How will global warming of 2°C affect Pennsylvania?

Observed and projected changes in climate and their impacts
“To prevent dangerous interference with the climate system, the scientific view is that the increase in global temperature should be below 2°C [relative to pre-industrial levels].”

- United Nations Framework on Climate Change, 2010
How will global temperatures change in the future?

The global average temperature has already increased by about 1°C (1.8°F) relative to pre-industrial levels.

Current CO₂ emissions are tracking the ‘higher emissions’ scenario; unless emissions are reduced, the 2°C threshold will be crossed before 2050.

Warming relative to 1850-1900

- **Higher Emissions**: 4.0-6.1°C
- **High Emissions**: 2.6-3.7°C
- **Lower Emissions**: 2.0-3.0°C

2015
In 13 out of the last 15 years, the annual mean temperature in PA exceeded the 20th-century average every.
Warming in Pennsylvania

PROJECTIONS

In the next 50-60 years, when global warming crosses the 2°C threshold, PA average summer and winter temperatures are projected to increase by over 5°F (2.8°C) relative to pre-industrial levels.

Source: produced by CSRC, UMass Amherst
Warming in Pennsylvania

How warm will Winter and Summer temperatures become?

PROJECTIONS

Winter

Observed

Modeled

Summer

Higher Emissions

The coldest winters in future will be like the warmest of recent years

Lower Emissions

hottest summers ...

...will become the coolest

Source: USGS
Summer in Eastern Pennsylvania by the end of this century could feel like a present-day typical summer in southern Georgia.

Consequences:
Negative impacts on human health, ecosystems, and the economy.

Analysis is based on changes in average summer heat index (a measure of how it actually feels for a given temperature and humidity).

Source: UCSUSA
Migrating Western Pennsylvania Climate

PROJECTIONS

Summer in Western Pennsylvania by the end of this century could feel like a present-day typical summer in Alabama.

Consequences:
Negative impacts on human health, ecosystems, and the economy.

Analysis is based on changes in average summer heat index (a measure of how it actually feels for a given temperature and humidity).

Source: UCSUSA
Extreme Heat in Pennsylvania

**OBSERVATIONS**

Summer daytime high temperatures in Philadelphia rarely go above 90°F in today’s climate.

**PROJECTIONS**

The number of days with dangerously high temperatures (above 100°F) is projected to increase significantly in the future.

Source: [UCSUSA](https://www.ucusa.org)
Rain and Snow in Pennsylvania

OBSERVATIONS

Annual total precipitation (rain + snow) has increased over the last few decades.

In 9 out of the last 10 years, Pennsylvania has received more precipitation than the 20th century average.

Source: NOAA
The amount of precipitation falling during intense multi-day events has increased significantly in the Northeast US.

Observed increase in very heavy precipitation* from 1958 to 2012
(* the top 1% of storm totals)

Source: NCA 2014
Powerful Storms

Downed tree crushes car in Harrisburg, PA after Hurricane Sandy in 2012

Strong storm leaves trail of debris in Salisbury, PA, 2016

Source: Christine Baker/ The Patriot News

Source: Dan Gleiter
Rain and Snow in Pennsylvania

Winter precipitation is projected to increase through the 21st century. Due to increasing temperatures, there will be more rain and less snow.

Total Precipitation

Snowfall

Projected changes in rainfall in summer are uncertain.

Source: USGS
Over the last century, sea level has risen by almost 1 foot around Philadelphia, PA.

Seemingly small increases in sea level can have large impacts along the coast due to storm surges and exceptionally high tides.
Sea Level Rise

PROJECTIONS
Sea level will continue to rise throughout this century

Recent studies indicate that we are likely to experience more than 1m (3.3ft) of sea level rise by 2100

Source: IPCC

Projected inundation around Philadelphia

2 °C WARMING AND SEA LEVEL RISE

Source: Climate Central
Immediate action on local and global scales is required to limit the global mean temperature increase to 2°C (3.6°F).

Average warming (°C) projected by 2100

- If countries do not act: 4.5°C
- Following current policies: 3.6°C
- Based on Paris pledges: 2.7°C

Source: Climate Action Tracker, data compiled by Climate Analytics, ECOFYS, New Climate Institute and Potsdam Institute for Climate Impact Research.
Strategies and Actions

**National Climate Assessment:**

The National Climate Assessment summarizes the impacts of climate change in the US, now and in the future.

**Integrating Climate Change into State Wildlife Action Plan (SWAP):**

The goals of SWAP are to generate proactive, comprehensive wildlife conservation strategies that assess the health, challenges, and potential actions each State would like to accomplish during the coming decade and beyond.

**Climate and Health Assessment:**

This scientific assessment examines how climate change is already affecting human health in the US and the changes that may occur in the future.

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