

Flood Resilience Planning

Department of Conservation and Recreation
Division of Dam Safety & Floodplain Management
Floodplain Management
Resilience Planning Program

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Presentation Outline

- Resilience Planning Overview
- Virginia Coastal Resilience Master Plan
 - Phase I
 - Phase II
- Community Outreach and Engagement Plan

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Department of Conservation and Recreation (DCR)

Virginia Code § 10.1-602. Powers and duties of Department.

The Department shall:

1. Develop a Virginia Flood Protection **Master Plan** (the Plan) for the Commonwealth...
2. Serve as the coordinator of all flood protection programs and activities in the Commonwealth...
3. Make available flood and flood damage reduction data to localities for planning purposes...
4. Assist localities in their management of floodplain activities...
5. ... ensure that the management of floodplains will preserve the capacity of the floodplain to carry and discharge a 100-yr flood.
6. Make ... periodic inspections to determine the effectiveness of local flood plain management programs ...
7. ... ensure current knowledge of the identification of flood-prone communities and of the status of applications made by localities to participate in the National Flood Insurance Program.
8. Establish guidelines which will meet minimum requirements of the National Flood Insurance Program ...
9. ... provide financial and technical assistance to localities ...
- 10. Serve as the lead administrator for the Virginia Coastal Resilience Master Plan and the Virginia Flood Protection Master Plan.**
- 11. Implement the Virginia Coastal Resilience Master Plan and the Virginia Flood Protection Master Plan.**
- 12. Ensure that the Virginia Coastal Resilience Master Plan and the Virginia Flood Protection Master Plan are integrated.**

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Principles for a Resilient Virginia

Principle 1: We are committed to addressing challenges relating to flooding and resiliency.

Principle 2: We must address these challenges with programs that work for all impacted parts of Virginia.

Principle 3: The programs we implement must work together as parts of comprehensive, cohesive plans.

Principle 4: These programs and plans must be developed and implemented with transparency and input from the public.

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Resilience Planning Activity Overview

Major Planning Efforts

- Coastal Resilience Master Planning Framework – Oct 2020
- Coastal Resilience Master Plan Phase I – Dec 2021
- Coastal Resilience Master Plan Phase II – Dec 2024
- Virginia Flood Protection Master Plan – Dec 2026

Supported By

- Public Comment Period on CRMP Framework and Phase I Plan – Dec 2022
- Community Outreach and Engagement Plan – Dec 2022
- Coastal Resilience Technical Advisory Committee - ongoing
- Resilience Coordination Working Group – through Nov '23

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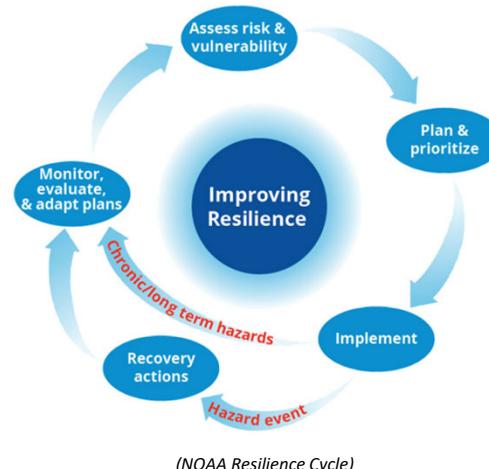
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What is Flood Resilience?

The capability to **anticipate, prepare for, respond to, and recover from flood hazards** with minimum damage to **social well-being, health, the economy, and the environment**.



(NOAA Resilience Cycle)

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Resilience Planning Concepts

NAVFAC Climate Change Installation Adaptation and Resilience, Planning Handbook 2017

- Uncertainty Strategies
 - No-regrets
 - Reversible and flexible
 - Safety margin
 - Reduced time-horizon
- Risk Management Strategies
 - Accept
 - Transfer/Share
 - Control/Mitigate
 - Avoid

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Virginia Coastal Resilience Master Plan

Phase I, December 2021

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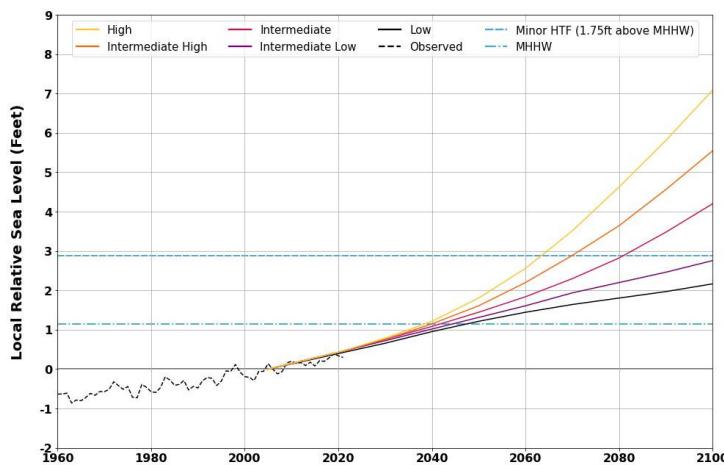


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The State of High Tide Flooding and 2022 Outlook

Annual Relative Sea Level Since 1960 and Projections to 2100

8638610 Sewells Point



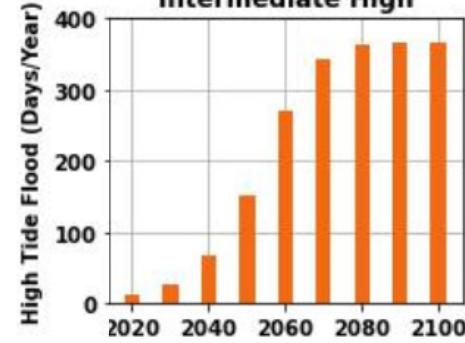
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Projected Annual High Tide Flooding

Intermediate High



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A Continuation of Efforts

Since 2008, the Commonwealth has attempted to lead a coordinated planning process to fill unmet and emerging resilience needs. While the state has made headway, building upon the previous work of multiple administrations, commissions, and studies has proved challenging. These cumulative efforts underscore the need for a unified coastal resilience strategy in Virginia. This prior work leveraged the creativity and ingenuity of the many coastal communities involved and should be considered as we chart a path forward that is both holistic and inclusive.

The Evolution of the Shoreline Resiliency Fund

In 2016, the Virginia General Assembly created the Shoreline Resiliency Fund to provide revolving loans to local governments to help residents and businesses subject to recurrent flooding. However, the Fund suffered from a lack of initial funding.

In 2020, the tides finally turned. The Commonwealth joined the Regional Greenhouse Gas Initiative, a market-based initiative to reduce carbon dioxide emissions from the power sector. The Regional Greenhouse Gas Initiative establishes annual caps, or allowances, for cumulative carbon dioxide emissions from all participating states' electric power sectors. Each state auctions off these allowances to power producers.

The Virginia General Assembly recast the Shoreline Resiliency Fund as the Virginia Community Flood Preparedness Fund and dedicated 45% of Regional Greenhouse Gas Initiative auction funds to the new program. Grants and loans from the new fund will

2016

2018/2019

Next Steps

2008
Governor Kaine releases Climate Change Action Plan2013
Recurrent Flooding Study for Tidewater Virginia is released by the Virginia Institute of Marine Science

2014

General Assembly establishes Levee and Joint Subcommittee on Coastal Flooding to review flood preparedness options

The Secure Commonwealth Panel is amended to the Secure and Resilient Commonwealth Panel and the Panel creates a Recurrent Flooding Subcommittee

Governor McAuliffe appoints Virginia's first Chief Resilience Officer

General Assembly passes legislation requiring all Hampton Roads Planning District Commission localities to address projected sea level rise and recurrent flooding in comprehensive plans

2018
General Assembly creates the position of Special Assistant to the Governor for Coastal Adaptation and Protection via § 2.2-435.11 to ensure a permanent focus on addressing coastal hazards

Governor Northam signs a transmittal letter to the National Oceanic and Atmospheric Administration that the Secure Virginia Coastal Zone Management Program in perpetuity and directs all state agencies to carry out duties consistent with the Program

ConserveVirginia initiative brought a new, data-driven approach to land conservation that identified nearly 545,000 acres of high priority natural wetlands and floodplains

2020

Executive Orders 24 and 45 are signed to foster consistent and sustainable long-term action on climate change mitigation, including coastal resilience, setting state planning and elevation standards for state-owned buildings

2020
Virginia Community Flood Preparedness Fund replaces the Shoreline Resiliency Fund and is funded by Regional Greenhouse Gas Initiative (RGGI) auction sales

Virginia Coastal Resilience Master Planning Framework is released, and state agencies begin initiating the implementation of resilience measures

Executive Order 71 is signed to establish the Virginia Coastal Resilience Technical Advisory Committee to advise the Commonwealth on the Virginia Coastal Resilience Master Plan

General Assembly codifies the Chief Resilience Officer position via § 2.2-222.4

2021
See Chapter 5 for future efforts and next steps.2021
Virginia Coastal Resilience Master Plan: Phase One is released

Virginia Community Flood Preparedness Fund offers \$35 million through its first two grant cycles

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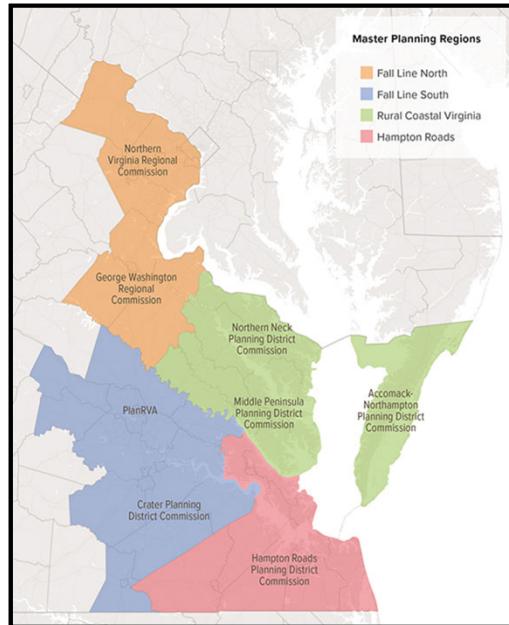
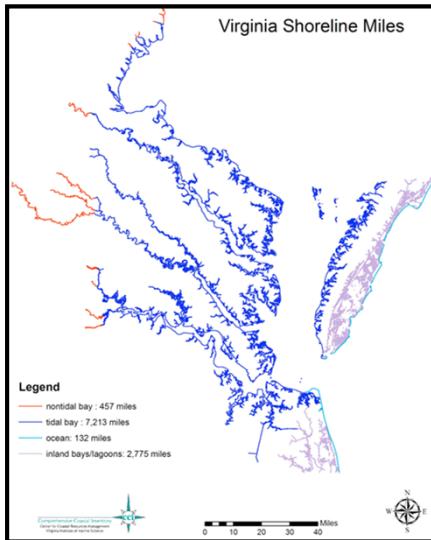
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Coastal Virginia



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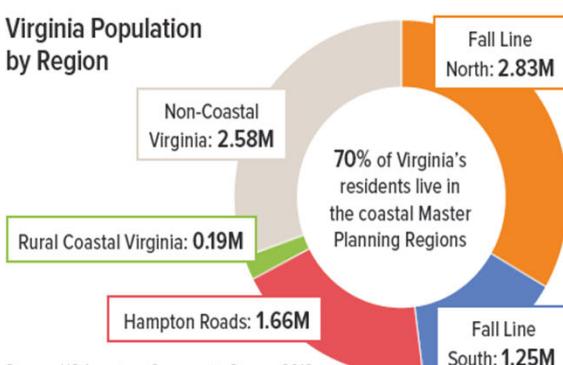
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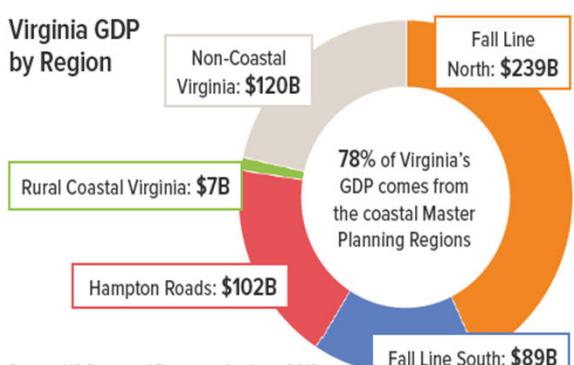
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Coastal Virginia

Virginia Population by Region



Virginia GDP by Region



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Coastal Resilience Master Plan

Framework Goals



Prioritize Projects



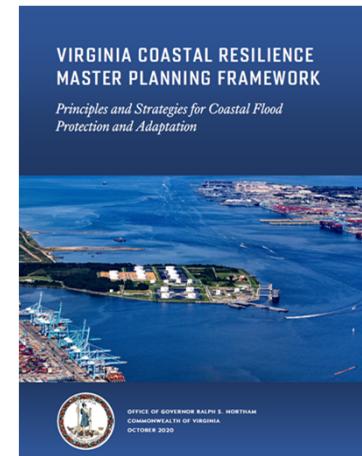
Financing Strategy



Incorporate Climate Change Projections



Coordinate Efforts



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Coastal Resilience Master Plan

Framework Principles



Best Available Science



Socioeconomic Inequities



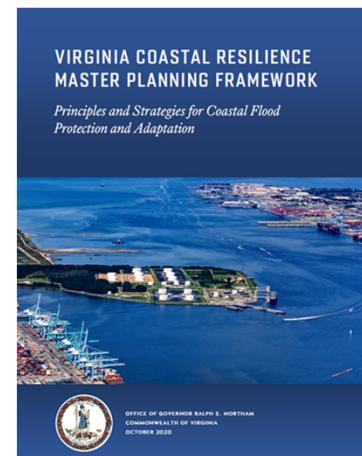
Nature-Based Solutions



Community and Regional Scale



Cost-Effective Solutions



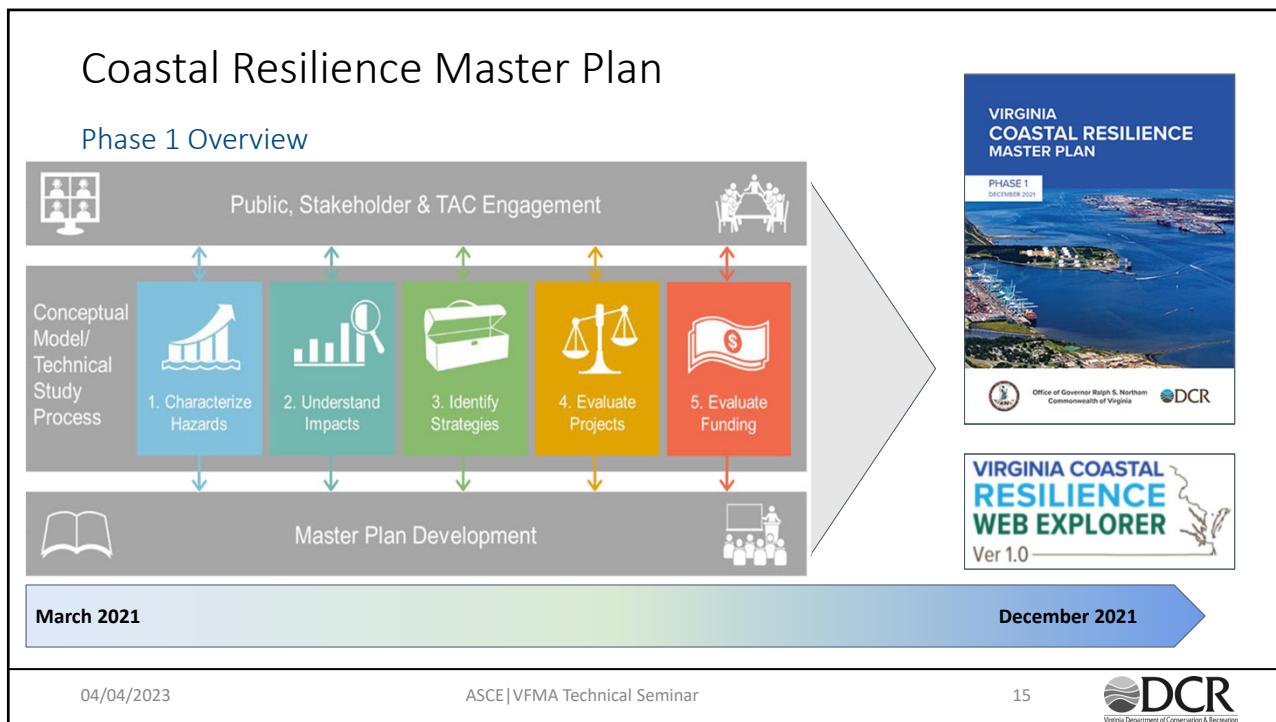
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Toward a Resilient and Thriving Coast

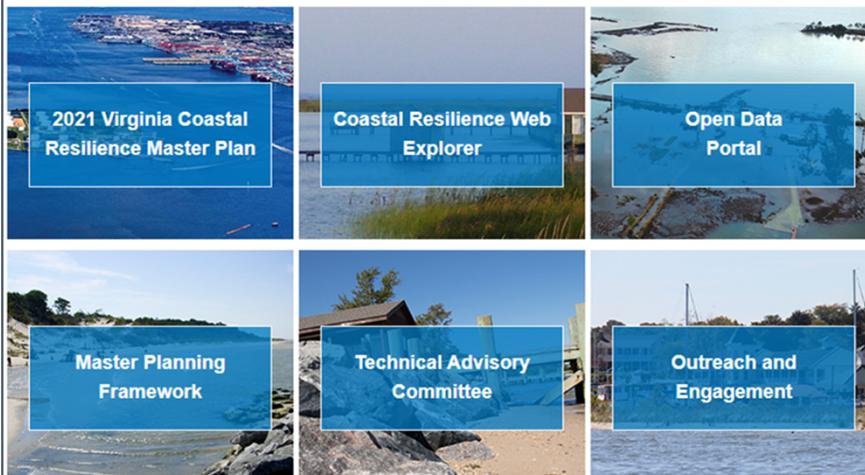
From our growing cities to our migrating coastal wetlands, Virginia's coast faces a new reality.

Disclaimer

All data products for the Coastal Resilience Master Plan are being provided herein with the expressed understanding that the Virginia Department of Conservation and Recreation (DCR) and the Commonwealth of Virginia are releasing these products at the user's own risk. This study is based on the best information, science and techniques available, however no warranty, express or implied, is made regarding the accuracy, completeness or reliability of the data provided. These data are provided on an "as is" basis. Neither DCR nor the contributors of said data to the DCR shall be held liable for any use or application of the data provided whatsoever, whether or not that use is improper or incorrect, and assume no responsibility for the use or application of the data or information derived from interpretation of the data. In no event shall DCR or its collaborators be liable for any direct, indirect or incidental damages arising from the use or application of these data. This disclaimer of liability applies to any damages or injury including but not limited to those caused by any failure of performance.

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Virginia Coastal Resilience Master Plan



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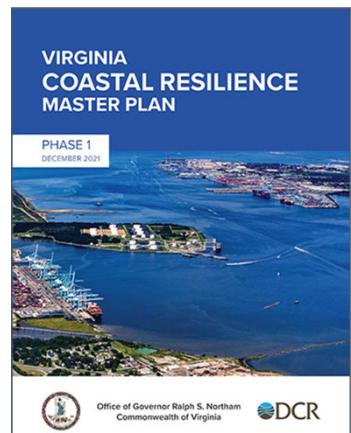
Coastal Resilience Master Plan

Phase 1 Accomplishments

- Determined the consequences of inaction.
- Established a project database.
- Built a foundation for planning and partnership.

Phase 1 Limitations

- Completed on an accelerated timeline.
- Limited public input.
- A partial assessment, rather than a plan.




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Virginia Coastal Resilience Master Plan

Phase II, December 2024

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Coastal Resilience Master Plan

Phase 2 Requirements

- SACAP in coordination with DCR, shall update the Virginia Coastal Resilience Master Plan no later than December 31, 2024
(every 5 years thereafter)
- CRMP shall be a place-specific plan for mitigating severe and repetitive flooding and shall [adhere to the Framework Principles]
- Phase 2 will incorporate:
 - all major flood hazards, including precipitation-driven flooding
 - a comprehensive risk assessment of critical human and natural infrastructure
 - a list of all projects considered and an update of the status of all projects previously implemented
- Phase 2 will implement the Community Outreach and Engagement Plan

[2022 GA HB516/SB551 now §[10.1-658, 659](#)]

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Coastal Resilience Master Plan

Phase 2 Status Update

- Current Efforts
 - Project Database Web Application
 - Funding Database Web Application
 - Pluvial Modeling
 - *Updated Impact Assessment*
 - *Updated Impact Assessment Report*
 - *Updated Web Explorer*
- Additional Efforts Needed via RFP
 - Community Outreach and Engagement
 - Major Flood Hazard - Riverine
 - Phase II Planning and Plan Development

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Coastal Resilience Web Explorer, Projects and Initiatives

VIRGINIA COASTAL RESILIENCE WEB EXPLORER Ver 1.0

Introduction Hazards Impacts Community Context **Projects and Initiatives** Funding Opportunities

The collected projects represented here provide an initial sample of the substantial resilience project needs within the Commonwealth. Projects were collected through a survey call issued to localities and PDCs. Future CRMP efforts will seek to extend the coverage of this database while moving to a more comprehensive capture of needs across the Commonwealth.

Select Area of Interest: Commonwealth - Virginia

Search: Clear Projects and Initiatives (Features: 517, Selected: 0) ...

Filters: Category: All Hazard Addressed: All Project Class: All

Additional Map Layers: Clear Map Layers

Coastal Floodplains
Community Resource Impact Areas
Critical Sector Impact Areas
Natural Infrastructure Impact Areas
Coastal Hazard and Social Vulnerability

Name

- 18th Street Drainage Improvements
- 1. Crows Nest Peninsula and Estuary Conservation
- 2019 FMA
- 5th Street Improvements
- Aberdeen Gardens Drainage Improvements
- Aberdeen Road Disconnect Wet Pond
- Aberdeen School Neighborhood Park ED Wetland Retrofit
- Amherst Road Wetlands
- Annual Coastal Beys seagrass restoration
- Appomattox River Trail (blueway and greenway)
- Aquatic Center Parking Lot
- Aquisition of LiDAR Data

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Coastal Resilience Web Explorer, Funding Opportunities

VIRGINIA COASTAL RESILIENCE WEB EXPLORER Ver 1.0

Introduction Hazards Impacts Community Context Projects and Initiatives **Funding Opportunities**

The Master Plan expanded and enhanced a funding database established by the Virginia Coastal Zone Management Program. This database is intended to provide a comprehensive resource of applicable programs and mechanisms that would support coastal resilience projects in Virginia. **Last updated September 2021.**

VA Funding for Projects (Features: 96, Selected: 0)

Search by Column: Name ...

Name	Administering Office	Funding Source	Funding Type	Purpose
Addressing the Impacts of Multiple Stressors on Shellfish Aquaculture Through Research/Industry Partnerships	National Oceanic and Atmospheric Administration (NOAA) Oceanic and Atmospheric Research	NOAA	Federal	Supports: establishing, continuing, and/or expanding collaboration between researchers and shellfish growers in order to address how acidification and at least one other environmental stressor affects the U.S. shellfish aquaculture industry. Project priorities of this funding opportunity are to (1) build or strengthen relationships between the shellfish aquaculture industry research community (including university, industry, private sector, tribal, state, and/or federal scientists perspectives), (2) develop scientific knowledge on the impact of ocean and coastal acidification in combination with other shellfish aquaculture, and (3) create data products, tools, technologies, management practices, or other deliverables that are applicable to building resilience within the shellfish aquaculture sector.
Building Resilience Against Climate Effects: Implementing and Evaluating Adaptation Strategies that Protect and Promote Human Health	National Center for Environmental Health	CDC	Federal	Supports: the building and enhancement of the resilience of U.S. cities and states to the health impacts of climate change overarching strategies. These strategies include 1) collaboration with stakeholders to create a Climate Impact Compendium data on local climate projections, health effects, social determinants of health, and current adaptive capacity; 2) implementation evaluation of adaptation actions that address the threats identified in the Compendium; and 3) use and dissemination of effective climate resilience adaptations in public health and

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Project/Funding Database Web Application

- Provide online access to [Resilience Project and Initiatives](#) and [Funding Opportunities](#) to develop, revise, and archive entries.
- Participant users approved by project owners can maintain projects and initiatives
- DCR managers and other approved participant users can maintain resilience funding opportunities
- All entries submitted to DCR for approval prior to publishing on Web Explorer
- Monitor and coordinate planned and implemented resilience actions
- Estimated completion early September 2023
 - Mock-up and Design: Complete
 - Developing: In-progress
 - Stakeholder Input Group Testing: June/July
 - Deployment: August/September

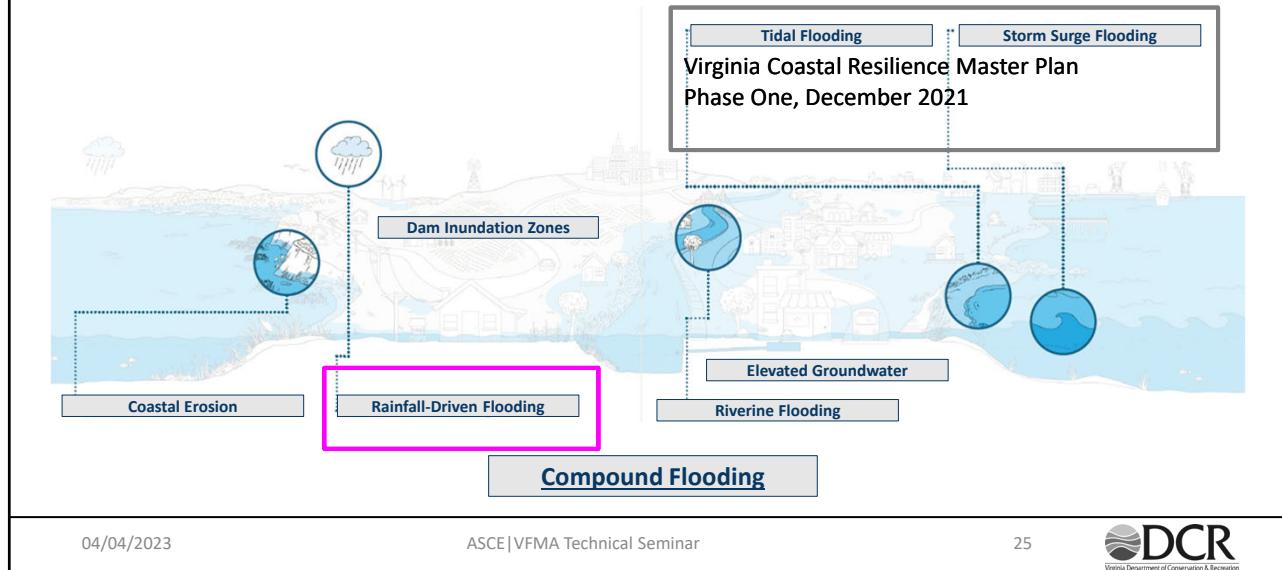
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Pluvial Modeling Update



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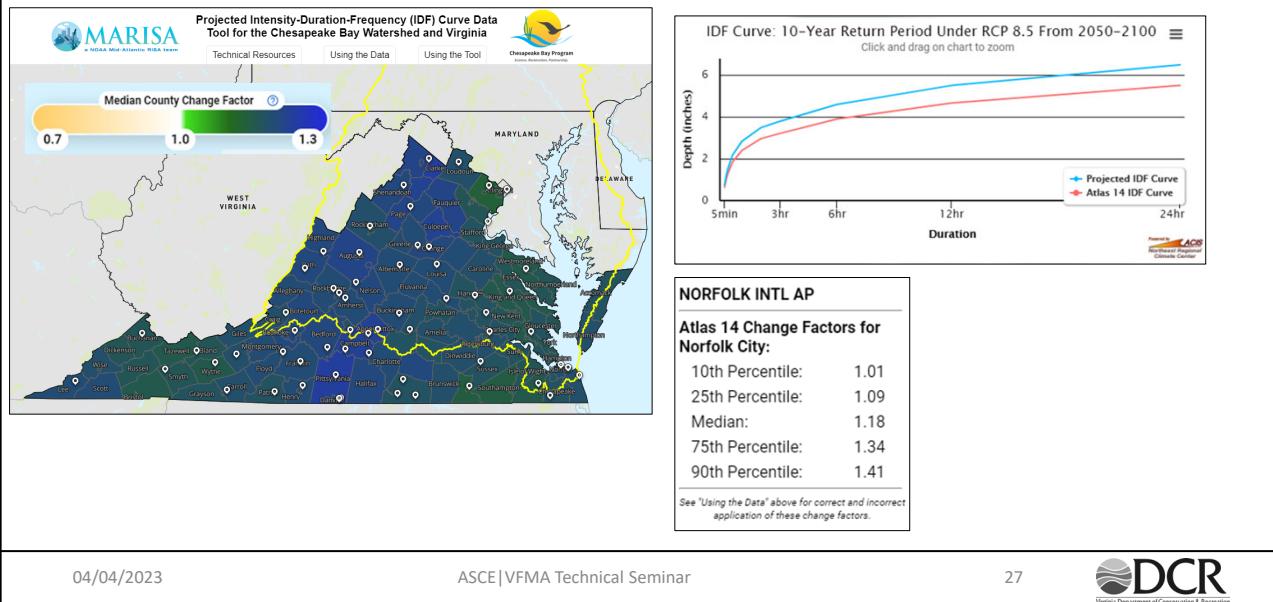
Master Plan Centralized Survey Results Flood Hazard Priority by Master Planning Region

Hampton Roads (HRPDC)	Rural Coastal (NNPDC, MPPDC, A-NPDC)	Fall Line South (Crater PDC, PlanRVA)	Fall Line North (NVRC, GWRC)
1. Rainfall-Driven Flooding 2. Storm Surge Impacts 3. Tidal Flooding 4. Riverine Flooding 5. Coastal Erosion 6. Groundwater Impacts	1. Rainfall-Driven Flooding 2. Tidal Flooding 3. Coastal Erosion 4. Storm Surge Impacts 5. Groundwater Impacts 6. Riverine Flooding	1. Rainfall-Driven Flooding 2. Riverine Flooding 3. Tidal Flooding 4. Storm Surge Impacts 5. Coastal Erosion 6. Groundwater Impacts	1. Rainfall-Driven Flooding 2. Riverine Flooding 3. Coastal Erosion 3. Tidal Flooding 5. Storm Surge Impacts 6. Groundwater Impacts

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Precipitation increasing in Intensity, Duration, and Frequency



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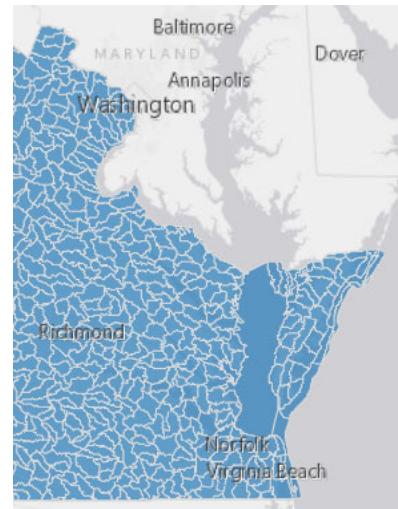
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Pluvial Flood Modeling Overview

- 8 Coastal PDCs. 57 Localities.
- ~400 HUC-12 basins, 5 to 10 sub-basins per HUC-12.
- Up to 63 simulations per sub-basin
 - Duration
 - 2-hr, 6-hr, 24-hr durations;
 - Return Interval
 - 2-, 5-, 10-, 25-, 50-, 100-, 500-year events; and
- Three future conditions scenarios (at the Intergovernmental Panel on Climate Change [IPCC] Representative Concentration Pathways [RCP]):
 - Median values for 2020-2070 @ RCP 8.5
 - Median values for 2050-2100 @ RCP 4.5
 - Median values for 2050-2100 @ RCP 8.5



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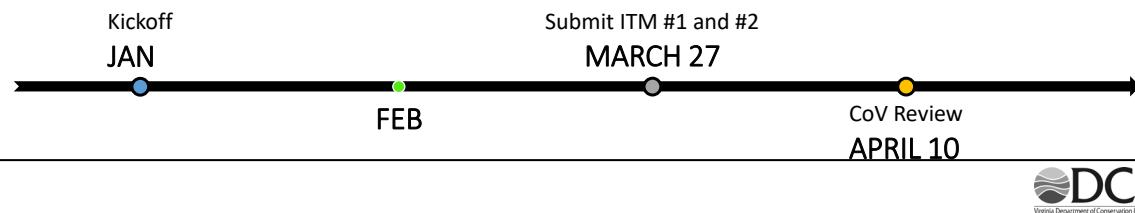
Data Dev. And Pre-Processing

SCOPE

- Update topo
- Data model development
- Precipitation, infiltration, and roughness data
- Data automation pipelines

DELIVERABLES

- Interim Technical Memo (ITM) #1 – Geom. and Parameterization
- ITM #2 – Model Forcing: Data and Methodology



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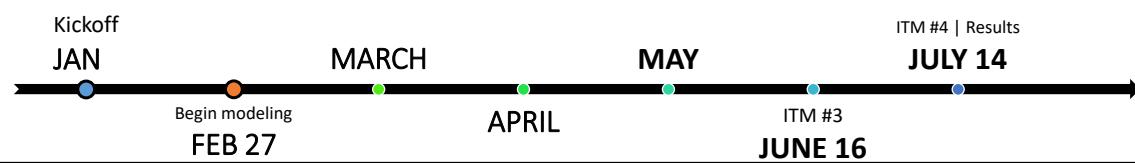
Pilot Hydraulic Modeling

SCOPE

- Develop and test model automation pipeline
- Perform pilot runs for 50 pilot basins, chosen from HUC12s
- Perform final adjustments and post-process initial results

DELIVERABLES

- ITM #3 – Model Dev. Pipeline
- Draft ITM #4 – Pluvial Pilot Findings
- Quality Plan for Pilot
- Pilot Results



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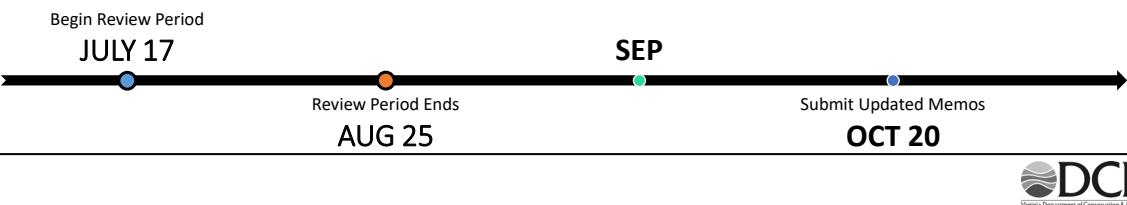
Pilot Modeling Coordination and Review

SCOPE

- Coordination on pilot modeling
- **Meetings to discuss findings of pilot with DCR and stakeholders**
- Respond to feedback
- Update ITMs 1-4

DELIVERABLES

- Update ITMs 1-3 including any revisions following feedback
- Update ITM #4
- Meeting notes for up to 10 meetings



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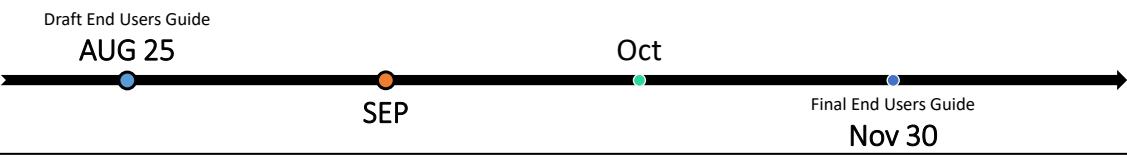
Independent Technical Review of Pilot Models

SCOPE

- Team member GKY to provide indep. review of draft models for first 5 basins and first 50 basins.
- **End users guide – how to use the models for resilience planning in their communities**

DELIVERABLES

- Tech. memo for first 5 basins
 - 2 weeks after receipt of first 5 basins
- Tech. memo for first 50 basins
 - 3 weeks after receipt of first 50 basins
- **End users guide**



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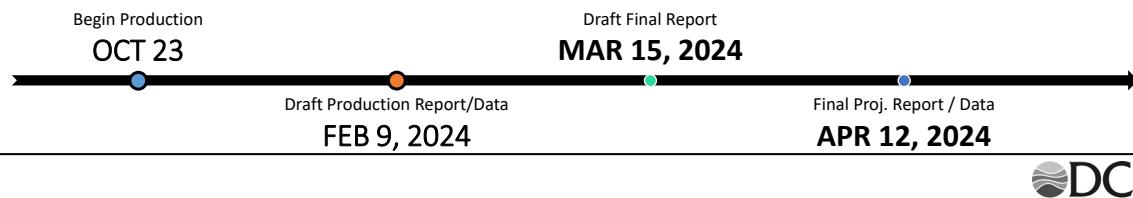
Study-wide Hydraulic Modeling

SCOPE

- Create and run production models
- Review (automated) models
- Post-process models and develop hosted map layer with download links
- Reporting and data transfer session

DELIVERABLES

- Results transmitted using AWS S3 – models, depth grids, inundation polygons
- Hosted map layer
- Reports



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Community Outreach and Engagement Plan

Community Outreach and Engagement Plan Overview

- Enactment Clause 3 of HB516/SB551 (2022) the plan shall strive for meaningful involvement by ensuring that
 - affected and vulnerable community residents have access and opportunity to participate in the full cycle of the decision-making process about the development of and updates to the Plans, and
 - decision-makers shall seek out and consider such participation, allowing the views and perspectives of community residents to shape and influence decisions.
- Jointly prepared by DCR and ODOI
- Designed to be a framework for a whole community approach
- Describes overall goals and approach
- Plan development, detailed actions, and deliverables will be provided by contractors selected via a DCR RFP process.

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The Challenge

How do we change the approach to outreach
 in order to engage all parts of communities,
 beyond individuals and organizations who are
 generally represented through various types of stakeholder committees,
 that have been/could be impacted by recurrent flooding
 in the Commonwealth's flood resilience planning process?

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Goals and Objectives

- Empower citizens and stakeholders, especially those who live and work in flood hazard zones, to contribute local experience and knowledge to the resilience planning process.
- Provide planning resources and opportunities to residents and stakeholders to encourage ownership and responsibility in community led efforts to shape and influence decisions in the planning process.
- Ensure communities, historically under represented in the planning process, are engaged and have the opportunity to provide input.
- Eliminate barriers surrounding public engagement, including, but not limited to: language, time of day, location, mobility and accessibility.

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Whole Community Approach

Whole Community includes:

- Individuals and families
- Media outlets
- Nonprofit groups
- Schools and academia
- Faith-based organizations
- Community organizations
- All levels of government



Source: FEMA

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What Actions Will We Take?

1. Align and integrate the COEP process with existing federal, state, and local programs to provide additional resources and synergies.
2. Leverage partnerships with trusted regional and local subject matter experts, stakeholders, and convenors that serve the communities.
3. Involve and collaborate with residents and stakeholders in a Whole Community approach.
4. Maintain this community outreach and engagement plan as a living document

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Public Comment Overview

- Public Comment Period
 - 12/30/22 – 1/31/2023
- Solicited public comment via Virginia Regulatory Town Hall, direct email, and existing virtual outreach meetings
- Virginia Regulatory Town Hall
 - 7 Comments
- Flood.Resilience@dcr.virginia.gov Email
 - 6 Emails with attachments (letters and COEP markup)
- Individuals, State Agency, Non-Profit/Governmental Organizations, Regional Planning District Commissions

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QUESTIONS

DCR Contact Information

Division of Dam Safety & Floodplain Management

Floodplain Management

Resilience Planning Program

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<https://www.dcr.virginia.gov/crmp/>

<https://www.dcr.virginia.gov/dam-safety-and-floodplains/flood-protection-outreach>

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Coastal Resilience

Key Acronym Reference

- COEP Community Outreach and Engagement Plan
- CRMP Virginia Coastal Resilience Master Plan
- CRO Chief Resilience Officer
- Framework Coastal Resilience Master Planning Framework
- Plans Virginia CRMP and VFPMP
- SACAP Special Assistant to the Governor for Coastal Adaptation and Protection
- TAC Coastal Resilience Technical Advisory Committee
- VFPMP Virginia Flood Protection Master Plan

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