Climate Change State Profiles

Massachusetts

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

How will global temperatures change in the Future?

Current CO₂ emissions are tracking the ‘very high emissions’ scenario; unless emissions are reduced, the 2°C threshold will be crossed before 2050.
How does global warming affect the Commonwealth of Massachusetts?
Warming in Massachusetts

**OBSERVATIONS**

Annual mean temperatures have increased by about 2.4°F (1.3°C) since 1895.

Source: NOAA
PROJECTIONS

In the next 50-60 years, average summer and winter temperatures will increase by over 5°F (2.7°C).
Warming in Massachusetts

How warm will Winter and Summer temperatures become?

PROJECTIONS

Winter

*Observed*

warmest winters ...

... will become the coldest

*Modeled*

Summer

hottest summers ...

...will become the coldest

Source: USGS
Migrating Massachusetts Climate

PROJECTIONS

Summer in Massachusetts by the end of this century could feel like a present-day typical summer in South Carolina.

Changes in average summer heat index (a measure of how it actually feels for a given temperature and humidity).

Source: UCSUSA
Extreme Heat

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

PROJECTIONS
The number of days with dangerously high temperatures (above 90°F) is projected to increase significantly in the future.

Source: UCSUSA
In 8 out of the last 10 years, Massachusetts has received more precipitation than the 20th century average.
Very Heavy Rainfall

OBSERVATIONS
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)

Change (%)

-12% 11% 12% 16% 37% 27% 71% 33%
Devastating floods in recent years

Coastal flooding in Scituate, MA after winter storm Juno, Jan 2015

Taunton River flood in Taunton MA, March 2010

Floodwaters in Shelburne, MA after hurricane Irene, Aug 2011
Rain and Snow in Massachusetts

Due to increasing temperatures, there will be more rain and less snow.

Projected changes in rainfall in summer are uncertain.

PROJECTIONS
Winter precipitation is projected to increase through the 21st century.

Total Precipitation

Higher Emissions
Lower Emissions

Snowfall

Projected changes in rainfall in summer are uncertain.
Over the last century, sea level has risen by about 0.9 feet around Boston MA.

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

Communities in Boston are now seeing more days with tidal flooding.
Changes in sea level take decades to centuries. Warming of 2°C could eventually lead to about 6 meters of sea level rise.
An immediate action on local and global scales is required to limit the global mean temperature increase to 2°C (3.6°F).
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.*

**Massachusetts Fish and Wildlife Climate Action Tool:**

*Designed to inform and inspire local action to protect the Commonwealth’s natural resources in a changing climate.*

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