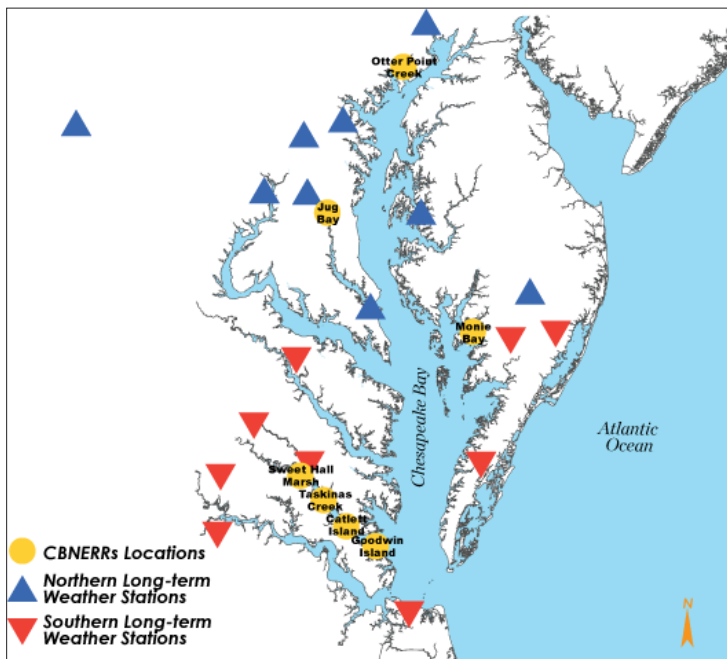


# CHANGING CHESAPEAKE: DETECTING CLIMATE CHANGE

Climate change is not just a future threat to Chesapeake Bay. The data shows our region has been dramatically impacted by temperature changes over the last century.



## THE STUDY

The National Oceanographic and Atmospheric Administration funded an analysis of long-term climate data in the Chesapeake Bay region to document trends. Researchers from the University of Maryland Center for Environmental Science partnered with the National Estuarine Research Reserves (NERR) of Maryland and Virginia, and Chesapeake Environmental Communications to analyze climate data from the NERR locations and the National Weather Service.

By examining 114 years of meteorological data, the team found clear evidence that physical climate changes are well underway and that species and habitats are responding those changes. Here are the facts:

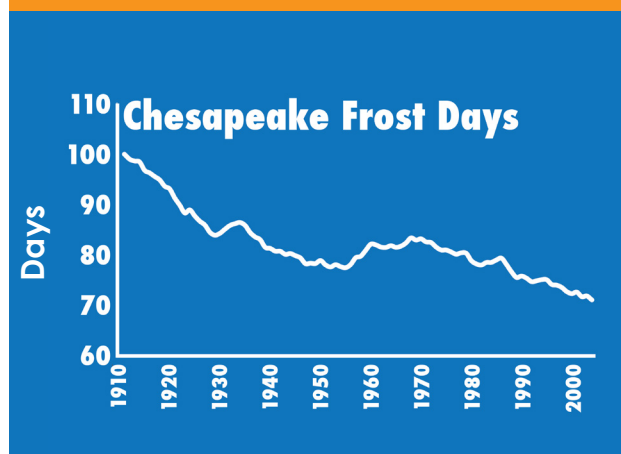
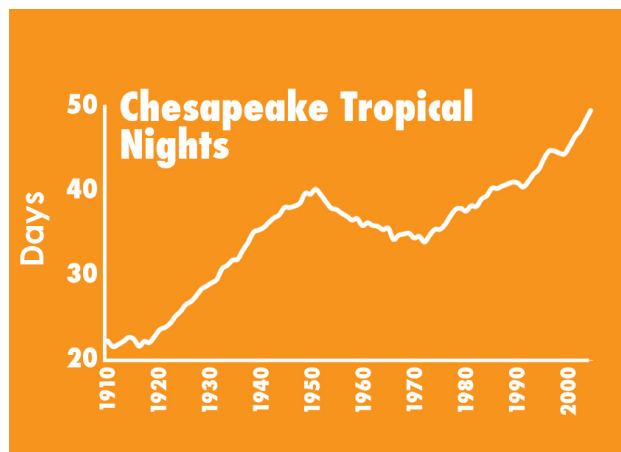
- Climate changes been detected in an expanded growing season length, precipitation patterns, and temperature dynamics,
- Underwater grasses are being negatively impacted,
- Migratory behaviors of fish, birds, and other species are being disrupted,
- Human health impacts may increase with rising temperatures,
- Increases in nutrient and sediment pollution from increasing precipitation may make restoration efforts more difficult.

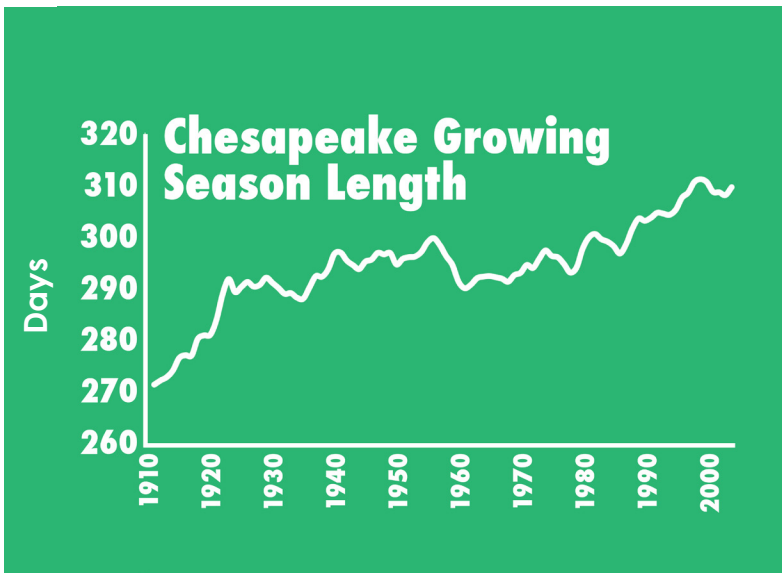
## THE FINDINGS

*Air and water temperatures are increasing in the Chesapeake Bay region.*

Warming temperatures in the Chesapeake Region have the potential to impact human health due to multiple factors. Warmer waters in winter extend the time period that that harmful bacteria can grow therefore increasing the likelihood that humans will encounter them. Warmer winters also allow agricultural pests and diseases that were not tolerant of Chesapeake winters to move into the region. Warm summer nights can impact the health of the infirm and elderly in households without air conditioning.

- There are 30 more warm summer nights (>68° F) per year now than 100 years ago.
- Warm summer nights are an indicator of heat stress that puts humans at risk of heat related medical issues.
- In the Southern Chesapeake region, there are 36 more warm (>77° F) summer days per year.
- Warmer winters are keeping water temperatures warmer longer which increases the likelihood of encountering potentially harmful Vibrio bacteria.
- Fewer frost days could allow new agricultural pests and diseases to move into the Chesapeake region.
- Over the past century, the number of frost days per year has dropped by more than 30.





**An expanding growing season is causing the seasonal behavior of animals and plants to change.**

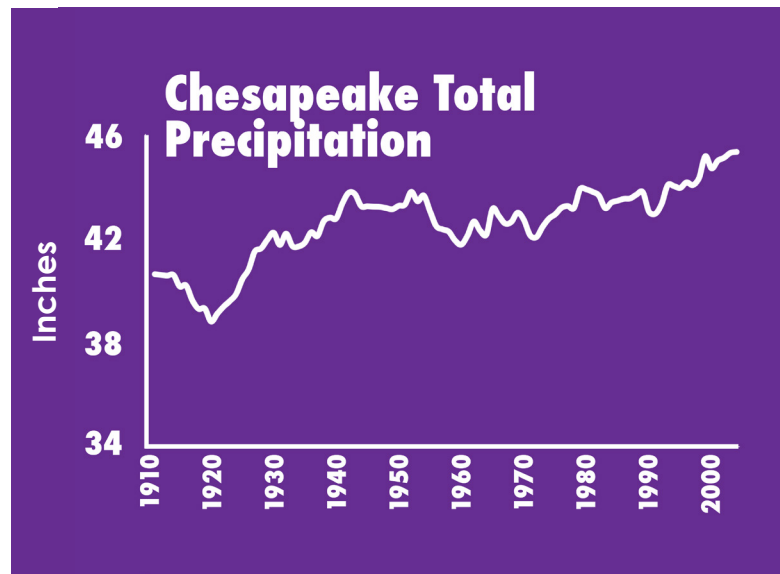
- The onset of growing season is occurring earlier and it is ending later than in the past.
- The length of the growing season has increased by more than 30 days across the Bay region over the last 114 years.
- Plants and animals use seasonal changes as cues so climate change impacts their behaviors.

The growing season is the number of days in any year that supports plant growth. Growing season is starting earlier and ending later than it did 100 years ago. Animals also use warm and cold periods as cues to tell them when to migrate. Brown pelicans, speckled trout, and other animals are experiencing changing migration patterns in response to temperature changes.

**Increased precipitation may make the restoration effort more difficult.**

- The Chesapeake region receives about 4.5 more inches of precipitation per year than it did a century ago.
- This additional precipitation has the potential to wash more sediments and nutrients into the Bay.
- With more fresh water flowing into the Bay's rivers, there is the potential to impact the salinity characteristics of the Bay.

The amount of precipitation the Chesapeake receives is one of the most important drivers of Bay health. There are strong relationships between precipitation (and associated river flow) and nutrient pollution, low dissolved oxygen, phytoplankton blooms, and bacteria levels. Climate forecasts suggest that annual precipitation will continue to increase through the end of the century.



## ADDITIONAL RESOURCES

### Changing Chesapeake

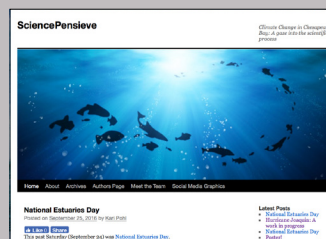
[www.chesapeakeedata.com/changingchesapeake](http://www.chesapeakeedata.com/changingchesapeake)



- A summary of all project findings and their implications.
- Public friendly content.
- Descriptions of potential impacts to seasonal behavior, underwater grasses, water quality and human health.

### SciencePensieve

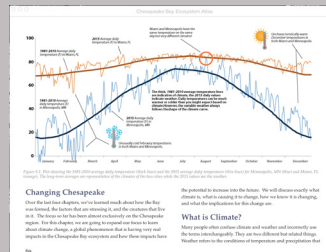
[www.sciencepensieve.org](http://www.sciencepensieve.org)



- Behind the scenes look at the analyses.
- Blog targeted at students and teachers.
- Access to data and code.

### Chesapeake Ecosystem Atlas

<http://itunes.apple.com/us/book/id1020777102>



- New chapter based on study findings.
- In depth discussion on what climate change is and how it's measured.
- Eighth to twelfth grade audience.