

The Costs of Climate Change: From Coasts to Heartland, Health to Security

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Chairman Yarmuth, Ranking Member Womack and distinguished Members of the Committee, thank you for the opportunity to testify to you today. It is a privilege to be before you at this hearing to discuss this very important topic.

My name is Ann Phillips, and I currently have the honor to serve as the Special Assistant to the Governor of Virginia for Coastal Adaptation and Protection. I am a retired Surface Warfare Officer - I drove and commanded ships for the United States Navy for 31 years, served abroad in Guam and Lisbon, Portugal, and operated extensively with NATO and Partnership for Peace nations. I retired in 2014 as a Rear Admiral and Commander, Expeditionary Strike Group TWO. My experience in coastal adaptation and protection, along with climate and national security, stems from my work as Chair of the Surface Force Working Group for the Navy's Task Force Climate Change while still on active duty, and from my work since retiring, chairing the Infrastructure Working Group for the Hampton Roads Intergovernmental Sea Level Rise Pilot Planning Project from 2014 to 2016, and as a member of the Advisory Board of the Center for Climate and Security, and on the Board of Directors for the Council on Strategic Risks.

I've been asked to address current and long term risk to the infrastructure, economy and social fabric of Virginia's coastal communities as viewed from my position as Special Assistant to the Governor. I would like to first set the stage in Coastal Virginia today, then describe what is at risk, and how Virginia's unique coastline intensifies that risk. I will then describe Virginia's efforts and intent to prepare, adapt and protect our Coast, and the actions that coastal communities are taking to deal with

the challenges they see as they prepare for their collective climate-changed futures, and finally, what Congress can do to help.

## **SETTING THE STAGE**

**Climate change has a significant and intensifying impact on our coastal communities in Virginia today.** Rising sea levels lead to recurrent nuisance flooding, caused by high tides, accompanied by wind, and /or increased intensity and frequency of rainfall, or any combination of the three. These circumstances intensify the impact of coastal storms and hurricanes and the accompanying flooding and storm surges. **Coastal Virginia deals with water where we did not plan for it to be, and that impedes the expected pattern of life, in some form, nearly every day.** This is our “new normal” - it affects every aspect of our lives in ways that we do not yet understand, or even realize. My current position works at the local, regional, state and national level to foster action across the whole of government, community and society to address and build resilience to this existential threat and to protect and adapt Coastal Virginia.

**In Coastal Virginia, everyone has a water story.** A moment when they have realized that an encounter with water, again, where they did not plan for it to be - is preventing them from going about their daily lives as they planned. **We are not simply preparing – we are already living with water.** Some examples:

- The businessman who plans travel to and from work around high tide cycles
- The NATO couple who bought a used 4WD vehicle and learned multiple routes around their city/neighborhood to go about their business based on the tide, wind, and rain predictions
- Communities now create neighborhood updates on weather, tide, wind, rain predictions
- Communities now create ad hoc neighborhood camera systems at intersections that flood repeatedly so that neighbors are warned of water depth before arriving,
- Residents in underserved communities can become trapped in homes and apartments by street flooding, impacting work schedules, and damaging vehicles, which can mean the loss of employment or pay, a critical setback for anyone on a limited income.

- Residents stranded in rental housing, or apartments, not realizing the flood propensity of the surrounding streets. If this happens at night, cars may be flooded and damaged before residents can move them to higher ground.
- Residents caring for elderly parents departing work early to arrive home before intense thunderstorm rainfall blocks access to their street/residence
- Sunny day flooding closing schools especially in rural coastal communities.

### **VIRGINIA'S UNIQUE RISK**

We also have a water-based economy in Coastal Virginia. The cornerstones of that economy are:

- **Our Federal presence, arguably the largest concentration in the nation** - in particular Department of Defense with Navy as the largest service represented, and including the substantial commercial industry surrounding military and commercial shipbuilding, maintenance and repair
- **The Port of Virginia** – large and expanding capacity with multi-modal access reaching from the East Coast to west of the Mississippi River
- **Beach and Water-related Tourism**
- **Water- adjacent and dependent agriculture, aquaculture, fisheries, commercial property, and housing stock**

All of this is supported by critical public and private utility and transportation infrastructure, as well as a substantial medical / hospital presence, and the universities, schools, and public infrastructure sustaining cities, counties and towns, along our coast.

**Virginia's high military concentration is tied to the water by the very nature of its mission, and at risk from the threat of sea level rise and climate change impacts.** In their 2016 report, "The Military on the Front Lines of Rising Seas," the Union of Concerned Scientists found that a 3 foot increase in sea level rise would threaten 128 coastal DOD installations in the United States, 43% of which are Navy facilities

valued at roughly \$100 billion.<sup>1</sup> In its own 2019 “Report on Effects of a Changing Climate to the Department of Defense,” the Department found that 53 of its mission-critical facilities are currently vulnerable to recurrent flooding, with 60 such facilities vulnerable within the next 20 years. When other hazards from climate change are considered (wildfire, drought, desertification), 79 total DoD facilities are vulnerable at present. **In Virginia, five Hampton Roads area facilities are on the US Navy and US Air Force list of most vulnerable infrastructure released in June 2019, including Naval Air Station Norfolk, Naval Air Station Oceana, Naval Support Activity Hampton Roads, Naval Support Activity Hampton Roads - Northwest Annex, and Joint Base Langley-Eustis.**<sup>2</sup> A 2008 study by the Organization for Co-operation and Economic Development, ranked the Hampton Roads metropolitan area as the 10<sup>th</sup> most vulnerable in the world related to the value of assets at risk from sea level rise.<sup>3</sup>

The Department of Defense and our federal partners are the largest employers in the state<sup>4</sup> and Virginia’s percentage of gross domestic product derived from the federal presence in the state is 8.9% (the highest percentage of any state).<sup>5</sup> Virginia also has the highest rate of defense personnel spending of any state, and is second only to California in defense contract spending and defense-related contract spending. The Hampton Roads region hosts federal facilities that are unique and not easily replicable in other locations, including our largest Naval Base, Naval Station Norfolk, as well as the only shipyard where we build aircraft carriers and one of only two places where we build nuclear- powered submarines - Newport News Shipbuilding, owned by Huntington Ingalls Industries. The City of Portsmouth is home to Norfolk Naval Shipyard, one of only four Navy- owned and operated nuclear repair shipyards in the United States, and very vulnerable to flooding. Joint Base Langley-Eustis, with Fort Eustis in the City of Newport News and Langley Air Force Base in the City of Hampton are also

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<sup>1</sup> “The US Military on the Front Lines of Rising Seas,” Executive Summary (Union of Concerned Scientists, 2016), <https://www.ucsusa.org/sites/default/files/attach/2016/07/front-lines-of-rising-seas-key-executive-summary.pdf>.

<sup>2</sup> United States Department of Defense, “Report on Effects of a Changing Climate to the Department of Defense,” January 2019.

<sup>3</sup> RJ Nicholls et al., “Ranking Port Cities with High Exposure to Climate Extremes - Exposure Estimates,” Environment Working Papers (Organisation for Economic Co-operation and Development. 2008.), [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/WKP\(2007\)1&doclanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/WKP(2007)1&doclanguage=en).

<sup>4</sup> “Virginia Statewide Community Profile” (Virginia Employment Commission, 2019). <https://virginiawlmi.com/Portals/200/Local%20Area%20Profiles/5101000000.pdf>

<sup>5</sup> “Defense Spending by State, FY 2017” (US Department of Defense, Office of Economic Adjustment, March 2019).

vulnerable. Langley AFB, which deals with rising water as a matter of routine, and has done considerable work to make its facilities resilient, has taken up much of the overflow from the impact to aviation training for the F-22 Strike Fighter from Tyndall Air Force Base after Hurricane Michael's impact on that facility last year.<sup>6</sup>

The Eastern Shore of Virginia hosts NASA's Flight Facility at Wallops Island, which includes the Virginia Space and Mid Atlantic Regional Spaceport, NASA flight test facility, National Oceanographic and Atmospheric Administration and Federal Aviation Administration facilities, and the Navy's Surface Combat Systems Center Range. These facilities are unique. For example, the Navy Surface Combat Systems Center Range, the only such test range on the East Coast of the United States, supports the majority of new construction combat systems training for the Fleet.

**We also are home to the Port of Virginia, the third largest container port on the East Coast and sixth busiest port by container traffic volume in the United States.** A multi-modal port with facilities located in Hampton Roads in the cities of Norfolk, Portsmouth and Newport News, and with barge service to the Port of Richmond and an Inland Port intermodal transfer facility in Front Royal, Virginia,<sup>7</sup> the Port of Virginia is the only East Coast port with federal authorization to dredge to a 55 foot channel depth, and generates a total of \$60 billion in economic activity for the Commonwealth.<sup>8</sup> With a focus on sustainability, the Port of Virginia works to build resilience, aligned with the surrounding communities. Much like the regions' federal facilities, however, its future resilience is inextricably linked to that of the surrounding cities and other localities that support and provide its critical utilities, transportation, logistics, and supply chain infrastructure.

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<sup>6</sup> "Tyndall AFB Personnel, F-22s Temporarily Relocate to Hawaii and Alaska," U.S. Indo-Pacific Command, accessed July 17, 2019, <https://www.pacom.mil/Media/News/News-Article-View/Article/1682655/tyndall-afb-personnel-f-22s-temporarily-relocate-to-hawaii-and-alaska-bases/>.

<sup>7</sup> "NAFTA Region Container Traffic - 2017 Port Rankings by TEU's" (American Association of Port Authorities, 2017).

<sup>8</sup> "About the Port of Virginia," accessed July 18, 2019, <http://www.portofvirginia.com/about/>.

**Coastal Virginia’s substantial tourism industry generates direct travel-related expenditures exceeding \$5.2 billion in our Coastal region<sup>9</sup>.** Virginia boasts wide beaches, access to a myriad of water sports and recreational activities, as well as natural tidal marshlands, unique barrier island structures, and we are a critical stopover on the North Atlantic migratory bird flyway, all incredible facilities and natural amenities, and all at extreme risk.

**Our substantial aquaculture and wild fishing industries generate over \$1.4 billion in annual sales,<sup>10</sup> including oysters, crabs, and the largest clam industry on the East Coast of the United States.<sup>11</sup>** These industries are vulnerable to both sea level rise and ocean acidification and warming. The infrastructure necessary for their success ties them to low-lying areas near the water - vulnerable to flooding - and accessibility to workplaces and docks is becoming a challenge during the more frequent high tide flooding that impacts road access, as well as activities on the waterfront. Ocean acidification and warming will affect the ability of some species to survive and reproduce in Coastal Virginia waters - in particular shellfish, endangering the wild-caught and grown seafood industry treasured by the Chesapeake Bay region.<sup>12</sup> For Virginia, this may be only a matter of time as such impacts have already been observed in the Pacific Northwest region of the United States, costing that region over \$110 million dollars and putting 3,200 jobs at risk.<sup>13</sup>

**Finally, our waterfront property and housing stock is a challenge we share with many other coastal states.** Within the next 30 years - the lifespan of a typical mortgage - as many as 311,000 coastal homes in the lower 48 states with a collective market value of about \$117.5 billion in today’s dollars will be at risk of chronic flooding (more than 26 times a year or about every other week). By the end of

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<sup>9</sup> “The Economic Impact of Domestic Travel on Virginia Counties 2017: A Study Prepared for Virginia Tourism Authority” (U.S. Travel Association, August 2018).

<sup>10</sup> “Fisheries Economics of the United States 2016” (U.S. Department of Commerce, NOAA National Marine Fisheries Service, 2018).

<sup>11</sup> Thomas J. Murray and Karen Hudson, “Economic Activity Associated with Shellfish Aquaculture in Virginia 2012,” , [https://www.vims.edu/research/units/centerspartners/map/aquaculture/docs\\_aqua/MRR2013\\_4.pdf](https://www.vims.edu/research/units/centerspartners/map/aquaculture/docs_aqua/MRR2013_4.pdf).

<sup>12</sup> “Virginia Is Highly Vulnerable to Ocean Acidification” (Natural Resources Defense Council adopted from Ekstrom et al., 2015, February 2015).

<sup>13</sup> “New Study: Rapid Ocean Acidification Threatens Coastal Economies in 15 States,” 2015. NRDC Press Release <https://www.nrdc.org/media/2015/150223>.

the century, 2.4 million homes and 107,000 commercial properties currently worth more than \$1 trillion altogether could be at risk, with Virginia's coastal real estate significantly exposed. The expected Virginia homes at risk in 2045 currently contribute about \$23 million in annual property tax revenue. The homes at risk by 2100 currently contribute roughly \$342 million collectively in annual property tax revenue.<sup>14</sup> In an ongoing Comprehensive Sea Level Rise and Recurrent Flooding Study conducted by the City of Virginia Beach and Dewberry, the annualized losses today in that City alone result in residential damages of \$26 million annually due to coastal flooding events. If no action is taken, with 1.5 feet of additional sea level rise, expected within 20-30 years, that number increases to \$77 million annually, and with 3 feet of additional sea level rise, forecast within 60-70 years, to \$329 million annually, a 12 – fold + increase.<sup>15</sup>

In terms of real estate value, research reported in the *Journal of Financial Economics* shows homes exposed to sea level rise are selling for approximately 7% less than equivalent properties that are unexposed to sea level rise and equidistant from the beach. Broken down in more detail, homes that may be inundated with one foot of sea level rise, trade at a 14.7% discount, and properties expected to be inundated after 2-3 feet of sea level rise, at a 13.8% discount.<sup>16</sup> This places Coastal cities and other localities under pressure to determine solutions to not only reduce the risk to these vulnerable properties, but to reduce the risk to their property tax base, without which they cannot remain viable. Yet coastal communities face challenges from another perspective, as the Credit Ratings agencies have begun to take notice of the risks carried by localities exposed to rising waters. The credit rating agencies are asking for detailed plans about localities' strategies to adapt and mitigate the risk as a criterion for retaining their credit and bond rating. The paradox is that some localities find themselves unable to issue any more debt to take action to better protect themselves and build their resilience because of the risk to their credit rating, as evaluated by the same ratings agencies that demand to

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<sup>14</sup> "Underwater: Rising Seas, Chronic Floods, and the Implications for US Coastal Real Estate" (Union of Concerned Scientists, June 2018).

<sup>15</sup> CJ Bodnar, "Comprehensive Sea Level Rise and Recurrent Flood Study" (Dewberry and City of Virginia Beach, May 2019), <https://www.vbgov.com/government/departments/public-works/comp-sea-level-rise/Documents/slr-update-ccouncil-5-7-19.pdf>.

<sup>16</sup> A Bernstein, M Gustafson, and R Lewis, "Disaster on the Horizon: The Price Effect of Sea Level Rise," *Journal of Financial Economics*, 2018.

know what they are doing to reduce the risk and vulnerability to their resilience, in order to retain their good credit. This is a problem today, and it will grow worse.

**There are health risks too. Combined sewer systems exist in about 860 US Cities, with three of them in Virginia (Alexandria, Richmond and Lynchburg).**<sup>17</sup> Combined Sewer Overflow events (CSO), pose a significant threat to public health and the environment – a threat that will only increase because of climate change. An EPA study found that climate change could lead to a 12 to 50 percent increase in storm events that lead to combined sewer overflow events<sup>18</sup>, with 70 such events releasing a combined one billion gallons of sewage occurring nationwide between January 2015 and September 2016.<sup>19</sup> Additionally, sea level rise is a threat to coastal localities with outflow pipes that may be inundated in the future, (and some are already) preventing discharge without costly pumping systems, and introducing seawater that could damage the mechanical and biological integrity of wastewater treatment facilities.<sup>20</sup>

**Further, increased flooding is also a threat to septic systems in rural areas, a tremendous and growing problem in much of rural Coastal Virginia, and in fact, in many Coastal states.** Inundated leach fields cause Septic systems to fail, releasing contaminated water into the ground or surface water. Failing septic systems, as well as the absence of either septic or sewer systems, cause significant public health and water quality risks for rural communities throughout Virginia.<sup>21</sup> The risk of septic system failure is increasing as sea level rises and flooding occurs more frequently, creating a unique challenge for the many rural homeowners and localities who lack the resources and capacity to rehabilitate or replace their systems, or install expensive sewage treatment facilities.

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<sup>17</sup> A Kenward et al., "Overflow: Climate Change, Heavy Rain, and Sewage," States at Risk (Climate Central, September 2016), [file:///C:/Users/dea29868/Downloads/Overflow\\_sewagereport\\_update.pdf](file:///C:/Users/dea29868/Downloads/Overflow_sewagereport_update.pdf).

<sup>18</sup> "A Screening Assessment of the Potential Impacts of Climate Change on Combined Sewer Overflow (CSO) Mitigation in The Great Lakes and New England Regions (Final Report)." (Washington, DC: U.S. Environmental Protection Agency, 2008).

<sup>19</sup> Kenward et al., "Overflow: Climate Change, Heavy Rain, and Sewage."

<sup>20</sup> Ben Bovarnick, Shiva Polefka, and Arpita Bhattacharyya, "Rising Waters, Rising Threat: How Climate Change Endangers America's Neglected Wastewater Infrastructure" (Center for American Progress, October 2014), <https://cdn.americanprogress.org/wp-content/uploads/2014/10/wastewater-report.pdf>.

<sup>21</sup> Jamie Huffman, Sarah Simonettic, and Scott Herbst, "Onsite Sewage Systems: Background, Framework, and Solutions" (Virginia Coastal policy center, Fall 2018).

## **VIRGINIA IS TAKING ACTION**

**This is our challenge. In Virginia, we have over 10,000 miles of tidally- influenced shoreline.**<sup>22</sup> Virginia has the eighth longest tidally- influenced coastline in the country, ranked just behind the state of Texas.<sup>23,24</sup> We have experienced over 18 inches of sea level rise in 100 years, as indicated by NOAA Sewell’s Point tide gauge at Pier Six, Naval Station Norfolk. With an average of 4.66 mm of sea level rise per year, Virginia has one of the highest rates of relative sea level rise change of any state on the East Coast of the United States, including the Gulf of Mexico.<sup>25</sup> We are also experiencing land subsidence - most evident in areas where there is heavy use of water from our aquifers. Land subsidence varies across Coastal Virginia, and can range from as much as 40% to as little as 0% of the observed relative sea level rise.<sup>26</sup> Since the late 1990s, the duration, severity, and impacts of flooding have all increased substantially.<sup>27</sup> Current scientific projections, as documented by the Virginia Institute of Marine Science Sea Level Report Card, show that our sea levels will continue to rise and the rate of rise will accelerate, such that we expect an additional 18 inches of relative sea level rise by mid-century.

With a growing understanding and acknowledgement of this evolving threat to the Commonwealth, over the past 10 + years, Virginia has laid the groundwork to prepare:

- Initiated a climate change commission and a Climate Change Action Plan under then Governor Kaine (Executive Order 59 (2007))
- Established the Joint Sub-Committee on Coastal Flooding to review potential actions the General Assembly can and may continue to take to better prepare the Commonwealth of Virginia, (2014)

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<sup>22</sup> MR Berman et al., “Virginia - Shoreline Inventory Report: Methods and Guidelines, SRAMSOE No. 450.” (Comprehensive Coastal Inventory Program, Virginia Institute of Marine Science, 2016).

<sup>23</sup> NOAA Office for Coastal Management, “Shoreline Mileage of the United States,” 1975.

<sup>24</sup> Berman et al., “Virginia - Shoreline Inventory Report: Methods and Guidelines, SRAMSOE No. 450.”

<sup>25</sup> “Sea Level Trends - NOAA Tides & Currents,” accessed July 17, 2019, <https://tidesandcurrents.noaa.gov/sltrends/>.

<sup>26</sup> D. P. S. Bekaert et al., “Spaceborne Synthetic Aperture Radar Survey of Subsidence in Hampton Roads, Virginia (USA),” *Scientific Reports* 7, no. 1 (2017): 14752, <https://doi.org/10.1038/s41598-017-15309-5>.

<sup>27</sup> T Ezer and L Atkinson, “Sea Level Rise in Virginia-Causes, Effects and Response,” *Virginia Journal of Science* 66, no. 3 (2015): 355–59.

- Instituted a Secure and Resilient Commonwealth Panel, and a Recurrent Flooding Subcommittee, (2016)
- Created the Virginia Shoreline Resiliency Fund structure (2016)
- Created the position of Special Assistant to the Governor for Coastal Adaptation and Protection (2018)

Much of the above, while well-intended, did not generate substantive coordinated action or policy at the state level, leaving Coastal regions, cities, and other localities to fend for themselves. The good news is that across Coastal Virginia, across rural, urban, suburban and industrial communities, cities, counties and towns have developed plans and are in the process of designing and implementing creative solutions to help stem the tide. The challenge for the Commonwealth is that coastal communities are ahead of the state, and ahead of the General Assembly. Local governments lead in planning, in policy, in research, in funding or funding strategy preparation, in implementation, and most importantly, in analyzing and understanding the scope, scale and cost of the sea level rise and recurrent flooding challenge today and in the future.

**Under Governor Ralph Northam, Virginia is taking bold and substantive action to identify and fill the gaps.** He intends to build capacity for Virginia as we set standards and define how we as a coastal state will approach this existential threat. During the 2019 General Assembly Session, Governor Northam proposed legislation to begin to do just that, the Virginia Coastal Protection Fund Act, which would have modified and funded the Virginia Shoreline Resilience Fund, recast as the Virginia Shoreline Protection Fund, and provided a continuing source of income – estimated to be at least \$50 million annually - generated by the sale of carbon dioxide emissions allowances received from Virginia joining the Regional Greenhouse Gas Initiative. Funds so generated would support implementing hazard - mitigation projects to both mitigate and prevent further flood damage. This legislation failed in Committee. And the General Assembly went further, preventing Virginia from participating in RGGI

under any circumstance by blocking the use of agency funds for RGGI participation, even though it has already been approved by the Virginia State Air Pollution Control Board.<sup>28</sup>

**Despite these efforts, Governor Northam remains committed to coastal resilience.** His priorities are to identify critical infrastructure that is vulnerable to rising waters and recurrent flooding; to determine the best and most practical, innovative and cost effective solutions to adapt and protect that infrastructure; to use creative and less costly green or green-gray infrastructure approaches to protect more dispersed assets and communities; and to leverage federal, state and local funds to help make coastal Virginia more resilient to climate change.

To do this, **Governor Northam has established a series of executive actions, through Executive Order 24, *Increasing Virginia's Resilience to Sea Level Rise and Natural Hazards***, signed on November 2, 2018. With this Order, Virginia is directed to determine the vulnerability of and set standards for future built infrastructure throughout the Commonwealth, to make Commonwealth holdings more resilient. We have established and will implement a series of sea level rise scenario planning curves, which we will use to ensure the resilience of state-owned infrastructure and as recommendations for local governments and regions to use in planning and preparations for the future. We have also established a series of recommendations for first finished floor elevation for future constructed state-owned buildings that may be located in floodplains.

**Executive Order 24 also directs development of a Virginia Coastal Protection Master Plan** to adapt and protect our coastal region. This plan will build on and align those actions, which our localities and regions have already taken to prepare themselves for their future, and will lay out a series of recommended actions and strategies for our state to develop and prioritize how it will adapt and protect our valuable and vulnerable coastline. In this context we view it as essential to work with our federal partners as we move forward to better prepare our state, regions, localities, and communities,

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<sup>28</sup> Lewis et al., "A BILL to Amend and Reenact § 10.1-603.25 of the Code of Virginia, Relating to the Virginia Coastal Protection Fund; Establishment of a Carbon Dioxide Cap and Trade Program; Authorization to Establish an Auction Allowance Program Consistent with the Regional Greenhouse Gas Initiative Memorandum of Understanding; Deposit and Distribution of Proceeds of Allowance Auctions; Virginia Coastal Protection Act.," Pub. L. No. SB1666 (2019), 10.1-603.25 (2019), <https://lis.virginia.gov/cgi-bin/legp604.exe?191+ful+SB1666>.

to build trust, and demonstrate value. Finally, Executive Order 24 will serve to coordinate, collaborate, and communicate across state entities, across and with federal entities, and across our Coastal regions, communities, and localities to ensure coordinated objectives, and the best use of scarce funding dollars.

**Virginia has identified four key areas of focus.** First, the use of natural and nature-based features as a way to buy time – as the first line of defense - as we build our strategy and understanding of what infrastructure is critical and vulnerable, and what the best plans and processes will be over time to adapt that infrastructure. Second, we are focused on collaborative efforts at every level, working with and across localities to expand the capacity of their dollars, of state dollars, and where possible, of federal dollars. Third, we are committed to ensure environmental justice, as underserved communities often bear the most substantial brunt of flooding challenges, and yet have the least capacity to plan, apply for grant dollars, determine or meet federal and state match requirements, and to sort out solutions to fund and implement actions to keep their communities and their histories viable into the future. Finally, we will facilitate the adoption of resilience practices across state agencies and processes.

Executive Order 24 builds on actions already underway across Coastal Virginia. At the federal level, the Department of Defense, Office of Economic Adjustment has initiated a series of “compatible use” Joint Land Use Studies (JLUS) in Coastal Virginia. The Joint Base Langley-Eustis Study with the Cities of Hampton and Newport News was completed in 2018, and the Norfolk - Virginia Beach JLUS just entered its public comment period in June, and is nearly complete. The third JLUS study, including the cities of Chesapeake and Portsmouth, has just begun and should be complete in FY 2020. These studies help Coastal Communities understand the impacts of rising waters and flooding on infrastructure in and around their shared federal facilities, and give the communities and their federal partners a better understanding of how to prepare and prioritize project outcomes of benefit to both to ensure operational and community readiness.

In addition, the US Army Corps of Engineers North Atlantic Coast Comprehensive Survey (2015), a post-Hurricane Sandy report, recommended seven additional Coastal Storm Risk management Studies, two specific in Virginia. The first, the Norfolk Coastal Storm Risk Management Study conducted by the USACE Norfolk District, received its signed Chief's Report in February 2019. The second, Northern Virginia/Potomac River Shoreline, executed by the USACE Baltimore District, with the State as a Cost Share Partner and the Metropolitan Washington Council of Governments as the Non-Federal Sponsor, officially started July 15<sup>th</sup>, 2019.

To give you a sense of the enormous costs of making our coast more resilient, the City of Norfolk USACE Coastal Storm Risk Management Study outlines \$1.57B in proposed projects to reduce the impact of storm surge and risk on the city.<sup>29</sup> Though this is valuable work, critical to the city's future, it does little to address nearer term recurrent flooding across the city, and such studies do not, by law, include Department of Defense infrastructure in considering impacts and design outcomes.

And the City of Virginia Beach is completing a series of studies, including a full watershed analysis, and a sea level rise and recurrent flooding study that has estimated \$2.4B in anticipated costs to reduce flooding and surge impacts across the city. Virginia Beach has raised taxes and storm-water fees, and committed to \$1.3B in spending over a 15-year period to begin to prepare for these impacts, and yet realizes that much of what it must do will require the cooperation of nearby cities to achieve the full set of desired resilience outcomes.

Many other cities are staring down costs on a similar scale, and rural localities with more dispersed populations and limited tax bases have a wholly different set of needs that must be addressed through more creative solutions.

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<sup>29</sup> "Final Integrated City of Norfolk Coastal Storm Risk Management Feasibility Study Report/Environmental Impact Statement," Feasibility Study (Norfolk, VA: US Army Corps of Engineers, Norfolk District, September 2018).

## **WHAT CONGRESS CAN DO TO HELP**

**First, I would like to thank both the House and the Senate for the addition of climate- related amendments in the 2018, 2019, National Defense Authorization Act language and the 2020 NDAA mark-up language.** These efforts help coastal communities in Virginia with substantial federal presence improve coordination at the federal, state, and local level and improve resilience for our federal and defense facilities along with that of the surrounding communities, without which they would not be able to ensure our forces are prepared to deploy. I would also like to thank the House and the Senate for their work on the 2018 Disaster Recovery Reform Act and its many innovative solutions to focus on pre-disaster hazard mitigation, which will also give options and opportunities for coastal communities to better prepare themselves in advance of increased hazardous weather and storm activity.

As sea levels rise and extreme weather events, like the extreme rain and flash flooding event of July 8<sup>th</sup> 2019 here in Washington, DC, become more and more common, the United States is under stress. Since 1980 there have been have been 219 disasters costing over \$1 billion each, for a cumulative cost of \$1.57 trillion.<sup>30</sup>

Because of this, since 1980 the federal government has appropriated over \$73 billion for disaster preparedness and recovery. In response to disasters, Congress has provided an additional \$254.6 billion in supplemental and contingency funds, nearly three times more than had been provided in the annual budget.<sup>31</sup> This is a fiscal and budgeting problem as well as a resilience and disaster preparedness problem. We know every dollar spent on disaster mitigation saves \$6, which should be full justification for Congress to take action to increase the amount of money spent on resilience and pre-disaster mitigation. The funding is needed, whether it is money for the Army Corps of Engineers to study and construct flood control projects, or for FEMA to improve predictive floodplain mapping and help communities move out of floodplains, or money for USGS or NOAA to better monitor, analyze and

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<sup>30</sup> Adam Smith, "2017 U.S. Billion-Dollar Weather and Climate Disasters: A Historic Year in Context." (NOAA Climate.gov, January 2018), <https://www.climate.gov/news-features/blogs/beyond-data/2017-us-billion-dollar-weather-and-climate-disasters-historic-year>.

<sup>31</sup> William Painter, "The Disaster Relief Fund: Overview and Issues" (Congressional Research Service, February 2019).

understand flooding and storm surges. Increased spending now will better protect people, property and the fiscal strength of the United States for tomorrow, and save precious dollars over time.

**The actions of this committee are vitally important to achieving this pivotal goal. This committee must lift the sequester on non-defense discretionary spending and ensure that agencies like FEMA, the Army Corps, NOAA, USGS, HUD, NASA and others have adequate funding to protect Americans from the outcomes of our changing climate, extreme weather and disasters.** Congress cannot fight this existential threat with one hand tied behind its back, and the sequester does just that.

**Further, this Committee must recognize climate resilience and disaster preparedness as one of the country's greatest and most immediate needs.** Without significant funding for and coordination across the federal agencies that provide resilience and pre-disaster mitigation, Congress will fail to meet its charge of protecting the communities of the United States. In addition, Congress should encourage greater alignment of these programs to eliminate redundancies and ensure the most expedient and effective use of funds to protect people and property and reduce repetitive disaster spending.

In addition to resilience, pre-disaster mitigation, and infrastructure and flood plain actions, the U.S. Army Corps of Engineers (USACE) has a \$96 billion backlog of authorized but unconstructed projects, while annual appropriations for the USACE Construction account under Energy and Water Development appropriations bills have averaged \$2 billion in recent years. Congress has also limited the number of new studies and construction projects initiated with annual discretionary appropriations, with a limit of five new construction starts using FY2019 appropriations.<sup>32</sup> Since only a few construction projects are typically started each fiscal year, numerous projects that have been authorized by previous Congresses remain unfunded and backlogged. This problem has worsened in recent decades as Congress has authorized construction of new projects at a rate that exceeds USACE's annual construction appropriations. This drives competition for funds among authorized activities during the budget development and appropriations process, and only a few projects make it into the President's budget each year. Non-federal entities involved in USACE projects are frustrated with the extreme effort it takes to fund the projects their localities need.

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<sup>32</sup> "Army Corps of Engineers Annual and Supplemental Appropriations: Issues for Congress" (Congressional Research Service, October 2018), <https://crsreports.congress.gov/product/pdf/R/R45326>.

Finally, additional topic areas of need include:

- **Substantive and timely, publically-available scientific data**
- **Expanded USACE Project Development**
- **Support for Department of Defense Office of Economic Adjustment**
- **Aligned and Expanded Federal Block Grant Programs**
- **State resilience incentivized with Federal Matching Funds**

## **CONCLUSION**

**In summary, as viewed from the state and community level, there is an urgent need for a coordinated federal effort to deal with the impacts of climate and rising waters on Coastal Communities.** Rising waters and recurrent flooding know no political boundaries; they know no boundaries of wealth or race; they know no boundaries of society. Coastal communities across Virginia and around the country are being impacted today.

**This Committee can help by lifting the sequester** on non-defense discretionary spending to ensure that Federal agencies have adequate funding to protect our country from the outcomes of our changing climate, extreme weather and disasters, **and by recognizing climate resiliency and disaster preparedness as one of the country’s greatest and most immediate needs. The Committee needs to take action now.**

**Virginia is committed to building capacity for our coastal communities to prepare for and build resilience to this threat,** and as one of many impacted coastal and riverine states, we need the support of a coordinated nationwide federal response to make this happen.

We have no time to waste because **“Time and Tide wait for no man.”**

(The words of Geoffrey Chaucer)

Thank you again for the opportunity to offer this testimony, and I look forward to your questions.