CLIMATE RESILIENCY GOAL

Climate Monitoring and Assessment Outcome

2025 PROGRESS
UNCERTAIN

OUTCOME: Continually monitor and assess the trends and likely impacts of changing climatic and sea level conditions on the Chesapeake Bay ecosystem, including the effectiveness of restoration and protection policies, programs and projects.

PROGRESS AS OF 2021: The Climate Monitoring and Assessment Outcome is uncertain. Monitoring and assessing the impacts of climate change on the resiliency of our living resources, habitats and communities is a significant challenge. The Climate Resiliency Workgroup is supporting science to assess and forecast the effects of climate change on selected aspects of the watershed and estuary; evaluating best management practice performance under a changing climate; and identifying the management utility of climate change indicators. In 2021, the Climate Resiliency Workgroup undertook a thorough review of the indicators. They identified whether an indicator would stay the same, is in the process of being updated or should be refined to better connect with the *Chesapeake Bay Watershed Agreement* goals. They also decided on brand new indicators that will be incorporated into the outcome. This review was approved by the Management Board in March 2021. More work is required to develop metrics that assess impacts and guide projects that improve resiliency and enhance the support of monitoring.

BACKGROUND: While no formal ecological condition or programmatic baseline for climate resiliency had been established prior to the Chesapeake Bay Watershed Agreement, Chesapeake Bay Program partners had been engaged in climate change-related activities for several years. In the 2010 *Strategy for Protecting and Restoring the Chesapeake Bay Watershed*, it was noted that changing climatic conditions are a significant challenge to the successful restoration and protection of the Chesapeake Bay and its watershed. The Climate Monitoring and Assessment Outcome is built off of the strategy's recommended actions to improve the monitoring of climate change impacts in the Bay and throughout the watershed, as well as ensure monitoring results are integrated and available to assess the effectiveness and adjust management actions as necessary. Reports prepared by the Chesapeake Bay Program's Scientific and Technical Advisory Committee (particularly, *Climate Change and the Chesapeake Bay: State-of-the-Science-Review and Recommendations*) have provided a sound basis for what it is envisioned will be a continuous effort to monitor and assess changing climatic conditions and resulting impacts throughout the watershed.

BASELINE: In 2018, the Climate Resiliency Workgroup developed five indicators to track the impact that changing climatic conditions are having on the physical environment of the watershed. They include:

• Average Air Temperature and Changes in High Temperature Extremes: Air temperature has increased over the last 100 years (1901-1917). However, throughout the Chesapeake Bay watershed, only one weather station showed a statically significant increase in high temperature extremes since 1984.

• Changes in Total Annual Precipitation: Annual precipitation totals in some parts of the watershed have increased over the last 100 years (1901-1917).

• Relative Sea Level Rise: Between 1960 and 2017, the level of the Bay has risen between one-eighth of an inch and approximately one-sixth of each inch each year.

• River Flood Frequency and Magnitude: Between 1965 and 2015, 72% of 47 stream sites in Delaware, Maryland, Pennsylvania, Virginia and West Virginia experienced an increase in the size of river floods. Seventy-one percent of stream sites experienced an increase in the frequency of river floods.

• Stream Water Temperature: Data shows that average annual stream temperature in the watershed has increased by 1.1 degrees Fahrenheit over the past six decades. Seventy-nine percent of 72 streams sites monitored between 1960 and 2014 experienced an increase in water temperature, averaging approximately 2.1 degrees Fahrenheit.

DATA SOURCE: The Chesapeake Bay Program has reviewed the current climate monitoring and assessment indicators and is developing more that will track the ecological and social impacts of climate change, in addition to others related to the physical environment. Further development of these indicators will depend on the quality of supporting data, the added value of the indicators in question and the priorities and resources of the Climate Resiliency Workgroup. Data sources for the five existing indicators are as follows:

• Average Air Temperature and Changes in High Temperature Extremes: Data related to changes in average air temperature and high temperature extremes come from temperature measurements collected at land-based weather stations by the National Oceanic and Atmospheric Administration (NOAA). This indictor will need to be refined to better connect with the Tree Canopy Outcome in the future.

• Changes in Total Annual Precipitation: Data is collected from precipitation measurements at land-based weather stations by the NOAA and maintained by the National Centers for Environmental Information.

• Relative Sea Level Rise: Data to measure relative sea level rise is collected by the NOAA through their network of tidal gauge stations. The devices measure the change in sea level relative to the land surface. This indicator will need to be refined to better connect with the Wetlands Outcome in the future.

• River Flood Frequency and Magnitude: Data for these indicators are collected from USGS monitoring stations. Stream gauges measure stream elevation continuously, while the USGS measures actual discharge. Data are no longer available for this indicator. *

• Stream Water Temperature: Changes related to stream water temperature come from measurements conducted by the U.S. Geological Survey at monitoring stations around the Chesapeake Bay watershed. This indicator will need to be refined to better connect with the Stream Health and Brook Trout outcomes in the future.

***Data are not currently available to support the River Flood Frequency and Magnitude indicator. Instead, it was decided to develop a Tidal Bay Water Temperature Change indicator in connection with water quality thresholds for fish and underwater grasses.**

Additional parts of each indicator were adapted from a national indicator maintained by the U.S. Environmental Protection Agency.