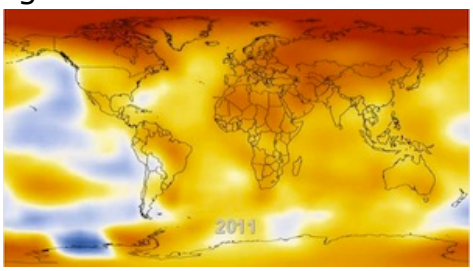
Climate and the New England Biosphere
Science brief #1

How can plants and animals respond to climate change?

The earth's climate system is changing, and New England's climate is showing the effects. The organisms of our backyards, forests, and coastlines are starting to make this very clear. In this brief, we discuss what the options are for plants and animals in a fast-changing climate, and how their responses will shape New England's future landscape.

What the climate scientists are telling us

An increasing number of Americans accept the reality of climate change. According to many studies of public opinion, however, most of us see the change coming in a few years, and having its most significant effects elsewhere in the world. But there have been definite changes in the climate of New England that track with global climate change. For example:



Since 1970, the annual average temperature in NE has risen at a rate of about 0.54°F per decade— more than 2° so far. During the same time period, the growing season has expanded by 2.5 days per decade. Ice-out, the date when the ice-cover breaks up, is coming 8-10 days earlier in NH. And there have been significant changes in patterns of precipitation, as well.

How organisms respond to climate changes

Of course, climate change is a constant feature of Earth's history, and an important part of the history of life as well. The present, human-driven climate change is unusual and concerning because it is happening so rapidly. While changes of a few degrees in average temperature have happened many times, they have typically developed over thousands or tens of thousands of years. The climate change we are experiencing has taken shape in a few decades.

But no matter what the timing, organisms really have the same 4 options they have had throughout the whole history of life on earth.

a. Change behavior. Plants are flowering earlier. Many bird species are arriving at their northern nesting ranges earlier. Though

they are not documented for NE yet, ecological mis-matches are happening — plants flowering before their insect pollinators start to fly, or caterpillars emerging before the bird nestlings that depend on them for food have hatched.

b. Change range. Many bird species in North America (and elsewhere) have expanded or moved their breeding ranges northward. Mountain species, such as the pika, are moving up higher to avoid temperatures they can't tolerate.

c. Evolve. This has not documented yet in New England, but evolutionary changes in response to climate change have been demonstrated in some insect and bird species.

d. Go extinct. Again, there has been no documentation in New England yet, but climate change can lead to local extinctions (for example, populations of species at the southern limits of their range).

Open questions

New England's climate is changing. Climate scientists can forecast what our temperatures and precipitation may be like (under various scenarios) in 10, 20, 75 years — but how the plants and animals will respond is harder to predict. What the changes will mean for the quality of life for New England's people is not at all clear, either. We can all contribute to a better understanding of these important questions, however, by paying attention to the landscape we live on, and the organisms that share it with us.

In other Briefs, we'll provide up-to-date science on some of the changes that you can help track in the natural areas you know best. We'll also provide suggestions on how you can involve others in observation and education about New England's biosphere as it responds to a changing climate.