

Climate change study says Vermont is getting warmer and wetter

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Overlooking Champlain Valley in Vermont, facing westward during sunrise.
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Vermont is becoming warmer and wetter due to climate change—and these trends are reshaping life in the Green Mountain State.

That's the big takeaway of the most comprehensive study of [climate change](#) in Vermont, the [Vermont Climate Assessment 2021](#). The University of Vermont study finds the state's average annual temperature has warmed by nearly 2°F, and precipitation has increased by a whopping 21%, since 1900.

Released today, the study is Vermont's first state climate assessment since 2014—and shows that many hallmarks of Vermont life are being impacted by climate change, from farming and maple syrup to long winters and skiing.

The study is also the latest evidence of significant warming and increased precipitation in the U.S. Northeast due to climate change.

"Climate change is here—and impacting communities across Vermont," says UVM climate scientist Gillian Galford, lead author of the Vermont Climate Assessment 2021. "Our goal is to give Vermonters the tools they need to better prepare for climate change."

For the study, researchers analyzed the latest climate science to investigate impacts across 10 key sectors of Vermont society, including: health, water, food and agriculture, energy, transportation, forests, tourism and recreation, fish and wildlife, and more.

Below are some key findings (more results available online at vtclimate.org):

- Temperature: Vermont is warming—especially winters. Average temperatures have increased by nearly 2°F since 1900. Winter temperatures have increased 2.5 times faster than average annual temperatures since 1960. Vermont's freeze-free period has lengthened by three weeks since 1960. On average, lakes and ponds are thawing one to three days earlier per decade.

- **Precipitation:** Vermont is getting wetter. Precipitation has increased 21% since 1900. Vermont now experiences 2.4 more days of heavy precipitation than in the 1960s, mostly in the summer. With flooding expected to increase, improved stormwater infrastructure and planning is required to reduce damage to homes, roads, bridges, and farm fields. Heavier rainstorms will impact farm and forestry operations.
- **Droughts:** Floods and droughts are now Vermont's most likely natural disasters. Both are expected to increase due to growing variability of rain and changing water tables. As a result, irrigation infrastructure will remain crucial for farms and gardens.
- **Wildlife:** Roughly 70 bird species are expected to disappear from Vermont in the next 25 years due to climate change, including the common loon and hermit thrush. Moose numbers are projected to decline, and white-tailed deer populations are expected to increase.
- **Forests and lakes:** Climate change is making conditions less favorable for several Vermont tree species—including the iconic sugar maple—and exacerbating threats (invasive plants, insects, diseases) to forests. Warming waters will have adverse effects on lakes and rivers, including increased risk of harmful algal blooms and reduced biodiversity.
- **Recreation:** The Vermont ski season will be shortened by one month (under a high emissions scenario) or by two weeks (under a low emissions scenario) by 2080. With snowmaking, the downhill skiing sector can likely remain viable in Vermont up until approximately 2050. In the summer, increased risks of harmful algal blooms will impact beaches, swimming, and other lake activities.
- **Tourism:** Vermont's warming climate will remain attractive compared to many regions. Expect an increase in summer "seasonal climate refugees" as rising temperatures nationwide

draws visitors looking to escape extreme heat. As summers—and growing seasons—lengthen, Vermont has the potential to increase tourism revenue via agritourism and gastrotourism.

- **Agriculture:** Rising temperatures and longer growing periods may benefit some farms and make new crops feasible. However, increasing precipitation and variability will complicate growing conditions for many crops, including apples and maple syrup, increasing the likelihood of crop damage or crop failure.
- **Emissions:** Transportation is the largest source of greenhouse gas emissions—and Vermonters drive the highest average miles per capita in the Northeast. Thermal energy for heating buildings is a close second major source of greenhouse gas emissions.
- **Energy:** Heating uses the largest amount of energy in Vermont, followed by transportation. Electrifying these two sectors as much as possible will significantly reduce Vermont's carbon footprint. Electricity in the state has the lowest carbon intensity in the country.
- **Health:** Climate-related health impacts include greater risks of heat exposure, diseases from ticks and mosquitoes, water quality issues, and natural disasters. These threaten some populations more than others, highlighting the unequal burden of climate impacts for people who are over 65, of marginalized communities, or have previous health issues.

While Vermont's climate is expected to remain attractive compared to many regions, temperatures and precipitation have increased faster than previously projected in the 2014 climate assessment. Greater warming and precipitation are expected in the future, with greater variability, periods of intense precipitation, and prolonged dry spells and droughts, the authors say.

While the study focused on Vermont, the researchers say it reflects larger climate change trends across New England and the U.S. Northeast,

which is experiencing a drastic increase in precipitation and heavier storms.

"As the local impacts of our changing climate continue to be quantified and measured across Vermont, the Vermont Climate Assessment is a timely compendium of these effects," says UVM's Lesley-Ann Dupigny-Giroux, Vermont's State Climatologist, and author of the next National Climate Assessment's water chapter. "It will assist stakeholders in their decision-making about mitigating against, and adapting to, climate change," adds Dupigny-Giroux, who was invited by the U.S. government to participate in the United Nations' COP26.

To address the growing risk of floods and droughts, the study recommends greater planning and investment in infrastructure for managing water, stormwater, and irrigation. Planning is crucial to prepare for current and future climate change impacts, and for accessing federal funding, researchers say.

"We want to help people to feel more prepared, to make better decisions—and be more resilient to climate change," says Joshua Faulkner of UVM's College of Agriculture and Life Sciences and UVM Extension, who co-led the project.

To slow the impacts of climate change, the study also recommends steep reductions in greenhouse gas (GHG) emissions, especially in the state's two largest sources of emissions and energy use: transportation and heating. Electrifying these sectors can significantly reduce Vermont's carbon footprint, researchers say, especially since Vermont's electricity has the lowest carbon intensity in the country.

The findings are being made available to the Vermont Climate Council, which is drafting a state Climate Action Plan by December 1, 2021. Vermont's Global Warming Solutions Act requires greenhouse gas

emissions reductions by 26% below 2005 levels by 2025, 40% below 1990 levels by 2030, and 80% below 1990 levels by 2050.

The team interviewed and surveyed over 150 citizens, state officials, business leaders, and stakeholders to inform the study. They found many examples of climate action, including greater use of electric cars and solar and wind energy, low-carbon agriculture, promising new Vermont-made electric aircraft technology, experimental snow storage to extend ski seasons, and communities and farmers improving their stormwater management in preparation for [climate](#) change.

Besides traditional data sources, the researchers also used unique, hyperlocal sources, such as data from the Joe's Pond ice-out competition in Northern Vermont, where locals have bet on when the pond thaws since the 1980s.

Provided by University of Vermont

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