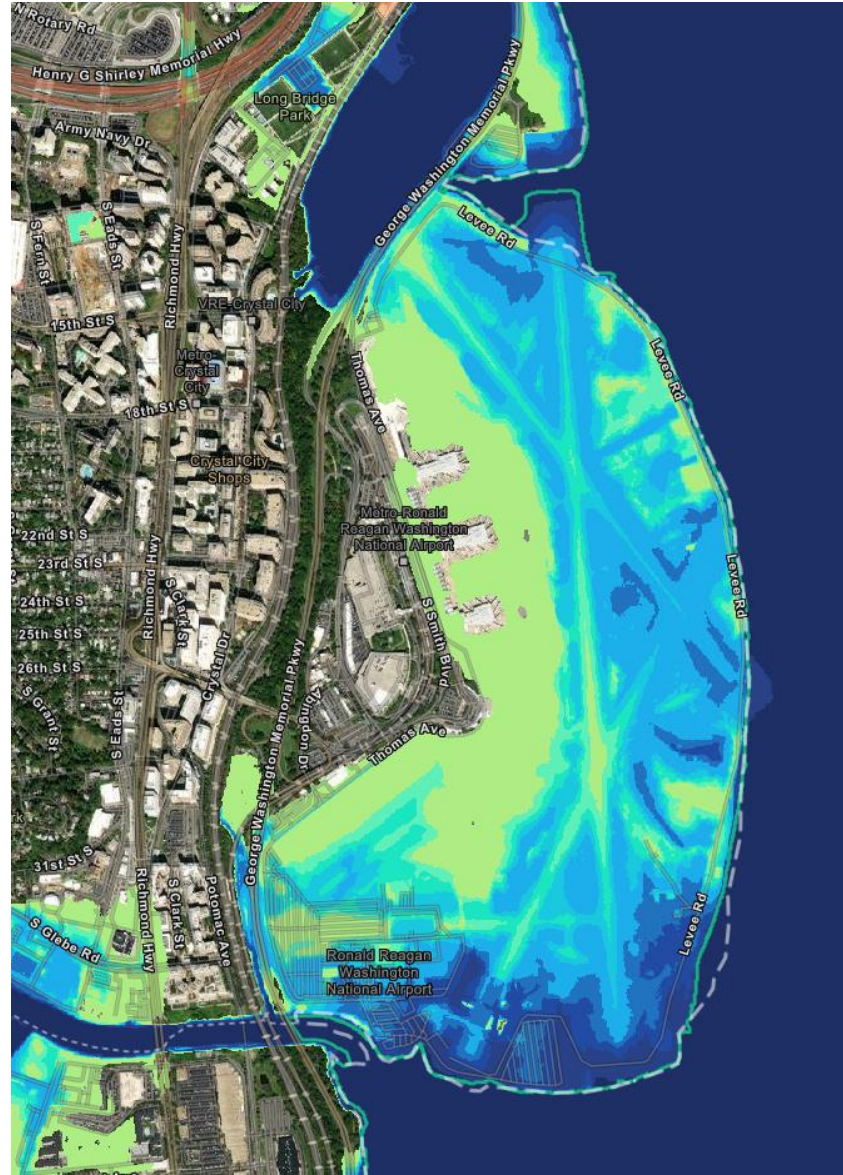
# 2080



# 2020



# 2080



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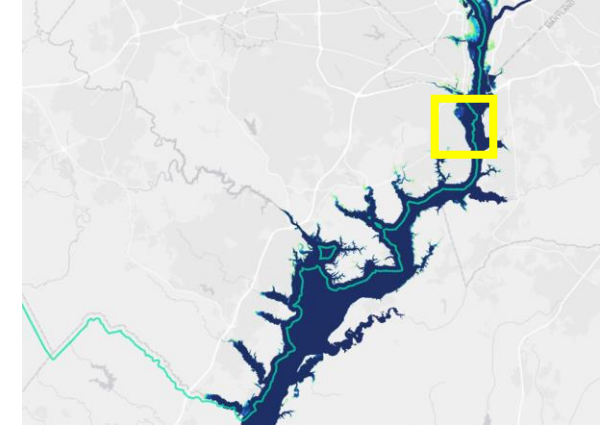
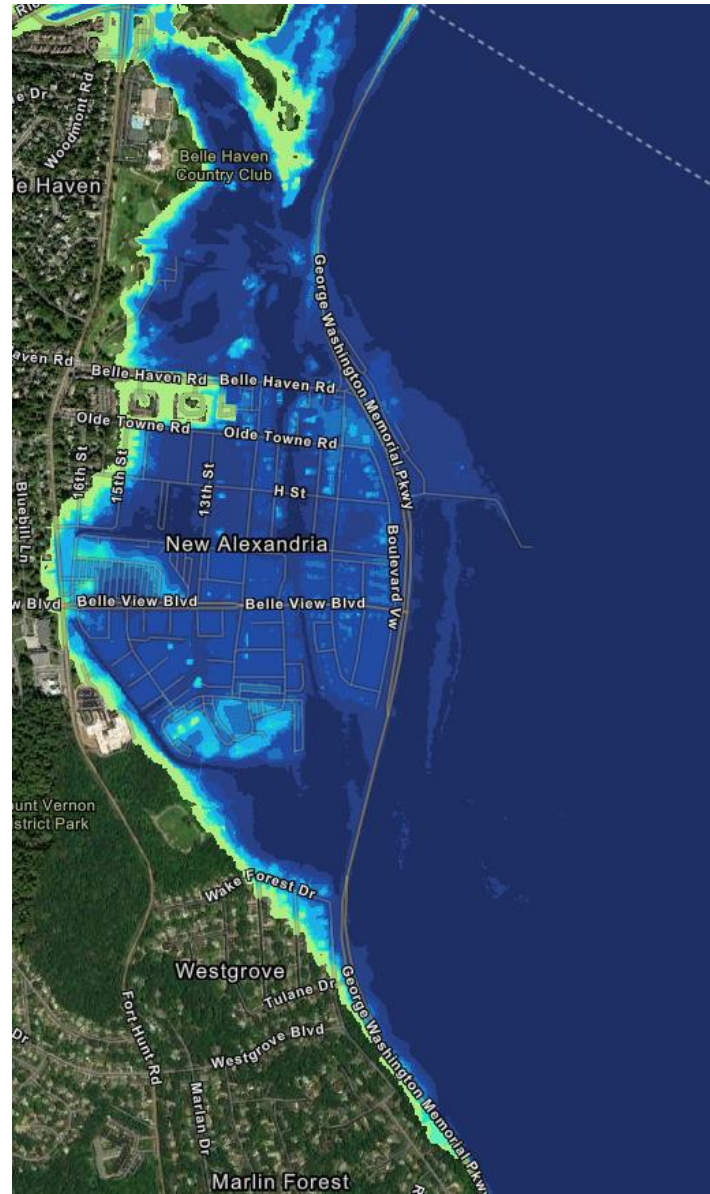
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VIRGINIA COASTAL  
**RESILIENCE**  
**MASTER PLAN**



# 2020

# 2080



## Event Type

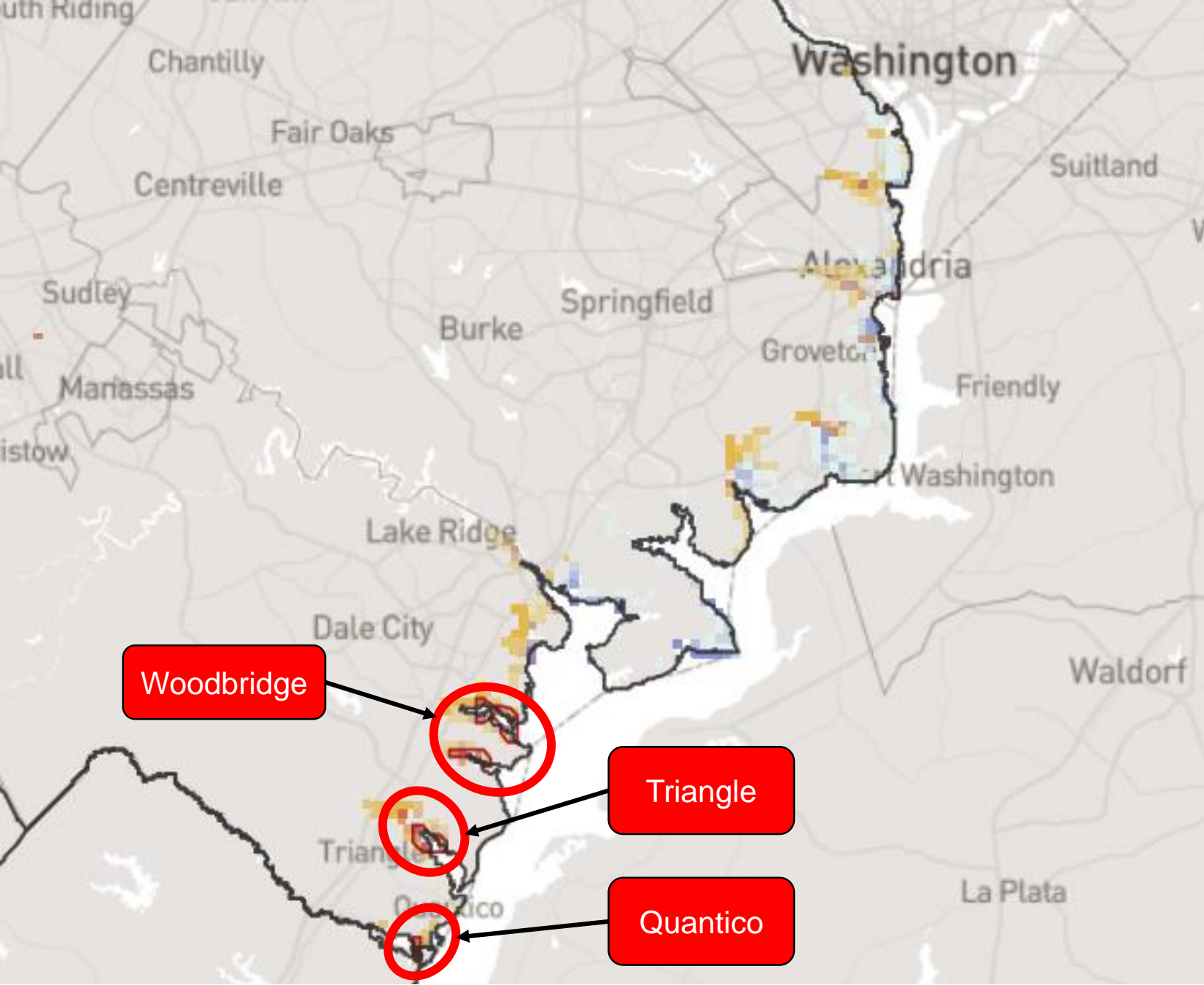
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# Social Vulnerability Metrics

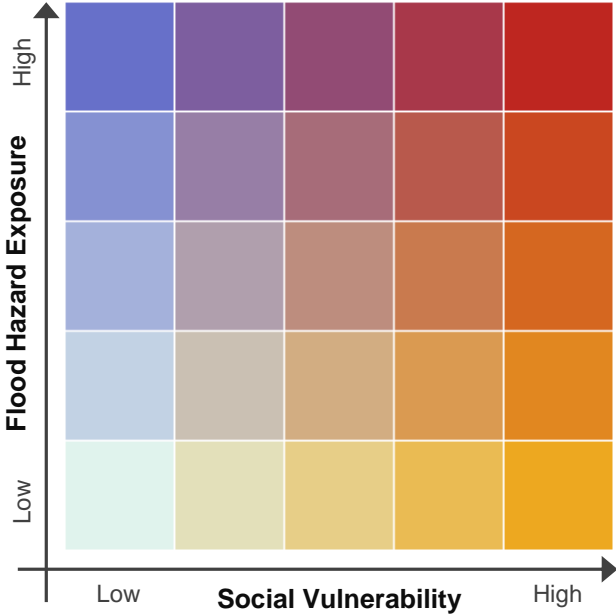
Overall Social Vulnerability	Socioeconomic Status	People Living Below Poverty
		Workforce Unemployment
		Adults with No High School Diploma
		Per Capita Income
	Household Composition & Disability	Elderly Population Aged 65 or Older
		Youth Aged 17 or Younger
		People with Disabilities
		Single-Parent Households
	Language & Ethnicity	People of Color (Non-White)
		People Speaking English "Less than Well"
	Housing & Transportation	Presence of Multi-Unit Structures
		Presence of Mobile Homes
		Crowded Living Quarters
		Households with No Vehicle
		People Living in Group Quarters

Source: Adapted from CDC Social Vulnerability Index



# Community Hazard Exposure & Social Vulnerability

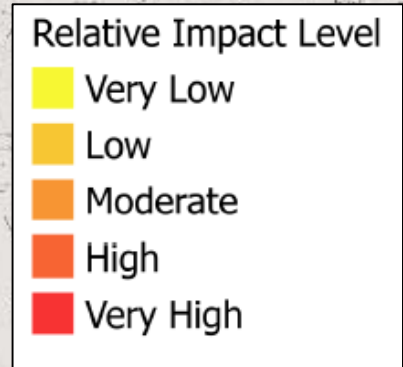
2080



# Community Resources

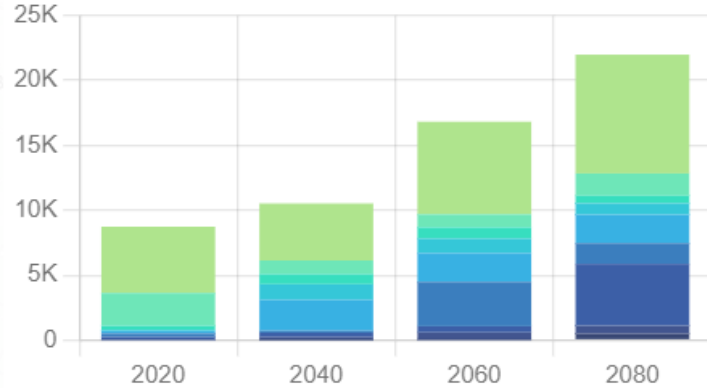
- Exposed Population
- Displaced Population
- Residential Structures
- Non-Residential Structures

# 2020

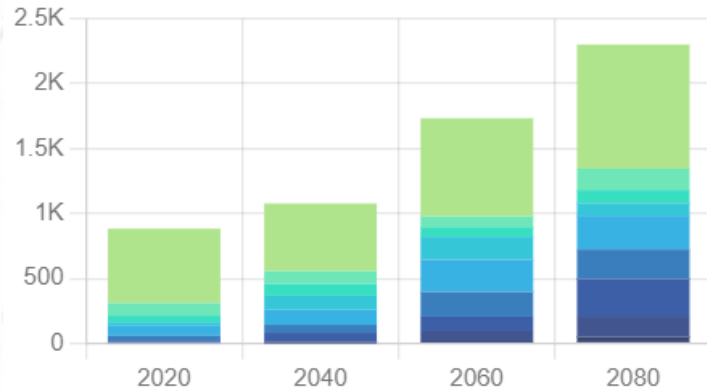


# Community Resources

**Residential Population Flooded by Event Type**

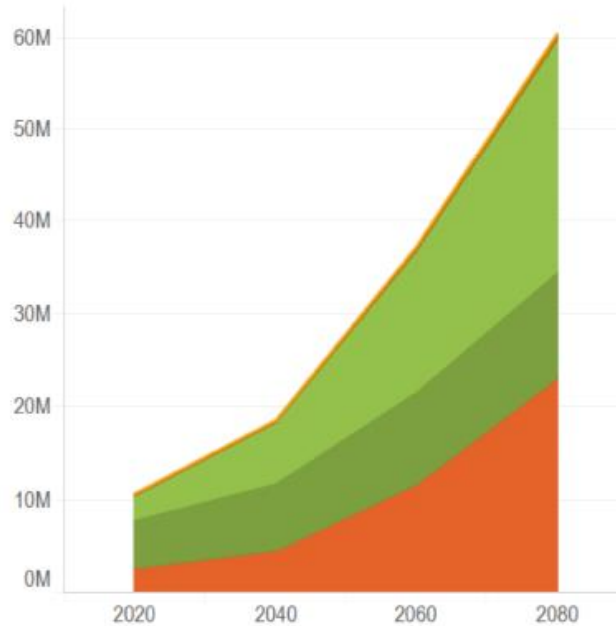


**Number of buildings in the floodplain by event type**



**Building Damages**

Average annualized losses due to flood damages to structures and their contents.

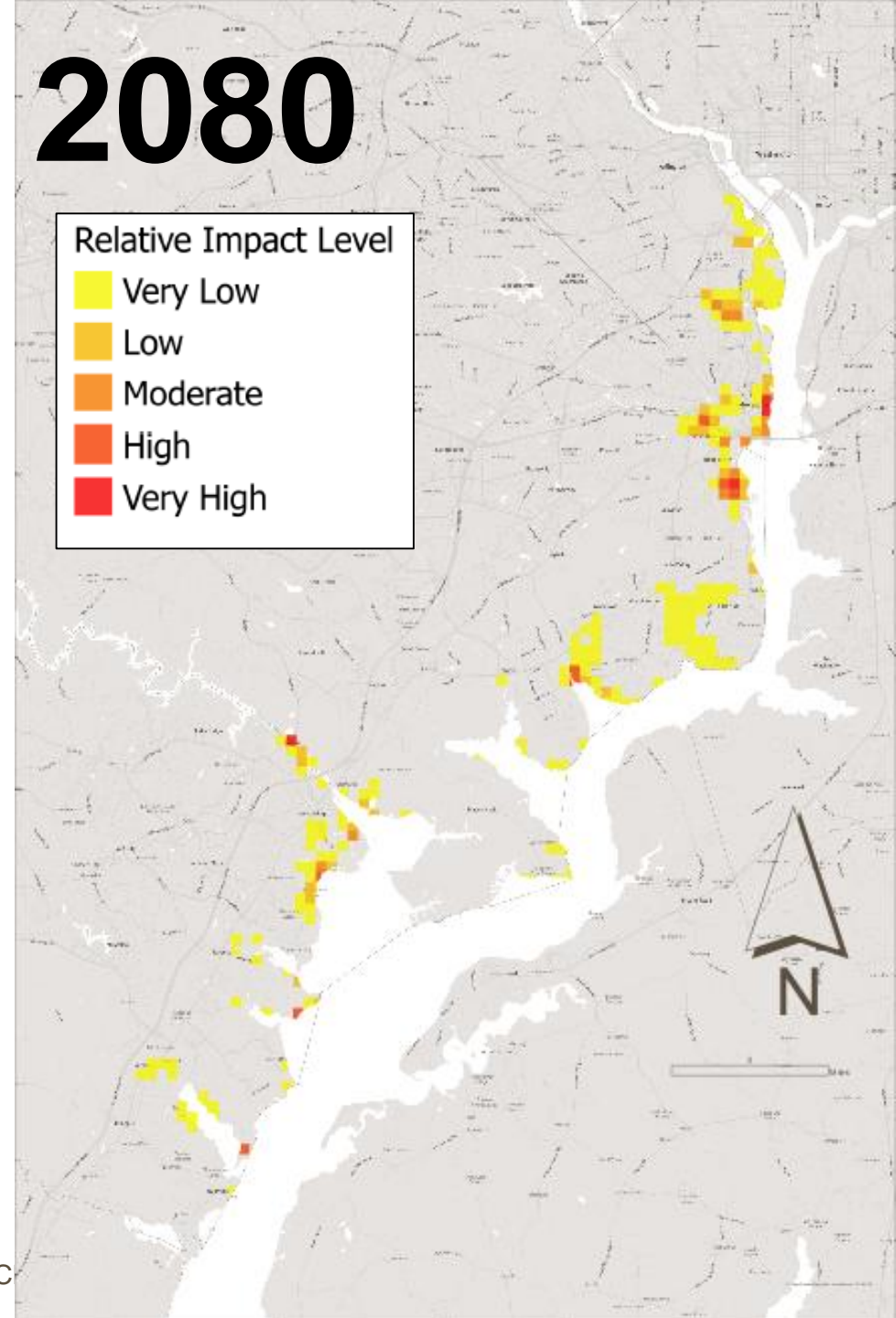


- Recreational
- Educational
- Commercial
- Industrial
- Agricultural
- Residential

# 2080

**Relative Impact Level**

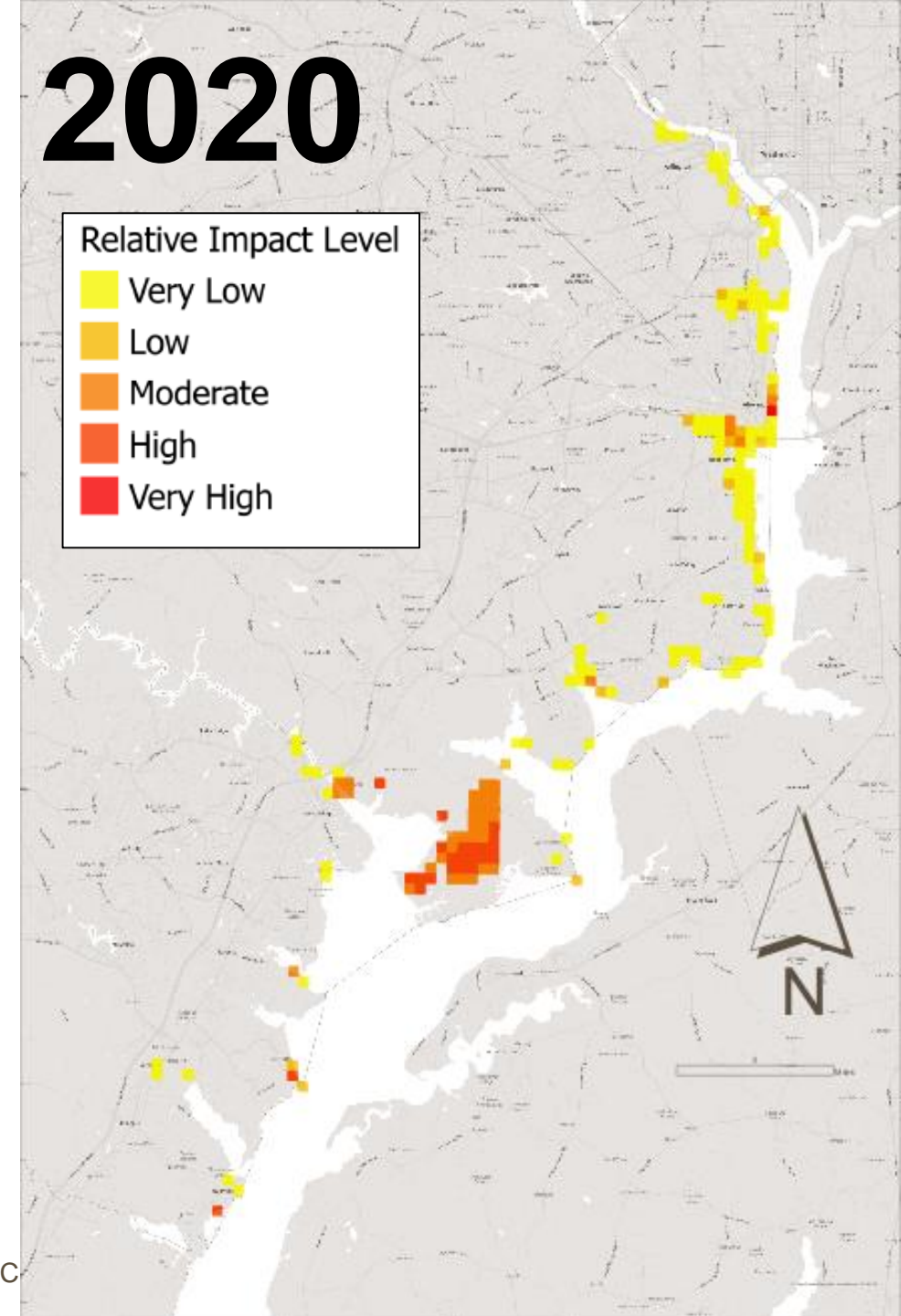
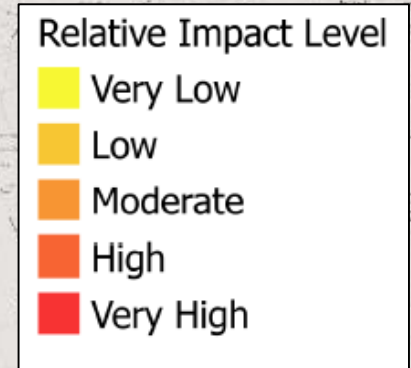
- Very Low
- Low
- Moderate
- High
- Very High



# Critical Sectors

- Transportation
- Communications
- Critical Commercial & Manufacturing Facilities
- Military Installations
- Energy Infrastructure
- Food and Agriculture
- Health and EMS
- Government facilities
- Waste & wastewater systems

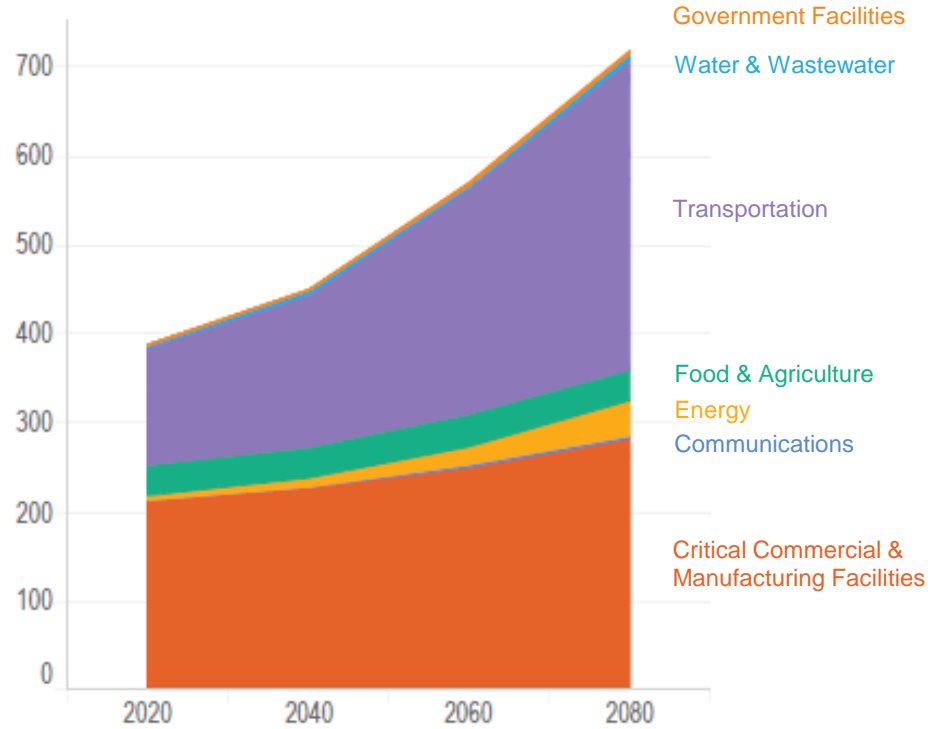
# 2020



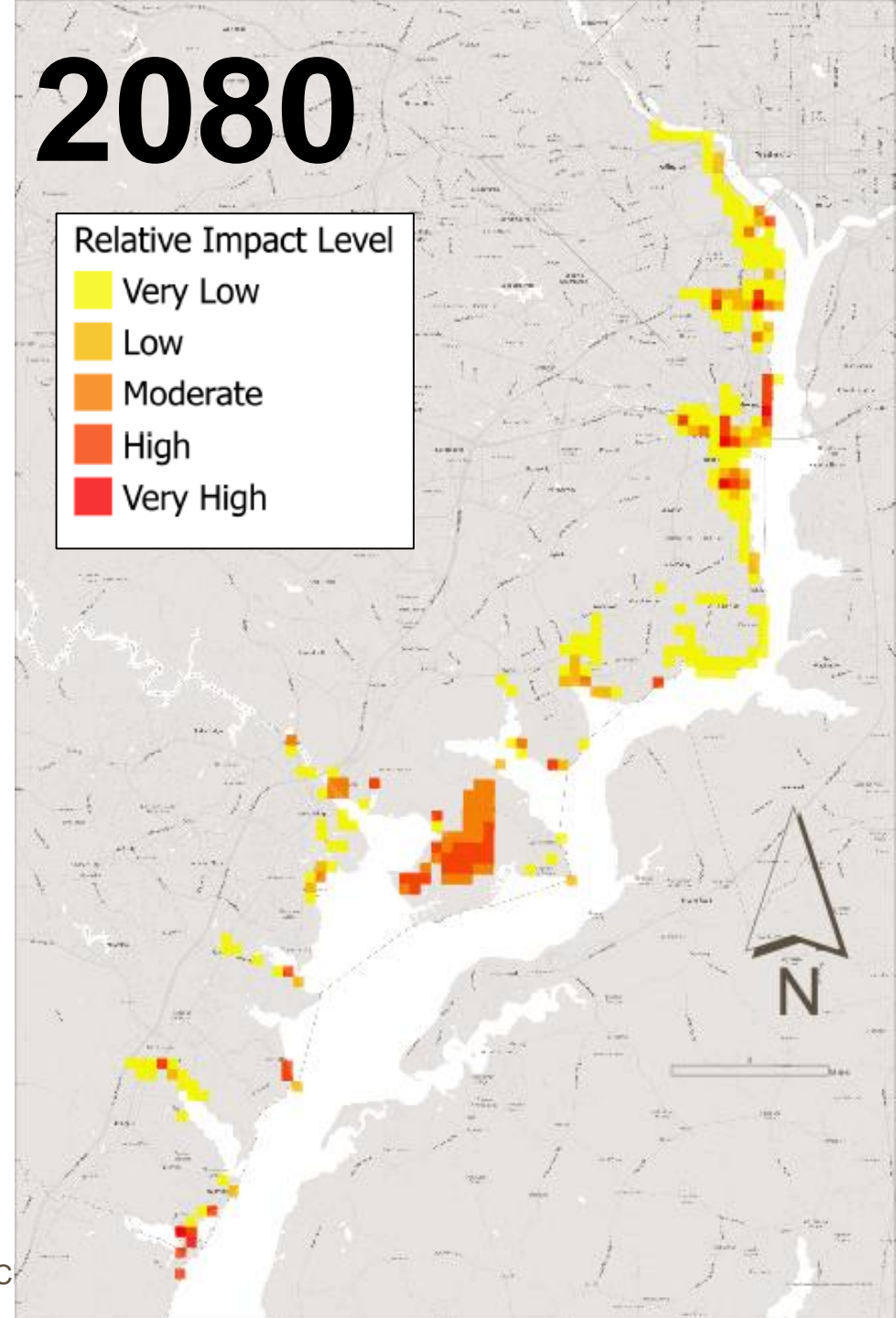
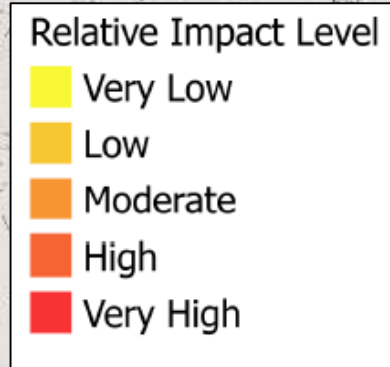
# Critical Sectors

## Critical Assets Impacted

Average annualized number of critical assets exposed to coastal flooding, by infrastructure sector.



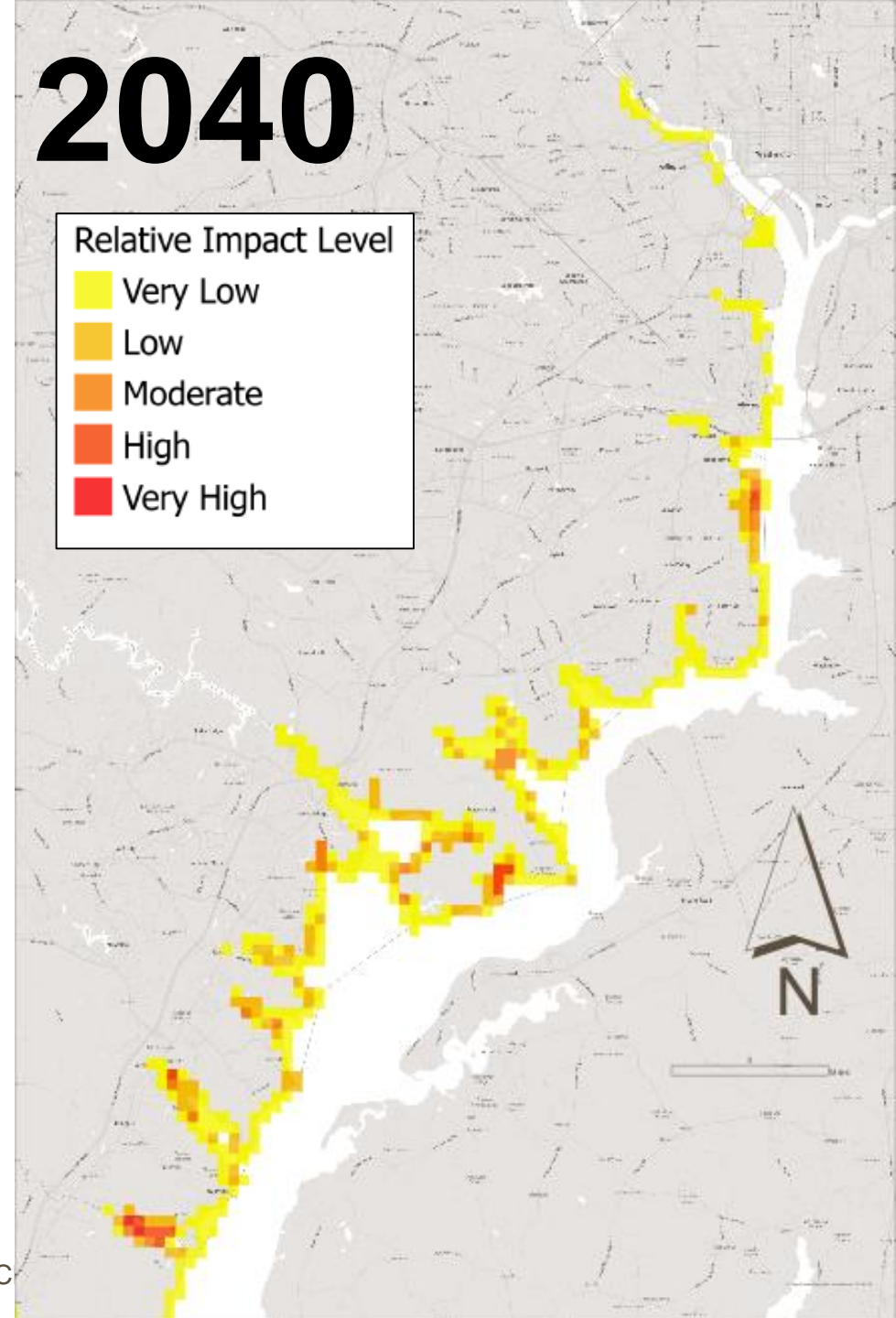
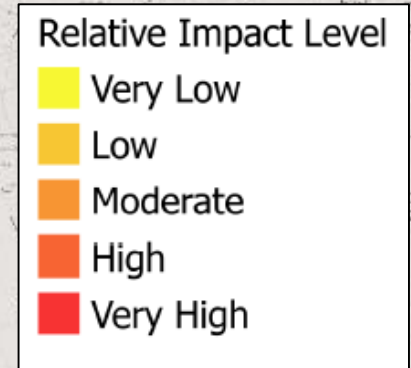
# 2080



# Natural Infrastructure

- Tidal Habitat
- Upland Habitat
- Beaches and Dunes
- Aquatic Habitat
- Recreational Areas

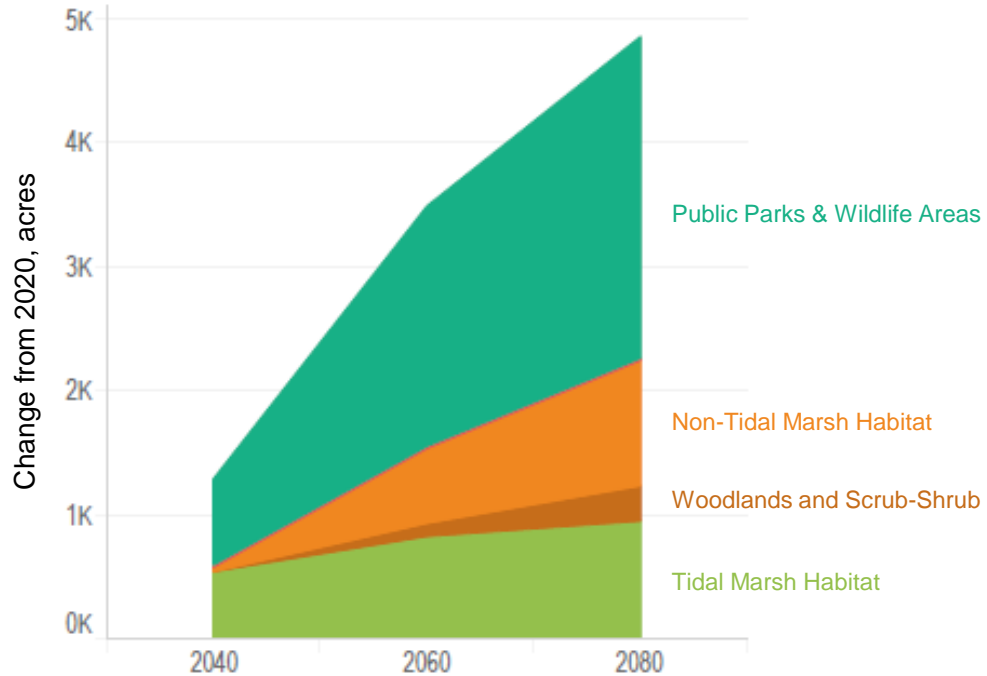
# 2040



# Natural Infrastructure

## Habitat Loss

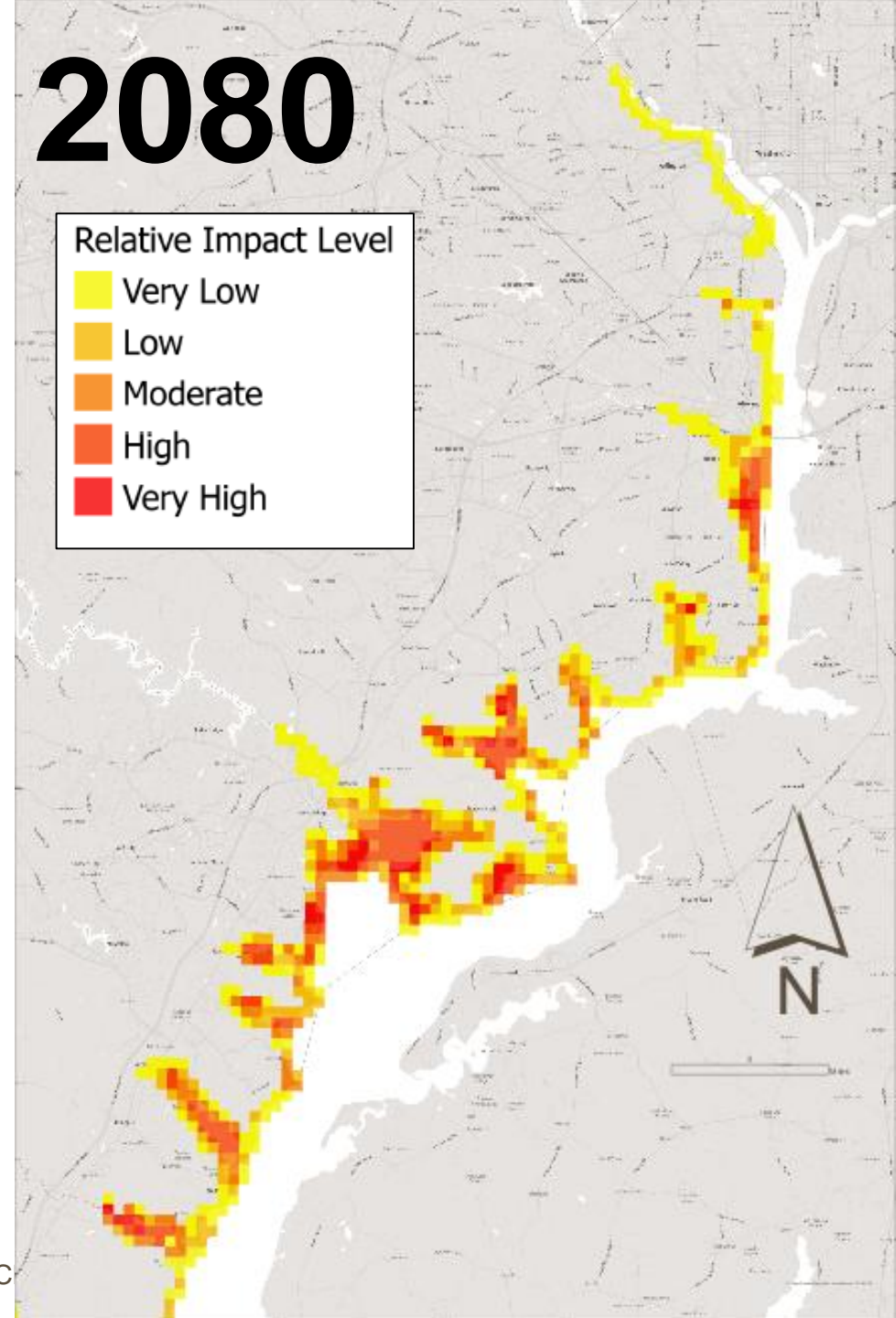
Acres of aquatic habitat, coastal habitat, and recreational areas anticipated to be permanently lost and converted to open water (relative to a 2020 baseline)



# 2080

Relative Impact Level

- Very Low
- Low
- Moderate
- High
- Very High







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# VIRGINIA COASTAL RESILIENCE MASTER PLAN

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## Public Survey:



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