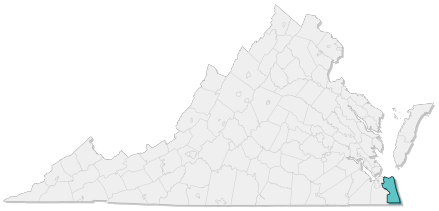
Virginia Beach, VA

Virginia Beach residents will face increasingly severe weather-related hazards, such as heat waves, flooding, and storm surge.



As the frequency and intensity of local hazards change, it is important for all of us to protect communities and local habitats. Using the best data, scientists can project how long-term averages in daily weather will change in the future, and the effects this will have on localities.

Information on extreme weather and hazards can empower citizens, decision-makers, and other stakeholders to make infored risk-reduction decisions. With planning and preparation, Virginia Beach can reduce risks for all residents.

Changing Temperature Patterns

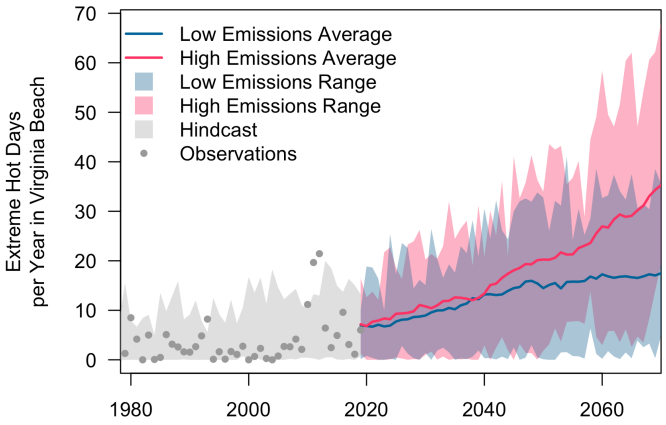
Human health, local fisheries, and infrastructure are all threatened by higher temperatures. At 95°F, it is hard to keep indoor areas and our bodies cool. Virginia Beach's summers are getting hotter and this is intensified by the Heat Island effect[1]. On average, Virginia Beach sees 4 days per year with temperatures above 95°F (1990-2019 average). Within the next 50 years (by 2070), Virginia Beach can expect a yearly average of 17 to 35 days above 95°F, with associated increases in cooling costs, reduced air quality, and heat-related illnesses.

HEAT-RELATED ILLNESSES

Heatwaves can kill people and pets. More than 100 Virginians have died from extreme heat between 2010 and 2019. Individuals at higher risk include children, pregnant women, older adults, outdoor workers, and lower-income residents.

ENERGY USE

Heat islands increase the demand for air conditioning. In the US, electricity demand for cooling will increase by 5-20% for every added degree C. During heatwaves, increased demand can overload systems causing power companies to conduct rolling brownouts or blackouts to avoid system failure.



The graph shows the number of days in a year with temperatures above or equal to 95°F. Dots represent observed annual days of extreme temperatures and the gray shading shows the hindcast[2]. Two scenarios of the future are shown as a high-emissions scenario (RCP 8.5) in red and a low-emissions scenario (RCP 4.5) in blue.

Data:

- Future scenarios: Multivariate Adaptive Constructed Analogs (MACA)
- Observed data: Gridded Surface Meteorological Dataset (gridMET)

[1] Heat islands are urban areas where temperatures are higher than the surrounding areas due to high concentrations of infrastructure and limited green space.

[2] Hindcasts are model results for a historical period. Hindcasts are useful for comparing observations with model estimates.

Changing Rainfall Patterns

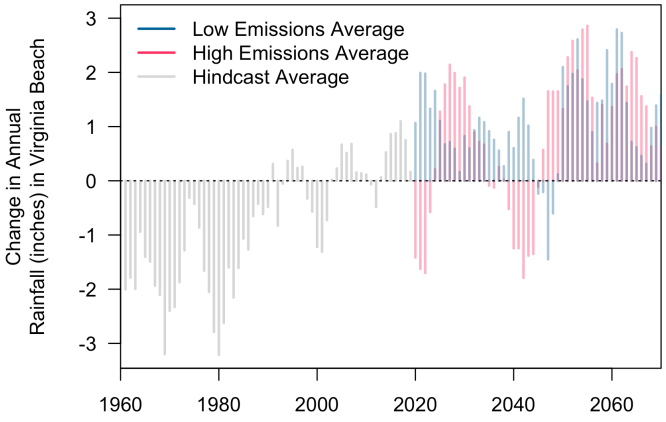
Heavy rainfall in Virginia Beach is increasing in frequency and intensity, causing property damage, septic backups, and impacts to water quality in wells, local streams, mold and indoor air quality issues, and the Chesapeake Bay. Annual rainfall in Virginia Beach will likely increase by an average of 2 inches (2050-2079 average compared to the 1990-2019 average).

FLOODING

Heavy rain overwhelms infrastructure and drainage systems, causing property damage and covering roads.

REDUCED HUMAN HEALTH

Changing moisture levels impact the spread of mold and illness, including tick- and mosquito-borne diseases. High humidity allows ticks to travel further and promotes mold growth. Flooded areas from rainfall promote mosquito reproduction leading to more mosquitoes.



The graph shows the change in annual rainfall compared to the average between 1990 and 2019. The gray lines show the hindcast. Two scenarios of the future are shown as a high-emissions scenario (RCP 8.5) in red and a low-emissions scenario (RCP 4.5) in blue. Data for the future scenarios are retrieved from MACA.

Data:

- Future scenarios: Multivariate Adaptive Constructed Analogs (MACA)

Sea Level Rise

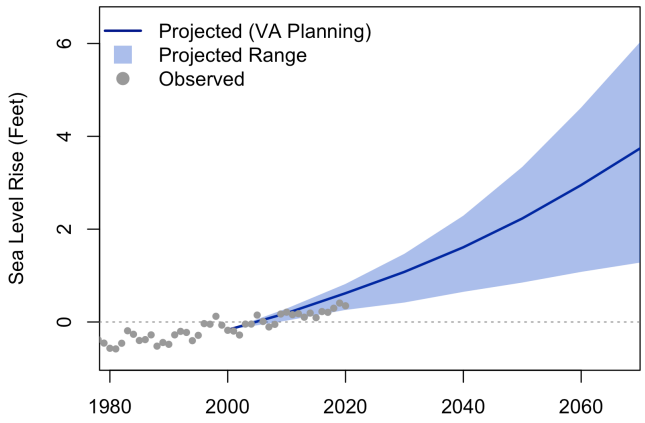
As temperatures warm, land ice melts and seawater expands causing sea levels to rise around the world. Between 1950 and 2019, sea levels in Virginia rose roughly 1 foot leading to more frequent and severe coastal flooding, and property damage. Sea levels will rise an additional 1 to 6 feet in the next 50 years (by 2070), submerging property and permanently reshaping Virginia Beach's coastline.

STORM SURGE

Rising sea levels increase the impacts of storm surge allowing waves and severe flooding to reach further inland. Storm surge can damage properties and coastal habitats, erode beaches, and cause serious injury or death.

TIDAL FLOODING

Rising sea levels allow tides to push further inland causing more frequent high tide flooding, putting low-lying housing, commercial property, and infrastructure at risk. Repeated tidal flooding disrupts everyday life by closing roads and overwhelming storm drains.



The graph shows the projected change of sea level in feet above NAVD88 compared to the 1983-2001 average. The blue line shows the sea level rise scenario used for official planning purposes in Virginia. The blue shading shows the range between the low and extreme scenarios for sea level rise. Dots show the observed changes in sea level at Sewell's Point, VA.

Data:

- Future scenarios: National Oceanic and Atmospheric Administration (NOAA)
- Observed data: Permanent Service for Mean Sea Level (PSMSL)

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