

KILLER HEAT

DANGEROUSLY HOT DAYS AHEAD

New UCS analysis shows that reducing emissions now can help avoid the worst increases in extreme heat where you live.

BY PAMELA WORTH

Last July, on a trip to visit friends in Montreal, my partner and I arrived to find the city in the midst of a sweltering heat wave. The apartment we stayed in, like many homes in the city, didn't have air conditioning and the 100-degree heat made it stifling inside even with windows wide open. When we returned from dinner, hours after the sun had set, the heat still hadn't broken. If anything, it felt hotter.

I've experienced many hot, humid summers along the eastern seaboard. I've even lived in Trinidad, about 10 degrees north of the equator. But until that night, I had never been so hot that I couldn't sleep. I had never been so hot that the visceral chill of a freezing-cold shower wore off in seconds. I'd never thought I could be so hot—in Canada, of all places.

The heat wave broke the next day, and I felt only relief, until I saw a startling headline in a newspaper: in Montreal and the surrounding province, the extreme heat had killed 70 people. The city morgue couldn't accommodate all the bodies.

As some of the more immediate and dramatic consequences of climate change brought on by burning fossil fuels become increasingly visible—like wild storms, rising seas, and raging wildfires—they draw our attention. But extreme heat is the deadliest weather hazard we face, killing more people in the United States each year than hurricanes, floods, lightning strikes, tornadoes, or even frigid cold.





Many of us have never felt off-the-charts heat, but many more of us will be exposed in the coming years.

WHAT IS “OFF-THE-CHARTS” HEAT?

We use this term to describe conditions for which a heat index cannot be calculated using the current National Weather Service formulas. Those formulas were designed to capture all but the most extreme heat people have typically experienced, and they top out at or above a heat index of 127°F, depending on the particular combination of temperature and humidity. Our modeling reported conditions higher than these values.

As climate change drives conditions to new extremes, we will increasingly find ourselves above the top range of heat index values the NWS reports, which the agency already characterizes as extremely dangerous. Prolonged exposure to these extremely dangerous conditions can lead to illness or death. A heat index that is “off the charts,” or above that extremely dangerous range, is presumably more lethal, although few medical studies exist.

“OFF-THE-CHARTS” HEAT

Dahl and her team projected future extreme heat using the heat index, or “feels-like” temperature, established by the National Weather Service (NWS). Heat index factors in not only thermometer readings but also humidity, which can make it feel much hotter. The NWS uses the heat index to issue public alerts about the likelihood of heat-related illnesses or death as those values climb. Alerts vary by region—because extreme heat affects people differently depending on whether they are regularly exposed to hot weather—but are generally issued when the heat index is forecast to rise above 100°F or 105°F for 48 hours or more.

To show how many more days would hit those high “feels-like” temperatures, the *Killer Heat* team compared historic averages from the period 1971–2000 with projected heat index values in the middle and end of this century. Alarmingly, the team’s projections soon bumped up against the limits of the NWS heat index formula, which is capable of calculating a value for 99 percent of current summertime conditions. The analysis found that as climate change intensifies extreme heat, the numbers will often rise beyond the calculable range—or quite literally off the charts (see the box). The UCS team accounted for these off-the-charts days as well.

“Many of us have never felt off-the-charts heat,” Dahl says. “The Sonoran Desert near the Mexican border is the only place

As heat-trapping emissions continue to rise, there will be fewer refuges from dangerously high temperatures, according to new research from the Union of the Concerned Scientists. *Killer Heat in the United States: Climate Choices and the Future of Dangerously Hot Days*, a report released this July, projects the frequency and intensity of the heat we can expect over the rest of this century. The findings point to a dramatic increase in lethal heat across the country, and troubling outcomes for public health. While some populations are more vulnerable to heat—including both elderly people and young children (whose bodies are less capable of regulating heat), outdoor workers, and people who either don’t have air conditioning or can’t afford to keep theirs on—*everyone* is susceptible to serious heat-related

illnesses above certain thresholds. “Extreme heat will likely affect more Americans in more locations, over more of their lives, than any other consequence of climate change,” says Kristina Dahl, senior climate scientist at UCS and lead author of the report. “Within the next 30 years, many people in the United States will be faced with heat unlike any they’ve felt before.”

If we remain on our current path of emissions, Dahl says, hazardously hot days will increase steeply in frequency and severity in just the next few decades, threatening the health, lives, and livelihoods of many millions of people. Such heat will likely make droughts and wildfires more severe, threaten our ecosystems, cause crops to fail, and reduce the reliability of the infrastructure we depend on.

in the United States right now where people experience maybe two days like that in an average year. But many more of us will be exposed in the coming years.”

Because the choices we make today will affect the frequency and intensity of future extreme heat, Dahl and her team ran models for three possible futures: one in which we allow emissions to keep rising, one in which we start taking moderate action to reduce emissions starting around 2050, and one in which we act decisively on emissions to limit future warming to 2°C above pre-industrial levels. The differences among these scenarios show clearly that our failure to act will lead to a dangerously hot future, while quickly and drastically reducing emissions can spare millions of people from deadly increases in summer heat.

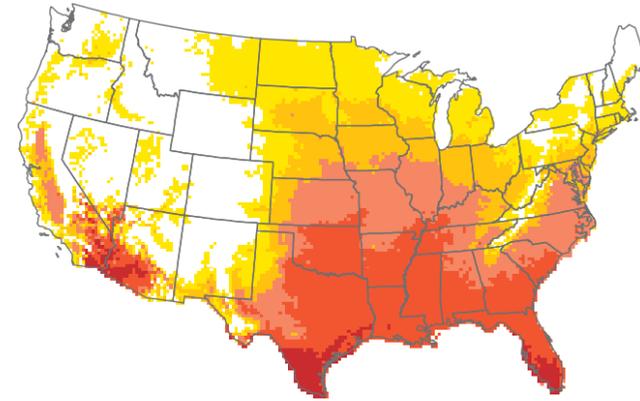
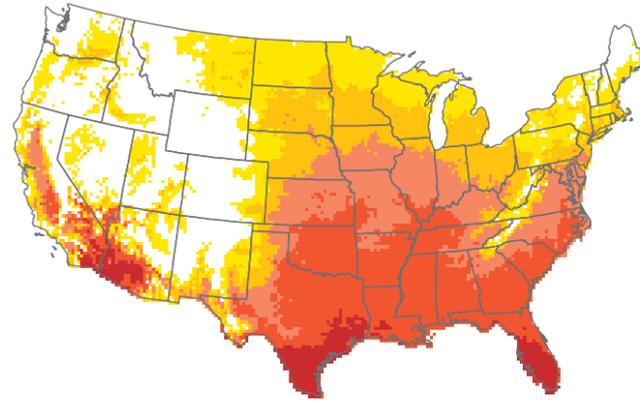
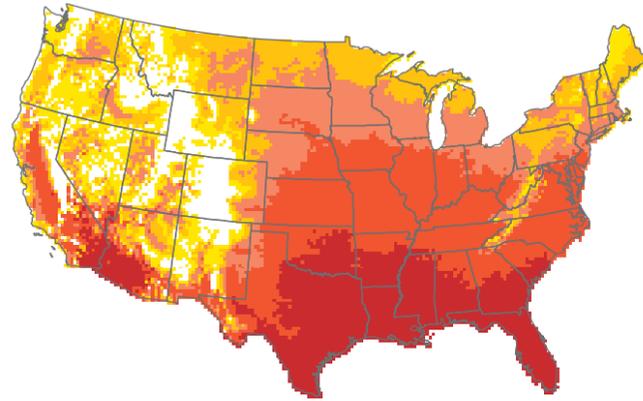
“It’s literally a matter of degrees,” says Dahl. “Every tenth of a degree we can avoid adding globally will make a difference.”

THE FREQUENCY OF EXTREME HEAT BY LATE CENTURY DEPENDS ON THE CHOICES WE MAKE

LATE CENTURY: NO ACTION

LATE CENTURY: SLOW ACTION

LATE CENTURY: RAPID ACTION



AVERAGE DAYS PER YEAR WITH A HEAT INDEX ABOVE 100°F

□ 0-1	■ >1-10	■ >10-25	■ >25-50	■ >50-100	■ >100-200
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The emissions choices we make in the coming decades will profoundly shape the frequency and severity of extreme heat later this century. If we take rapid action to reduce global emissions, the contiguous United States would experience about half as many days with a heat index above 100°F in late century as it would with no action at all.

THE CONSEQUENCES OF INACTION

Using the historical baseline of 1971–2000, Dahl’s team projects that with no action to reduce heat-trapping emissions, there will be twice as many days in an average year with a heat index over 100°F, and four times the number of days over 105°F, by midcentury. More than one-third of the contiguous United States by area will experience off-the-charts heat. And whereas fewer than 900,000 people in the United States currently endure 30 days or more with a heat index above 105°F in an average year, 91.9 million people—or about a third of the current population—will have to adapt to those conditions within the next few decades.

By late century, the numbers are even more stark. On average, there will be four times the number of days per year with a heat index above 100°F, and eight times as many above 105°F. At least once each year, off-the-charts heat will affect more than 60 percent of the contiguous United States by area. Nearly 300 urban areas will endure 30 or more days per year with a heat index above 105°F.

WHAT TO EXPECT WHERE YOU LIVE

Extreme heat will affect different regions in different ways. Some states where residents are currently unaccustomed to extreme heat—including those in New England, the Midwest, and the

Pacific Northwest—may not have the infrastructure needed to keep people safe during ever more frequent extreme heat conditions. And residents of states such as Florida, Louisiana, and Texas, who are used to weeks of heat indices above 105°F, will have to adapt to months and months of such extremes. Some states are likely to experience heat so extreme and frequent that they may see an exodus of residents.

To find the team’s heat index projections for your location, go to www.ucsusa.org/killer-heat. You’ll be able to see how many days your region is expected to endure heat indices above 90°F, 100°F, and 105°F—or conditions that are off the charts. You’ll also be able to see how dramatically reducing emissions can avoid the worst outcomes.

As Dahl notes, the differences among outcomes show up most clearly in the end-of-century results (see the maps above). While even aggressive emissions reductions cannot fully prevent temperatures from rising, they can help to stabilize temperatures in the years ahead.

“We don’t have long to act, but we still do have a choice,” she says. (See the box for ways to take action.) “I think of it in terms of my kids: this warmer world isn’t what I would have wanted for them. But we can still make it manageable for them to live their lives. Or we can force them—their generation and the ones to come—to live in a world where simply going outside in the summer will be unacceptably dangerous.” {C}

HOW YOU CAN FIGHT BACK

We don’t have to stand by while emissions and temperatures rise. Call, email, or meet with your legislators and urge them to:

- Support global climate action, including US participation in the Paris climate agreement
- Create extreme heat adaptation and emergency response plans
- Expand funding for programs that provide cooling assistance to low- and fixed-income households
- Direct the Occupational Safety and Health Administration to set heat-protective standards for outdoor and indoor workers
- Invest in heat-resilient infrastructure (e.g., train tracks that won’t buckle; roads that won’t melt)
- Create and strengthen policies to reduce transportation emissions
- Invest in renewable energy, energy efficiency, and new low-carbon energy technologies
- Put an economy-wide price on carbon emissions

WE’RE TURNING 50. TIME TO PLAN FOR THE FUTURE

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