

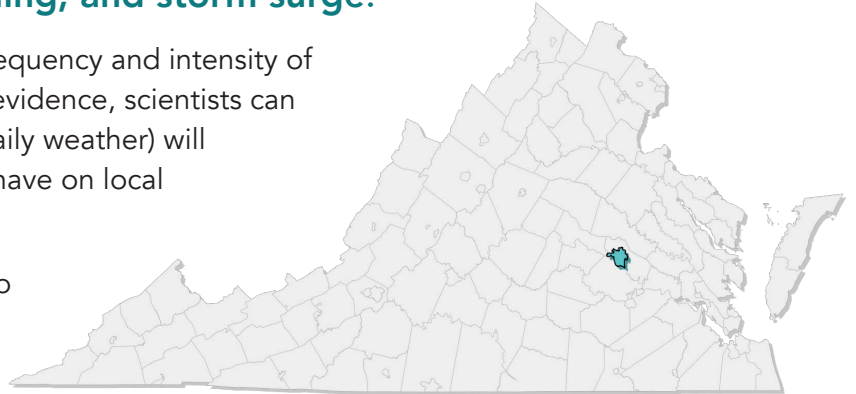
# Community Climate Outlook

## RICHMOND, VA

Richmond residents will face a worsening variety of weather- and climate-related hazards, such as **heat waves, flooding, and storm surge**.

As Richmond's climate changes, so has the frequency and intensity of these local hazards. Using the best available evidence, scientists can project how climate (long-term averages in daily weather) will change in the future, and the effects this will have on local communities.

This information can guide decision-making to help Richmond and its residents plan and prepare for future weather and climate hazards.



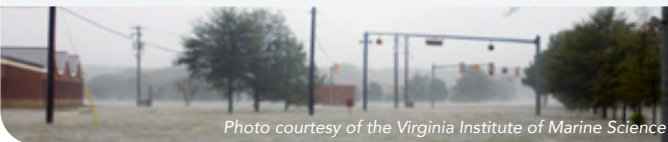
## SEA LEVEL RISE



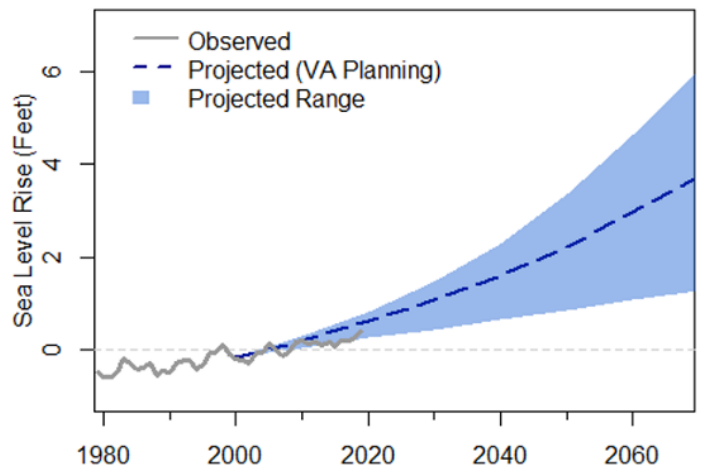
**KEY MESSAGE:** Sea levels in Richmond have risen over 1 foot since 1950, leading to more frequent and severe coastal flooding, agricultural losses, and property damage.<sup>1</sup> Sea levels will rise 2-6' by 2070, submerging private property and permanently reshaping Richmond's coastline. Visit [adaptva.com](http://adaptva.com) for more information on how citizens and localities can prepare.



**FLOODING:** High tide flooding will become more frequent, putting low-lying homes and infrastructure at risk. And rising sea levels will amplify the impacts of storm surge, allowing waves and severe flooding to reach further inland, damaging homes and property.



**AGRICULTURE:** Sea level rise increases the salinity of rivers and groundwater. Saltwater can intrude into wells and agricultural fields, forcing them to be abandoned. It also harms aquaculture, altering the range of marine species and habitats.



Projections are for average annual sea level and do not include the effects of tides and storm waves. The blue line represents NOAA's intermediate-high sea level rise scenario, used for official planning purposes by the state of Virginia. The blue shading shows the range between NOAA's low and extreme scenarios for sea level rise (NOAA et al., 2017). The gray line shows changes in sea level at Sewell's Point, VA. All sea levels are displayed in feet above NAVD88.<sup>2</sup>

<sup>1</sup>Local data are made available by VIMS Sea Level Rise Report Cards, available at [www.vims.edu/research/products/slrc](http://www.vims.edu/research/products/slrc).

<sup>2</sup>NAVD88 is the standard elevation datum used for sea level rise projections in VA.

<sup>3</sup>(From reverse) Data from the Centers for Disease Control and Prevention.

<sup>4</sup>(From reverse) Jastram and Rice, 2015.

<sup>5</sup>(From reverse) MACA data are available at [www.climatologylab.org/MACA](http://www.climatologylab.org/MACA).

<sup>6</sup>(From reverse) gridMET data are available at [www.climatologylab.org/gridMET](http://www.climatologylab.org/gridMET).

For more information visit: [marisa.psu.edu/outlooks](http://marisa.psu.edu/outlooks)



## TEMPERATURE



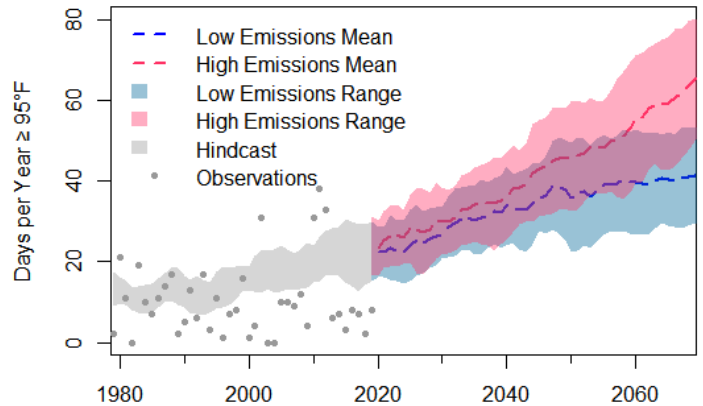
**KEY MESSAGE:** Richmond's summers are getting hotter. Compared to 1950, Richmond sees 12 more days per year in excess of 95°F. Human health, local fisheries, and county infrastructure are all threatened by higher temperatures. By 2070, Richmond can expect 29 to 80 days above 95°F every year, with associated increases in cooling costs and heat-related illnesses.



**HUMAN HEALTH:** Heatwaves can be deadly to people and pets. More than 80 Virginians have died from heat-related causes since 2010, with disproportionate impacts on vulnerable, low-income populations.<sup>3</sup>



**FISHERIES:** Rising water temperatures store less dissolved oxygen, disrupting important local fisheries such as rockfish, oysters, and soft-shelled crabs. Water temperatures have risen 1.2°F since 1960 and continue to climb.<sup>4</sup>



High-emissions temperature projections (RCP 8.5) are in red, and low-emission projections (RCP 4.5) in blue. Dots represent annual days  $\geq 95^\circ\text{F}$ , and gray shading shows temperature hindcasts. Modeled data are retrieved from Multivariate Adaptive Constructed Analogs (MACA)<sup>5</sup>, and observed data are from the Gridded Surface Meteorological Dataset (gridMET).<sup>6</sup>

## PRECIPITATION



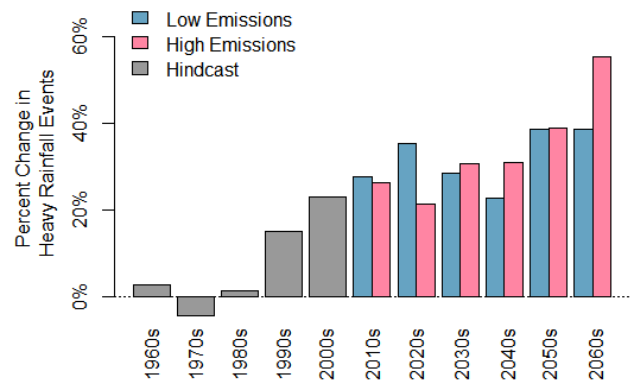
**KEY MESSAGE:** Heavy downpours in Richmond have increased in frequency and intensity, causing property damage, septic backups, well contamination, and impacts to water quality in local streams and the Chesapeake Bay. Richmond can expect up to 35% more days of heavy rainfall ( $\geq 2$  inches) by 2070.



**FLOODING:** Heavy rain overwhelms infrastructure and drainage systems, causing property damage and covering roadways.



**HUMAN HEALTH:** Rising water tables cause septic backups and groundwater pollution, putting Richmond's drinking water at risk of contamination. Changing moisture levels impact the spread of illness, including tick- and mosquito-borne diseases.



The graph shows the % increase in days with  $\geq 2''$  rain relative to a 1960-1989 mean. High-emission projections (RCP 8.5) are in red and low-emission projections (RCP 4.5) in blue. Precipitation hindcasts are in gray. Modeled data are from Multivariate Adaptive Constructed Analogs (MACA).

**FUTURE SCENARIOS:** Future climate will depend, in part, on the efforts that individuals and society take to reduce greenhouse gas emissions. This fact sheet presents projections of future climate from ensembles of downscaled model results for Richmond, VA based on two scenarios for future emissions: a high-emissions scenario that assumes continued growth in the use of fossil fuels (RCP8.5, often called 'business as usual') and a moderate-emissions scenario that assumes a partial transition to lower-carbon energy sources (RCP4.5). More information on these scenarios can be found at [iiasa.ac.at/web-apps/tnt/RcpDb](https://iiasa.ac.at/web-apps/tnt/RcpDb).