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Belief (and Disbelief) in Global Warming: 10 Years of Attitudes about Climate Change in the NSEE

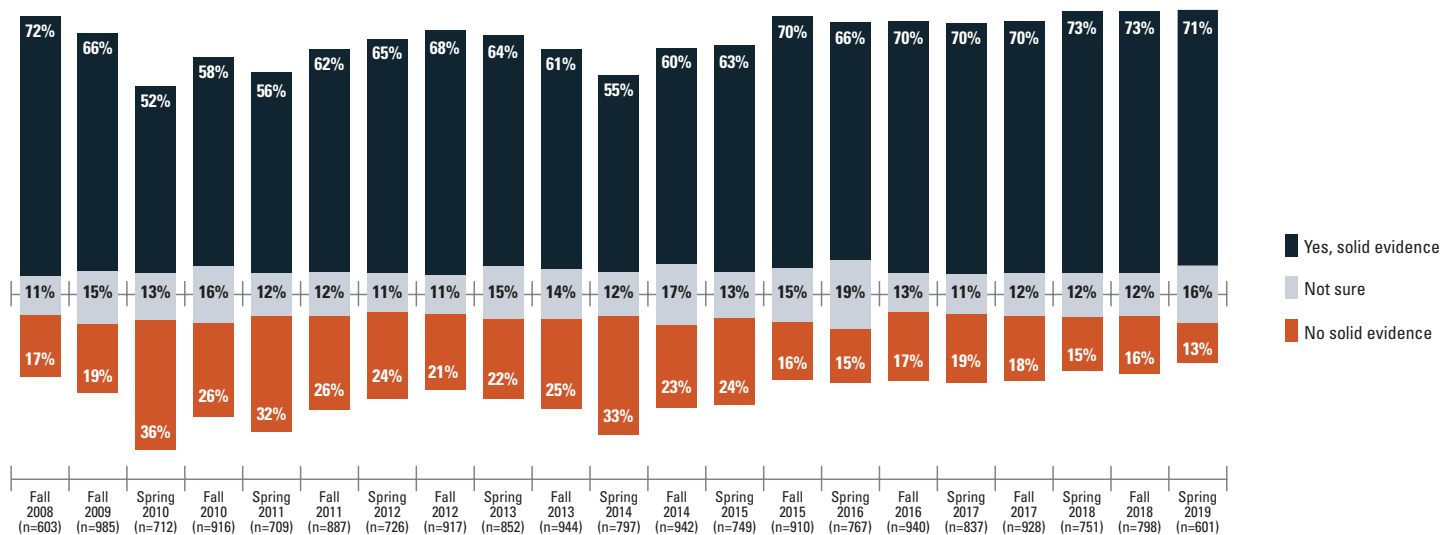
Introduction

As America prepared to elect a new president in the fall of 2008, the University of Michigan and Muhlenberg College partnered on their first national survey on the issue of global warming. In the midst of that historic campaign and the emerging financial turmoil that would usher in the Great Recession, nearly 3 out of 4 Americans (72%) expressed the view that there was solid evidence of global warming at the time (see *Figure 1*). This result, which mirrored the findings from a number of other national surveys,¹ was in line with a fairly popular belief at the time that Americans were in large part coming to a consensus that global warming was a reality.² However, this assumption proved to be quite flawed as within only two years Michigan and Muhlenberg's National Surveys on Energy and Environment (NSEE) would find that only a slim majority (52%) of Americans maintained the viewpoint that there was solid evidence of global warming. It would not be until 2015 that the record-level acceptance of global warming set in 2008 would be nearly equaled, and 2018 for this mark to be surpassed. The latest numbers, in Spring 2019, find attitudes about climate change at roughly the same levels as in Fall 2008.

NSEE @10

Since 2008, the University of Michigan and Muhlenberg College have conducted the National Surveys on Energy and Environment (NSEE), a biannual national opinion survey on energy and climate policy. To celebrate the tenth anniversary of the survey, NSEE is releasing a series of reports highlighting the breadth of topics we have covered over the past decade. These reports present time-series data on how American attitudes about energy policy and climate change have changed since 2008, as well as comparisons to Canadian opinion, collected through a parallel survey conducted by researchers at the University of Montreal.

Figure 1. American views on evidence of global warming, 2008-2019



Question text: "Next, I would like to ask you a few questions on the issue of global warming. From what you've read and heard, is there solid evidence that the average temperature on earth has been getting warmer over the past four decades?"

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National Surveys on Energy and Environment

So what explains the shifts in American acceptance of global warming during the last decade that has been captured by 21 national surveys of nearly 17,000 Americans? An immense amount of scholarly research has been focused on this question, with three broadly-defined factors emerging as the most significant contributors to the changes in opinion observed. First, between 2009 and 2010, as the United States Congress for the first time attempted to pass major legislation to reduce greenhouse gases, there was a tremendous campaign by opponents of these efforts to raise doubts about the existence of global warming. The “cues” coming from elected officials, representatives of industries, and conservative commentators helped foster doubt about global warming, particularly among Republicans.³

Second, the deep economic recession of this period appears to have eroded some acceptance of the problem of global warming, as aversions to the solutions being proposed to address the issue (e.g., cap-and-trade policies) may have pushed some to shy away from acknowledging the underlying problem.⁴ Finally, during the winters between 2009 and 2011 the United States experienced some relatively cold and snowy seasons, including a number of major winter storms along the heavily-populated Northeast coast, that appear to have diminished acceptance levels among a modest portion of Americans. The confluence of these factors emerged in the form of a doubling (16% to 32%) of the number of Americans who told NSEE interviewers that there was not evidence of global warming.⁵

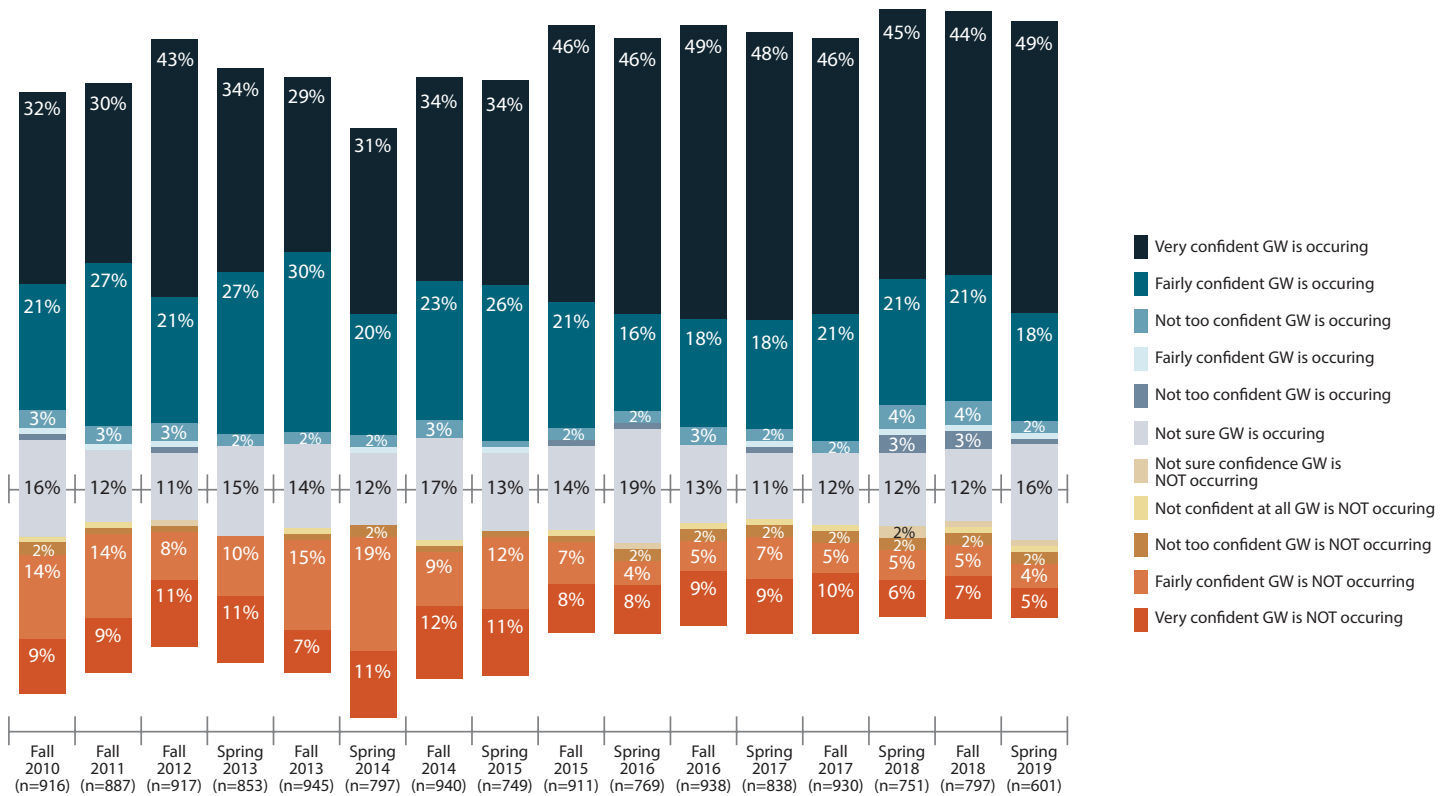
While the decline in American acceptance of global warming between 2008 and 2010 was dramatic in terms of its size and swiftness (21% drop in fewer than two years), the rebound in public recognition of evidence has been more gradual and uneven over the last decade. After the significant decline in acceptance that culminated in 2010, there was slow but steady growth in American acknowledgement of evidence of global warming. This culminated during the 2012 presidential election when, in Fall 2012, 68% of Americans stated that they saw solid evidence of rising temperatures on the planet.

As had happened after the initial election of Barack Obama in 2008, acceptance of global warming once again declined after his reelection in 2012, with a 13% decline in acceptance occurring between 2012 and 2014 (68% to 55%). But since Spring 2014, American acceptance of global warming has risen back to the approximate level it was in 2008, with 7 out of 10 Americans reporting that they think there is solid evidence of global warming in each of the six NSEE surveys between Fall 2016 and Spring 2019. Notably, only 13% of Americans surveyed in the Spring 2019 NSEE indicated that they did not think there was solid evidence of global warming, marking the lowest level of skepticism in 21 surveys dating back to the first iteration in Fall 2008.

Confidence among Those Who Believe Climate is Changing Rises over Time

As acceptance of global warming has stabilized around 70% of the American public, confidence in this position on the matter has increased in recent years. In 2008, when 72% of Americans reported that they thought there was solid evidence of global warming, only 32% of Americans said that they were “very confident” in that evidence (see Figure 2). Comparatively, as American acceptance of evidence of global warming has returned to levels near or above the 2008 mark (e.g., 71% in 2019), confidence with this position has increased with 49% of American adults very confident that there is solid evidence of global warming in 2019. The confluence of high and stable levels of acceptance of global warming and strong confidence in those appraisals has been present in the United States since 2016 and may indicate more durability in beliefs regarding climate change than in early periods.

Figure 2. Levels of confidence that global warming is or is not occurring, 2010-2019^{a,b}



Source: Fall 2010 – Spring 2019 NSEE waves.

Survey data tables for all NSEE waves are available at <http://closup.umich.edu/national-surveys-on-energy-and-environment>.

a Question text (Acceptance of climate change): “Next, I would like to ask you a few questions on the issue of global warming. From what you’ve read and heard, is there solid evidence that the average temperature on earth has been getting warmer over the past four decades?”

b Question text (Global warming is occurring): “How confident are you that the average temperature on earth is increasing? Are you very confident, fairly confident, not too confident, or not confident at all that the average temperature on earth is increasing?”

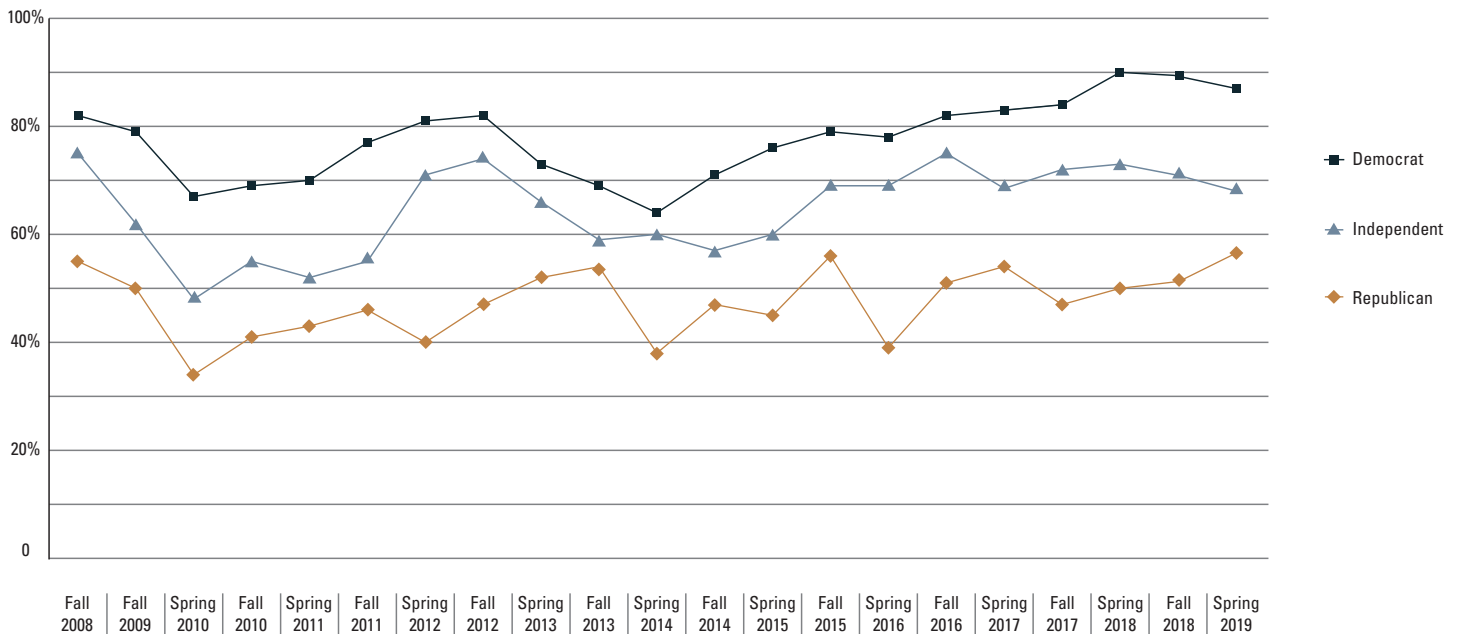
Question text (Global warming is not occurring): “How confident are you that the average temperatures on earth are not increasing? Are you very confident, fairly confident, not too confident, or not confident at all that the average temperature on earth is not increasing?”

Partisanship Highly Influential in Shaping Climate Attitudes

As with many areas of public opinion, views on climate change are significantly shaped by an array of political, social, and economic factors. Among the factors that most directly affect American views on the existence of global warming, one stands out in terms of its predictive ability. Party affiliation has been shown to have a tremendous impact on individual perceptions regarding climate change, with the divide between Democrats and Republicans remaining consistently large over the last decade. NSEE studies (see *Figure 3*) have found Democrats regularly 25% to 30% more likely than Republicans to indicate that there is solid evidence of global warming. This partisan gap has been particularly robust in the past few years with Republican levels of global warming acceptance lagging 30% to 40% behind that of Democrats.

While the divide between Democrats and Republicans on the existence of climate change has been consistently large over the last decade, within these partisan groups there has also been significant fluctuation in terms of acceptance of evidence of global warming. Among Democrats, strong majorities ranging from a low of 65% (Spring 2014) to a high of 90% (Spring 2018) have indicated that there is solid evidence of global warming. Comparatively, Republican acceptance levels have ranged from 35% (Spring 2010) to 57% (Spring 2019). There has also been considerable fluctuation in beliefs regarding global warming among Americans who do not affiliate with a major political party, with the percentage of this politically independent cohort indicating there is solid evidence of global warming varying between 49% (Spring 2010) and 75% (Fall 2008).

Figure 3. Percent of Americans who say there is solid evidence of global warming, by party affiliation^a



Source: Fall 2008 – Spring 2019 NSEE waves

Note: See Note 6 on page 17 for the sample size for each of the groups shown in the figure

Canada Corner: Attitudes about Climate Change in Canada

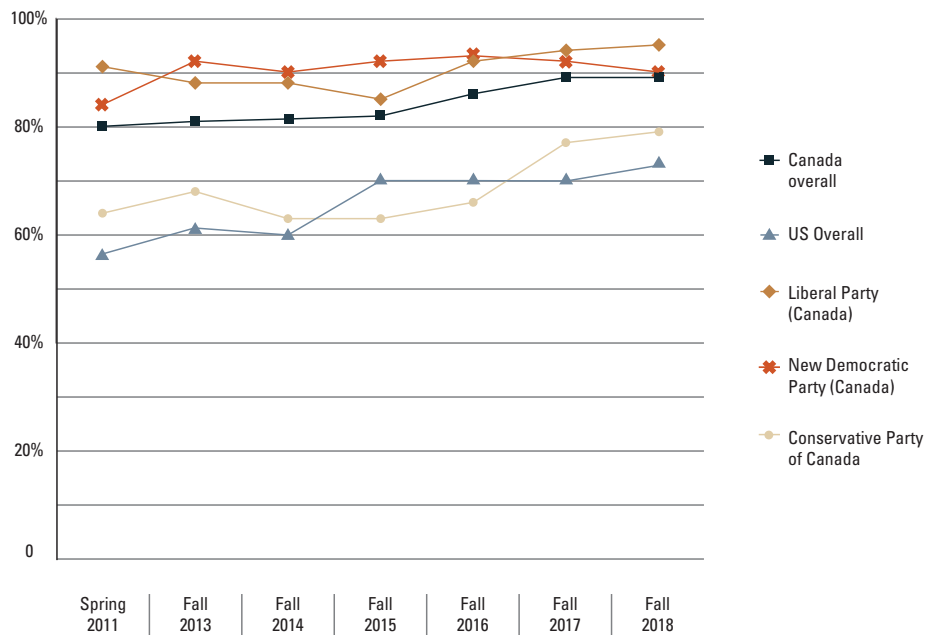
Since 2011, the Canadian Surveys on Energy and the Environment (CSEE) have served as a sister survey to the NSEE, fielding a number of identical questions in Canada. These surveys provide a unique comparative perspective on public attitudes toward climate change and energy issues in the United States and Canada, and comparing responses across countries has commonly found striking differences in public attitudes across these neighboring federations.

When it comes to beliefs about global warming, the vast majority of Canadians agree there is solid evidence of warming global temperatures (see figure below). Over time, the proportion of respondents agreeing to this question has increased from 80% in 2011 to closer to 90% in 2017 and 2018. While American attitudes track along this same trajectory, there has been a relatively consistent 15- to 20-point gap between the two countries over the last decade.

This high proportion of Canadians who believe the planet is warming has been consistently found among supporters of Canada's left-of-center New Democratic Party and the Liberal Party of Canada. And though, much like in the US, Canadian conservatives have historically been less likely to say that temperatures are on the rise, in Canada the gap between the conservative and progressive blocs appears to be decreasing over time. Self-identified Conservative Party of Canada (CPC) supporters have been increasingly likely to report seeing solid evidence of a warming planet, with an increase in belief levels among this segment from about 60% in 2011 to 80% in 2018.

These dynamics are quite different from what is found in the United States (compare to *Figure 3*) and might be explained by things Canadians are seeing literally in their backyards. Indeed, as a northern nation, average temperatures are warming faster in Canada than elsewhere in the world.

Percent of respondents who say there is solid evidence of global warming, by country, Canadian party affiliation



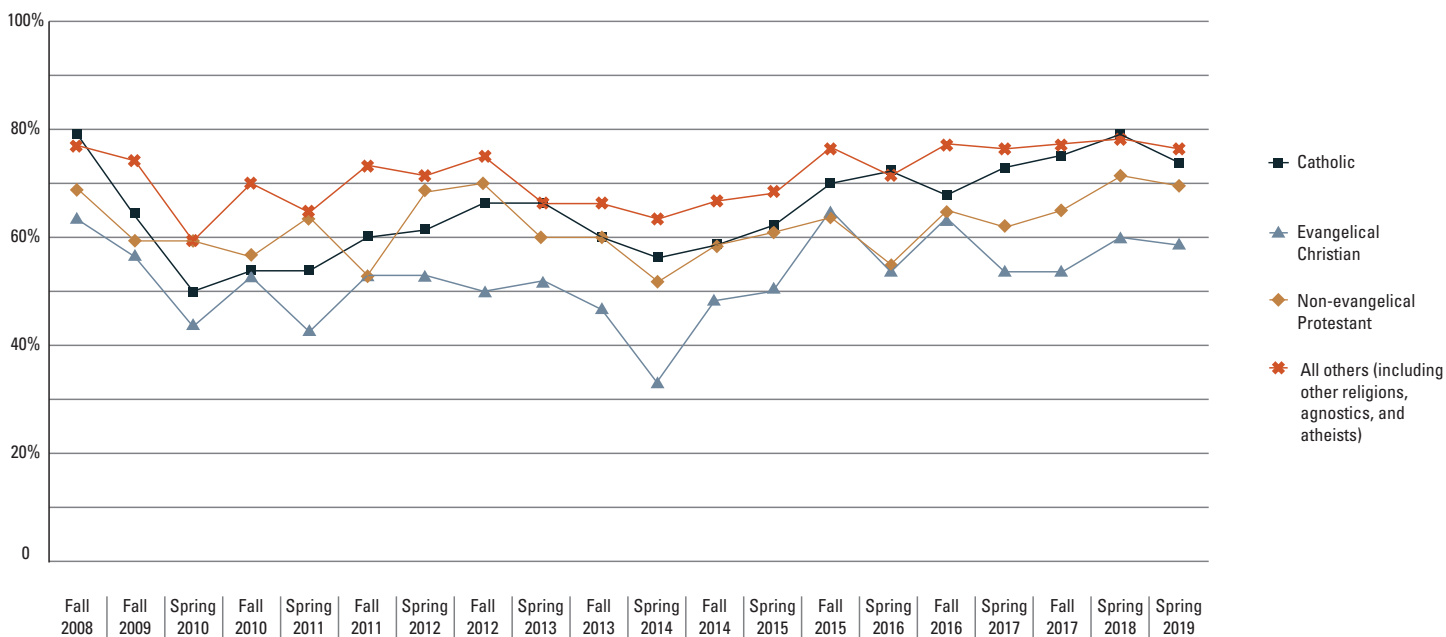
Source: NSEE and CSEE surveys, 2011-2018

Question text: See Footnote a

Religious Affiliation and Other Demographic Factors also Impact Climate Beliefs

In addition to partisan differences regarding beliefs on the existence of global warming, the NSEE studies have shown a number of other individual-level factors are related to acceptance of evidence of climate change. Religious affiliation has consistently been a fairly strong predictor of American views on the existence of global warming, with the highest levels of acceptance found among individuals identifying as atheist, agnostic, or Jewish and the lowest levels of acceptance among those identifying as Evangelical Christian (see *Figure 4*). Indeed, NSEE has looked at the religious dimensions of attitudes toward climate change in more depth in a report from November 2015.⁷

Figure 4. Percent of Americans who say there is solid evidence of global warming, by religious affiliation^a



Source: Fall 2008 – Spring 2019 NSEE waves

Note: See Note 8 on page 18 for the sample size for each of the groups shown in the figure

As with many aspects of public opinion in the United States, there is considerable variation in views on the existence of global warming across categories of racial and ethnic identification. Americans identifying as white have been significantly less likely than those identifying as African-American, Asian, or Hispanic and Latino to indicate that there is solid evidence of global warming. While these differences have been consistent over the last decade, the results from the most recent NSEE study (Spring 2019) demonstrate the significant variation across racial and ethnic classifications in terms of views on the existence of climate change. In the 2019 study, 65% of white Americans indicated that there was solid evidence of global warming compared with 87% of African-Americans, 90% of Asian-Americans, and 82% of Hispanics/Latinos who believe that there is solid evidence that temperatures are rising on the planet.⁹

Do Words Matter?

There was great debate, particularly in the early 2000s, about whether to use “global warming” or “climate change” to refer to the rapid rise in global temperatures as a result of human activity.¹⁰ Two small experiments, embedded in the Fall 2013 and Fall 2014 NSEEs, find little difference among those who already believe that climate change is occurring. However, these experiments did find differences among those who say that there isn’t evidence that the earth is warming, both of which favor the use of “climate change.”

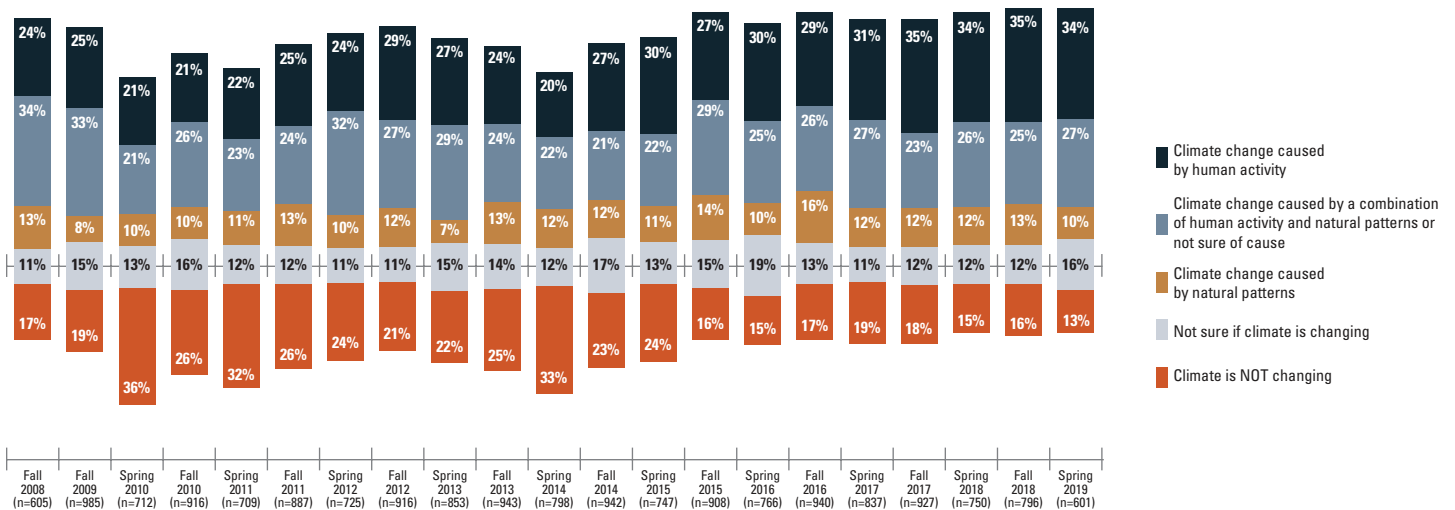
On the Fall 2013 survey, respondents were randomly asked either about their level of concern for “global warming” or “climate change.” While climate skeptics in both groups showed low levels of concern, those assigned to the “global warming” group were more likely to respond that they were “not concerned at all” about the issue compared to those assigned to the “climate change” group.¹¹

Similarly, the Fall 2014 survey asked half of the survey respondents an open-ended question about the first thing that comes to mind when they hear the term “global warming,” and the other half an identical question about “climate change.” Climate skeptics assigned to the “global warming” group were much more likely to provide responses tagged as “hoax, fraud, not happening” than those in the “climate change” group.¹²

Americans Increasingly Say Climate Change Caused by Human Activity

As established in this report, acceptance of evidence of global warming among Americans has become widespread and fairly stable over the past three years. While such findings may not signify a “climate consensus” in the United States they do suggest broad acknowledgement that temperatures on the planet are increasing. While a substantial majority of Americans see evidence of global warming, views on the underlying causes of increasing temperatures are more divided. Since its origin in 2008, the NSEE has asked Americans who think global warming is happening if they believe the cause of the rising temperatures is human activity or natural factors. As shown in *Figure 5*, over the course of the past decade the percentage of Americans who indicate humans are at least partially responsible for climate change has ranged from a low of 42% (Spring 2010 and 2014) to a high of 60% (Spring 2018). Notably, a majority of Americans have indicated that there is solid evidence of human-influenced global warming since Fall 2015, with an average of 57% of Americans holding this position in the last eight NSEE waves (Fall 2015 to Spring 2019).

Figure 5. American views on the existence and causes of climate change, 2008-2018^{a,c}



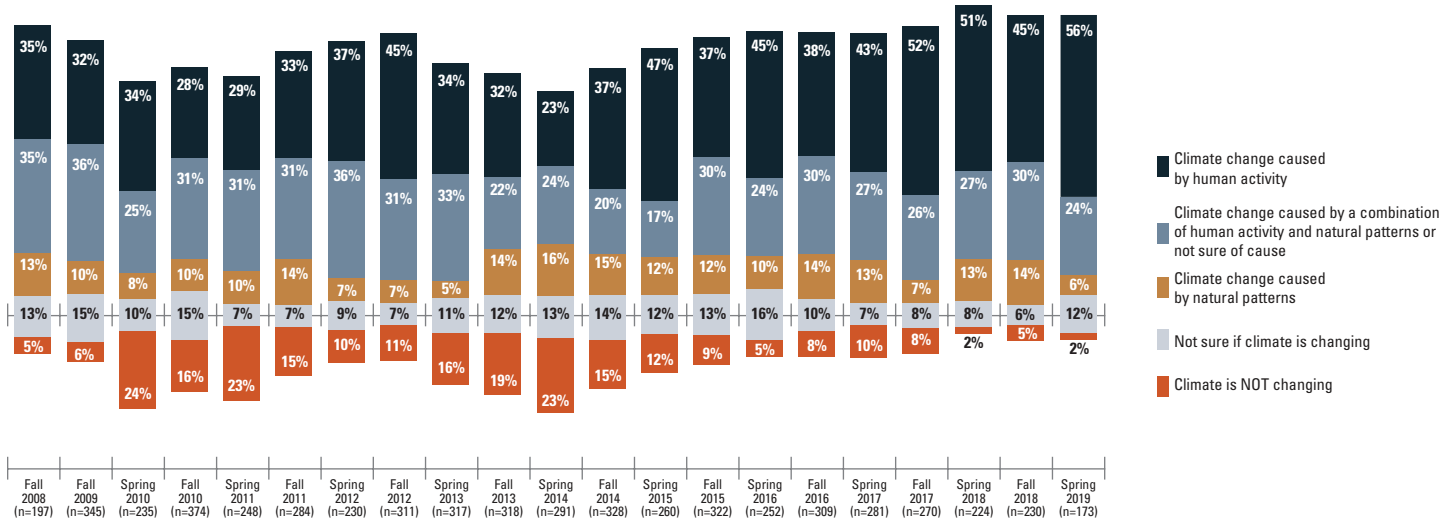
Source: Fall 2008 – Spring 2019 NSEE waves

c Question text: “Is the earth getting warmer because of human activity such as burning fossil fuels, or mostly because of natural patterns in the earth’s environment?”

National Surveys on Energy and Environment

The partisan differences in acceptance of evidence of global warming are also apparent in terms of perceptions of the root causes of climate change. While a majority of Democrats in all but one NSEE wave (Spring 2014) have indicated that there is solid evidence of human-induced global warming, in none of the waves have a majority of Republicans maintained the same appraisal. As can be seen in *Figure 6*, large majorities of Democrats have consistently indicated that there is evidence of human-induced climate change. Since Fall 2017, at least 7 out of 10 Democrats have indicated that climate change is happening and is either mostly or partially caused by humans, including 80% in the most recent wave in Spring 2019.

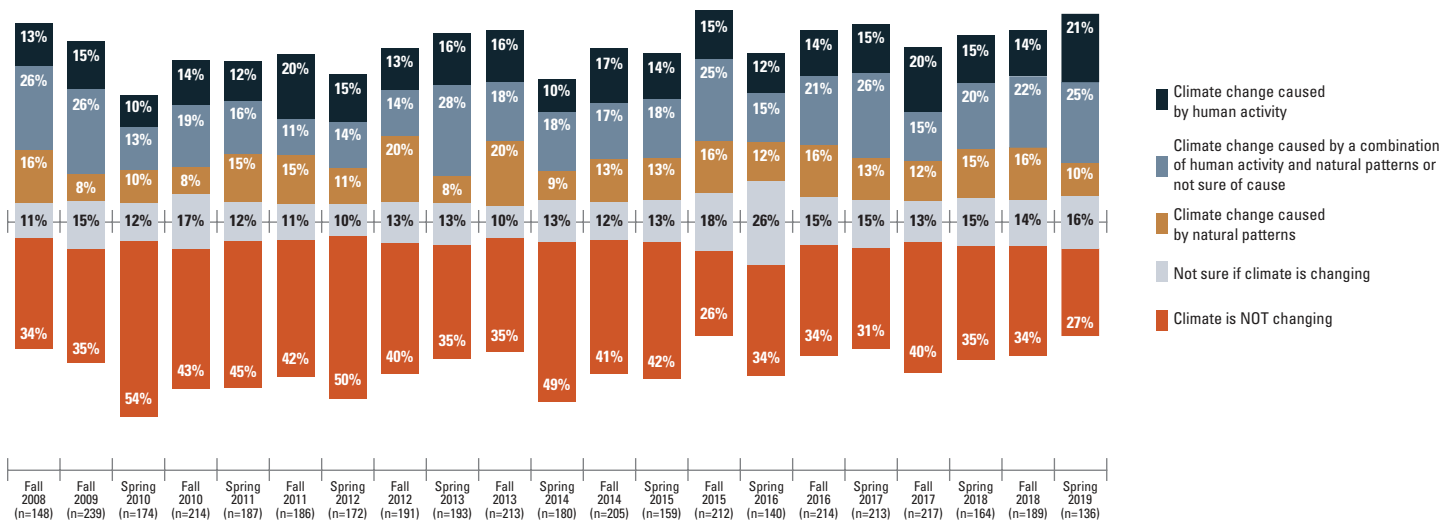
Figure 6. Democrats' views on the existence and causes of climate change, 2008-2019^{a,c}



Source: Fall 2008 – Spring 2019 NSEE waves

Since 2008, the largest percentage of Republicans who indicated that there is human-influenced global warming was 46% in Spring 2019 (see *Figure 7*). This is significantly lower than the 80% of Democrats and 59% of Independents who said there is evidence of human-influenced global warming in the Spring 2019 NSEE wave.

Figure 7. Republicans' views on the existence and causes of climate change, 2008-2019^{a,c}



Source: Fall 2008 – Spring 2019 NSEE waves

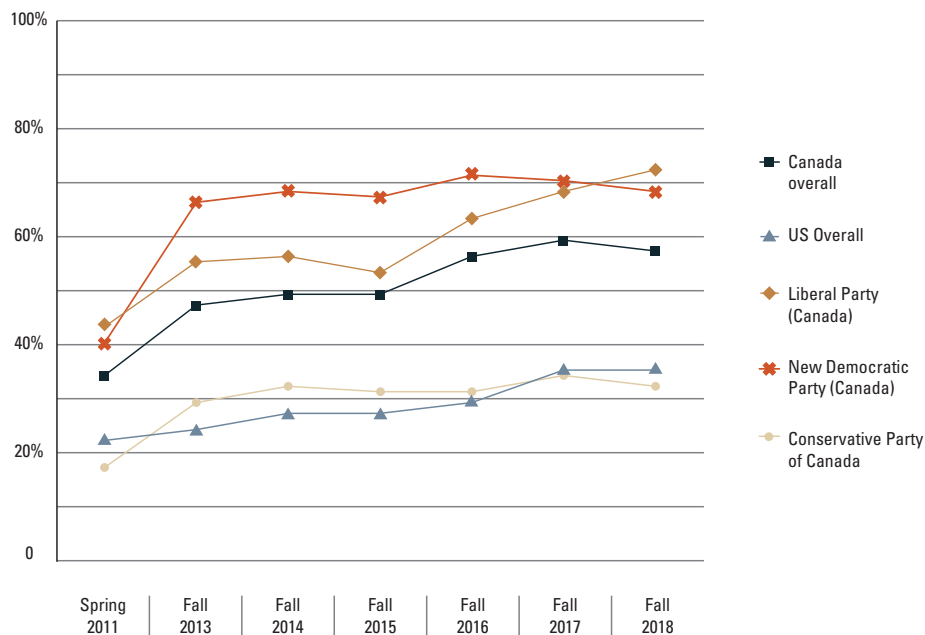
Canada Corner: A Majority of Canadians Attribute Warming to Human Activity

While the vast majority of Canadians perceive the planet is warming, this does not necessarily translate into an understanding of the primary cause. The CSEE’s findings on the percentage of Canadians who perceive solid evidence and who attribute climate change primarily to human activity has largely mirrored what the NSEE has found among Americans, though again with a 15- to 20-point spread (see figure below).

Supporters of Canada’s left-of-center New Democratic Party (NDP) have historically been the most likely to attribute global warming to human activity, though in recent years views on this question between supporters of the NDP and Liberal Party of Canada (LPC) have been statistically indistinguishable. Both, notably, have been consistently more likely to attribute climate change primarily to human activity than have been Democrats in the US (compare figure below to *Figure 6*).

Meanwhile, between 2011 and 2014, attitudes among supporters of the Conservative Party of Canada (CPC) appeared to have been converging with those of other Canadians, but since 2015, this trend appears to have been reversed. Although supporters of the CPC were increasingly more likely to perceive “solid evidence” of global warming (refer to page 5), they have been increasingly less likely to attribute this warming to human activity, at least since 2015. This corresponds to the year CPC member Stephen Harper lost the election to the LPC candidate Justin Trudeau after a near decade-long stay in power, and the moment at which climate change policy resurfaced on Canada’s political agenda. Notably, though, even in these most recent years, Canadian conservatives have attitudes about anthropogenic climate change consistent with the average American, and have been significantly more likely than US Republicans (refer to *Figure 7*) to attribute climate change to human activity.

Percent who say warming is mostly caused by human activity by country, Canadian party affiliation



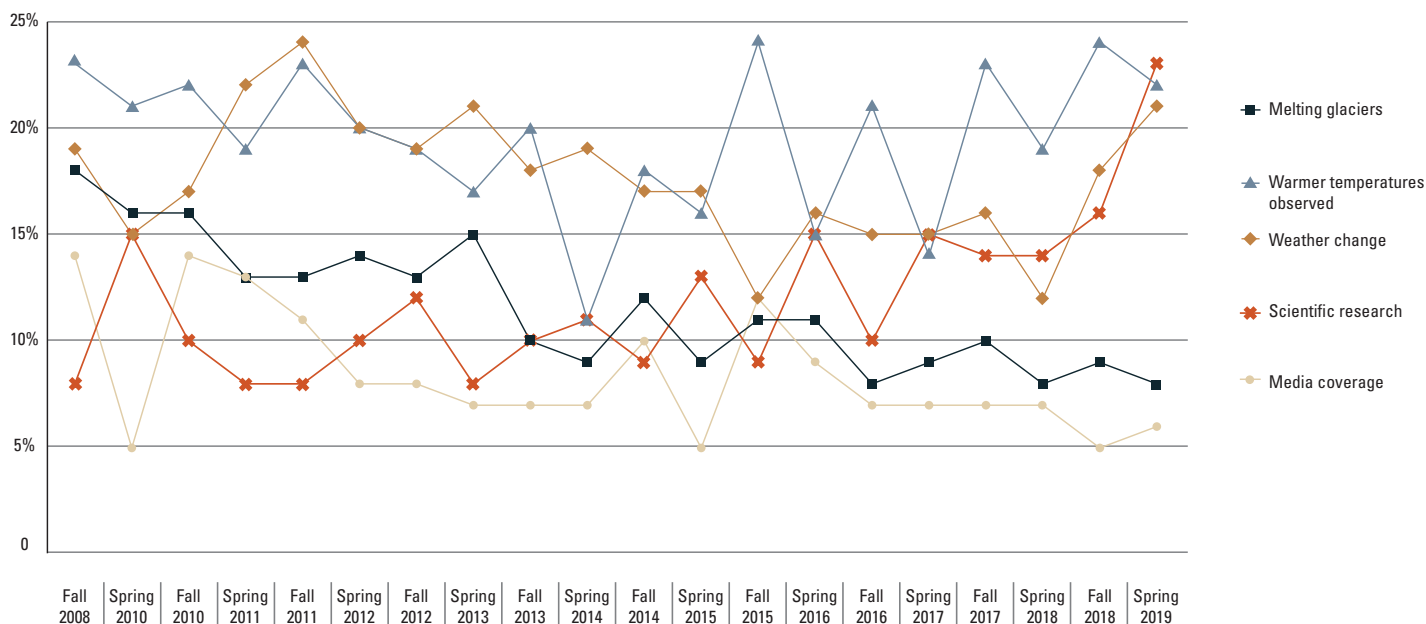
Source: NSEE and CSEE Surveys, 2011-2018
 Question text: See Footnotes a and c

Personal Observations and Arctic Impacts Influence Attitudes on Climate Change

One of the key features of the NSEE has been its focus on the factors that individuals cite as the reasons for their views. Survey respondents have been asked to identify the factor that most influences their positions on the existence of global warming and the relative impact of an array of factors in shaping their beliefs on the matter. Among Americans who think that climate change is occurring, a number of factors are commonly cited as the primary reason for their belief that temperatures on the planet are rising. When asked in an open-ended form, “What is the primary factor that caused you to believe that temperatures on earth are increasing?,” respondents over the last decade have most commonly cited observations and experiences with higher temperatures and changes in weather. As can be seen in *Figure 8*, experiences with higher temperature and changed weather have been consistently identified as among the most influential factors in determining acceptance of global warming, with about 4 in 10 respondents citing these factors as key to their conclusion that global warming is occurring.

A few examples from the Spring 2019 NSEE are illustrative of these responses. When asked to identify the primary factor for his acceptance of global warming, a middle-aged man from Indiana said that, “Summers are warmer and winters not as cold,” while another male respondent in his 50s from Oregon simply said, “I see it and feel it.” Additionally, a female respondent in her late 40s from Connecticut said, “Winters were colder and snowier,” and a senior citizen from Michigan said, “I pay attention to our weather.” These comments are indicative of the large number of individuals who tie personal experiences with heat and weather to their belief that global warming is happening.

Figure 8. Primary factor influencing belief that temperatures are rising, among Americans who think global warming is occurring^d



Source: Fall 2008 – Spring 2019 NSEE waves

Note: See Note 13 on page 19 for the sample size for each of the waves shown in the figure

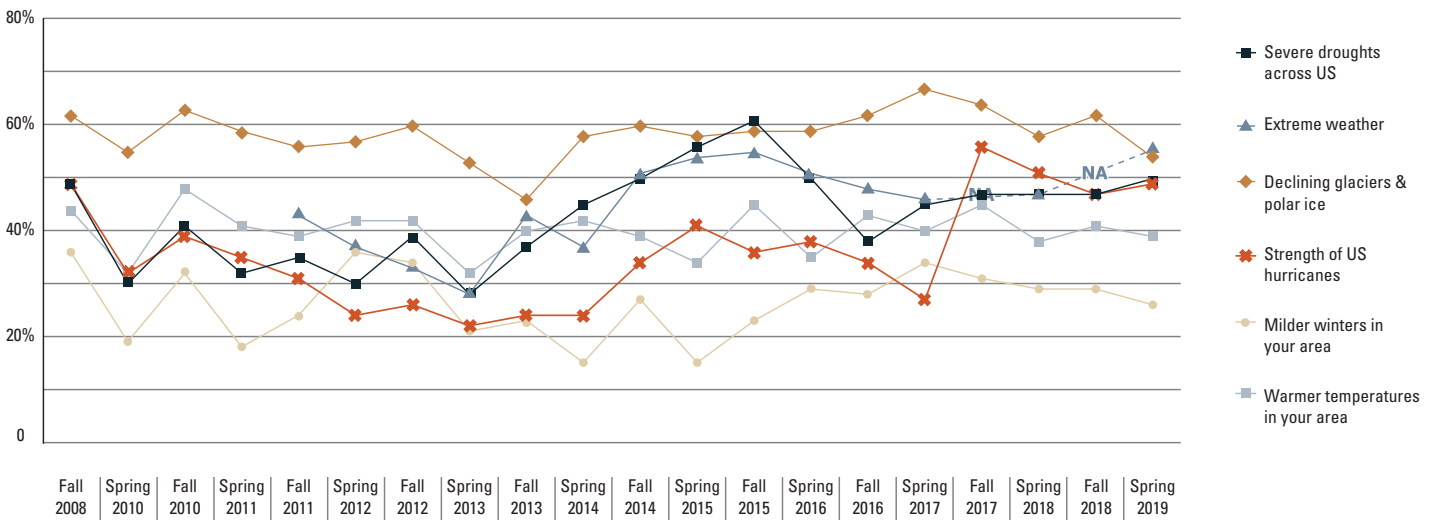
Note: Additional response categories not shown: Al Gore documentary, Declining species, Human activity, Natural patterns, Ocean/sea-level rise, Religious factors, Population growth, Growing season/plants, Not sure/Other¹⁴

^d Question text: “What is the primary factor that has caused you to believe that temperatures on earth are increasing?”

In addition to the open-ended responses regarding the primary factors behind individual acceptance of global warming, the NSEE includes a battery of questions examining the relative influence of an array of factors on perceptions of global warming. The battery examines the degree to which factors including declining polar and glacial ice, the strength of hurricanes, severe droughts, extreme weather events, and mild winters affect individual perceptions that global warming is occurring.

The results over the last decade indicate that “declining glaciers and polar ice” is consistently identified by respondents as having the largest effect on their acceptance of global warming (see Figure 9). Since being added as an option in 2011, the category “extreme weather events” has been among the factors that respondents say has the largest effect on their position that global warming is occurring, including in the latest iteration (Spring 2019) when more respondents (56%) said this factor influenced their appraisal than any other option.

Figure 9. Percent of Americans who say various factors have a very large effect on their belief that temperatures are increasing, among Americans who think global warming is occurring^e



Source: Fall 2008 – Spring 2019 NSEE waves
 Note: See Note 15 on page 20 for the sample size for each of the questions shown in the figure

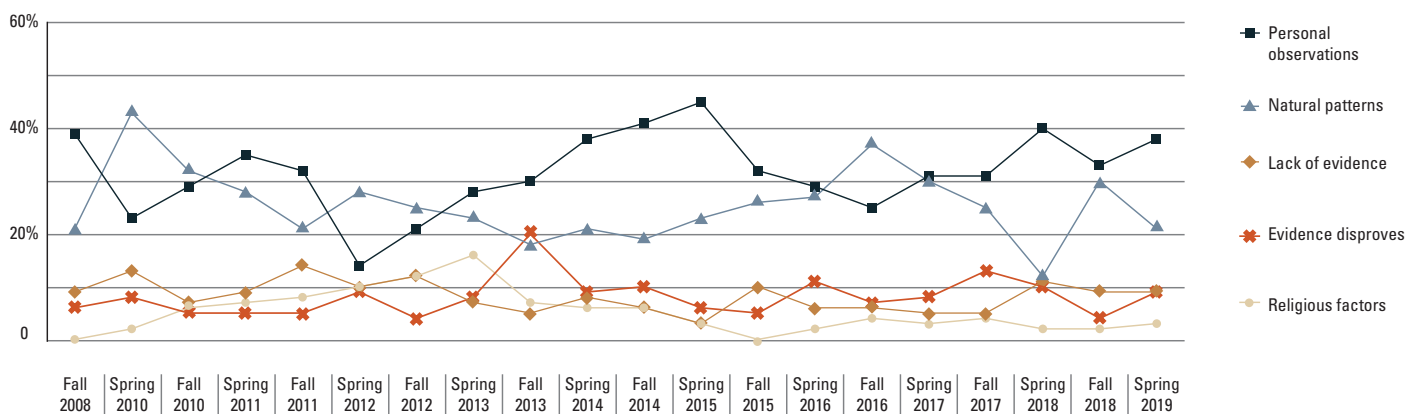
^e Question text: “Next I would like to read you a list of factors that may or may not have had an effect on your view that the earth is getting warmer. For each factor that I mention please indicate if it has had a very large, somewhat large, not too large, or no effect on your view that the earth is getting warmer. ... Declining glaciers and polar ice throughout the globe; ...Warmer temperatures in your area during recent years; ...The strength of hurricanes hitting the United States; ...Milder winters in your area; ...Severe droughts in areas across the United States.”

Climate Skeptics Also Point to Personal Observations as Influencing their Attitudes

As with those that believe there is solid evidence of global warming, individuals skeptical of global warming were asked to identify the primary factor that leads them to their conclusion on the matter. Since 2008 an array of factors have been identified by skeptics as the major factor that leads them to doubt the existence of global warming, with their own experiences and observations regularly among the most commonly-cited factors (see *Figure 10*). Some examples from the Spring 2019 wave are indicative of the common theme of personal experiences affecting evaluations of evidence of global warming. When asked to identify the main factor underlying their skepticism an elderly male from New Hampshire said, “Everything is the same as when I was a kid,” while a male in his mid-forties from California stated, “It still gets cold where I live.”

In addition to personal experiences, individuals have often identified the existence of natural weather cycles as playing a central role in their skepticism about the existence of global warming. In regard to the primary factor behind his skepticism, a middle-aged male respondent from Tennessee told an NSEE interviewer that, “It ebbs and flows over the course of a lifetime,” with an elderly female from New Jersey telling her interviewer that her main reason for skepticism is a “thousand year cycle that repeats itself.”

Figure 10. Primary factor influencing belief that temperatures are not rising, among Americans who think global warming is not occurring^f



Source: Fall 2008 – Spring 2019 NSEE waves

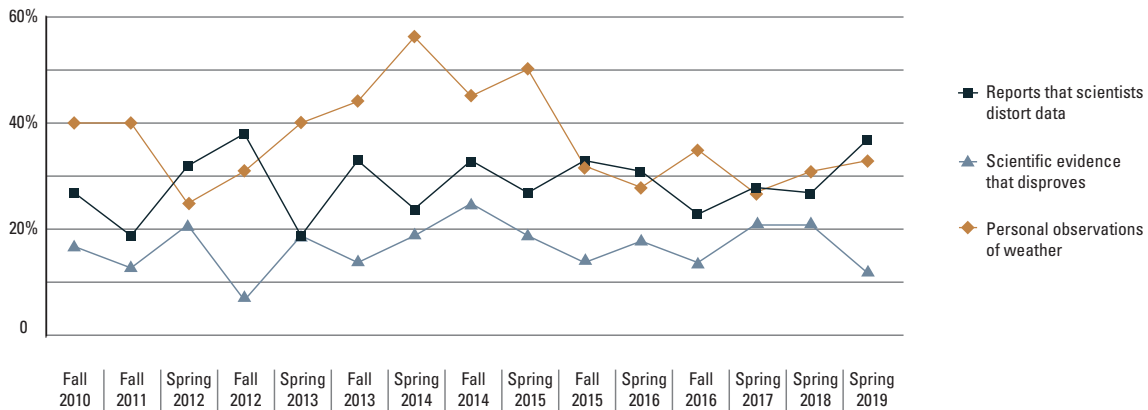
Note: See Note 16 on page 20 for the sample size for each of the waves shown in the figure.

Note: Additional response categories not shown: Media has misled, Political factors, No particular reason, Not sure/Other¹⁷

^f Question text: “What is the primary factor that makes you believe that temperatures on earth are not increasing?”

Individuals who are skeptical about the existence of global warming have also been regularly asked to identify the relative effects of a number of factors on their views regarding climate change. As with the open-ended question format, personal observations of weather have been regularly identified as having the largest impact on individual views that global warming is not occurring (see *Figure 11*). The one factor tested in the NSEE that has occasionally surpassed personal experiences in influencing skepticism regarding global warming is the proposition that scientists have been distorting climate data to demonstrate that global warming is occurring. In the wake of the release of hacked e-mails from climate scientists in 2010 that some claimed demonstrated efforts to distort findings to show greater evidence of global warming, those who doubt the existence of climate change have been more likely to point to distortion of data as having a “very large” or “somewhat large” effect on their view that there is not solid evidence of global warming.¹⁸

Figure 11. Percent of Americans who say various factors have a very large effect on their belief that temperatures are not increasing, among Americans who think global warming is not occurring^g



Source: Fall 2008 – Spring 2019 NSEE waves

Note: See Note 19 on page 21 for the sample size for each of the questions shown in the figure

Trust in Scientists

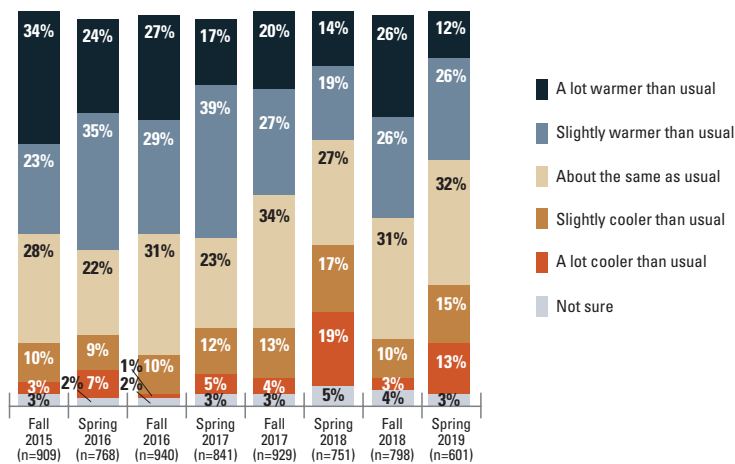
On both the Fall 2014 and Fall 2015 surveys, the NSEE asked all respondents (not just those who said they do not believe there is evidence that the earth is warming) how much they trust scientists as a source of information about global warming. While fewer than half of those who doubt the existence of global warming say they trust scientists, a majority of Americans—59% on the 2014 poll and 69% on the 2015 survey—said that they do trust scientists.²⁰ Among those who say there is evidence that the earth is warming, the numbers are even higher.

^g Question text: “Next I would like to read you a list of factors that may or may not have had an effect on your view that global warming is not occurring. For each factor that I mention please indicate if it has had a very large, somewhat large, not too large, or no effect on your view that global warming is not occurring. ... Your personal observations of weather in your area; ... Scientific evidence that disproves the existence of global warming; ... Reports that climate scientists have distorted data to demonstrate that global warming is occurring”

Attitudes about Climate Change and Perceptions of Weather Are Linked

The relationship between weather and perceptions of climate change has been a focus of many waves of the NSEE since its inception in 2008. As noted previously, individuals regularly cite their observations and experiences with weather as a key factor in their views on the existence of global warming. But do the perceptions of the existence of global warming affect the way that Americans evaluate their weather? In recent years, the NSEE has included a battery of questions that ask Americans to evaluate aspects of weather in their area of residence during the season that preceded their interview (e.g., evaluation of summer weather in surveys fielded in the Fall, and winter weather in surveys fielded in the Spring.) The results of these findings indicate after most seasons since 2016 Americans are more likely to describe their local weather during those seasons as warmer rather than cooler (see *Figure 12*). Only after the winter of 2018 did slightly more NSEE respondents say the previous season was cooler (36%) than warmer (33%).

Figure 12. American perceptions of their local weather in the past summer (Fall waves) or winter (Spring waves)^h



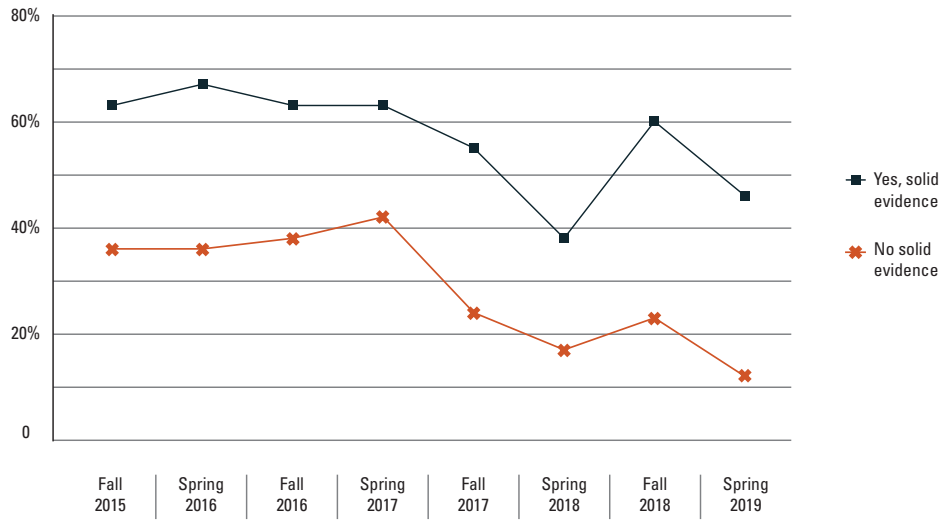
Source: Fall 2015 – Spring 2019 NSEE waves

^h Question text (on Fall surveys): “In general how would you describe the overall weather in your area this past summer? Would you say it was a lot warmer than usual, slightly warmer than usual, slightly cooler than usual, a lot cooler than usual, or about the same as usual?”

Question text (on Spring surveys): “In general how would you describe the overall weather in your area this past winter? Would you say it was a lot warmer than usual, slightly warmer than usual, slightly cooler than usual, a lot cooler than usual, or about the same as usual?”

The appraisals of local seasonal weather appear significantly different among those who think climate change is occurring and those who do not. Those who say there is evidence of global warming are significantly more likely to report seasonal temperatures in their area were warmer than usual (see *Figure 13*). Conversely, those who do not think there is solid evidence of global warming are more likely to report that seasonal temperatures are about the same as usual. Such differences suggest a degree of motivated reasoning in terms of American perspectives on the weather they are experiencing.

Figure 13. Percent of Americans who say local weather was warmer in the past summer (Fall waves) or winter (Spring waves), by whether respondent believes there is evidence of global warming^{b,a}



Note: See Note 21 on page 21 for the sample size for each of the groups shown in the figure

Conclusion

Since the initial NSEE survey in Fall 2008, evidence of global warming has become increasingly identified by the scientific community. Major reports from the International Panel on Climate Change in 2014, 2015, and 2017, along with studies from domestic sources including NASA and NOAA, have detailed an array of findings that demonstrate rising global temperatures and resulting effects on earth's ecosystems.

Over this same time span, American public opinion regarding evidence of global warming has demonstrated considerable variation, including a significant decline in acceptance around 2010. Yet in the past few years American beliefs regarding global warming appear to be stabilizing at a level where roughly 7 out of 10 Americans see solid evidence of rising temperatures on the planet. To be clear, the broad acceptance of global warming among Americans in some ways masks continued differences on the causes of global warming and climate policy alternatives that are under consideration. Nevertheless, acceptance by Americans that global warming is happening is in all likelihood a necessary, if not sufficient, condition for one of the world's largest emitters of greenhouse gases to more fully engage on the matter.

Methods

The NSEE is a biannual telephone survey of a random sample of adult (age 18 and over) residents of the United States. The sample size, balance of landline and cell phone numbers, and response rate varies from wave to wave. Methodological details about each of the survey waves are available on the CLOSUP website: www.closup.umich.edu/nsee.

The CSEE have (to date) been conducted concurrently with the fall wave of the NSEE. Like the American surveys, the CSEE surveys use random digit dialing (RDD) of landline and cell phones to generate a probabilistic, nationally representative sample of adult (18 and over) residents of Canada. The sample size, balance of landline and cell phone completes, and response rates vary from wave to wave and have been compiled on the CLOSUP website: www.closup.umich.edu/nsee.

Funding, Financial Disclosure, and Research Transparency

Funding for the NSEE surveys to-date has been provided by general revenues of the University of Michigan Center for Local, State, and Urban Policy, and the Muhlenberg College Institute of Public Opinion. The authors did not accept any stipend or supplemental income in the completion of the survey or the reports from this survey. The NSEE is committed to transparency in all facets of our work, including timely release and posting of data from each survey wave, including providing online access to NSEE survey instruments, data tables, and downloadable datasets.

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Notes

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6. The sample size for each of the groups shown in *Figure 3* is:

	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014
Democrat	197	345	236	374	248	284	230	312	317	318	291	328
Independent	151	309	217	206	184	259	190	281	229	301	216	268
Republican	148	239	175	215	187	185	173	191	192	213	181	205

	Spring 2015	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019
Democrat	262	321	251	309	281	270	224	231	173
Independent	174	262	201	295	229	264	229	252	133
Republican	159	213	140	214	213	217	165	189	136

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8. The sample size for each of the groups shown in *Figure 4* is:

	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013
Catholic	171	263	203	280	188	321	201	235	219	242
Evangelical Christian	90	126	127	121	138	109	97	105	123	87
Non-evangelical Protestant	89	142	136	220	166	188	189	198	226	277
All others (including other religions, agnostics, and atheists)	181	341	154	209	149	198	166	264	202	253

	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Spring 2019
Catholic	204	232	202	238	173	258	211	207	183	151
Evangelical Christian	90	116	70	98	60	97	96	126	94	61
Non-evangelical Protestant	263	253	203	225	152	203	185	193	96	101
All others (including other religions, agnostics, and atheists)	164	227	184	283	245	282	254	291	276	195

9. The percent of Americans who say that there is solid evidence of global warming, by racial identity:

	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013
White	68%	61%	49%	59%	52%	64%	66%	67%	65%	59%
African-American	83%	81%	71%	58%	67%	58%	70%	73%	60%	70%
Hispanic/Latino	92%	75%	60%	43%	59%	65%	57%	69%	59%	59%
All others	73%	82%	61%	71%	76%	52%	68%	73%	57%	70%

	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Spring 2019
White	53%	58%	60%	69%	64%	67%	67%	67%	69%	65%
African-American	57%	64%	68%	75%	63%	77%	79%	77%	87%	87%
Hispanic/Latino	57%	59%	69%	74%	72%	72%	79%	78%	79%	82%
All others	61%	63%	61%	67%	69%	81%	69%	69%	76%	72%

Source: Fall 2008 – Spring 2019 NSEE waves

Note: “All others” includes respondents who identified as Asian, Native American, Mixed Race, or other.

Note: For frequencies for racial identity for each wave, see http://closup.umich.edu/national-surveys-on-energy-and-environment/nsee-data-tables/search/nsee-search.php?searchterm=demog_race&use_type=search

10. Kennedy, C., & Lindsey, R. (2015, June 17). *What’s the difference between global warming and climate change?* Washington, DC: National Oceanic and Atmospheric Administration. Retrieved from <https://www.climate.gov/news-features/climate-qa/whats-difference-between-global-warming-and-climate-change>

11. Concern about “global warming” vs. “climate change,” by whether respondent says there is solid evidence of global warming

	Yes, solid evidence		No solid evidence	
	“Global warming” (n=301)	“Climate change” (n=279)	“Global warming” (n=115)	“Climate change” (n=120)
Very concerned	40%	37%	0%	3%
Somewhat concerned	47%	48%	7%	7%
Not too concerned	10%	11%	23%	43%
Not concerned at all	3%	4%	70%	30%
Not sure	0%	0%	0%	0%

Source: Fall 2013 NSEE

Question text: “How concerned are you about the issue of [global warming/climate change]? Are you very concerned, somewhat concerned, not too concerned, or not concerned at all about the issue of [global warming/climate change]?”

12. What comes to top of mind when hear the term “global warming” vs. “climate change,” by whether respondent says there is solid evidence of global warming

	Yes, solid evidence		No solid evidence	
	“Global warming” (n=285)	“Climate change” (n=278)	“Global warming” (n=131)	“Climate change” (n=90)
Warmer/increasing temperatures	16%	19%	9%	8%
Changing weather and temperatures	17%	39%	8%	26%
Glaciers melting/Polar ice	16%	3%	2%	4%
Politics	1%	2%	14%	9%
Al Gore	6%	1%	5%	3%
Ocean/Sea level rise	3%	1%	0%	0%
Nothing/Not sure	3%	3%	8%	3%
Other	19%	19%	14%	18%
Hoax/Fraud/Hype	1%	1%	37%	24%
Global warming	5%	6%	1%	1%
Fossil fuels/Carbon dioxide	10%	4%	2%	2%
Concern/Danger/Serious threat	3%	2%	0%	1%

Question text: “Now please tell me what is the first thing that comes to mind when you hear the term [global warming / climate change]?”

13. The sample size for each of the waves shown in *Figure 8* is:

Fall 2008	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014
435	369	530	400	550	474	623	542	578	435

Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019
564	458	636	499	659	586	650	547	579	425

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14. Frequencies for these other responses to the open-ended question are available through the NSEE Question Database, available at http://closup.umich.edu/national-surveys-on-energy-and-environment/nsee-data-tables/search/nsee-search.php?searchterm=believer_factor_open

15. The sample size for each of the questions shown in *Figure 9* is:

	Fall 2008	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014
Severe droughts across US	435	367	530	400	550	469	611	541	579	435	565
Extreme weather	NA	NA	NA	NA	551	468	611	541	579	436	564
Declining glaciers & polar ice	435	368	530	400	550	471	619	541	579	434	564
Strength of US hurricanes	435	368	527	398	550	470	614	542	578	435	566
Milder winters in your area	435	368	530	400	549	469	613	541	579	435	564
Warmer temps in your area	435	369	529	400	550	470	616	542	579	434	565

	Spring 2015	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019
Severe droughts across US	470	637	503	659	586	649	547	574	425
Extreme weather	471	636	503	658	586	NA	547	NA	425
Declining glaciers & polar ice	469	636	503	659	588	650	547	574	425
Strength of US hurricanes	471	636	502	658	588	649	547	576	425
Milder winters in your area	470	637	503	659	586	648	547	575	425
Warmer temps in your area	471	636	502	658	587	650	547	579	425

16. The sample size for each of the waves shown in *Figure 10* is:

Fall 2008	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014
100	252	241	225	228	174	194	184	237	265

Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019
219	176	141	117	156	156	169	112	127	78

17. Frequencies for these other responses to the open-ended question are available through the NSEE Question Database, available at http://closup.umich.edu/national-surveys-on-energy-and-environment/nsee-data-tables/search/nsee-search.php?searchterm=nonbeliever_factor_open

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19. The sample size for each of the questions shown in *Figure 11* is:

	Fall 2010	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014
Scientists distort data	243	227	175	193	185	235	264
Scientific evidence disproves	239	228	152	192	183	235	263
Personal observations of weather	240	229	174	193	184	236	264

	Fall 2014	Spring 2015	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Spring 2018	Spring 2019
Scientists distort data	221	180	141	118	158	155	110	78
Scientific evidence disproves	221	180	141	119	156	156	109	78
Personal observations of weather	220	180	141	118	157	156	112	78

20. Data is available through the NSEE Question Database, available at http://closup.umich.edu/national-surveys-on-energy-and-environment/nsee-data-tables/search/nsee-search.php?searchterm=science_trust&use_type=search

21. The sample size for each of the groups shown in *Figure 13* is:

	Fall 2015	Spring 2016	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019
Yes, solid evidence	637	503	658	586	649	548	578	425
No solid evidence	141	119	157	157	171	112	128	77

Reports from National Surveys on Energy and Environment

Adaptation, Mitigation, and Geoengineering: 10 Years of Climate Action in the NSEE (December 2018)

Findings from the Fall 2018 NSEE (November 2018)

Global Warming and the American Voter in the 2018 Midterms: Perspectives from the Fall 2018 NSEE (October 2018)

Solar, Wind, and State Mandates: 10 Years of Renewable Energy in the NSEE (October 2018)

Fuel Economy, Electric Vehicle Rebates, and Gas Taxes: 10 Years of Transportation Policies in the NSEE (July 2018)

As Americans Experienced the Warmest May on Record Their Acceptance of Global Warming Reaches a New High (July 2018)

Federalism and California's Role in Light-Duty & Heavy-Duty Vehicle Emissions Standards (July 2018)

American Opinions on Carbon Taxes and Cap-and-Trade: 10 Years of Carbon Pricing in the NSEE (June 2018)

Should State and Local Governments Address Climate Change? 10 Years of Climate Federalism in the NSEE (March 2018)

Coal, Natural Gas, and Pipelines: 10 Years of Fossil Fuels in the NSEE (February 2018)

A Majority of Americans Support Net Energy Metering (September 2017)

Strong Public Support for State-level Policies to Address Climate Change (June 2017)

Moving the needle on American support for a carbon tax (March 2017)

Fewer Americans Doubt Global Warming is Occurring (August 2016)

American Views on Fracking (May 2016)

American Attitudes about the Clean Power Plan and Policies for Compliance (December 2015)

Acceptance of Global Warming Rising for Americans of all Religious Beliefs (November 2015)

Acceptance of Global Warming Among Americans Reaches Highest Level Since 2008 (October 2015)

Belief in Global Warming Among Americans Gradually Increases Following the Winter of 2015 (July 2015)

Cap-and-Trade Support Linked to Revenue Use (June 2015)

Widespread Public Support for Renewable Energy Mandates Despite Proposed Rollbacks (June 2015)

Acceptance of Global Warming Among Americans Moderately Increases in Late 2014 (February 2015)

Public Support for Regulation of Power Plant Emissions Under the Clean Power Plan (January 2015)

Public Opinion on Hydraulic Fracturing in the province of Quebec: A Comparison with Michigan and Pennsylvania (October 2014)

Public Perceptions of Shale Gas Extraction and Hydraulic Fracturing in New York and Pennsylvania (September 2014)

Public Views on a Carbon Tax Depend on the Proposed Use of Revenue (July 2014)

American Acceptance of Global Warming Retreats in Wake of Winter 2014 (June 2014)

Public Opinion on Climate Change and Support for Various Policy Instruments in Canada and the US (June 2014)

The Decline of Public Support for State Climate Change Policies: 2008-2013 (March 2014)

The Chilling Effect of Winter 2013 on American Acceptance of Global Warming (June 2013)

Public Opinion on Fracking: Perspectives from Michigan and Pennsylvania (May 2013)

NSEE Findings Report for Belief-Related Questions (March 2013)

NSEE Public Opinion on Climate Policy Options (December 2012)

All NSEE reports are available online at: <http://closup.umich.edu/national-surveys-on-energy-and-environment/>



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