EXECUTIVE SUMMARY

Confronting Climate Change in the U.S. Northeast






SCIENCE, IMPACTS, AND SOLUTIONS

A Report of the
Northeast Climate Impacts Assessment

Dr. Norbert P. Psuty

Jerry and Marcy Monkman

AP Photo/Robert E. Klein

From the sandy beaches of New Jersey to the rocky shores of Maine, and inland from the cornfields of Pennsylvania to the forested mountains of Vermont, the northeastern United States boasts enormous geographical and climatic diversity within a relatively small expanse. The character and economy of the Northeast have been profoundly shaped over the centuries by its varied and changeable climate—the pronounced seasonal cycle that produces snowy winters, verdant springs, humid summers, and brilliant autumns, and the year-to-year and seasonal variability that includes extreme events such as nor'easters, ice storms, and heat waves.

This long-familiar climate has already begun changing in noticeable ways, however. Since 1970 the Northeast has been warming at a rate of nearly 0.5 degree Fahrenheit (°F) per decade. Winter temperatures have risen even faster, at a rate of 1.3°F per decade from 1970 to 2000. This warming has been correlated with many other climate-related changes across the region, including:

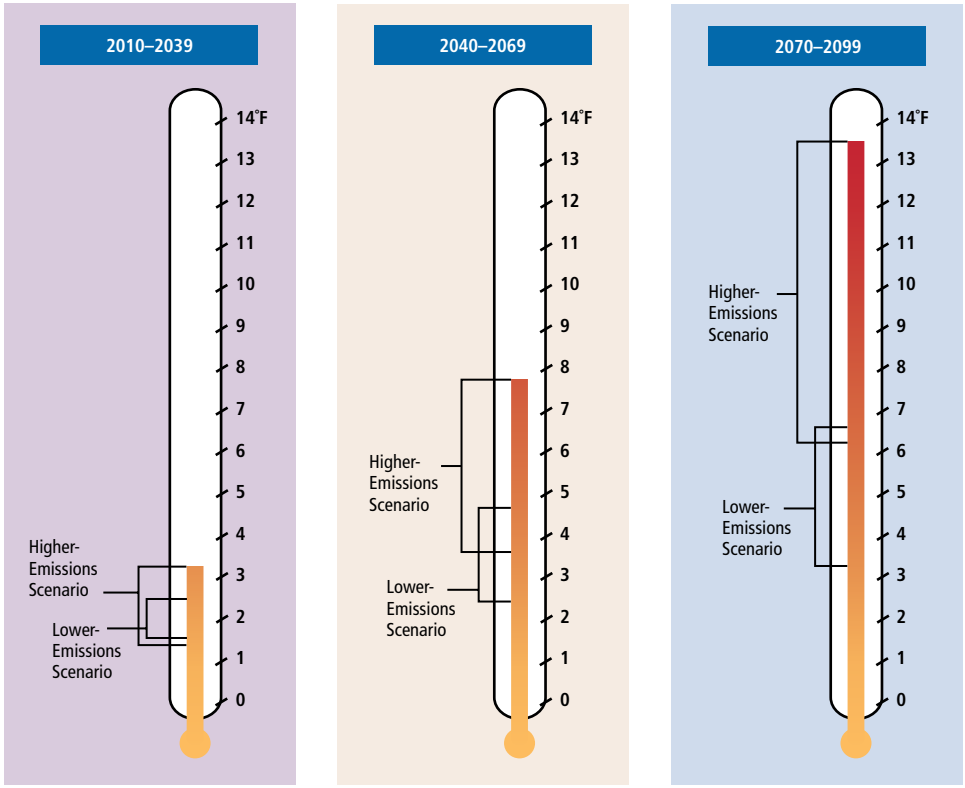
- More frequent days with temperatures above 90°F
- A longer growing season
- Less winter precipitation falling as snow and more as rain
- Reduced snowpack and increased snow density
- Earlier breakup of winter ice on lakes and rivers
- Earlier spring snowmelt resulting in earlier peak river flows
- Rising sea-surface temperatures and sea levels

All of these observed changes are consistent with those expected to be caused by global warming. The Intergovernmental Panel on Climate Change (IPCC), representing the world's leading climate scientists, concluded in February 2007 that it is "unequivocal" that Earth's climate is warming, and that it is "very likely" (a greater than 90 percent certainty) that the heat-trapping emissions from the burning of fossil fuels and other human activities have caused "most of the observed increase in globally averaged temperatures since the mid-twentieth century." Thus, the Northeast and the rest of the world face continued warming and more extensive climate-related changes to come—changes that could dramatically alter the region's economy, landscape, character, and quality of life.

The research summarized here describes how climate change may affect the Northeast states under two different scenarios of future emissions of heat-trapping gases. The first

Changes in Regional Average Summer Temperature

The Northeast is already experiencing rising temperatures, with potentially dramatic warming expected later this century, especially if emissions of heat-trapping gases continue along the path of the higher-emissions scenario. These "thermometers" show projected increases in regional average summer temperatures for three time periods: early-, mid-, and late-century.



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(the higher-emissions scenario) is a future where people—individuals, communities, businesses, states, and nations—allow emissions to continue growing rapidly over the course of this century. The second (the lower-emissions scenario) is a future in which societies choose to rely less on fossil fuels and adopt more resource-efficient technologies.

Cities across the Northeast that today experience few days above 100°F could average 20 to 30 such days per summer by late-century under the higher-emissions scenario.

These scenarios represent strikingly different emissions choices that societies may make. However, they do not represent the full range of possible emissions futures. A number of factors, including unrestrained fossil-fuel use, could drive global emissions above the higher-emissions scenario used in this study, while rapid, concerted efforts to adopt clean, efficient technologies could reduce emissions below the lower-emissions scenario.

HOW WILL EMISSIONS CHOICES AFFECT THE NORTHEAST'S FUTURE CLIMATE?

NECIA climate projections found that over the next several decades, temperatures across the Northeast will rise 2.5°F to 4°F in winter and 1.5°F to 3.5°F in summer regardless of the emissions choices we make now (due to heat-trapping emissions released in the recent past). By mid-century and beyond, however, today's emissions choices generate starkly different climate futures. By late this century under the higher-emissions scenario:

- Winters in the Northeast could warm by 8°F to 12°F and summers by 6°F to 14°F above historic levels.
- The length of the winter snow season could be cut in half across northern New York, Vermont, New Hampshire, and Maine, and reduced to a week or two in southern parts of the region.
- Cities across the Northeast that today experience few days above 100°F each summer could average 20 such days per summer, and more southern cities such as Hartford and Philadelphia could average nearly 30 days.
- Short-term (one- to three-month) droughts could occur as frequently as once each summer in the area of the Catskills and the Adirondacks, and across the New England states.

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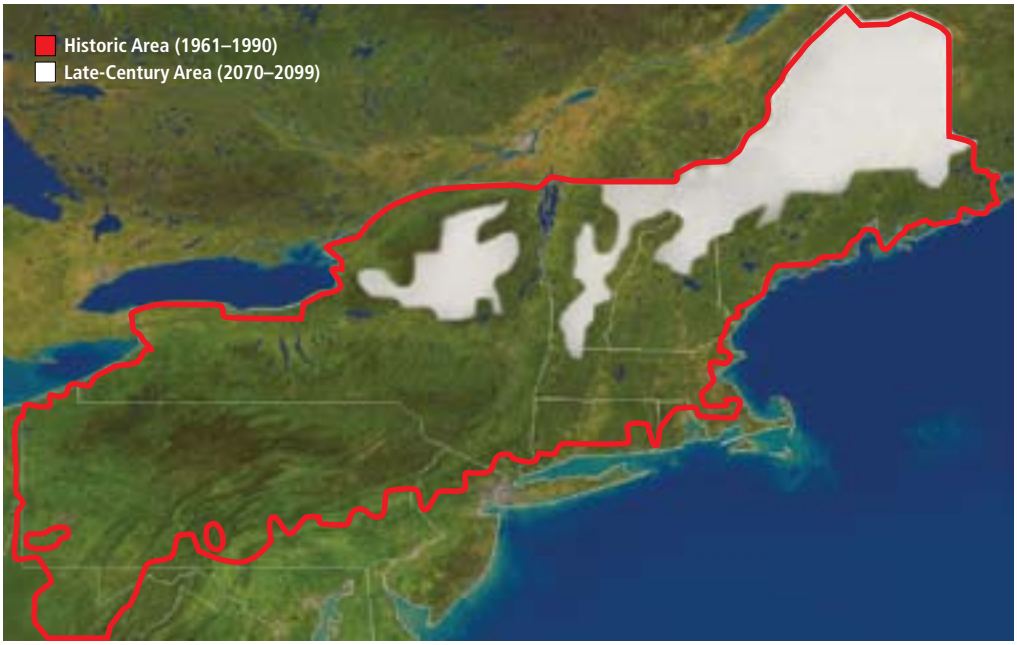
The Changing Face of Winter



If higher emissions prevail, a typical snow season may become increasingly rare in much of the Northeast toward the end of the century. The red line in the map captures the area of the northeastern United States that, historically, has had at least a dusting of snow on the ground for at least 30 days in the average year. The white area shows the projected retreat of this snow cover by late-century to higher altitudes and latitudes, suggesting a significant change in the character of a Northeast winter.

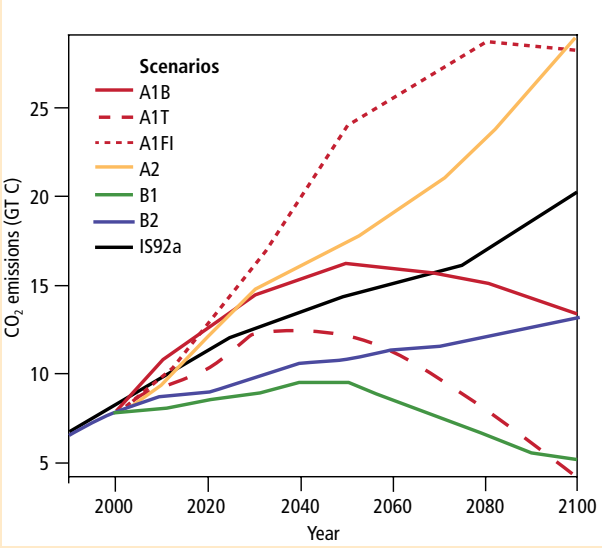
Assessing Future Climate Change in the Northeast

In order to project changes in temperature and other climate variables over the coming decades, scientists must address two key uncertainties. The first is directly related to human activity: how much carbon dioxide (CO_2) and other heat-trapping gases will our industrial and land-use activities emit over the coming century? The second is scientific in nature: how will the climate respond to these emissions (e.g., how much will temperatures rise in response to a given increase in atmospheric CO_2)?

To address the first uncertainty, the IPCC has developed a set of possible futures, or scenarios, that project global levels of emissions of heat-trapping gases based on a wide range of development variables including population growth, energy use, and other societal choices. Analyses of the Northeast Climate Impacts Assessment (NECIA) used the IPCC's A1fi and B1 scenarios to represent possible higher- and lower-emissions choices, respectively, over the course of the century. The higher-emissions scenario represents a world with fossil fuel-intensive economic growth. Atmospheric CO_2 concentrations reach 940 parts per million (ppm) by 2100—more than triple pre-industrial levels.

The lower-emissions scenario assumes a relatively rapid shift to less fossil fuel-intensive industries and more resource-efficient technologies. This causes CO_2 emissions to peak around mid-century then decline to less than our present-day emissions rates by the end of the century. Atmospheric CO_2 concentrations reach 550 ppm by 2100—about double pre-industrial levels.

To estimate the range of potential changes in the Northeast's climate and address the second uncertainty—how the climate will respond to increasing emissions—NECIA researchers used the IPCC's higher- and lower-emissions scenarios as input to three state-of-the-art global climate models, each representing different climate "sensitivities" (see below).



IPCC Emissions Scenarios

Projected carbon emissions for the IPCC SRES scenarios. The higher-emissions scenario (A1fi) corresponds to the dotted red line while the lower-emissions scenario (B1) corresponds to the green line.

Climate sensitivity is defined as the temperature change resulting from a doubling of atmospheric CO_2 concentrations relative to pre-industrial times, and determines the extent to which temperatures will rise under a given increase in atmospheric concentrations of heat-trapping gases.

The greater the climate sensitivity of the global climate model, the greater the extent of projected climate change for a given increase in CO_2. That is why NECIA analyses used three different climate models to generate the projections described in this study: the U.S. National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory (GFDL) CM2.1 model, the United Kingdom Meteorological Office's Hadley Centre Climate Model version 3 (HadCM3), and the National Center for Atmospheric Research's Parallel Climate Model (PCM). The first two have medium and medium-high climate sensitivities, respectively, while the third has low climate sensitivity.

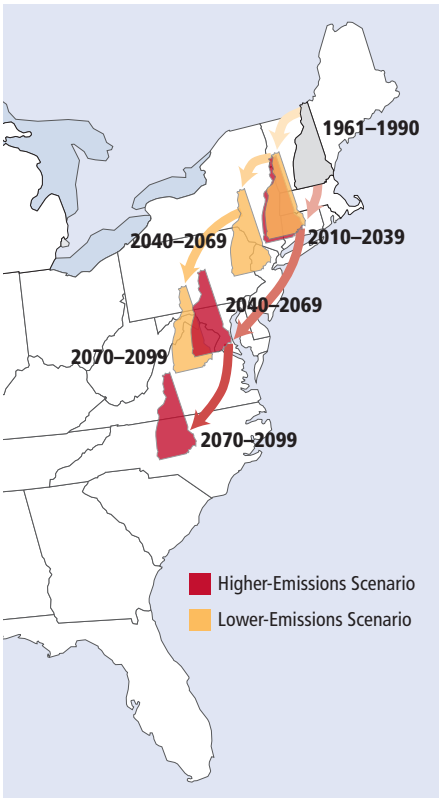
These models are among the best of the latest generation of climate models. Confidence in using these global models to assess the Northeast's future climate is based on results from a detailed analysis that indicates these models are able to reproduce not only key features of the regional climate but also climate changes that have already been observed across the region over the past century (e.g., rising temperatures, increases in precipitation and storms producing heavy precipitation).

Uncertainties in climate modeling and the workings of the earth-atmosphere system remain and several lines of evidence suggest that the climate-model projections used in the NECIA assessment may be relatively conservative. The models do not, for instance, capture the rapid winter warming observed in the Northeast over the past several decades. Projections of sea-level rise used in this report may also be quite conservative because they do not account for the rapid rate of decay and melting of the major polar ice sheets currently being observed, nor the potential for further acceleration of this melting.

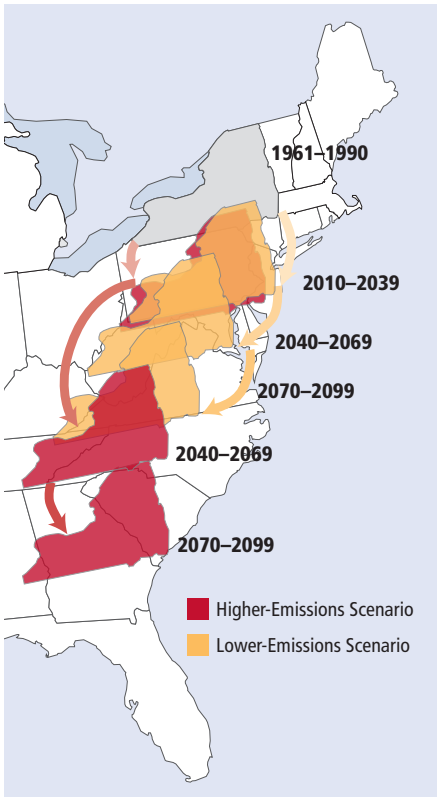
Global climate models produce output in the form of geographic grid-based projections of daily, monthly, and annual temperatures, precipitation, winds, cloud cover, humidity, and a host of other climate variables. The grid cells range in size from 50 to 250 miles on a side. To transform these global projections into "higher-resolution" regional projections (which look at changes occurring across tens of miles rather than hundreds), NECIA scientists used well-established statistical and dynamical downscaling techniques. The results of this collaborative climate research were presented in an earlier NECIA report titled *Climate Change in the U.S. Northeast*.

Migrating State Climates

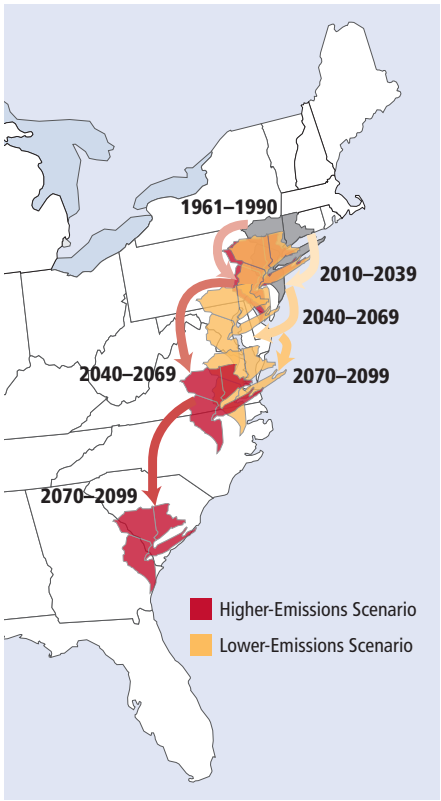
New Hampshire



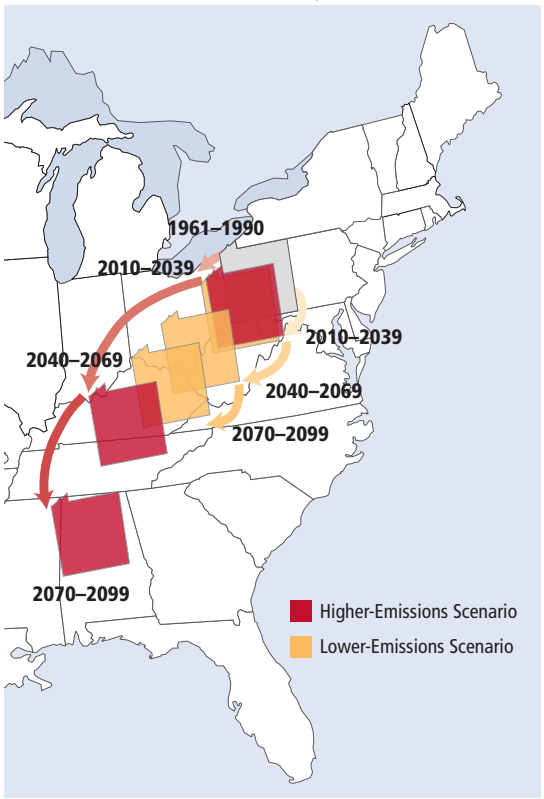
Upstate New York



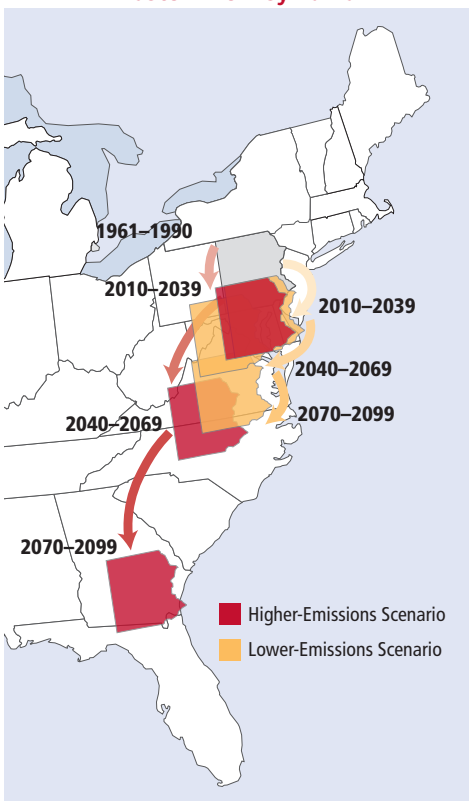
NYC Tri-State Region



Western Pennsylvania



Eastern Pennsylvania



Changes in average summer heat index—a measure of how hot it actually feels, given temperature and humidity—could strongly affect quality of life in the future for residents of the Northeast. Red arrows track what summers could feel like in, for example, the NYC Tri-State region (the greater New York City metropolitan region, encompassing parts of New Jersey and Connecticut) over the course of the century under the higher-emissions scenario. Yellow arrows track what summers in these states would feel like under a lower-emissions scenario.

AP Photo/Seth Wenig

Angel Franco/The New York Times/Redux

Peter LaTourrette/birdphotography.com

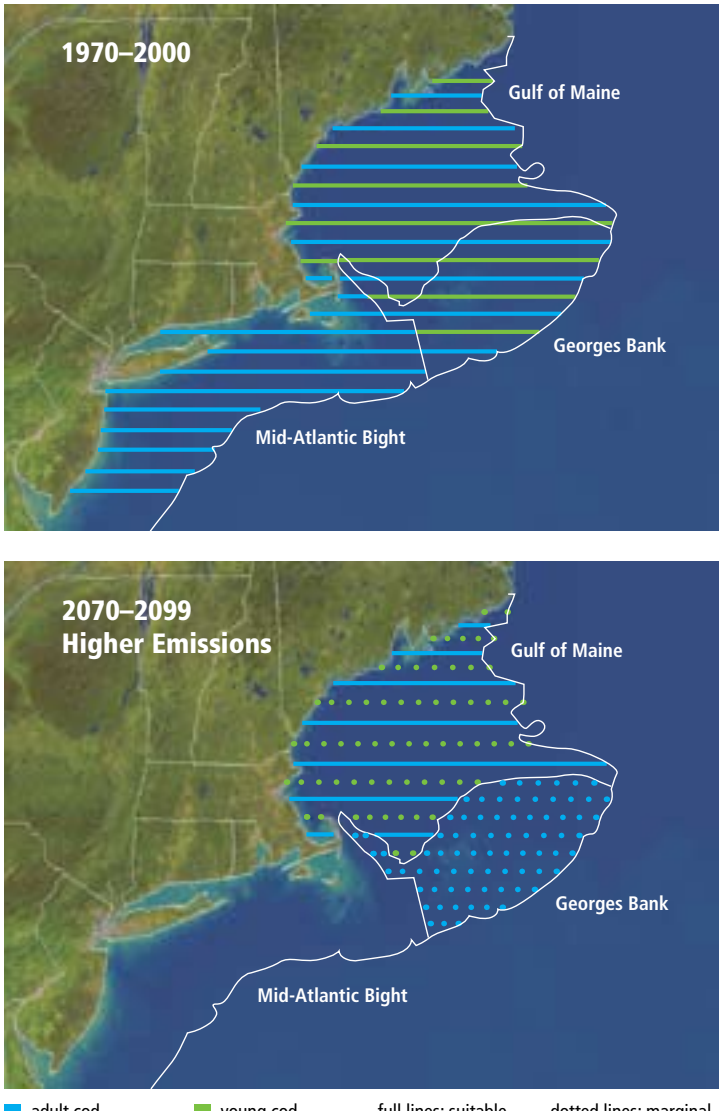
CONTINUED FROM PAGE 3

- Hot summer conditions could arrive three weeks earlier and last three weeks longer into the fall.
- Global average sea level is conservatively projected to rise one to two feet.

In contrast, substantially smaller climate-related changes can be expected if the Northeast and the world reduce emissions consistent with the lower-emissions scenario used in this study—typically, about half the change expected under the higher-emissions scenario. For example, Northeast winters are projected to warm 5°F to 8°F above historic levels by late-century, and summers by 3°F to 7°F.

Leading scientists and economists from universities and research institutions across the Northeast and the nation have used these new climate projections to assess the impacts of these two very different future Northeast climates on vital aspects of the region's life and economy: coastal areas, marine fisheries, forests, agriculture, winter recreation, and human health. These experts also describe actions that can be taken today in the Northeast to reduce emissions and help avoid the most severe impacts of global warming and to adapt to the unavoidable changes that past emissions have already set in motion.

Emissions Choices May Redefine Waters Suitable for Cod



In the waters off of the Northeast states, cod are currently at the southern edge of their favored temperature range, or suitable thermal habitat. Waters that historically provide suitable temperatures for adult and young cod (bottom temperatures less than 54°F and 47°F, respectively) are illustrated in the top map, while the bottom map shows changes in this area by late-century under the higher-emissions scenario. Historically productive Georges Bank is expected to no longer support the "recruitment" (growth and survival to harvestable size) of young cod and to be only marginally suitable for adult cod. The Gulf of Maine is expected to continue to support adult cod throughout the century, but the warmer waters would hinder recruitment.

WHAT MIGHT THE PROJECTED CLIMATE CHANGES MEAN FOR THE NORTHEAST'S ECONOMY AND QUALITY OF LIFE?

By late this century, if the higher-emissions scenario prevails:

- The extreme coastal flooding that now occurs only once a century could strike New York City on average once every decade.
- Increasing water temperatures may make the storied fishing grounds of Georges Bank unfavorable for cod.
- Pittsburgh and Concord, NH, could each swelter through roughly 25 days over 100°F every summer—compared with roughly one day per summer historically—and even typically cool cities such as Buffalo could average 14 days over 100°F each year, amplifying the risk of heat-related illnesses and death among vulnerable populations.
- In Philadelphia, which already ranks tenth in the nation for ozone pollution, the number of days failing to meet federal air-quality standards is projected to quadruple

Tim McCabe/USDA

AP Photo/The Herald, Lauren Tagliatela

AP Photo/Steven Senne

(if local vehicle and industrial emissions of ozone-forming pollutants are not reduced).

- Only western Maine is projected to retain a reliable ski season.
- The hemlock stands that shade and cool many of the Northeast's streams could be lost—much like the American elm—to a pest that thrives in warmer weather, further threatening native brook trout in the Adirondacks and elsewhere.
- Climate conditions suitable for maple/beech/birch forests are projected to shift dramatically northward, while conditions suitable for spruce/fir forests—a primary source of sawlogs and pulpwood as well as a favored recreation destination—would all but disappear from the region.
- As their forest habitat changes, many migratory songbirds such as the Baltimore oriole, American goldfinch, and song sparrow are expected to become less abundant.
- Parts of Massachusetts, New Jersey, Pennsylvania, and other areas in the Northeast are likely to become unsuitable for growing certain popular varieties of apples, blueberries, and cranberries.
- Unless farmers can afford cooling technologies, milk production across much of the region is projected to decline 5 to 20 percent in certain months.

If, instead, the region and the world begin now to make the transition to the lower-emissions pathway:

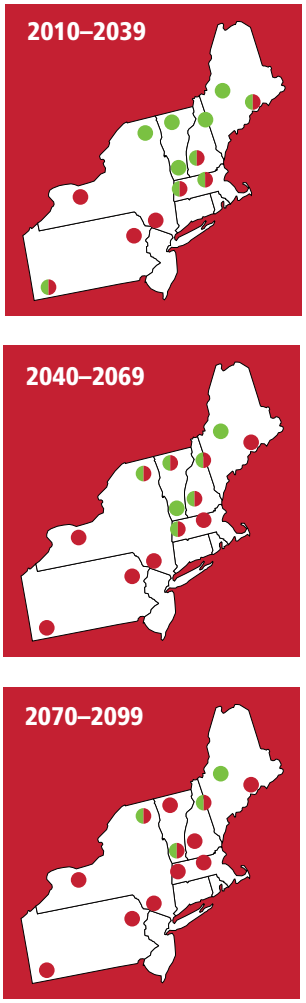
- New York City is projected to face today's 100-year flood every two decades on average.
- Georges Bank would remain suitable for adult cod, although yield and productivity may decline as these waters become less hospitable for the spawning and survival of young cod.
- Philadelphia's severe ozone-pollution days will increase by 50 percent (assuming that local vehicle and industrial emissions of ozone-forming pollutants are not reduced).
- In addition to western Maine, the North Country of New York and parts of Vermont and New Hampshire may retain reliable ski seasons.
- Climate conditions suitable for maple/beech/birch forests would shift only in the southern part of the region.
- Winter temperatures may prevent a deadly hemlock pest from infesting the northern part of the region.
- Less extensive (although still substantial) changes in the region's bird life are expected.
- Much of the region is projected to remain suitable for traditional apple and berry crops.
- Reductions in milk production (up to 10 percent) would remain confined primarily to New Jersey and small areas of Pennsylvania.

In many cases, however, the impacts of global warming are projected to be similar under either of the two emissions scenarios presented here:

- Atlantic City, NJ, and Boston are expected to experience today's once-a-century coastal flooding once every year or two on average by the end of the century.
- The lobster fisheries in Long Island Sound and the coastal waters off Rhode Island and south of Cape Cod are likely to decline significantly by mid-century, and cod are expected to disappear from these southern waters by century's end.

Vulnerability of Ski Resorts to Climate Change

Higher Emissions



Ski resorts in "highly vulnerable" areas (red) are projected to fail to meet two criteria for sustainability (season length greater than 100 days, and high probability of being open during the profitable Christmas–New Year's holiday period). Those in "vulnerable" areas (red and green) are projected to fail to meet one of these criteria, and those in "viable" areas are projected to meet both criteria. Under lower emissions, several additional areas (northern New Hampshire, northeastern New York, and southern Vermont) are projected to retain viable resorts.

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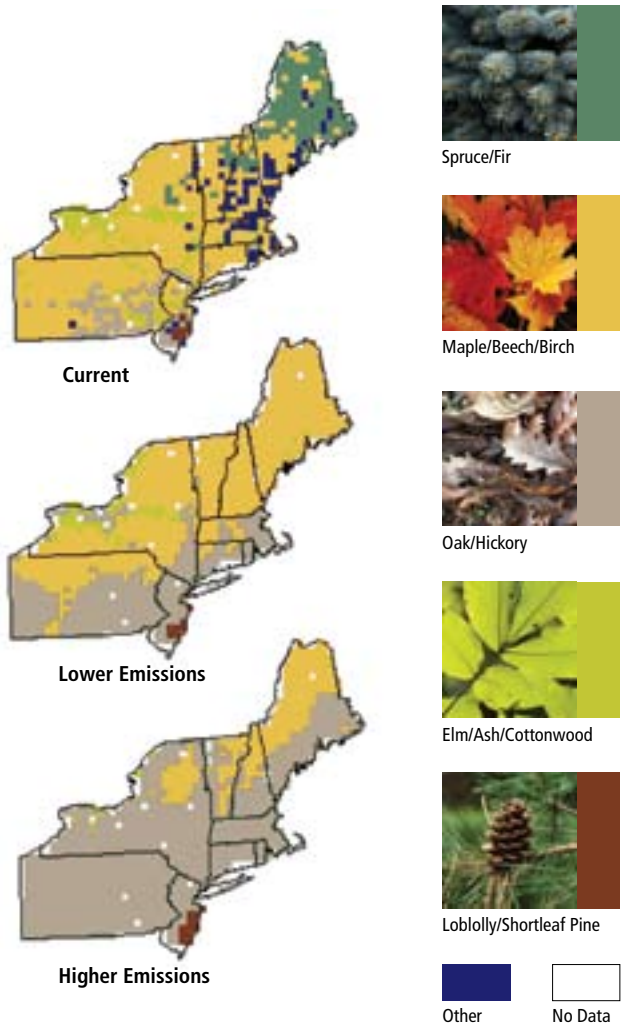
Jupiter Images

Tim McCabe, USDA Natural Resources Conservation Service

Changes in Habitat Suitability for Different Forest Types by Late-Century



Much of the Northeast is currently dominated by hardwood forests composed of maple, beech, and birch; higher altitudes and latitudes are dominated by spruce/fir forests. As the climate changes this century, suitable habitat for spruce and fir species is expected to contract dramatically under either emissions scenario (compared with observed forest distribution in the 1990s, shown here as "current"). Suitable maple/beech/birch habitat is projected to move significantly northward under the higher-emissions scenario, but shift far less under the lower-emissions scenario. (The "other" category includes species such as red, white, and jack pine.)

- The number of days over 90°F is expected to triple in many of the region's cities, including Boston, Buffalo, and Concord, NH.
- Hotter, longer, drier summers punctuated by heavy rainstorms may create favorable conditions for more frequent outbreaks of mosquito-borne disease such as West Nile virus.
- Most of the region is likely to have a marginal or nonexistent snowmobile season by mid-century.
- Warmer winters will shorten the average ski and snowboard seasons, increase snowmaking requirements, and drive up operating costs.
- Spruce/fir forests such as the Great North Woods are expected to lose significant area, diminishing their value for timber, recreation, and wildlife habitat. Certain species that depend on these forests, such as the Bicknell's thrush, are projected to disappear from the region.
- Weed problems and pest-related damage are expected to escalate, increasing pressures on farmers to use more herbicides and pesticides.

Clearly, under either of the emissions scenarios explored by NECIA, the Northeast can anticipate substantial—and often unwelcome or dangerous—changes during the rest of this century. Heat-trapping emissions released in the recent past have already committed the world to further warming over the next few decades. Decision makers at all levels of society should recognize the need to adapt to these unavoidable changes.

The intensity of the warming and the severity of the related impacts)the Northeast will face beyond mid-century, however, depends on actions to curb further emissions starting now.

As noted above, the emissions scenarios used in this assessment represent neither a ceiling nor a floor on future levels of carbon dioxide (CO_2) and other heat-trapping gases in the atmosphere. The lower-emissions scenario describes a world in which atmospheric concentrations of CO_2 rise from ~380 parts per million (ppm) today to ~550 ppm by the end of the century, in contrast to 940 ppm under the higher-emissions scenario. However, many lines of evidence indicate that even greater emissions reductions, and thus less severe impacts, are well within our reach. The latest assessment of the IPCC describes the technical and economic potential for stabilizing atmospheric concentrations of heat-trapping gases at or below the equivalent of 450 ppm of CO_2. Achieving such a target would require the United States and other industrialized nations to make deep emissions reductions by mid-century—on the order of 80 percent below 2000 levels—along with substantial reductions by developing countries.

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AP Photo/Michael Dwyer

Brad Feinknopf

HOW CAN DECISION MAKERS, BUSINESSES, AND INDIVIDUALS IN THE NORTHEAST MEET THE CHALLENGE OF A CHANGING CLIMATE?

In the Northeast, as well as elsewhere in the United States and the world, there is growing momentum to pursue deep emissions reductions consistent with staying below the lower-emissions pathway described in this report. In 2001, for example, New England governors and Eastern Canadian premiers signed an agreement committing their states and provinces to a comprehensive Climate Change Action Plan that includes a long-term goal of reducing regional emissions 75 to 85 percent below then-current levels. More recently, policy makers in California and New Jersey have set ambitious near- and longer-term targets for reducing emissions, and similar measures are being debated in statehouses across the country and in Congress.

Of course, actions in the Northeast alone will not be sufficient to stem global warming. But as both a global leader in technology, finance, and innovation and a major source of heat-trapping emissions, the Northeast is well positioned to help drive national and international progress in reducing emissions. Concerted, sustained efforts to reduce emissions by just over 3 percent per year on average would achieve nearly half of the total reductions needed by 2030, putting the region well on track for achieving the 80 percent mid-century goal.

Unrestrained fossil-fuel use could drive global emissions above the higher-emissions scenario used in this study, while rapid, concerted efforts to adopt clean, efficient technologies could reduce emissions below the lower-emissions scenario.

From individual households to industry and government, decision makers across the Northeast have myriad options available today to move toward this goal across the region's four major CO_2-emitting sectors (electric power, buildings, transportation, and industry), and many are already taking innovative steps to do just that. These options include:

- Accelerating the region's transition from fossil fuels to clean, renewable energy resources (e.g., solar, wind, geothermal), through wise energy choices aided by market incentives and regulations.
- Embracing efficiency by purchasing energy-efficient lighting and small appliances and replacing vehicles, heating and cooling systems, motors, and large appliances with more efficient models as the existing equipment reaches the end of its useful life.

Eric Michaud

Traditional Fruit Crops May Suffer in a Warmer Climate

Many apple varieties, and a number of other fruits, require roughly 1,000 hours below 45°F each winter in order to produce good fruit yields the following summer and fall. By late this century under the higher-emissions scenario, winter temperatures are projected to be too warm across much of the Northeast to consistently meet these requirements. Growers across much of the region may need to switch to varieties with lower chilling requirements where such options exist.

AP Photo/Michael Dwyer

Kent McFarland Photos

New England Futures/Maine DOT

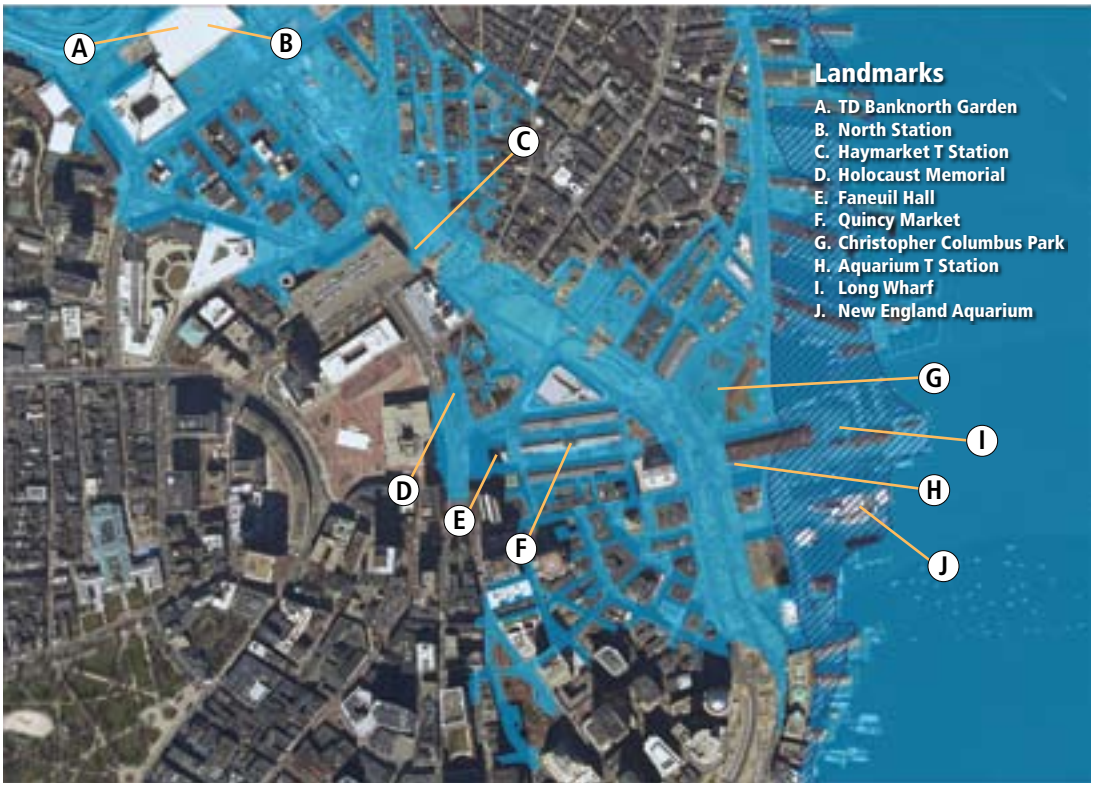
- Using state and municipal zoning laws, building codes, and incentives to encourage energy-efficient buildings, discourage urban sprawl, provide low-emissions transportation alternatives, and avoid development in vulnerable coastal areas and floodplains.

Concerted actions such as these to meet the climate challenge can also advance other widely shared goals in the Northeast such as enhancing regional energy and economic security, creating jobs, producing cleaner air, and building a more sustainable economy.

What is needed now is a strong, sustained, and well-coordinated effort between governments at all levels, businesses, civic institutions, and individuals to adopt policies, programs, and practices that accelerate the adoption of clean, efficient energy choices. The costs of delay are high. For every year of delay in beginning significant emissions reductions, global concentrations of heat-trapping gases rise higher and the goal of avoiding dangerous climate change becomes more difficult and more costly to achieve. Given the century-long lifetime of CO_2 in the atmosphere, the longer we wait to take action, the larger and more concentrated in time our emissions reductions will need to be to limit the extent and severity of climate change.

Although the task of reducing emissions may seem daunting, the nation achieved a similarly rapid energy transformation only a century ago as it shifted from gaslights and buggies to electricity and cars over a few short decades. In 1905 only 3 percent of U.S. homes had electricity, virtually none had cars, and few could envision how these innovations would transform America and its economy half a century later. Similarly, slightly less than 3 percent of our electricity is

Because past emissions have committed the region to a certain level of global warming over the next several decades, we must also begin to adapt to the unavoidable consequences.



Current 100-year flood zone
Projected 100-year flooded area (higher-emissions scenario)

Boston: The Future 100-Year Flood under the Higher-Emissions Scenario

This image shows the current Federal Emergency Management Agency (FEMA) 100-year flood zone (hatched darker blue) as well as the extent of the projected 100-year flood zone in 2100 (lighter blue) under the higher-emissions scenario for the waterfront/ Government Center area of Boston. Important Boston landmarks (such as Faneuil Hall) and transportation infrastructure currently not at great risk of flooding could witness repeated flooding in the future unless protected from such events. Flood elevations under the lower-emissions scenario are roughly half a foot lower than the flooding depicted here (but still two feet higher than the current 100-year flood).

Dr. Norbert P. Psuty

Jerry and Marcy Monkman

Save the Bay

currently generated by non-hydroelectric renewable energy technologies. Yet with foresight, perseverance, and bold leadership, we can dramatically modify our energy system once again, moving from fossil fuels to renewables and, in doing so, avoiding severe climate change.

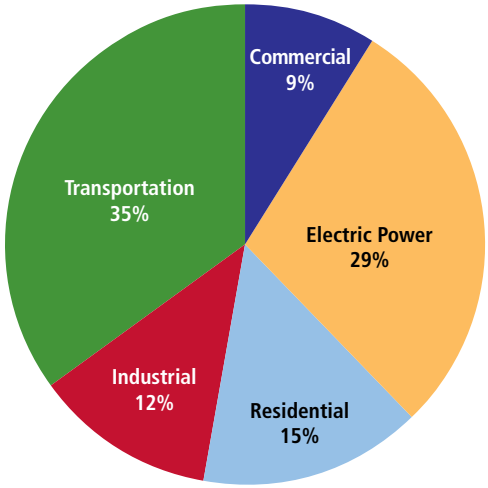
Because past emissions have committed the region and the world to a certain unavoidable level of global warming over the next several decades, decision makers in the Northeast must also begin to develop timely and forward-looking strategies that can help vulnerable constituencies adapt to the consequences. Aggressive steps to reduce emissions can limit the regional impacts of climate change and thus improve the prospect that ecosystems and societies will find effective ways to adapt. In turn, timely and effective adaptation measures will help reduce the vulnerability of people and ecosystems to the warming that cannot be avoided.

As both a global leader in technology, finance, and innovation and a major source of heat-trapping emissions, the Northeast is well positioned to help drive national and international progress in reducing emissions.

Decision makers can help the region adapt through policies and management actions that reduce our exposure to climate risks (such as catastrophic flooding) and also increase the ability of vulnerable sectors and communities to cope with ongoing changes and recover from extreme events or disasters. For each adaptation measure considered, policy makers and managers must carefully assess the potential barriers, costs, and unintended social and environmental consequences.

The very character of the Northeast is at stake. NECIA findings make clear that the emissions choices we make here in the Northeast and globally will have dramatic implications for the climate our children and grandchildren will inherit. The Northeast states and their municipal governments have a rich array of proven strategies and policies available to meet the climate challenge in partnership with businesses, institutions, and an increasingly concerned and supportive public. The time to act is now.

Northeast States—Regional Emissions of CO_2 by Sector, 2003



Source: State Energy Data System. Table 2, 2003 State Emissions by Sector.

In the Northeast, transportation is the largest source of heat-trapping emissions. Combined with electricity generation, these sectors account for nearly two-thirds of the region's emissions. Combustion of fossil fuels for water and space heating in homes and businesses and for powering industrial activities accounts for the remaining third. Fortunately, a rich array of strategies and policies exist to reduce emissions across these sectors.

PPM Energy

Bringing Renewable Energy Online

New York state's 320 MW Maple Ridge wind farm, pictured here, generates enough electricity to serve up to 160,000 average homes.

The full text of the report *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions* is available online at www.climatechoices.org.

NECIA oversight and guidance is provided by a multidisciplinary Synthesis Team of senior scientists:

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The material presented in this summary is based primarily on the peer-reviewed research of the NECIA collaborators listed below. Most of this research is also presented in more technical detail in the formal scientific literature, including a special issue of the journal *Mitigation and Adaptation Strategies to Global Change* (in press, 2008).

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About the Northeast Climate Impacts Assessment

The Northeast Climate Impacts Assessment (NECIA) is a collaborative effort between the Union of Concerned Scientists (UCS) and a team of independent experts to develop and communicate a new assessment of climate change and associated impacts on key climate-sensitive sectors in the northeastern United States. The goal of the assessment is to combine state-of-the-art analyses with effective outreach to provide opinion leaders, policy makers, and the public with the best available science upon which to base informed choices about climate-change mitigation and adaptation.

For more information on our changing Northeast climate and what you can do visit *www.climatechoices.org*.
For information on the NECIA and the technical papers behind the report visit *www.northeastclimateimpacts.org*.