



RESULTS: GENERAL REGIONAL TRENDS

The Midwestern United States faces diverse and significant risks from unabated climate change. These risks vary across the region, which includes some states bordering the Southeast, like Missouri, and other far northern states like Wisconsin and Minnesota. As a result, there is no single top-line number that represents the cost of climate change to the Midwest economy as a whole. For this reason, we have broken down the region into its ten major metropolitan areas, which contain 80% of the population of the region and represent over 80% of its GDP.¹² We go into specific detail on each area's likely climate risks and costs in the next section. We also provide a more focused look at agricultural impacts across the region on pages 15–20.

Despite this regional variability, there are some generalizations we can make about the Midwest's reaction to a changing climate. These include:

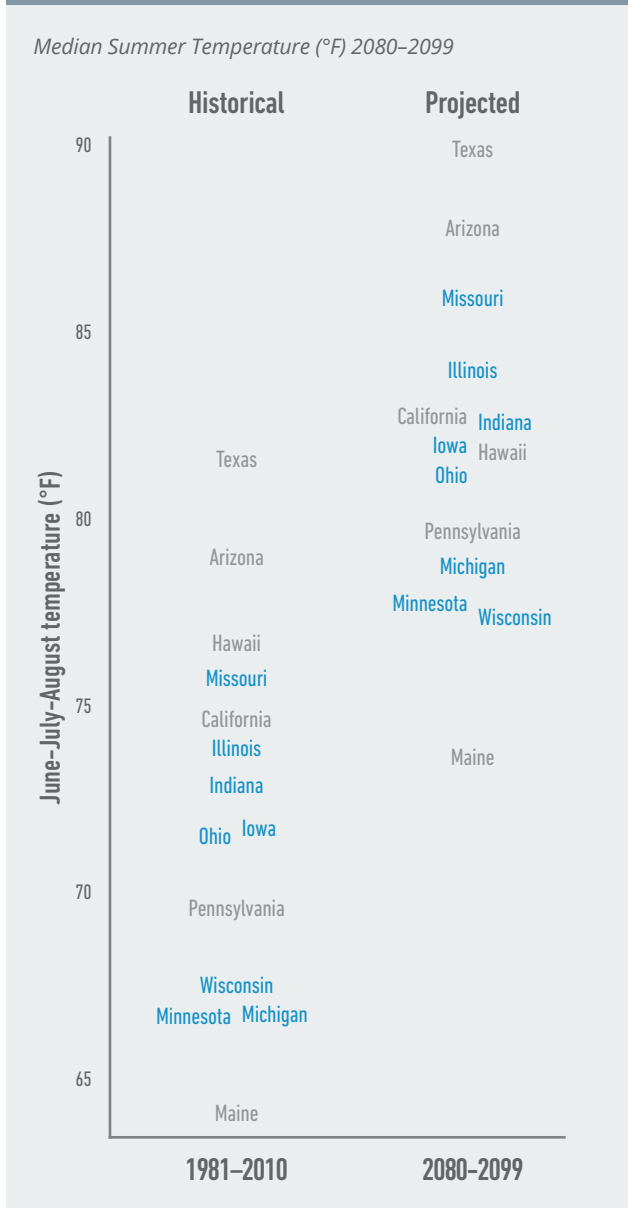
- **Increasing heat.** Overall, residents of the region will likely see between two and five times more days over 95°F in a typical year in the next 5 to 25 years than they have over the past 30 years. The more southern Midwest states will see the most dramatic increase in these extremely hot days—the average citizen in the Chicago area is expected to experience more days over 95°F than the average Texan does today, with a 1-in-20 chance of more than double the average number of hot

days currently experienced each year in Texas. However, their northern neighbors will experience increased heat as well. This may manifest in the form of warmer winters rather than much hotter summers; of the seven states that currently have sub-freezing average winter temperatures, only two (Wisconsin and Minnesota) are still expected to do so if we continue on our current emissions pathway through the end of the century.

- **Increasing humidity and the “Humid Heat Stroke Index.”** As Midwesterners well know, it's not just the heat, it's the humidity—or, in this case, a dangerous combination of the two. One of the most striking findings in our analysis is that increasing heat and humidity in some parts of the region could lead to outside conditions that are literally unbearable to humans, who must maintain a skin temperature below 100°F in order to effectively cool down and avoid fatal heat stroke. The Midwest has never yet seen a day exceeding this combination of heat and humidity, which we measure as Category IV HHSI along a “Humid Heat Stroke Index” (see Figure 4)—though Appleton, Wisconsin came very close in 2005 when a combination of an outside temperature of 101°F and dew point of 90°F led to a Category III HHSI day. Our research shows that if we continue on our current path, the average Midwesterner will likely see up to three days at the extraordinarily dangerous Category IV HHSI every year (with a 1-in-20

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Figure 3: Changing Summer Temperatures By State



Data Source: American Climate Prospectus

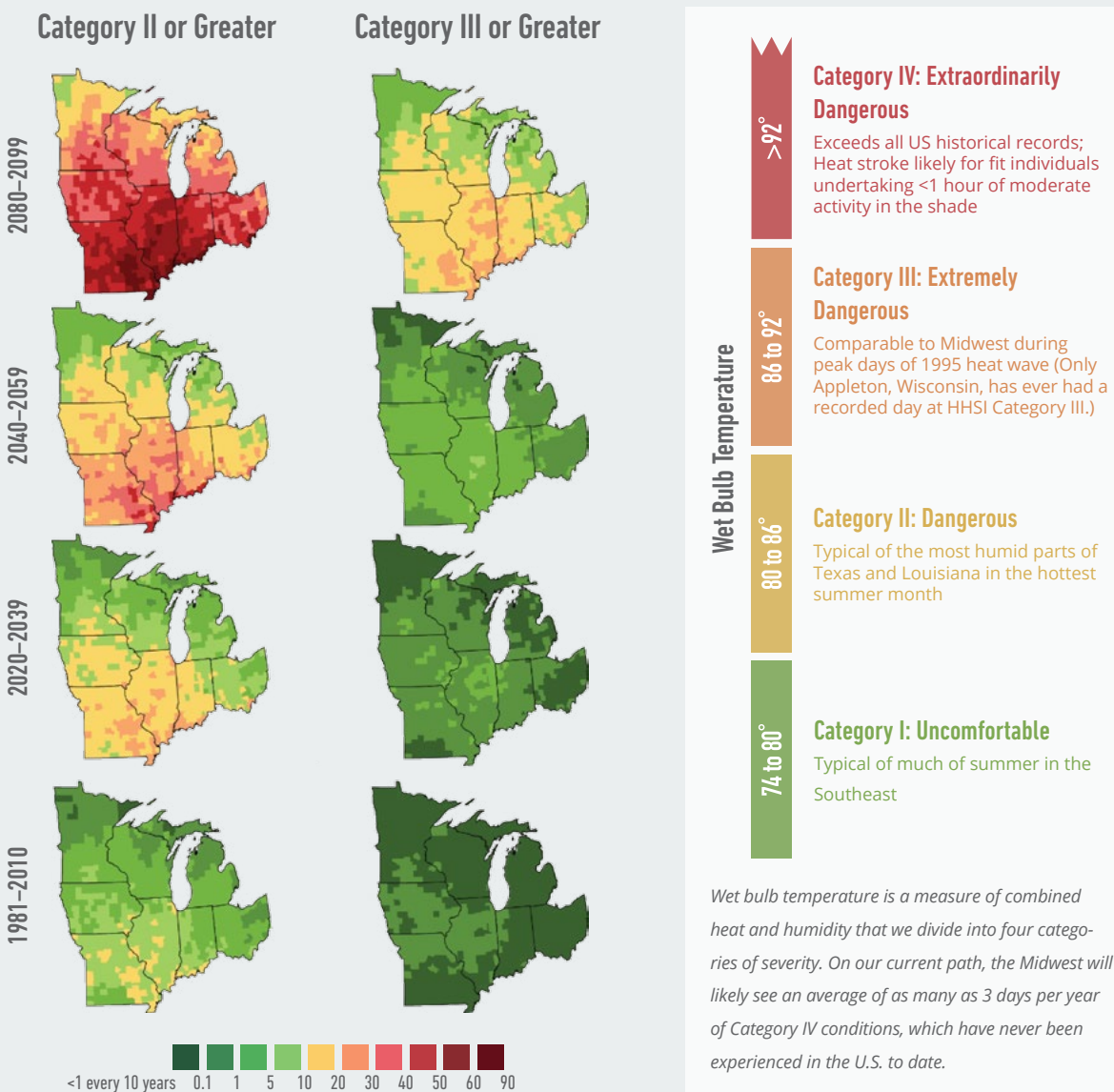
chance of more than 9 days), and as many as 25 days at Category III HHSI (with a 1-in-20 chance of more than 38 days), by the end of this century.

- Changes in precipitation.** In general, precipitation changes due to climate change are much harder to predict than heat impacts. However, if we stay on our current path, average annual precipitation across the Midwest will likely increase over the course of the century, compared to the past three decades. But looking only at annual averages across the region can mask differences in seasonal or local precipitation patterns, which directly affect rain- or snow-dependent industries such as agriculture and tourism. Precipitation increases are most probable in the spring, when most Midwestern states will very likely get wetter. In fall and winter, precipitation levels will also likely increase across the region, while summer will bring likely *decreases* in precipitation to Iowa and Wisconsin and mixed impacts to other states. These variations will have measurable impacts on the lake levels in the Great Lakes and the Mississippi River, which are core to the region's economy and culture.
- Economic impacts of heat, humidity, and precipitation changes on agriculture, energy, health, crime, and labor productivity.** Increased heat and humidity and variations in precipitation will have a significant impact on the Midwest economy as a whole and on particular sectors such as energy and agriculture. Because these impacts vary so greatly across the region, we discuss them by metro area below, as well as in a special chapter on climate risk to the Midwest agriculture sector.

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Figure 4: Humid Heat Stroke Index

Mean number of days in a typical Midwest summer when the temperature and humidity could reach HHSI category II, III, or even greater. These are days when the heat and humidity could be so high that it will be dangerous for humans to remain outdoors.



Data Source: American Climate Prospectus