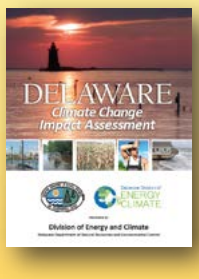
Climate Change in DELAWARE

It's happening now – temperatures, rainfall, and sea levels are changing.

It affects all of us and the places and resources we care about.

Climate change is a challenge, caused mainly by human actions.

Our choices today can make a difference.



This summary is adapted from the Delaware Climate Change Impact Assessment, a report detailing the best available science on the potential impacts of climate change to people, places, and resources in Delaware.

August 2014

Delaware Division of ENERGY & CLIMATE

Climate change is affecting Delaware now.

Climate change affects people, places, and resources we care about—our homes, neighborhoods, and communities, as well as beaches, wetlands, forests, rivers, and streams. These resources enhance our quality of life and support our economy.

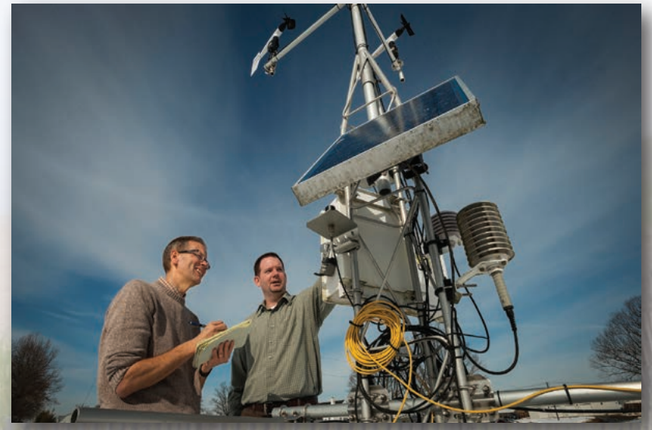
Higher temperatures, increasing rainfall, and rising sea levels are already occurring. These changes are expected to continue—and become more serious—in the coming years.

Climate change is caused mainly by human activities, particularly the burning of fossil fuels that release heat-trapping gases.

This is a global challenge, but we can take actions to lessen the impacts of climate change on our lives, communities, economy, and ecosystems, now and in the future.

We can choose

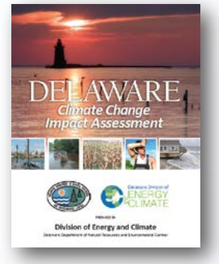
- to reduce the emissions of heat-trapping gases that are driving climate change.
- to help make our state more resilient to the changes we are already experiencing.
- to adapt to and plan for the future impacts of a changing climate.
- to do what we can to ensure a high quality of life for all Delawareans today, and for future generations.



State Climatologist Dan Leathers, left, and Kevin Brinson inspect a Delaware Environmental Observing System (DEOS) weather station.

In Delaware, scientists and policy makers are working together to understand how the changing climate is affecting our state. We are using the best available science to make our homes, communities, businesses, and natural resources more resilient to climate impacts.

The Delaware Climate Change Impact Assessment



- summarizes the best available science on how climate change may affect Delaware's people, places, and resources.
- increases our understanding of the current and future risks of a changing climate.
- helps Delaware's citizens, communities, and businesses prepare for, adapt to, and reduce the impacts of climate change on our state.

How can the Assessment be used?

The Assessment is a scientific summary written for policy makers, practitioners, and non-scientist readers. It can be used by:

- local governments, businesses, and community leaders, as a useful reference and resource for more in-depth planning and development of strategies to adapt to changing climate conditions.
- state agencies, who can use the climate information to help improve Delaware's resilience to climate change impacts.
- scientists and researchers, who can combine the climate data and projections with other models and assessment tools to quantify future impacts.
- all Delawareans, who can learn about the climate change risks they may face and some ways they can take helpful action.

What is Resilience? *"A capability to anticipate, prepare for, respond to, and recover, from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment."*

(Source: "America's Climate Choices: Adapting to the Impacts of Climate Change," 2010, National Research Council.)

What does a changing climate mean for Delaware?

Changes in temperature, rainfall, and sea levels already are being observed across the state. These changes are expected to continue and become even more serious in the coming years. Specifically, we expect:

Average temperatures to increase

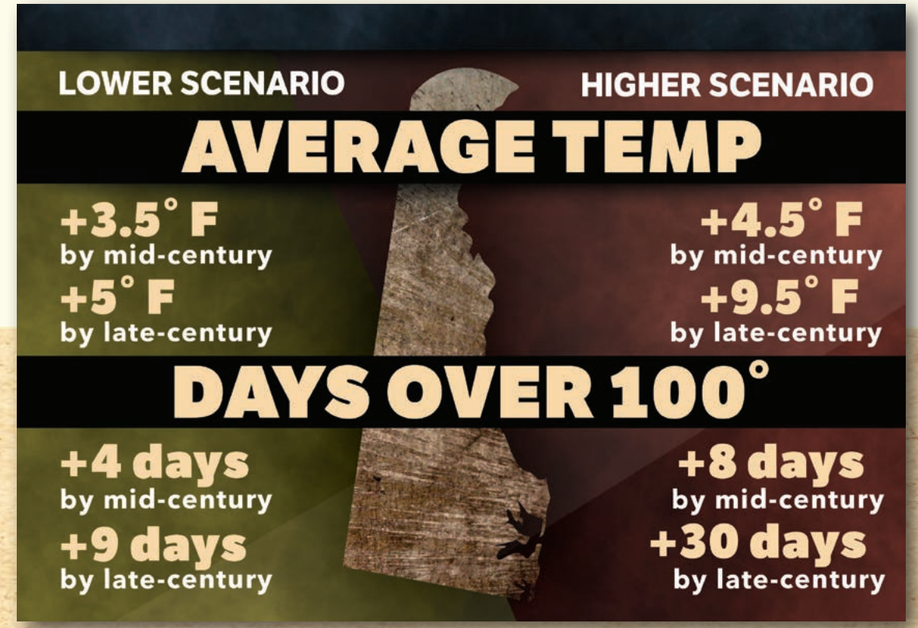
- Annual and seasonal temperatures in Delaware have already increased by 2 degrees Fahrenheit since 1900.
- Average temperatures are expected to increase another 2.5 to 4.5 degrees by mid-century (2050) and by as much as 8 degrees by 2100 (late-century).

Temperature extremes to become more frequent

- Higher summer temperatures (days over 95°F) and longer growing seasons already are being recorded.
- The number of very hot days (over 95°F) is expected to increase.
- Heat waves are projected to become longer and more frequent.

More frequent extreme rainfall

- Average precipitation is expected to increase by about 10 percent by 2100 (late-century).
- Heavy rainstorms are expected to become more frequent and more intense, with an increasing number of very wet days with 2 inches or more of rainfall.



About lower and higher scenario projections

The lower scenario represents a future in which people shift to clean energy sources in the next few decades, reducing emissions of carbon dioxide and other heat-trapping gases, also known as greenhouse gases. The higher scenario represents a future in which people continue to depend heavily on fossil fuels (for example, coal, oil, gasoline, and diesel), and emissions of greenhouse gases continue to grow.

Higher temperatures mean increased energy demand

"Cooling degree-days" are a useful indicator of energy demand for air conditioning. As average and seasonal temperatures warm, demand for cooling will increase while demand for heating decreases. With the projected increases in temperatures, the energy demand for cooling is expected to increase 30 percent by 2040, and up to 70 percent by 2060. This increase in summer cooling represents a growing demand for electricity—and increasing energy costs for homeowners, businesses, and communities.

How does climate change affect you?

Our food and water systems, our personal and community health, our transportation and commerce networks, and the habitats that support our wildlife and ecosystems are all vulnerable to the impacts of climate change. The decisions that we make now will have lasting impacts on Delaware's future and our quality of life. To make these decisions, we need the best available science.

The Delaware Climate Change Impact Assessment provides that foundation. It is a report based on solid science that is specific to Delaware. The Assessment summarizes Delaware's climate—both historic trends and future projections—and describes how changes in temperature, precipitation, and sea levels can affect our resources in five key areas: **public health, water resources, agriculture, ecosystems and wildlife,** and **infrastructure.**

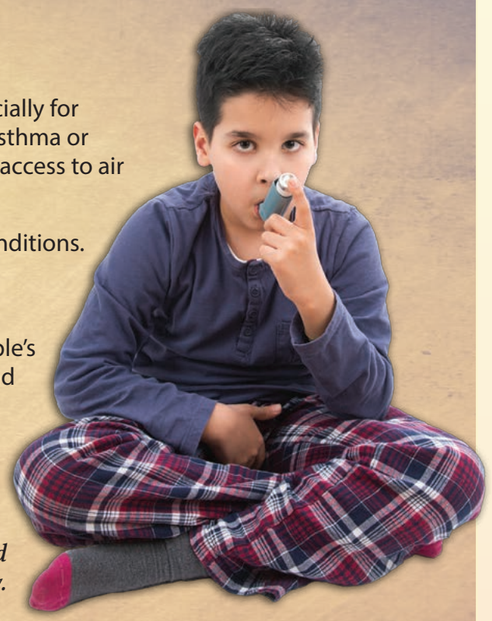
PUBLIC HEALTH

Increasing temperatures . . .

- may increase risk of serious illness, such as heat stroke, especially for vulnerable citizens: the elderly, small children, people with asthma or heart disease, and socially isolated people who have limited access to air conditioning or health care.
- may worsen air quality, by increasing ground-level ozone conditions.

More frequent extreme rainfall . . .

- combined with increasing temperatures could increase people's exposure to allergens, tick- and mosquito-borne diseases, and other diseases once common only in warmer climates.
- combined with sea level rise may lead to failure of septic system drain fields as groundwater levels rise.



Children and other vulnerable populations can be harmed by increasing heat and worsening air quality.

INFRASTRUCTURE

Increasing temperatures . . .

- could heighten peak demand for electricity in summer, possibly causing power outages.
- may speed the deterioration of roadways, resulting in higher monitoring and maintenance costs.
- combined with sea level rise and changes in rainfall may affect the availability and effectiveness of cooling water for power generation and industrial uses.

More frequent extreme rainfall . . .

- may cause rapid erosion and flood damage to buildings, roads, bridges, and culverts.
- could undermine rail lines, which carry passengers on the busy Washington, D.C.–Boston corridor, and freight, including coal for power generation and grain for livestock.
- combined with changes in the timing of spring thaw could increase flooding, especially in urban northern Delaware, where severe stormwater runoff problems already exist.

Sea level rise . . .

- is likely to affect the condition of roads and bridges and other infrastructure throughout the state, including access routes and evacuation routes to many beach communities and other low-lying areas.
- could inundate the Port of Wilmington's main facilities and other industrial areas along the Delaware River.

More extreme precipitation events aggravate flooding and erosion of roads, bridges, dams and other infrastructure, including utility lines.

How does climate change affect you?

AGRICULTURE

Increasing temperatures . . .

- could lead to greater heat stress for poultry and other livestock, and higher energy costs for farmers to protect animal health.
- may lengthen the growing season and bring warmer winters, which could increase weeds and insect pests and require more use of pest controls.
- combined with changes in rainfall could bring crop losses, reduced yields, and impaired pollination and seed development.
- combined with higher carbon dioxide levels could accelerate the growth of weeds and force famers to plant different crops.

More frequent extreme rainfall . . .

- may cause flooding that hinders movement of crops or livestock to market or processing facilities, prevents deliveries of feed, or damages farm facilities.
- could cause delays in planting, post-planting washouts, and heightened crop disease pressure.

Sea level rise . . .

- may harm soil and groundwater quality in coastal regions and along rivers and streams, reducing agricultural productivity in tidal areas.

WATER RESOURCES

Increasing temperatures . . .

- will increase evaporation, which could increase demand for water for irrigation, power generation, and household needs, in turn affecting availability of local water supply.
- combined with changes in rainfall could affect the quality of drinking water sources.

More frequent extreme rainfall . . .

- will damage infrastructure through flooding and erosion.
- may overwhelm stormwater and wastewater systems, increasing risk of contaminated flood waters.
- could affect water-based recreation such as fishing, boating and swimming by worsening water quality in streams, rivers, and ponds.

ECOSYSTEMS AND WILDLIFE

Increasing temperatures . . .

- may alter the timing and availability of food sources and quantity of pests, diseases, and predators.
- could trigger changes in the timing of animals' and plants' bloom, birth, and growth, disrupting ecosystems and changing what is considered "native" to Delaware in the future.
- may increase water temperatures, affecting freshwater habitats and increasing the risk of harmful algal blooms.
- may reduce soil moisture for trees and plants, leaving them more vulnerable to pests and diseases.

More frequent extreme rainfall . . .

- combined with sea level rise may increase tidal flooding, leading to greater erosion and reduced water quality.

What can we do about climate change?

We cannot solve the global challenge of climate change alone, but we can take actions that will help ensure a continued high quality of life for all Delawareans, protect public health and safety, and make our communities stronger and more resilient.

Above, planting trees is an effective way to offset greenhouse gas emissions. Above right, installing programmable thermostats can cut down on emissions and save money on power bills. Far right, citizens and state agency representatives participate in a public meeting on sea level rise.

We can take action to:

- understand the challenge that faces us by learning about climate change and how it may affect Delaware.
- reduce our emissions through energy-efficiency improvements and use of renewable energy sources in residential, commercial, and industrial sectors.
- protect our homes and businesses by preparing for natural hazards such as storms and extreme heat and rain events.
- participate in local efforts to build climate resilience.
- plan now for changes ahead and for short-term impacts we already face.
- prepare for and adapt to our changing climate.

The Division of Energy and Climate serves the people of Delaware by reducing the adverse impacts of energy use on our environment, health, and economy.

We educate, lead by example, and build partnerships to increase energy efficiency and renewable energy, promote sustainable growth, and prepare for a changing climate.

Division of Energy and Climate programs:

The **Energy Efficiency Investment Fund** has funding opportunities for businesses interested in saving money through energy efficiency improvements. The program is designed to help commercial and industrial customers replace aging, inefficient equipment and systems with energy efficient alternatives.

The **Green Energy Fund** provides grants for renewable energy systems. Over the life of the Green Energy Program, the program has provided grant funding to homeowners, local businesses, fire departments, churches, and farmers for more than 1,000 renewable energy projects in Delaware.

The **Weatherization Assistance Program** is designed to reduce energy costs for low-income families by improving the energy efficiency of their home. Grant funds are provided by the U.S. Department of Energy and state sources for administering the program.

For more information on climate change in Delaware:

1. Delaware Climate Change Impact Assessment
Delaware Division of Energy & Climate (DNREC)
http://www.dnrec.delaware.gov/energy/Pages/The-Delaware-Climate-Impact-Assessment.aspx

2. Delaware Sea Level Rise Vulnerability Assessment
Delaware Coastal Programs (DNREC)
http://www.de.gov/slrva

3. Preparing for Tomorrow's High Tide: Recommendations for Adapting to Sea Level Rise in Delaware
Delaware Coastal Programs (DNREC)
http://www.dnrec.delaware.gov/coastal/Pages/SLR/DelawareSLRAdaptation.aspx

4. Delaware Homeowner's Handbook to Prepare for Natural Hazards
Delaware Sea Grant Program (University of Delaware)
http://www.deseagrant.org/products/delaware-homeowners-handbook-prepare-natural-hazards

5. Natural Hazard and Climate Change Adaptation Tool Kit for Delaware Communities
Delaware Sea Grant Program (University of Delaware)
http://www.deseagrant.org/products/natural-hazard-and-climate-change-adaptation-tool-kit-delaware-communities

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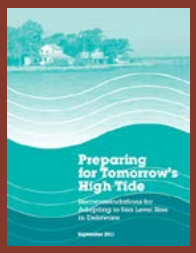
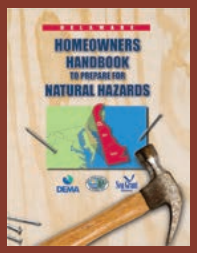
3 

4 

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http://www.dnrec.delaware.gov/ energy/Pages/default.aspx

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