

## Do Scientists Agree about Climate Change? Public Perceptions from a New Hampshire Survey

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### A New Survey Initiative

Human-caused climate change has a dual identity as a major topic for scientific research and a divisive political wedge issue among the public. While research across many disciplines has built a strong consensus among scientists, surveys have mapped out deepening divisions in public opinion.<sup>1</sup> However, the wording of survey questions often conforms to popular rather than scientific concepts, making comparisons between public and scientific views less clear-cut. Survey questions might be vaguely worded, for example, or ask ordinary people questions that even top scientists cannot answer, such as personal consequences of future climate change.

Carsey Institute researchers, working with the University of New Hampshire (UNH) Survey Center and the University Office of Sustainability, recently began a new initiative tracking public perceptions about climate change as they change over time. A series of regional surveys designed for other purposes now includes a set of three questions about climate change. Unlike questions on some earlier surveys, the questions in UNH's new survey initiative focus on the central point stated by scientists in a wide range of scientific reports: what is happening now—not some time in the future—due to climate change. The neutral and factual wording of the questions focuses on what people know, or believe they know, about climate change now.

The first survey took place in April 2010 as part of New Hampshire's Granite State Poll. Along with other questions on political candidates and background factors, a statewide sample of 512 residents was asked how well they understand the issue of global warming or climate change, whether they think most scientists agree that it is happening now and caused by humans, and what they personally believe. Our New Hampshire poll will be repeated quarterly, with the next wave in summer 2010. Continuing results here and

### Key Findings

In April 2010, the Granite State Poll included three new questions about climate change on its survey of 512 New Hampshire residents. Key findings are as follows:

- Slightly more than half the respondents believe they understand “a moderate amount” about climate change or global warming. Twenty-nine percent believe they understand “a great deal.” Understanding tends to increase with education.
- About half think that most scientists agree climate change is happening now, caused mainly by human activities. On the other hand, 41 percent think there is little agreement among scientists.
- Similarly, about half personally believe that climate change is happening and is human caused. Thirty-nine percent believe it is happening but with natural causes. Only 4 percent believe that climate change is not happening.
- Most of those with college or postgraduate education believe that climate change is happening now, caused by humans, and that scientists agree on this point.
- Sharp polarization exists. While a large majority of Democrats believe that climate change is happening and is human caused, most Republicans believe it is a natural phenomenon. Three-fourths of Democrats but only one-fourth of Republicans think that most scientists agree.
- There is a strong correlation between personal beliefs and perceptions about the scientific consensus.

elsewhere should provide a “thermometer” tracking public views of climate change science, almost in real time. This collaborative survey research is part of UNH’s commitment to integrating sustainability throughout its curricula, operations, research, and engagement efforts.<sup>2</sup>

## How Much Do You Understand?

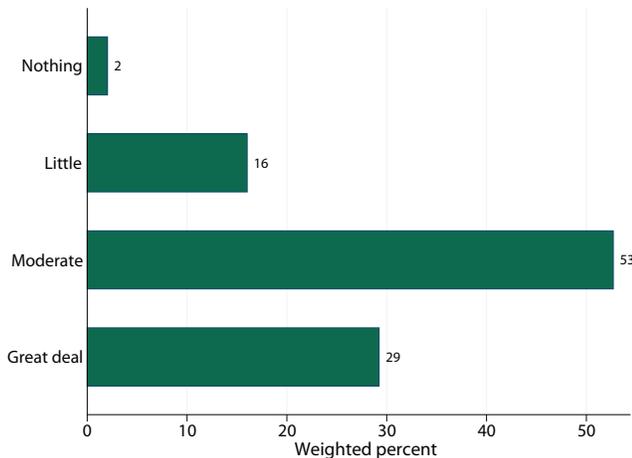
The first of three climate change questions in our telephone interviews asked respondents to rate their own understanding:

Next, I would like to ask you some questions about the issue of global warming or climate change. How much do you feel you understand about this issue—would you say a great deal, a moderate amount, only a little, or nothing at all?

- 4 A great deal
- 3 A moderate amount
- 2 Only a little
- 1 Don’t know/nothing at all

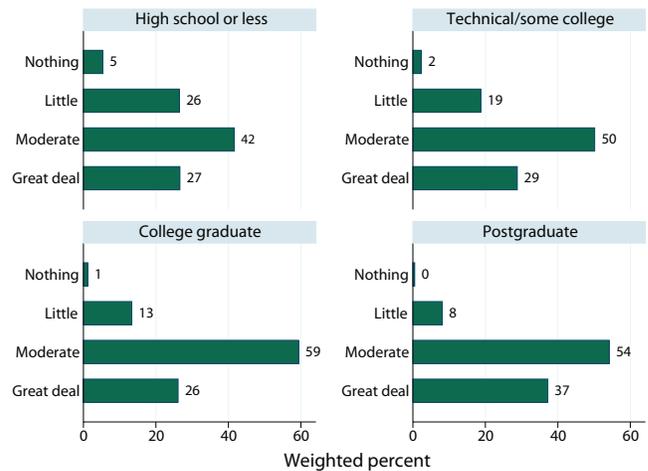
Most respondents expressed confidence in their understanding of these complex issues (see Figure 1). Fifty-three percent felt they understood “a moderate amount” about global warming or climate change, and twenty-nine percent said they understood “a great deal.” Relatively few admitted to understanding “only a little” (16 percent) or “nothing at all” (2 percent). Margins of error for the overall percentages in Figures 1, 3, and 5 should be within + or – 5 percent.

FIGURE 1. HOW MUCH DO YOU UNDERSTAND ABOUT CLIMATE CHANGE?



Topics such as the greenhouse effect, atmospheric chemistry, and past climate change involve technical knowledge outside most people’s experience. We found that respondents with higher education tended to have even greater confidence in their understanding. Eighty-four percent of college graduates and ninety-one percent of those with postgraduate degrees said they understood “a moderate amount” or “a great deal” about climate change (see Figure 2).

FIGURE 2. HOW MUCH UNDERSTANDING ABOUT CLIMATE CHANGE, BY EDUCATION



## Do Scientists Agree?

Claims that scientists do not agree about climate change have been widely repeated by non-scientists. In journals and meetings where scientists address their peers, one does indeed see lively discussion and competing hypotheses regarding topics such as the impacts of climate change on behavior of ice sheets, ocean currents, and storms. Behind the unsettled frontiers, however, stands a broad consensus on more fundamental facts. There is little disagreement among active scientists that concentrations of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases affect the earth’s climate, that these concentrations are rapidly increasing due to human activities and are already reaching levels not seen in hundreds of thousands of years, that many indicators show climate unevenly but clearly warming now as a result, and that future changes in this direction present risks for coastal cities, agriculture, and other aspects of civilization. The consensus builds on studies ranging from basic physics to indicators of ancient climates, satellite measurements, and ocean-atmosphere models. Such research has been conducted by scientists across many different disciplines, working with many kinds of data in many different countries.

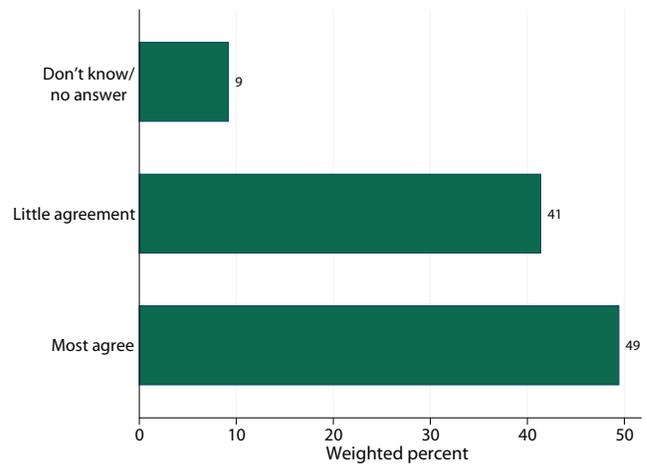
Consensus views based on this body of research have been articulated through individual and joint statements by all of the major U.S. scientific organizations with relevant expertise,<sup>3</sup> in statements or reports by the national academies of thirteen leading scientific nations,<sup>4</sup> and in broad international reviews of research results.<sup>7</sup> A survey of more than 3,000 earth scientists found that 90 percent agreed that mean global temperatures have generally risen compared with pre-1880s levels. Eighty-two percent agreed human activities are a significant contributing factor to temperature change. Among active climate researchers answering the survey, more than 96 percent agreed on both items.<sup>6</sup> An open letter to the U.S. Congress in October 2009 noted, “Observations throughout the world make it clear that climate change is occurring, and rigorous scientific research demonstrates that the greenhouse gases emitted by human activities are the primary driver.” This letter was signed by the presidents or directors of eighteen scientific organizations, including the American Association for the Advancement of Science, the American Geophysical Union, the American Meteorological Society, and the American Statistical Association. Similar points were made in a May 2010 letter signed by 255 members of the National Academy of Sciences published in the leading journal *Science*: “The planet is warming due to increased concentrations of heat-trapping gases in our atmosphere . . . Most of the increase in the concentration of these gases over the last century is due to human activities, especially the burning of fossil fuels and deforestation.”<sup>7</sup>

We designed the second question on our public opinion survey to match the central point made in all of these statements by scientists:

- Which of the following two statements do you think is more accurate?
- 3 Most scientists agree that climate change is happening now, caused mainly by human activities.
  - 2 There is little agreement among scientists whether climate change is happening now, caused mainly by human activities.
  - 1 Don't know/no answer

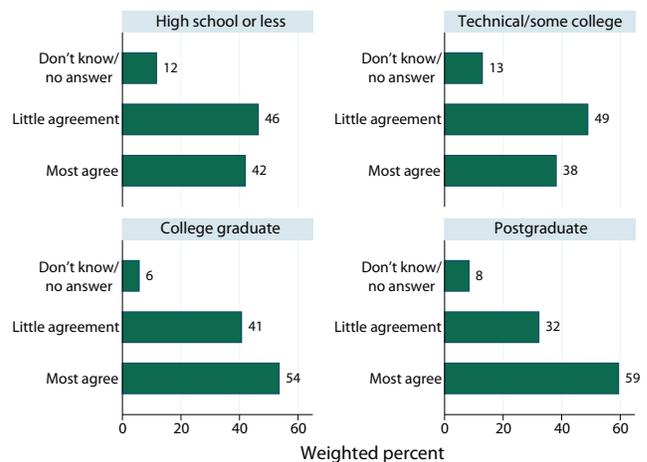
In half the interviews, “most scientists agree” was the first choice read by the interviewer; in the other half, “there is little agreement” was read first. Results from the two forms are combined in our analysis here to offset possible response-order bias. About half the respondents (49 percent) understand that most scientists agree change is happening now, caused mainly by human activities. A large minority (41 percent), however, believe there to be little agreement among scientists (see Figure 3).

FIGURE 3. DO SCIENTISTS AGREE IT IS HAPPENING NOW, CAUSED BY HUMANS?



Awareness of the scientific consensus varies sharply with respondent education, as graphed in Figure 4. Fifty-four percent of college graduates and fifty-nine percent with postgraduate degrees think that most scientists agree. Respondents with a high school education or less, or technical school/some college, more often believe that there is little agreement among scientists.

FIGURE 4. DO SCIENTISTS AGREE IT IS HAPPENING NOW, BY EDUCATION



## What Do You Personally Believe?

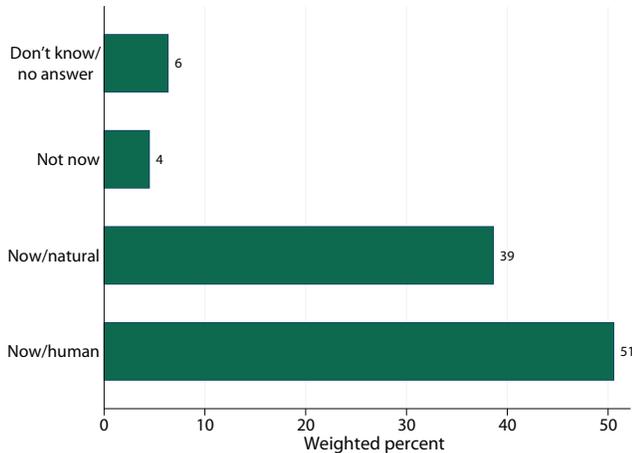
We also asked respondents what they personally believe about climate change:

Which of the following three statements do you personally believe?

- 4 Climate change is happening now, caused mainly by human activities.
- 3 Climate change is happening now but caused mainly by natural forces.
- 2 Climate change is not happening now.
- 1 Don't know/no answer

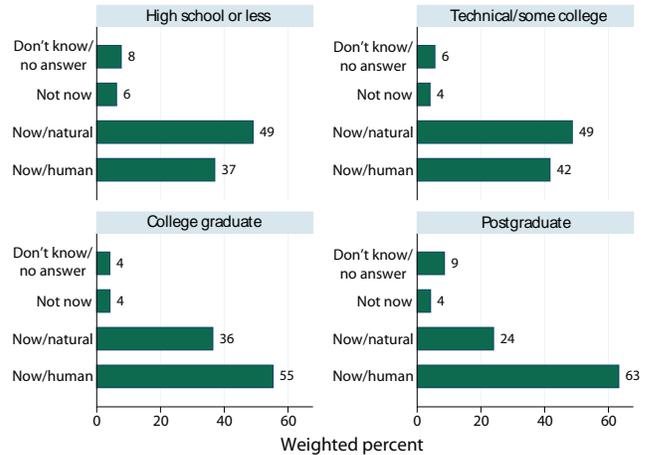
Similar to the science question, we alternated the interview scripts so that “happening now, caused mainly by human activities” was read first half the time, and “not happening now” was read first in the others. We also alternated the sequence of the science and personal opinion questions, so each came first half the time. Overall, 51 percent chose the “now/human” response (see Figure 5).

FIGURE 5. WHAT DO YOU PERSONALLY BELIEVE?



The patterns of personal beliefs seen in Figure 5 resemble scientific agreement results in Figure 3. Like other questions on our survey, personal beliefs vary with education (see Figure 6). Majorities of those with college or postgraduate degrees think change is human caused and happening now. Those without college degrees more often credit natural causes.

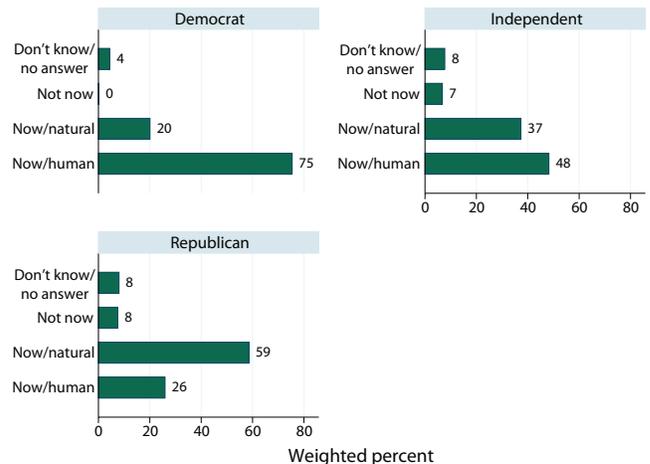
FIGURE 6. WHAT DO YOU BELIEVE, BY EDUCATION



## Polarized Views of Science

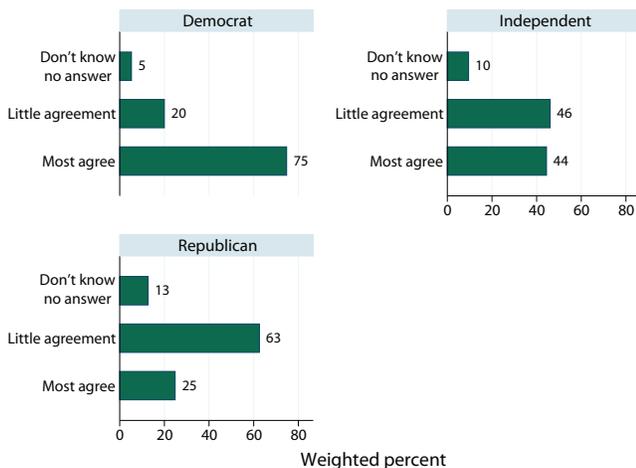
Breakdowns in Figures 2, 4, and 6 draw attention to the influence of education on what people believe about climate change. Given the polarized nature of political discourse on this topic, it came as no surprise to see that political orientation matters even more than education. Figure 7 depicts the relationship between political party identification (Democrat, Independent, or Republican) and personal beliefs about climate change. About three-quarters of the Democrats, compared with only one-quarter of Republicans, believe that climate change is happening now, caused mainly by humans. Most Republicans believe that climate change is happening now but caused by natural forces. Independents fit between these extremes, with a plurality accepting “now/human.”

FIGURE 7. WHAT DO YOU BELIEVE, BY POLITICAL PARTY IDENTIFICATION



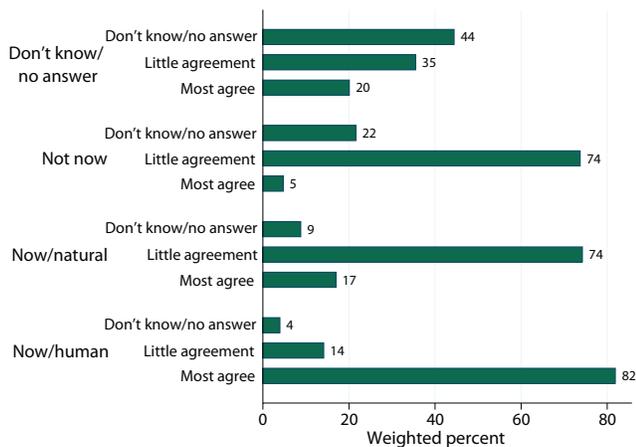
A political breakdown regarding agreement among scientists yields similar results (see Figure 8). Three-quarters of Democrats but only one quarter of Republicans think that most scientists agree that climate change is happening now, caused by humans. Most Republicans believe instead that there is little agreement among scientists. Independents split almost evenly between the two choices.

FIGURE 8. DO SCIENTISTS AGREE IT IS HAPPENING NOW, BY POLITICAL PARTY IDENTIFICATION



Of course, respondents' personal beliefs and their perceptions of what scientists believe turn out to be closely related (see Figure 9). Those who believe that the climate is changing now, due to human causes, overwhelmingly (82 percent) think that most scientists agree with them. By almost as great a margin, 74 percent of those who believe that current climate change has natural causes, or that climate is not changing, think that there is little agreement among scientists on this point.

FIGURE 9. DO SCIENTISTS AGREE, BY WHAT YOU BELIEVE



## Discussion

On issues such as the reality of climate change, scientists might wish the public would look to them for explanations of research results and then form their own opinions. In practice, however, most of the public has no contact with the research journals and professional meetings of scientists. Scientists' efforts to communicate more directly with the public face competition from other voices, often more familiar to lay audiences, making conflicting claims about science. Higher education clearly plays a role, visible in this survey and others.<sup>8</sup> Beyond their school years, however, most people acquire information about science indirectly from non-scientists, such as journalists, political commentators, activists, or bloggers. These intermediate sources have limitations in their own comprehension and may hold strong biases about what to transmit. Moreover, in this new-media age people increasingly choose to acquire and retain information from sources that support their own prejudices,<sup>9</sup> so contrary information becomes systematically filtered out. As a result, people who have never read or listened to climate scientists can nevertheless believe they understand the scientists' research fairly well and hold strong opinions about the validity of this research.

Improved science literacy among journalists would be valuable, although news media experiencing financial pressures sometimes feel that reporters dedicated to science are a luxury they can no longer afford. One promising development has been the growing engagement of leading researchers in science blogs, which aim to make state-of-the-art scientific ideas and discussions accessible to a much broader audience.<sup>10</sup> Their efforts might help to counterbalance, at least partly, some of the confusion spread by less-informed sources.

Scientific knowledge about climate change has advanced substantially in the few years since the Intergovernmental Panel on Climate Change published its Fourth Assessment Report (2007).<sup>11</sup> However, while scientific understanding advanced, understanding by the U.S. public seemed to march in the opposite direction. Several recent polls found significant declines in the proportion of Americans who believe climate change is happening or is caused mostly by humans.<sup>12</sup> These declines followed "Climategate," the theft in the fall of 2009 of emails from the Climate Research Unit at the University of East Anglia and a snowy 2010 winter in parts of the United States.<sup>13</sup> While their data show that global warming continues, many scientists are encountering a severely polarized public response.

Our New Hampshire poll will be repeated quarterly, with the next wave in the summer of 2010. Continuing results will provide a public opinion "thermometer," tracking perceptions about climate change science, almost in real time.

## Endnotes

1. R. E. Dunlap and A. M. McCright, “A Widening Gap: Republican and Democratic Views on Climate Change,” *Environment* September/October 2008, <http://www.environmentmagazine.org/Archives/Back%20Issues/September-October%202008/dunlap-full.html>; M. C. Nisbet and T. Myers, “Twenty Years of Public Opinion about Global Warming,” *Public Opinion Quarterly* 71 (3) (2007): 444–470.
2. UNH has earned several awards for its sustainability initiatives, which range from the oldest endowed sustainability program in U.S. higher education to leading policy research on vulnerable children, youth, and families and sustainable community development. Discover the sustainable learning community at UNH at [www.sustainableunh.unh.edu](http://www.sustainableunh.unh.edu), [www.carseyinstitute.unh.edu](http://www.carseyinstitute.unh.edu), and [www.discoversustainability.org](http://www.discoversustainability.org).
3. N. Oreskes, “The Scientific Consensus on Climate Change,” *Science* 306 (5702) (2004): 1686.
4. G8+5, “G8+5 National Academies’ Joint Statement: Climate Change and the Transformation of Energy Technologies to a Low Carbon Future,” National Academies of Brazil, Canada, China, France, Germany, India, Italy, Japan, Mexico, Russia, South Africa, the United Kingdom, and the United States, <http://www.nationalacademies.org/includes/G8+5energy-climate09.pdf>; National Research Council, *Advancing the Science of Climate Change* (Washington, DC: National Research Council of the National Academies, 2010).
5. Intergovernmental Panel on Climate Change, *Climate Change 2007—The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2007); K. Richardson et al., *Synthesis Report from Climate Change: Global Risks, Challenges & Decisions* (Denmark: University of Copenhagen, 2009), <http://www.pik-potsdam.de/news/press-releases/files/synthesis-report-web.pdf>.
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7. P. H. Gleick et al., “Climate Change and the Integrity of Science,” *Science* 328 (5979) (2010): 689–690.
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9. M. A. Baum and T. Groeling, “New Media and the Polarization of American Political Discourse,” *Political Communication* 25 (2008): 345–365; D. M. Kahan et al., “The Second National Risk and Culture Study: Making Sense of—and Making Progress in—the American Culture War of Fact,” (Washington, DC: George Washington University Research Paper No. 370, 2007).
10. For example, see <http://www.realclimate.org>.
11. For an update covering newer research since the 2007 IPCC report, see K. Richardson, *Synthesis Report*.
12. Gallup Poll, “America’s Global Warming Concerns Continue to Drop,” <http://www.gallup.com/poll/126560/Americans-Global-Warming-Concerns-Continue-Drop.aspx>; A. Leiserowitz, E. Mailbach, and C. Roser-Renouf, “Climate Change in the American Mind: Americans’ Global Warming Beliefs and Attitudes in January 2010,” (New Haven, CT: Yale Project on Climate Change, 2010), <http://environment.yale.edu/uploads/AmericansGlobalWarmingBeliefs2010.pdf>; In contrast, another recent survey emphasized public support for action on climate change, despite divisions on whether warming has mostly human causes: Stanford University, “Global warming poll,” (Produced by GFK, 2010) <http://woods.stanford.edu/docs/surveys/Global-Warming-Survey-Selected-Results-June2010.pdf>.
13. Although the Climate Research Unit scientists were widely criticized in news media and blogs based on excerpts from these emails, two careful inquiries found no evidence of wrongdoing: the Science and Technology Committee of the U.K. House of Commons (see <http://www.realclimate.org/docs/387.pdf>) and an independent appraisal by the Oxburgh Report commissioned by the University of East Anglia (see <http://news.sciencemag.org/scienceinsider/2010/04/oxburgh-report-clears-controvers.html>); For recent updates on temperature trends, see <http://data.giss.nasa.gov/gistemp/>.

#### ACKNOWLEDGMENTS

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Since 1997, the University Office of Sustainability—the oldest endowed sustainability program in higher education in the United States—has been transforming UNH into a sustainable learning community across curriculum, operations, research and engagement, and initiatives in biodiversity, climate, food, and culture.

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