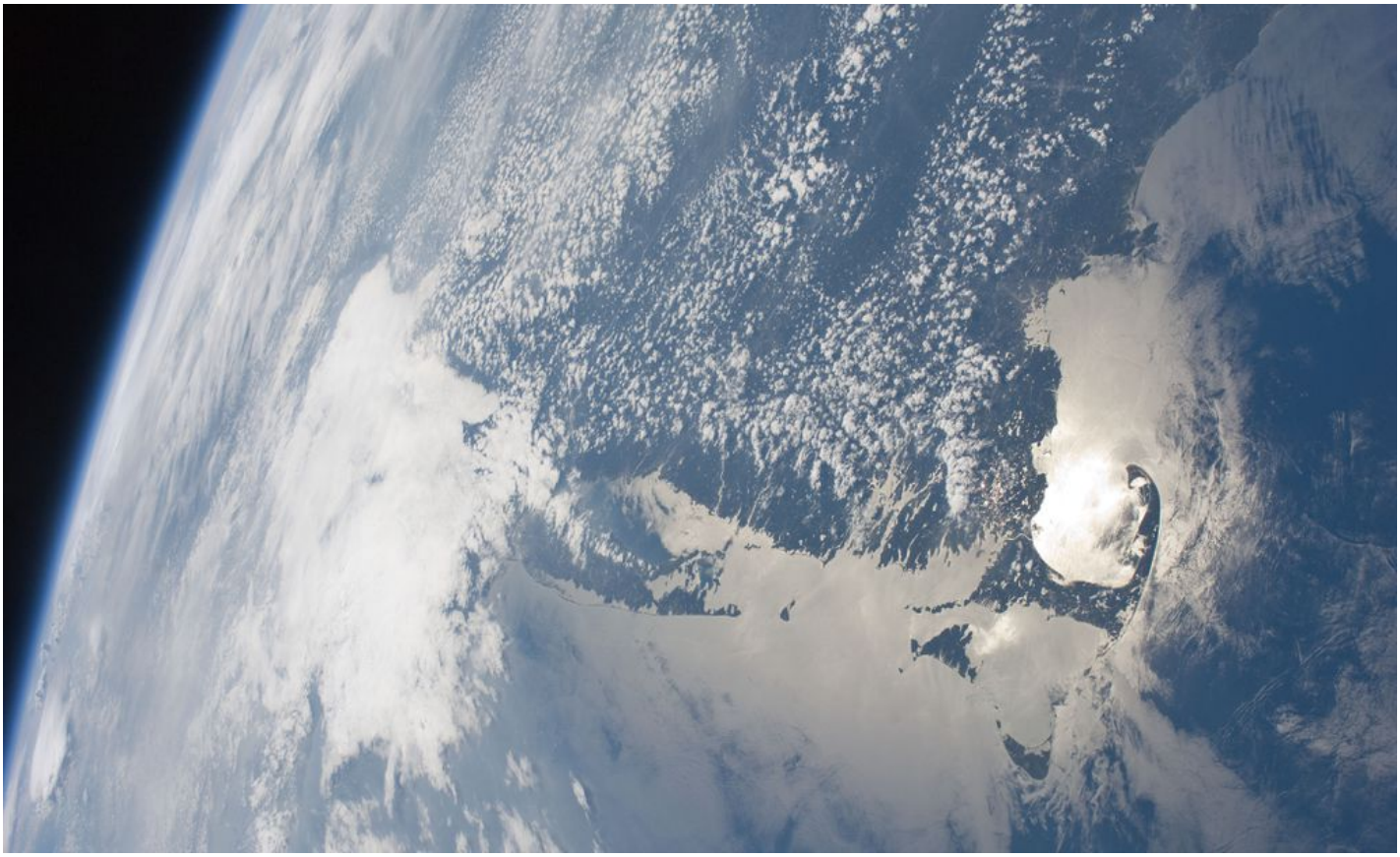
New England is warming faster than the rest of the planet, new study finds

By David Abel Globe Staff, Updated December 30, 2021, 6:44 p.m.



The Massachusetts coastline, seen from the International Space Station, faces big changes as the climate warms. RON GARAN/NASA/FILE

New England is warming significantly faster than global average temperatures, and that rate is expected to accelerate as more greenhouse gases are pumped into the atmosphere and dangerous cycles of warming exacerbate climate change, according to a new study.

The authors of the scientific paper, which was published in the most recent edition of the journal Climate, analyzed temperature data over more than a century across the six New England states and documented how winters are becoming shorter and summers longer, jeopardizing much of the region's unique ecology, economy, and cultural heritage.

Their findings were underscored this year in Greater Boston, which is on track to having the warmest year on record since 1900, according to data compiled by the National Oceanic and Atmospheric Administration.

“Based on the data presented here, and the continuing increase of greenhouse gases, it is clear that humanity does not have its hand on the rudder of climate control,” the authors wrote. “We are in a climate crisis, and we need to take concerted steps to reduce our production of greenhouse gases as soon as possible. The temperature changes that are currently happening . . . threaten to disrupt the seasonality of New England, which will disrupt the ecosystems and the economy of New England.”

Between 1900 and 2020, New England warmed an average of 1.83 degrees Celsius (3.29 degrees Fahrenheit), while temperatures on the rest of the planet rose an average of 1.14 degrees Celsius, the study found. Nearly all of that warming has occurred since the 1960s as the burning of more fossil fuels resulted in more heat-trapping carbon dioxide and methane in the atmosphere.

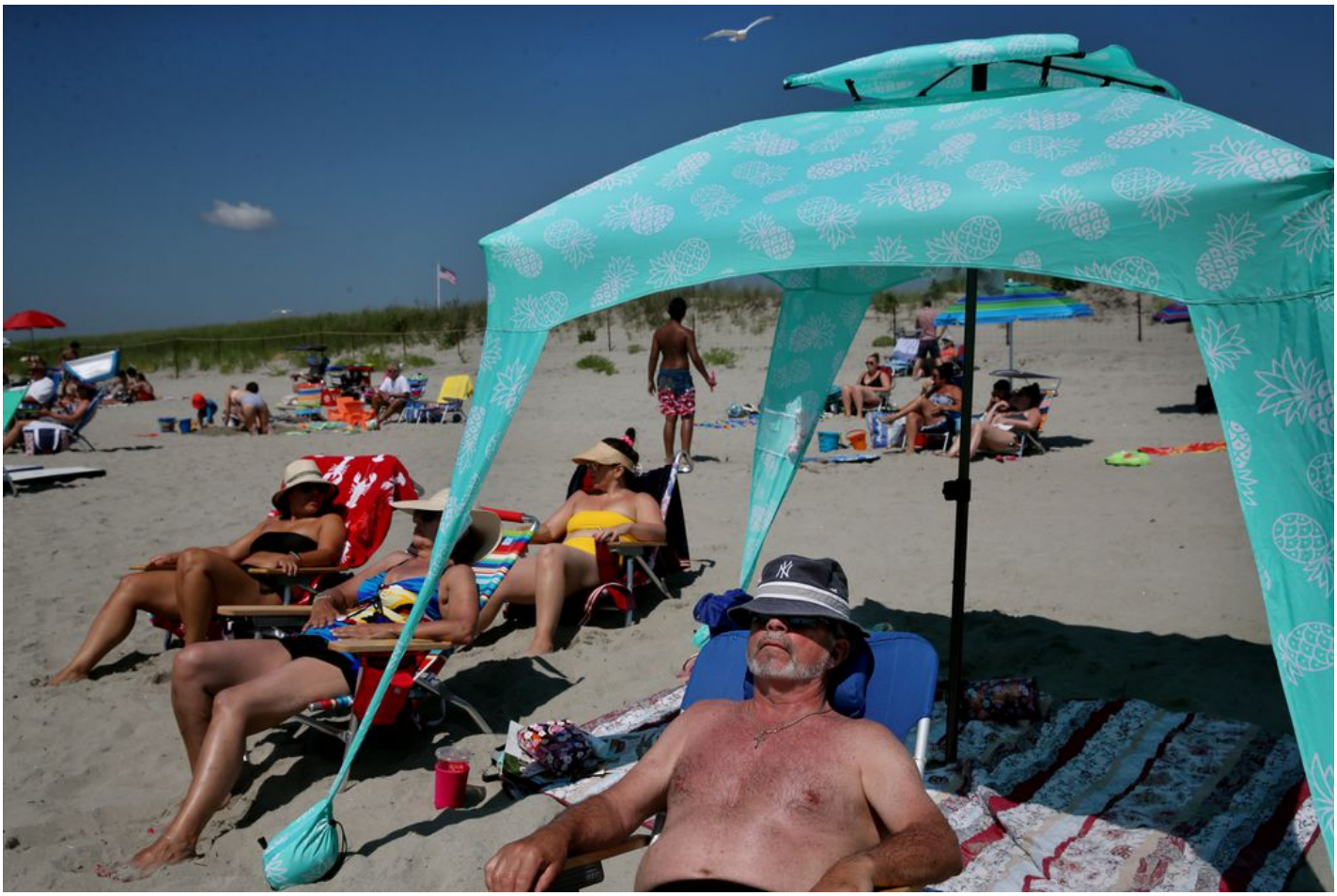
In Massachusetts, average annual temperatures have increased even faster — rising 1.97 degrees Celsius, or 3.55 degrees Fahrenheit, in that period, faster than the other states in New England.

The warming in the region already has exceeded a threshold set by the Paris Climate Accord, in which nearly 200 nations agreed to cut their emissions in an effort to limit

global warming to 1.5 degrees Celsius. If global temperatures exceed that amount, the damage from intensifying storms, rising sea levels, droughts, forest fires, and other natural disasters is likely to be catastrophic, scientists say.

With New England’s annual temperatures expected to rise sharply in the coming decades, the authors of the study said the region should expect major disruptions to its economy, including coastal waters that will become increasingly inhospitable to iconic species such as cod and lobster; fewer days when skiing and other winter recreation will

be possible; less maple syrup and other agricultural products produced; and a range of other consequences.



Summers are getting hotter in New England, and longer. CRAIG F. WALKER/GLOBE STAFF/FILE

"We have a daunting task ahead to stabilize our global temperatures," said Stephen Young, a professor of environmental sustainability at Salem State University, and the lead author of the study.

The paper adds to previous research that documented disproportionately high temperatures and resulting changes in the Northeast. Previous studies have shown far fewer rivers and lakes icing over in winter, less precipitation in the form of snowfall, and earlier blooming of everything from lilacs to apple trees.

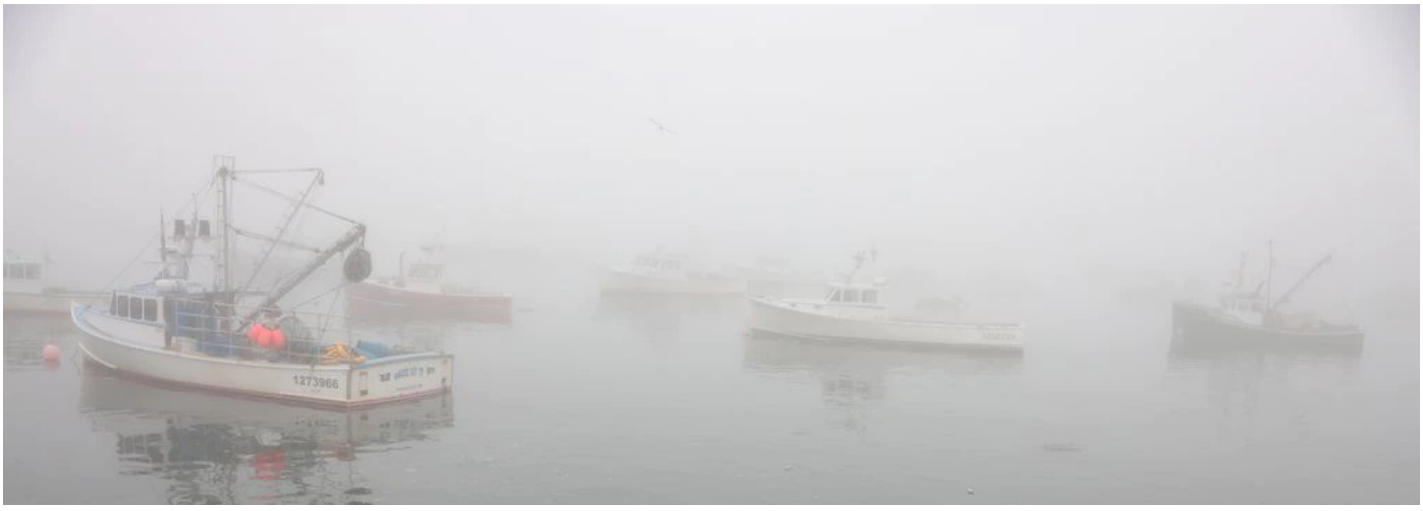
A previous paper by Young found New England lost an average of 6.2 days of snow covering the ground between the winters of 2001 and 2017, with Connecticut losing the most, at 14.6 days. Massachusetts lost 12 days of snow cover during that period. The lack

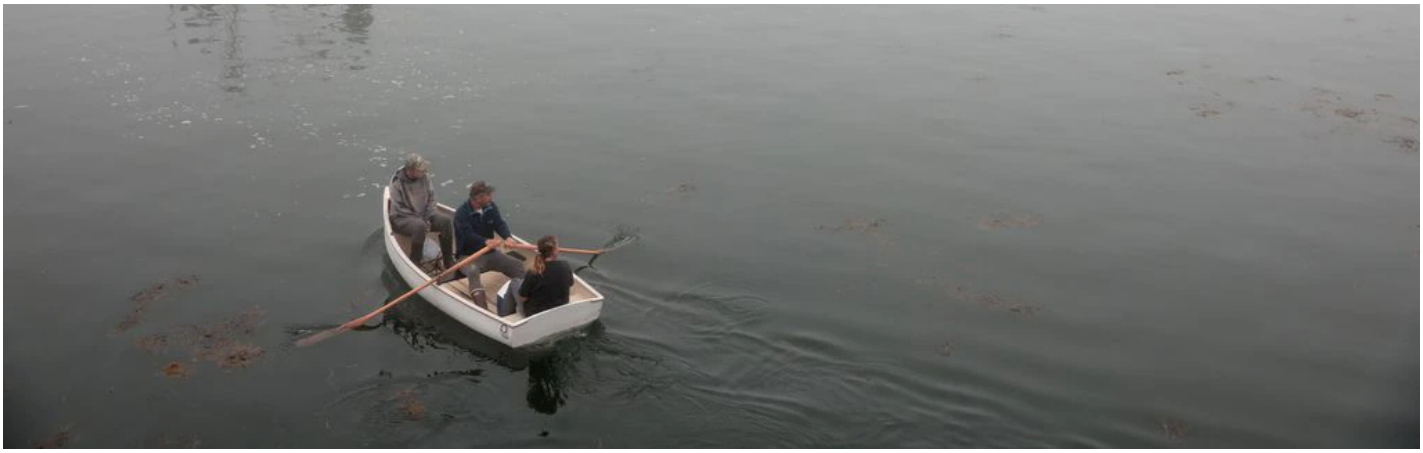
of snowfall is contributing to the region's warming, he noted, as snow reflects the sun's energy back into space, and with less snow, more sunlight is absorbed by the ground.

"This is a reinforcing feedback loop," Young said.

In 2017, climate scientists at the University of Massachusetts Amherst published a study in the journal PLOS One that found the Northeast was warming more rapidly than any other part of the country, except Alaska. They projected average annual temperatures would reach 2 degrees Celsius above pre-industrial levels by 2025, which some states have already exceeded in recent years.

The scientists attributed the warming in the Northeast to changes in atmospheric conditions as well as rising temperatures in coastal waters, such as the Gulf of Maine, which scientists say is among the fastest-warming bodies of water on the planet.





The Gulf of Maine, which stretches from Cape Cod to Nova Scotia, is one of the fastest-warming bodies of water on the planet. JESSICA RINALDI/GLOBE STAFF

"The coastal Northeast is part of a very small fraction of Northern Hemisphere land areas that have warmed by over 2 degrees Celsius so far," said Ambarish Karmalkar, an assistant professor of geosciences at UMass Amherst, and an author of the 2017 paper. "It's the combination of ocean warming in the northwest Atlantic and changes in atmospheric circulation in the Atlantic sector that are responsible for higher warming trends along the coast."

Cameron Wake, a climate scientist at the University of New Hampshire in Durham, said his research has found that his state has experienced higher average temperatures in wintertime, with the coldest days now nearly 6 degrees Fahrenheit warmer than in the 1970s.

The warmer winters have allowed more invasive insects to survive in areas where they couldn't before. For example, tree pests, such as the hemlock woolly adelgid and emerald

ash borer, are expanding their ranges throughout New England, decimating forests in their path, while deer ticks are thriving, killing moose and increasing the prevalence of Lyme disease.

Tree pests, such as the emerald ash borer, are expanding their ranges throughout New England. AP/FILE

“This new research is entirely consistent with what we’ve found,” Wake said.

Richard Primack, a Boston University biology professor who studies the effects of climate change on plants and animals, has linked the region’s warming to losses of local biodiversity. More than half of the migratory bird species at a banding station in Plymouth have been found to be in decline, while more than half of wildflower species at a study location in Concord have decreased or gone extinct in the area, his research has found.

He called the most recent study “a good summary” of how the region’s seasons are changing.

“Climate change will affect each season in its own distinctive way, and force New Englanders to adjust their lifestyles,” he said, noting his family recently installed air conditioning in their home to cope with summer heat waves.

While the region’s temperatures have been rising in every season, the most notable increases have been for the coldest days in winter.

Overall, between 1900 and 2020, New England winters have warmed on average 2.75 degrees Celsius, or 4.86 degrees Fahrenheit, according to the study. In Massachusetts

degrees Celsius, or 4.80 degrees Fahrenheit, according to the study. In Massachusetts, winter temperatures have surged an average of nearly 7 degrees Fahrenheit.

Warming in the winter has been less noticeable and creates a kind of cognitive dissonance about climate change, as few enjoy enduring the brutal cold, Young said.

As a result, he worries that less frigid winters could be "making many people complacent to the current warming, and making the issue of climate change in New England seem not so urgent."

"We still have the ability to mitigate the worst of climate change, but we have to act urgently," he said.

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