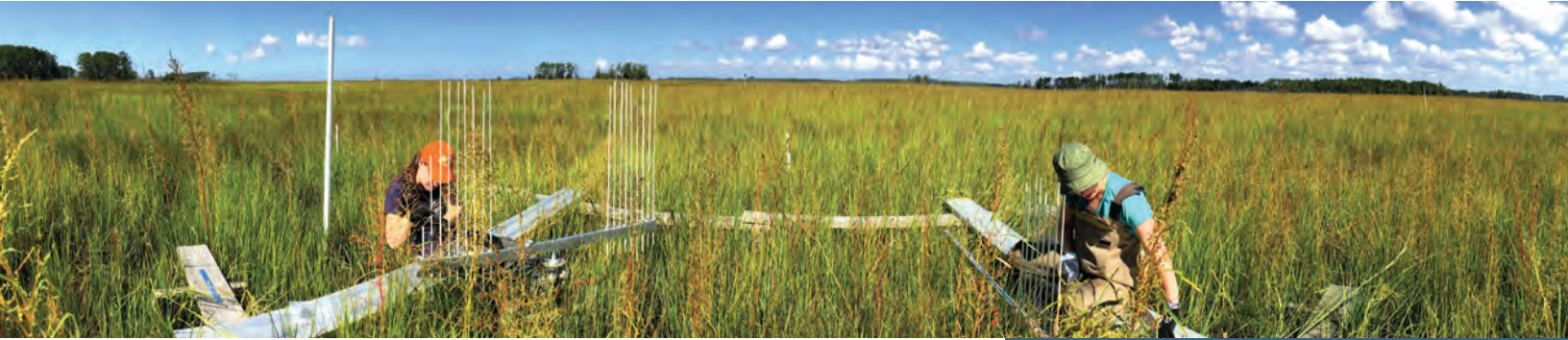




# Chesapeake Bay Sentinel Site Cooperative

*A regional collaborative network to monitor sea level change impacts and build coastal resilience*



## What Is the Cooperative?

The Chesapeake Bay Sentinel Site Cooperative is a Bay-wide collection of ecosystem-based study sites. The Cooperative focuses on measuring the impacts of sea level rise and is strengthened by partnerships with coastal managers, decision makers, and community liaisons. Partners work together to apply the science produced at sentinel sites to coastal management and resilience efforts. As a collaborative team, the partners share emerging insights from sentinel site research; explore potential collaborations and funding opportunities; jointly implement new methods and technologies; and learn from each other through webinars, workshops, and monthly presentations.

## Sea Level Rise and the Chesapeake Bay

Local sea level rise is the result of several interacting processes. They include global sea level rise caused by thermal expansion and melting glaciers; sinking of the land (subsidence) caused by groundwater extraction and geological processes; and the influence of oceanic and atmospheric dynamics, such as the El Niño Southern Oscillation. The processes that affect a given location differ, accounting for the variability of sea level rise along the coast. In the Chesapeake Bay, subsidence strongly influences local sea level rise.

Long-term data from NOAA tide gauges positioned around the Chesapeake indicate that relative sea levels are rising at 3.4 mm per year, or twice the average global rate of 1.7 mm per year. Over a 30-year period from 1985 to 2015, tide gauges showed rates of sea level rise ranging from 4.8 mm per



*Scientist surveying Sweet Hall Marsh in Virginia.  
Photo: Scott Lerberg*

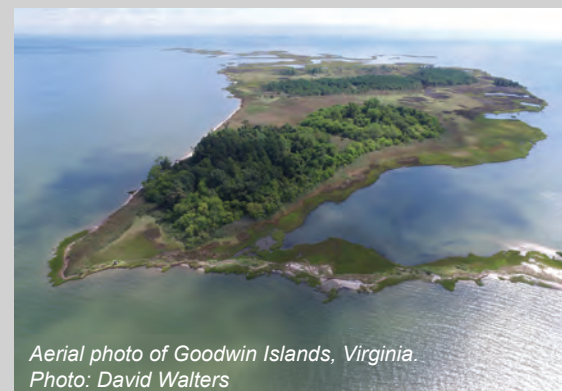
year in flood-prone Annapolis, Maryland, to 6.3 mm per year at Sewell's Point, Virginia, in the subsiding Hampton Roads region.

NOAA tide stations are essential to documenting changes in local sea levels, but in addition, long-term monitoring data from sentinel sites inform coastal decision-makers about the longevity and health of vital Chesapeake Bay ecosystems.

## Our Mission

**To integrate science findings from local observations across the Chesapeake Bay region to improve planning and management decisions regarding sea level rise and ecological changes**

## What Is a Sentinel Site?

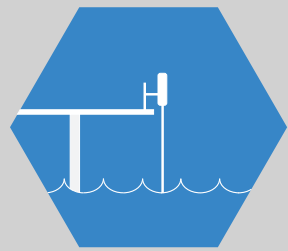


*Aerial photo of Goodwin Islands, Virginia.  
Photo: David Walters*

Sentinel sites are discrete locations across the Bay region where researchers conduct intensive studies and sustained observations to detect and understand changes in coastal ecosystems.

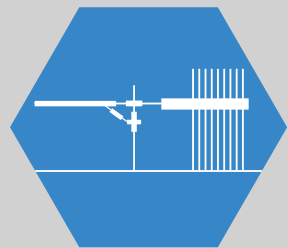
*Banner photo: Scientists taking surface elevation table measurements, Deal Island, Maryland. Photo: Kim Hernandez*

## Monitoring Tools



### Water Levels

Sea level rise manifests itself differently along the coast, making it important to obtain local water level information. Water-level monitoring stations at each sentinel site continually measure the depth of water, providing a long-term dataset for scientists to use.



### Surface Elevation Tables

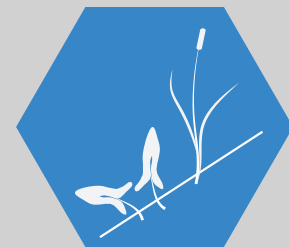
Surface elevation tables (SETs) are mechanical devices permanently installed in wetlands that allow scientists to measure small changes in surface elevation precisely and accurately. This tool allows scientists to better understand how coastal marshes respond to sea level rise. SETs are commonly used with marker horizons—squares of feldspar clay applied to the surface of the marsh—to track changes in accretion (the accumulation of sediments on the marsh surface over time).

# Chesapeake Bay Sentinel Sites

## One Mission, Diverse Strengths

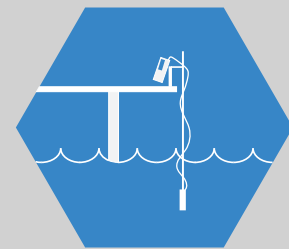
Chesapeake Bay sentinel sites share a mission to improve planning and management decisions by providing the best possible data derived from local observations. The map below depicts the type and number of monitoring instruments at each sentinel site.

Each site also brings a set of strengths to the sentinel site collaborative network. These include studying the efficacy of restoration approaches, conservation strategies for rare and endangered species, and how marshes respond to experimental manipulations intended to mimic human disturbances, such as warming and increased carbon dioxide.



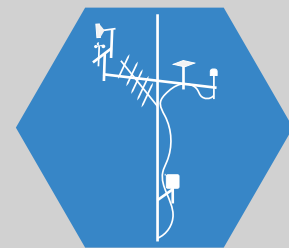
## Vegetation Sampling

Scientists measure plant traits such as height, percent cover, stem density, and biomass within sampling plots to understand how wetland vegetation responds to changing sea levels.



## Water Quality

Water quality is a major driver of ecosystem change. At water-monitoring stations, researchers and managers monitor parameters such as temperature, total suspended solids, dissolved oxygen, pH, conductivity, chlorophyll, and nitrogen.



## Meteorological Data

Real-time weather stations at each sentinel site measure temperature, precipitation, wind speed, wind direction, relative humidity, and barometric pressure. This vital information helps scientists and managers to understand estuarine circulation, plant productivity, and storm frequency and intensity.

# Chesapeake Bay Sentinel Site Cooperative's Goals

With an emphasis on sea level rise, Cooperative activities seek to:

**Enhance and expand sea level rise partnerships to maximize the effectiveness of data collection, modeling, synthesis, and response to this information and translation through increased coordination and collaboration**

Representatives from CBSSC sentinel sites meet frequently to discuss and discover new ways to collaborate and synthesize long-term data to tell the story of how the Chesapeake Bay wetlands are responding to a changing climate.



Erosion at Goodwin Island. Photo: Scott Lerberg

## Improve science-based capabilities for understanding sea level rise and its impacts

The CBSSC is continually evolving to apply the techniques and technologies used to measure ecosystem resilience and vulnerability in the context of rising sea level. Through partnerships with institutions such as NOAA, the U.S. Fish and Wildlife Service, and local universities, new methods are being developed to conduct model runs, provide technical assistance through workshops, and increase the accuracy of elevation measurements. Additionally, new resilience tools are continually developed with input from Cooperative members.



Scientist surveying across an inlet on the Eastern Shore of Maryland  
Photo: Galen Scott

## Foster resilience efforts that connect sentinel site data and products to local communities

The CBSSC works to expand the reach of monitoring instrumentation to help local communities reduce their vulnerability to coastal hazards and increase community resilience. For example, Cooperative members work to identify suitable locations for water-level-measuring stations in areas around the Bay that lack local, accurate information about water levels to support adaptation and planning.



Flooded road at Dames Quarter, Deal Island, Maryland. Photo: Kim Hernandez

## Member Organizations



For additional information, please contact:

**Sarah Wilkins**  
Coordinator for the  
Chesapeake Bay Sentinel Site  
Cooperative

sarah.wilkins@maryland.gov  
410-260-8904